SOLVING NON-EQUIVALENCE PROBLEMS WHEN TRANSLATING A HIGHLY TECHNICAL TEXT INTO ISIZULU THROUGH INVESTIGATION AND ANALYSIS OF TERM FORMATION STRATEGIES

By

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DEDICATION

To my son Nkosinathi Nkululeko Malindi

DECLARATION

Student Number**: 99311233**

I declare that this thesis, entitled

SOLVING NON-EQUIVALENCE PROBLEMS WHEN TRANSLATING A HIGHLY TECHNICAL TEXT INTO ISIZULU THROUGH INVESTIGATION AND ANALYSIS OF TERM FORMATION STRATEGIES

is my own work and that sources that I have used or quoted have been indicated and acknowledged by means of complete references

NY Malindi **Date**

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Abbreviations

BAE	Borrowing where alternatives exists
BUO	Borrowings utilised as only option
BWT	Borrowing with transliteration
C	Compounding
DB	Direct borrowing
ITE	Insertable translation equivalents
P	Paraphrasing
PanSALB	Pan South African Language Board
PRW	Paraphrasing using related word
PUW	Paraphrasing using unrelated word
QEDC	Quadrilingual Explanatory Dictionary of Chemistry
SL	Source language
ST	Source text
TL	Target language
TT	Target text

Definitions of terms

Borrowing	Borrowing a term from other language
Compounding	Formation of term consisting of one or more words
Direct borrowing	Borrowing terms from other languages without modifying and adapting them according to the target language word structure, but used as they are and prefixed by a vowel 'i' followed by a hyphen
Extracted semi-automatically	Text extracted from corpus using relevant software
Hyponym	Word with specific meaning
Insertable translation equivalent	Term that can be listed in the dictionary
Lexicalised	Source concept known to target culture but not 'allocated' a target word to express it
Lexicography	Process of writing, compiling and editing dictionaries
Marginalised language	Language excluded from being developed
Multi-word terms	Terms composed of more than one words
Non-equivalence	Relation that does not hold between the source language and target language text
Parallel texts	Source text and its translation
Paraphrasing	Process of expressing meaning of a term using other words
Pure (indigenous term)	Original/natural term
Semantic transfer/shift	Evolution of word usage
Single-word terms	Term composed of one word
Source text	Text from which you translate
Standardise	Cause to conform to a standard
Superordinate	Word with general meaning
Technical translator	One who translates technical texts
Term extraction	Taking out of terms from a text

Term formation	Process of coining/creating terms
Terminology	System of terms belonging/peculiar to a specialised subject
Translation equivalent	Translated term that is equal in meaning to the source term
Transliteration	Borrowing terms from other languages and modifies and adapts them to the target language word structure
Wordsmith Tools (a corpus query tool)	Software for finding word patterns

Abstract

The focus of this study is on solving non-equivalence problems when translating a highly technical text. This study investigates the term formation strategies used in providing the isiZulu term translation equivalents of 50 English chemistry dictionary entries and their definitions into isiZulu, totalling approximately 1 109 source text terms. This dictionary is a Quadrilingual Explanatory Dictionary for Chemistry (QEDC) comprises four languages, which are English, Afrikaans, Pedi and Zulu. I am providing and investigating the isiZulu translation equivalents only.

The term list/DIY glossary was created using English chemistry terms excerpted manually from 50 chemistry dictionary entries' definitions and terms collected from a 'keywords' list. The keyword list was extracted from the source text semi-automatically using *WordSmith Tools* (a corpus query tool). This term list/DYI glossary was provided with isiZulu translation equivalents from the existing general isiZulu dictionaries and terminology lists.

Due to the problem of non-equivalence between English and isiZulu, only 30% of translation equivalents could be found in the existing sources referred to above.

The next step was therefore to collaborate with a chemistry specialist/expert, who is an isiZulu mother-tongue speaker, to try to find and/or create suitable translation equivalents for those terms that did not have ready translation equivalents which could not be found in the written sources referred to above. By consulting with the specialist/expert, the newly coined/created isiZulu terms could be 'legitimised'. The term list/DIY glossary was then used for the translation of the source text. Before these translation term equivalents could be used for translating the source text, they were then back translated for validation reasons, i.e. to identify vagueness in the equivalents provided, as these are technical terms. For the translation of the source text, it was necessary to determine which of the various isiZulu translation equivalents for a particular SL term should be selected for use in the translation task.

The consolidated term list/glossary was used not only as a DIY glossary/term list to translate the source text, but was also used in this study as terminological data in an analysis of the term formation strategies applicable and used in finding isiZulu translation equivalents for the English chemistry terms. The various strategies used were identified with reference to the term formation strategies listed by Baker (1992: 26–41), and Mtintsilana and Morris (1998: 110–112). The frequency of use of these term formation strategies applied to the translation task at hand were subsequently broadly analysed statistically.

The study uncovered a number of term formation strategies used in providing the various isiZulu chemistry translation equivalents. These strategies include the use of loan words, paraphrasing, transliteration, semantic shift, compounding, etc.

It was also clear from the term selection for use in the translation of the ST that both the translator and subject field specialist/expert preferred directly insertable translation equivalents rather than, for example, paraphrases, which could be cumbersome.

The predominance of borrowing as a term formation strategy can probably be ascribed to the highly technical nature of the ST. It is, however, heartening to note that after borrowing, the most preferred strategy is the use of ready translatable equivalents, i.e. indigenous isiZulu terms.

However, the practice of borrowing as a term formation strategy has a negative impact on the one-to-one relationship of a concept and its term, since a borrowed term does not assist in concept formation and the user's understanding the concept. I am of the opinion that this state of affairs is a result of the slow process in the standardisation of isiZulu terms, particularly in highly technical fields such as the field of chemistry.

TABLE OF CONTENTS **PAGE**

Chapter 4: Conclusion
Introduction

CHAPTER 1: INTRODUCTION

1.1 Background and rationale of the study

Section 6(1) of the Constitution of the Republic of South Africa (1996) declares that the official languages of South Africa are Sepedi, Sesotho, Setswana, siSwati, Tshivenda, Xitsonga, English, Afrikaans, isiNdebele, isiXhosa and isiZulu. The Pan South African Language Board (PanSALB) was established in terms of PanSALB, 1995 (Act No. 59), amended as PanSALB, 1999 (Act No.10). The Board was established in accordance with the Constitution. PanSALB's focus areas, inter alia, are the development of the historically marginalised indigenous languages, of which isiZulu is one, through, among other things, translation, lexicography, terminology development, research and promotion of multilingualism.

PanSALB is one of the sponsors of the project, which responds to the call for language development enshrined in the Constitution, aimed at the compilation of a multilingual explanatory dictionary of chemistry (QEDC), which will contain four languages: English, Afrikaans, isiZulu and Sepedi. According to Taljard and Gauton (2001: 191–208), the target user of the QEDC will be either the learner in the secondary school phase (grades 10–12), or a pregraduate university or a technical college student in the physical-science field receiving their tuition through the medium of English as a second language.

The QEDC is being compiled in two phases. The first has been completed, in which ±500 chemistry terms and their conceptual definitions were terminologically and lexicographically processed for English and Afrikaans and entered into an electronic database.

My involvement in this QEDC project is the translation of 50 dictionary entries and their definitions into isiZulu, totalling approximately 1 109 source text words. The focus of this research study will be on solving problems of non-equivalence when translating highly technical texts (such as the QEDC) into isiZulu—which is one of the previously marginalised languages—through investigation and analysis of the term formation strategies used.

1.2 Statement of the problem

My role in translating the English chemistry entries and their definitions into isiZulu in this project of compiling the Quadrilingual Explanatory Dictionary of Chemistry (QEDC), which comprises four languages: English, Afrikaans, isiZulu and Sepedi, gave rise to this mini-dissertation due to the problems I encountered in carrying out this duty. That is:

- The lack of isiZulu terminology in relation to chemistry terms; and
- The absence of isiZulu chemistry dictionaries which created non-equivalence problems in translating technical terms expressible in English.

1.3 Aims of the study

The following objectives of this mini-dissertation were formulated in line with what has been outlined above:

- To select and provide the isiZulu translation equivalents for 50 English chemistry dictionary entries, and their definitions.
- To establish the most frequently used term formation strategies, and to provide reasons for the selection of equivalents used for the QEDC, based on an investigation and statistical analysis of term formation strategies used to solve the problem of non-equivalence in relation to chemistry terms translated into isiZulu for the QEDC.

1.4 Literature review

Introduction

The isiZulu as one of the previously marginalised African languages in South Africa is faced with the problem of a lack of terminology, especially in the technical fields, which creates a number of non-equivalence problems in translating technical terms expressible in languages such as English and Afrikaans.

Mtintsilana and Morris (1988: 109) point out that with English and Afrikaans the only official languages in South Africa, the State actively supported terminology development in Afrikaans to ensure parity with English.

According to Madiba (1998: 64) terminology creation in African languages received no state support since these languages enjoyed neither official status nor any officially recognised functional status until the introduction of mother-tongue primary education in 1953. Orthography rule lists and limited terminology lists were only then developed for use in black schools. Expertise in terminology was lacking in black communities too.

Terminology development and translation processes are regarded as, inter alia, tools for language development. They are the tools that address lack terminology/non-equivalence problems in relation to specialised fields. This study is aimed at providing translation equivalents for chemistry terms mostly creating new terms using the applicable term formation strategies.

For this reason this section of my mini dissertation gives an overview of the general literature based on theoretical aspects in relation to the aim of this study, as well as research methodology used. These aspects are:- non-equivalence at word level, corpus and corpus compilation, corpus-based methodology, corpus-processing software, term, terminological data and term excerption theoretical guidelines. These will be discussed briefly in the following paragraphs in relation to what is entailed in this study.

1.4.1 The problem of non-equivalence at word level

Baker (1992: 20) states that non-equivalence at word level means that the target language has no direct equivalent for a word which occurs in the source text. The lack of equivalence at word level poses the translation problems arising. She further unpacks this statement by asking a question; what does a translator do when there is no word in the target language which expresses the same meaning as the source language word? This is wherein my dissertation kicks in as the aim of this study has already been stated. My dissertation seeks to solve a problem of non-equivalence when translating English chemistry terms into isiZulu.

The type and level of difficulty posed can vary tremendously depending on the nature of non-equivalence. Different kinds of non-equivalence require different strategies, some very straightforward, others more involved and difficult to handle.

These are some common problems of non-equivalence at word level: culture-specific concepts; the source-language concept is not lexicalised in the target language; the source-language word is semantically complex; the source and target languages make different distinctions in meaning; the language lacks a superordinate; the target language lacks a specific term (hyponym); differences in physical or interpersonal perspective; differences in expressive meaning; differences in form; differences in frequency and purpose of using specific forms; the use of loan words in the source text.

Strategies used for dealing with non-equivalence at word level are:- translation by more general word (superordinate); translating by more neutral/less expressive word; translating by cultural substitution; translating using a loan word or loan word plus explanation; translating by paraphrase using a related word; translating by paraphrase using unrelated word; translating by omission; translating by illustration.

1.4.2 Corpus

Kenny (2014) defines corpus as a body of text assembled in some principled way. She further provides an example pertaining her definition, stating that Shakespeare's collected work are his oeuvre, but when she studies them they become her corpus. Corpora have been around for a very long time, but in a hard copy form, usually in the form of texts printed on paper, but due to increasing computer power and storage and improved techniques for manipulating textual data, individual researchers can now hold multi million word corpus on the hard drive of their personal computers.

Most recent corpus-based translation studies have taken the soft option; they use computer to handle large quantities of linguistic data sourced in electronic or 'machine readable' texts. Such corpus is analysable automatically or semi-automatically Kenny (2014).

Madiba (2004) used the Special Language Corpora for African Languages (SPeLcal) to illuastrate how parallel corpora can be used as tools for developing the indigenous languages of South Africa. Special-purpose multilingual and parallel corpora can be used as translator's tool in finding suitable term equivalants when translating technical text from English into isiZulu (Gauton and De Schryever (2004).

1.4.3 Corpus compilation, corpus tools and corpus-based translation studies

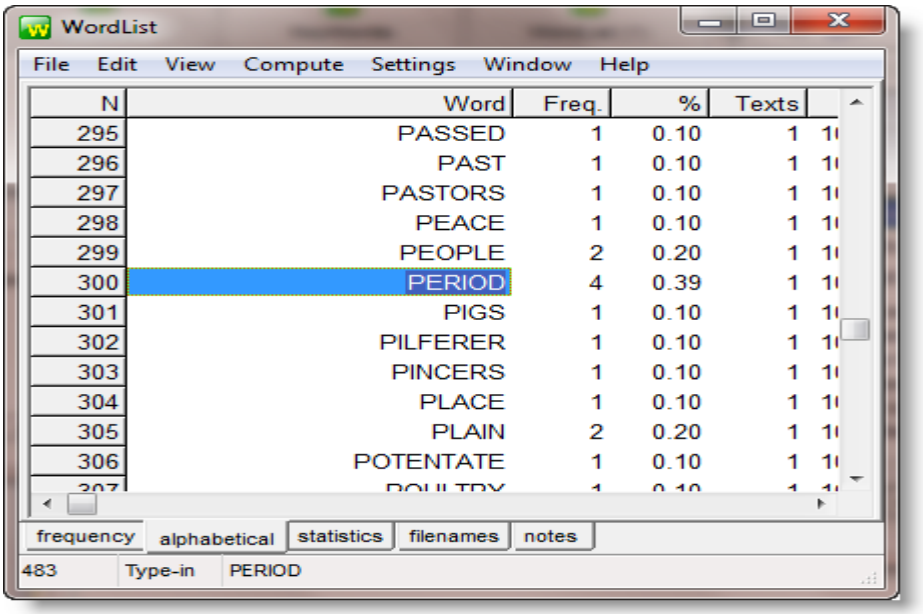
Corpus is not just any collection of electronic text, but the fact that texts are assembled 'in a principled way' presupposes a set of criteria governing the compilation of a corpus (Kenny 2014). Olohan (2004:50) describes how text should be handled and prepared for an electronic corpus

Corpus projects are designed to produce a bigger resource over longer period (Olohan 2004). The process of corpus compilation involves the selection of text to be included in a corpus; text should be scanned first (avalaible only electronically); text should be saved in a rich format (RTF) first to preserve some text and character formatting; then the files can be converted to plain text format—as required by corpus-processing software (graphs, pictures, footnotes and endnotes should therefore be removed from the a text); corpus-based translation studies copyright permissions would be required for holding texts electronically—the researcher should state that this is for translation purposes and also researchers will have access to.

In corpus-based translation studies, an attempt is made to study translation through corpora, using, and if necessary adapting, the methodologies and tools of corpus linguistics. A corpus provides data for the study of a language and corpus linguistics provides methodological apparatus and analytical tools (Kenny: 2014: 23)

Corpus tools are the corpus-processing softaware used to extract data from corpora. Lawrence (2013: 13) indicates that *AnConc Tools* and *WordSmith Tools* continue to be popular amongst researchers (corpus linguists).

WordSmith Tool consists of various tools, namely, *Keywords Tools* and *Wordlist Tool.* WordList Tool generate word list based on one or more texts or web text files. To do so, it compares the words in a text with reference set of words usually taken from a large corpus text. Any word, which is found outstanding in its frequency in the text, is considered "key". Word lists are shown both alphabetical and frequency order. They can be saved for later use, edited, printed, copied to your processor, or saved to text files. Below is an example of how the list looks:



1.4.5 Paraphrase

Paraphrase involves more than one word; sentence alignment is use instead of parallel concordancing. Mtintsilana and Morries (1988:69) see this strategy as a productive way of extending the indigenous vocabulary although disadvantage is that it consists of more than one word therefore not insertable translation equivalent.

1.4.6 Indigenised loan word

Indigenising a loan word means “modifying a word slightly to remove some of the ‘foreigness’ of the word and spelling it according to the orthography of a language which is borrowing the word” Wallmach and Kruger (1999: 281). Borrowing is an important way in which technical languages expand their vocabularies, and this leads to an internationally accepted communiation across language boundaries fairly easy.

1.4.7 Term, terminological data and term excerption theoretical guidelines

Excerption refers to the process of extracting terms for compilation of corpus of terminological data. It is the initial step in the process of terminology development. Term exerption means that term have to recognised/identified as terms in the text of a specialised vocabulary from those that may be said belong to the general

language. Term excerption is not done in isolation. It is done in relation to the aims of terminography and lexicography with particular needs of the end user in mind.

The term “excerpt” originate from Latin word “excerptum” (something picked out); from “excerpere”, (to select something”; that is to pick term out from where they are located. The next step is to provide translation equivalents to the terminological data. The researcher/terminologist has to be aware of the general qualities of a term to execute the term excerption. Here are the few general qualities of a term:

- A term is unique to a subject field
- Has a clearly defined meaning in a precise application of usage
- Can be a single word, word group or phrase, characterising a technical register
- Terms are used to designate specific concepts

1.5 Research methodology

The corpus-based methodology and the quantitative research methodology were used in order to achieve the aim of this study as stated above. Terminology data was needed to be used for translating the source text and for statistical analysis of term formation strategies used, i.e. to find out which term formation strategies were used the most. And the statistics related to this were displayed in the form of a graph. The researcher applied the following techniques that will be broadly discussed in Chapters 2 and 3:

- Excerpting terms from Keyword list (see Appendix A), which was extracted semi-automatically from the chemistry corpus by using a corpus-processing software, *WordSmith Tool* (corpus tool). This list was provided by the project leaders, Gauton and Taljard, for this study.
- Excerpting terms from the English chemistry dictionary entries and their definitions.
- Creating terminology data from these terms.
- Finding translation equivalents for this data, thus creating a term list/DIY glossary.

- Using term list/DIY glossary for translating the source text (QEDC) and analysing statistically the term formation strategies used to form translation equivalents

1.5 Organisation of the study

In Chapter 1 (Introduction) the research problem is stated, the aim and the background of the study are given and the method of research to be followed is outlined.

In Chapter 2 the process of obtaining the relevant data (terminology) is explained. The word list extracted semi-automatically from the chemistry corpus using *WordSmith Tools* (as provided by the project leaders) was used as a starting point to excerpt terms. Further terms were excerpted from the English chemistry dictionary entries and their definitions. The translation equivalents were found from the existing sources and mostly were coined to be used in the translation of the source text as well as for analysis of term formation strategies.

In Chapter 3 the various strategies used to find isiZulu translation equivalents for the English chemistry terms as discussed in Chapter 2, were identified and analysed statistically with reference to the term formation strategies listed by Baker (1992: 26–41) and Mtintsilana & Morris (1998: 110–112).

Chapter 4 provides a summary, conclusion, findings and recommendations.

CHAPTER 2: TERM EXTRACTION AND EQUIVALENTS

2.1 Introduction

Terminologists need to be aware of the qualities of terms to be able to identify terms from the text. The aim of excerption of terms is to compile a terminology data that will be used for SL translation (QEDC). Excerption simple means that terms have to be identified/recognized as term in a text, discerning the terms of specialised vocabulary from those that may be said as belonging to the general language.

In this chapter terms will be excerpted from the keyword list, which consist of terms and non-terms, a source text extracted semi-automatically using *WordSmith Tools* (a corpus query tool) (check more information about this *corpus-processing software* in the literature review section) as provided by the project leaders was used as a starting point to excerpt terms. The terminological data will be compiled and provided with suitable translation equivalents found in the existing sources (i.e. isiZulu dictionaries, *isiZulu Terminology and Orthography,* terminological lists). More equivalents will be created in following the form formation strategies.

2.2 Term identification and term excerption

Terms were identified or recognised by means of their general characteristics and excerpted from the key words (keyness) list (with non-terms and terms), which was extracted from the source text semi-automatically using *WordSmith Tools*, which was provided by the project leaders for this study. Terms were further excerpted from the English chemistry dictionary entries definitions.

2.2.1 Keywords (keyness) list

The list contained 260 items (i.e. terms and non-terms). See Appendix A (p 64) in this regard.

There were 59 terms that were excerpted and 101 non-terms were deleted from the list.

2.2.2 Term excerption from the Keywords list

1. Acid

2. Atom
3. Atomic (number)
4. Bond
5. Carbon
6. Cell
7. Chemical (reaction)
8. CL
9. Colloidal (particles)/(dispersion)
10. Compound ncentration
11. Current
12. Debye
13. Decomposition
14. Density
15. Diffusion
16. Dilute
17. Dipole (moment)
18. Diprotic
19. Dispersion
20. Dissolved (substance)
21. E
22. Electric (charge)
23. Electrochemical (cell)
24. Electrodes
25. Electrolysis
26. Electrolyte
27. Electrolytic
28. Electronegativity
29. Element
30. Electron
31. Enthalpy
32. Formula
33. G
34. Gas
35. H
36. Homogeneous (mixture)/(substance)
37. Hydrogen
38. Ions
39. Liquid
40. Molecule
41. N Symbol
42. Negative
43. Particles
44. Periodic (table)
45. Point (end)
46. Process
47. Reaction (chemical)
48. Separation
49. Solution
50. Solvent
51. Spin (electron)

52. Substance
53. Symbol
54. Synonym
55. Unit
56. V
57. Water
58. pH

2.2.3 Terms excerption from the English chemistry dictionary entries definitions

Terms were further excerpted manually from the original English (SL) definitions (see Appendix B, p 76 in this regard) and there were 175 terms extracted, and these terms were consolidated with the terms excerpted from the keyword list and the terminological data was created from this terms.

2.3 Finding translation equivalents in existing sources

Written sources, such as dictionaries, any existing term lists, the *IsiZulu Terminology and Orthography* and parallel texts, such as textbooks, are used to try and find all term equivalents for the extracted source text (English) terms.

2.3.1 Consulting existing isiZulu dictionaries

Two bilingual dictionaries were identified and consulted to look for suitable translation equivalents for the terms in question.

There are 68 term equivalents found in the *English-Zulu/Zulu-English dictionary* by Doke, Malcom, Sikakana & Vilakazi (1990).

There are 64 term equivalents found in the *Scholar's Zulu Dictionary* by Dent and Nyembezi (1995). 62 Term equivalents were found in the official *IsiZulu Terminology & Orthography* No.4 compiled by the IsiZulu Language Board (1993) and 66 term equivalents were found in existing term lists (i.e the *Multilingual Natural Sciences Nguni* (2008) term list compiled by the National Language Services as well as in *Science terms* (2006), compiled by the Department of Education).

2.3.1.1. Term equivalents found in Doke, Malcolm, Sikakana & Vilakazi's (1990) *English-Zulu/Zulu-English dictionary:*

Term	Term Equivalents
1. acetic acid	-muncu /-munyu
2. acid	ili-asidi
3. air	umoya
4. ampere	i-ampere/isibalo okubalwa ngaso amandla kagesi
5. atom/simpler compound	i-athomu/isincinci/imvithimvithi/okunci/intwanyana encane/ingangoba ayinakubuye ivithizwe
6. carbon	ikhabhoni
7. cell	iseli
8. chemical	phathelene nekhimisteli/-thakiweyo
9. compound	inhlanganisela/imvange/ingxube
10. concentration	ukushinqisa ingqikithi yomuthi ukuze ibe namandla kakhulu
11. condense	phenduka kube ngamanzi
12. conductor	into yokudlulisa ukufudumala nokunye
13. Copper (Cu)	ithusi
14. current	ukuhamba kwelekthrisithi
15. dehydration	ukomisa
16. density	ukuzima
17. dilute	-hlambulula/-thela amanzi
18. dispersion	inhlazane/ukudamuka
19. dissociation	ukwahlukanisa
20. dissolved	-ncibilika/-hlakazeka/-gqamuka/-buhluka
21. distil	-thonsisa/ukupheka into ize ibe yisitimu/-bekelela amathonsi, wona ageleze aze abe ngugologo
22. effect	okubangwayo/umphumela
23. effervesce	-zoyizayo/-gqwambisayo/-bila
24. effusion	ukuphuma/ukukhipha
25. electric	okuphathelene nogesi/kagesi
26. electricity	ugesi/ilekthrisithi
27. electron	into encane kangangokuba ingeze yacazwa, ephethe ilekthroni
28. electroplating	ukwemboza insimbi ngoqweqwe lwesiliva ngokusebenzisa ilekthrisithi
29. element	into engumsuka wezinye izinto
30. emulsion	ukuyikiza/umuthi oxutshwe namafutha
31. energy	isidlakadlaka/amandla/ukuqinisa/ukucophelela
32. environment	inhlalo okuhlalwa phakathi kwayo
33. ether	umoya osesibhakabhakeni
34. (molecular) formula	amazwi aklanywe kafuphi ukuze afumbathe umthetho ophathe leyo nto okukhulunywa ngayo
35. gas	ugesi
36. gold	igolide
37. hydrogen	ihayodrojini/umoya ongugesi othi uma uhlanganiswa ne-oksijini kuvele amanzi
38. homogenous	-luhlobo lunye/-zinhlobo ezifanayo
39. heat	ukushisa/ukufudumala
40. iron	insimbi

41. leaves	amaqabu/amagqabu
42. light	ukukhanya
43. liquid	into engamanzi/ingovungovu/uketshezi
44. molecule	okuncinyane kakhulu
45. molten	okuncibilikile
46. N Symbol	uphawu/isifanekiso N
47. negative	-phikayo/-landulayo/-phambene na-
48. nickel	uhlobo lwensimbi emhlophe
49. nucleus	ubuphakathi bento, into ephakathi kwezinye, kuyilapho ezinye ziqoqelene kuyo
50. particles	amahlayihlayi/imizwayi
51. process	ukuqhubeka/ukuhamba
52. property	okuvezwa ku-
53. radiation	ukukhishwa kwemisebe
54. reaction	ukuphatheka/okuphendulwa ngayo
55. science	isayensi
56. silver	isiliva
57. solid	into eqinile njengetshe/-jiyile/-litshe/-nqumile/-songele
58. solution	umbhubhudlo/incibilikiselo
59. speed	ukushesha/ijubane/isiqubu/isivinini
60. spin	-shwila
61. synonym	isinonimi
62. unit	okukodwa
63. vapour	umhwamuko/isisi/isitshodo
64. volume	ivolumu/indawo yokumumatha
65. water	amanzi
66. work	umsebenzi
67. X-ray	i-eksireyi
68. zero	ilize/iqanda

2.3.1.2. Term equivalents found in Dent & Nyembezi's (1995)

Scholar's Zulu Dictionary

TERM	Term Equivalent
1. acid	ili-asidi
2. air	umoya
3. atom/simpler compound	intwanyana/isithako semvelo esibuncane obungenakubuye buncishiswe sisale kuseyiso leso sithako
4. atomic number	inombolo ye-athomu
5. bond	isibopho
6. carbon	ikhabhoni/isithako semvelo esikhona cishe kuzo zonke izinto eziphilayo
7. carbon dioxide	ikhabhonidayoksayidi
8. cell	iseli
9. chemical	-phathelene nekhimisteli/-thakiweyo/isithako semvelo
10. compound	okuthakiwe/ingxube

11. condense	-guqula kube wuketshezi
12. conductor	into ezwela ukushisa
13. Copper (Cu)	ikhopha
14. current	umsinga/ukuhamba kwelekthrisithi
15. density	isisindo/ukuminyana/ukucinana
16. diffusion	ukuxubana
17. dilute	hlambulula
18. dissolved	ukuncibilika
19. distillate	-khongozela amathonsi esisi/-consa
20. effect	okubangwayo/umphumela
21. effervesce	-zoyizayo/-gqwambisayo/-bila
22. electric	-elekthrikhi
23. electricity	ilekthrisithi
24. electroplating	ukwemboza insimbi ngoqweqwe lwesiliva ngokusebenzisa ilekthrisithi
25. element	isithako semvelo/yinto engumsuka wezinye izinto
26. emulsion	umuthi oxutshwe namafutha
27. energy	isidlakadlaka/amandla
28. environment	inhlalo yendawo
29. ether	umoya osesibhakabhakeni/umuthi osetshenziswa njengesidakamizwa
30. (molecular) formula	umthetho ofinqiwe/amazwi aklanywe kafuphi ukuze afumbathe umthetho ophathe leyo nto okukhulunywa ngayo
31. gas	igesi
32. gold	igolide
33. hydrogen	ihayodrojini
34. homogenous	-luhlobo lunye/-zinhlobo ezifanayo
35. heat	ukushisa/ukufudumala
36. light	ukukhanya
37. liquid	uketshezi
38. metal	insimbi/okusansimbi
39. molecule	imolikhuli/ubuncane bokugcina uma into ibuye icoliswe incishiswe futhi ayisoze yaba yileyo nto okuqalwe ngayo
40. negative	-phikayo/-landulayo/-phambene na-
41. nickel	uhlobo lwensimbi emhlophe elukhuni emhloshana evama ukuhlanganiswa nezinye izinsimbi
42. nucleus	ubuphakathi bento, into ephakathi kwezinye kuyilapho ezinye izinto ziqoqelene kuyo
43. oxidation	ukulumbana ne-oksijini
44. particles	amahlayihlayi
45. process	inqubo/ukuqhubeka/ukwenza
46. property	okuvezwa ku-
47. reaction	ukulumbana kwezithako
48. reduction	ukunciphisa
49. separation	isehlukaniso/ukuhlukanisa
50. science	isayensi/isifundo sendabuko
51. silver	isiliva

52. solid	into eyisigaxa
53. solvent	uketshezi oluncibilikisayo
54. solution	umbhubhudlo/incibilikiselo
55. speed	isivinini/ukushesha/ijubane
56. substance	isiqa/utho
57. synonym	izwi elisho okufanayo
58. unit	okukodwa/umuvo
59. vapour	umhwamuko/isisi
60. volume	umthamo/ubuningi
61. water	amanzi
62. work	umsebenzi
63. X-ray	imisebe ye-X-reyi
64. zero	okungekho/unothi/iqanda (cf. isikhathi samanqamu (zero hour))

2.3.2 Term found in the official *IsiZulu Terminology & Orthography* (1993)

There are 62 term equivalents found in the official *IsiZulu Terminology & Orthography No.4* compiled by the IsiZulu Language Board (1993)

2.3.2.1 Term equivalents

TERM	**Translation Equivalent from *isiZulu Terminology & Orthography***
1. acid	i-esidi
2. Air	umoya
3. Atom/simpler compound	i-athomu
4. base	ibhesi
5. carbon	ikhabhoni
6. carbon dioxide	ikhabhonidayoksayidi
7. carbon monoxide	ikhabhonimonoksayidi
8. chemical	ikhemikheli
9. compound	okuhlanganisiwe/okuthakiwe
10. concentration	-qoqana/okuqoqene
11. conductor	ukuzwela ukushisa
12. Copper (Cu)	ithusi
13. current	umsinga
14. density	isisindo
15. diffusion	ukuxubana
16. dilute	-hlambulula
17. dissociation	ukwahlukanisa
18. dissolved	ukuncibilika
19. distillation	ukucwenga
20. effect	okubangwayo/umphumela
21. electric	ukuhamba kogesi/kwelekthrisithi
22. element	isithakomvelo
23. emulsion	uluyikiza
24. energy	amandla
25. environment	ubunjalo bendawo

26. ether	i-itha
27. (molecular) formula	umthetho ofinqiwe
28. gas	igesi
29. gold	igolide
30. hydrogen	ihayodrojini
31. heat	ukushisa/ukufudumala
32. iron	insimbi
33. light	ukukhanya
34. liquid	uketshezi/okuluketshezi
35. magnetic filed	isigaba esinozibuthe
36. magnetic waves	amagagasi anozibuthe
37. mass	ingqumbi
38. metal	okusansimbi
39. molecule	imolekhuli
40. molten	okuncibilikile
41. N Symbol	uphawu/isifanekiso N
42. negative	-phikayo/-landulayo/-phambene na-
43. nickel	uhlobo lwensimbi emhlophe
44. nucleus	inyukilasi
45. oxidation	ukulumbana ne-oksijini
46. process	inqubo eluchungechunge
47. property	isimo
48. radiation	ukushisa ngemisebe
49. reduction	ukunciphisa
50. separation	isehlukaniso/ukwehlukanisa
51. solid	-sasigaxa
52. solution	umbhubhudlo
53. speed	ijubane
54. substance	isiqa/utho
55. synonym	okufanayo
56. unit	isigamu
57. vapour	umhwamuko
58. volume	umthamo
59. water	amanzi
60. work	umsebenzi
61. X-ray	imisebe ye-X-reyi
62. zero	unothi/iqanda

2.3.3 Consulting existing term lists

Existing term lists, the *Multilingual Natural Sciences Nguni* (2008) term list, compiled by the National Language Services and *Science Terms* (2006), compiled by the Department of Education, are used in finding equivalents.

There are 66 term equivalents found in these existing term lists/glossaries.

2.3.3.1 Term equivalents

Term	Translation Equivalent from *Multilingual Natural Sciences Nguni* (2008) by the NLS and *Science Terms* (2006) by the Department of Education
1. acid	uketshezi olushisayo/i-esidi
2. Air	umoya
3. Atom/simpler compound	umsukantozonke
4. base	isisekelosithako
5. carbon	ikhabhoni
6. carbon dioxide	isikhunta
7. carbon monoxide	isisi semoto
8. cell	inhlayiya/inhlayo yokuphila
9. chemical	ikhemikhali
10. compound	ingxube
11. concentration	ukujiya ukushuba
12. condense	-jiyisa
13. conductor	isidlulisi/(ukushisa/ugesi)
14. Copper (Cu)	ithusi/ikhopha
15. Decomposition reaction	ukubolisa/ukubola
16. dehydrated	ukuncishelwa ngamanzi
17. density	isisindomthamo
18. dilute	-hlambulula
19. dispersion	ukusakaza/ukuhlakaza
20. dissolved	okuncibilikile
21. distillation	ukuconsisa/ukuthonsisa
22. effect	umphumela/umthelela
23. electric	okukagesi
24. electric charge	isidonsamlilo sikagesi/ubungako bukagesi
25. electric current	umsinga kagesi
26. electrolysis	ukucwenga usawoti ngogesi/ukusawota
27. electrolyte	umbhubhudlogesi/umbhubhudle wokudlulisa ugesi
28. electron	ngobuhlansi
29. electroplating	ukwemboza ngensimbi
30. element	-ngehlukaniseki/isishisisi sikagesi
31. energy	amandla
32. environment	indalo/imvelo
33. ether	uketshezi olusatshwala/i-eta
34. gas	igesi
35. homogenous	luhlobo lunye
36. gold	igolide
37. hydrogen	ihayodrojini
38. heat	ukushisa
39. iron	insimbi/inyele
40. ions	inhlansigesi
41. magnetic field	indawo enozibuthe

42. magnetic waves	amagagasi anozibuthe
43. magnetite	imagnithayithi
44. mass	(matter) ingqumbi/(physics) isisindo
45. metal	insimbi
46. molecule	inhlayiya/imolekhuli
47. molten	-ncibilikile
48. monomer	inhlayiyana ehlanganisekayo/imonoma
49. nickel	insimbi emhlophe
50. particle	inhlayiya
51. process	inqubo inkambiso
52. property	uphawu
53. radiation	ukushisa/ukusabalalisa
54. radioactive element	i-elementi enemisebengozi
55. radioactive metallic element	i-elementi esansimbi enemisebengozi
56. reaction	ukuguqula
57. separation	ukwehlukanisa
58. solid	isigaxa esiqinile
59. solute	okuncibikiliswayo
60. solution	ukuncibilikiswa/umbhubhudlo
61. speed	ijubane
62. spin	-jikelezisa ngesivinini
63. unit	-ngakunye/okukodwa okuhlangene
64. vapour	umhwamuko
65. volume	umthamo
66. water	amanzi

2.3.4 Term equivalents preferred for use in SL translation

The following terms were preferred term equivalents for the translation of QEDC

1. acid	i-esidi
2. air	umoya
3. atom/simpler compound	i-athomu
4. base	ibhesi
5. carbon	ikhabhoni
6. carbon dioxide	ikhabhonidayoksayidi
7. carbon monoxide	ikhabhonimonoksayidi
8. cell	iseli
9. chemical	ikhemikhali
10. compound	## none
11. concentration	ukuqoqana
12. condense	-guqula kube wuketshezi
13. conductor	isidlulisi
14. copper (Cu)	ikhopha/ithusi
15. current	umsinga
16. decomposition reaction	## none
17. dehydrated	## none

18. density	## none
19. dilute	-hlambulula
20. dispersion	ukusakazeka/ukuhlakazeka
21. dissolved	okuncibilikile
22. distillation	## none
23. effect	umphumela/umthelela
24. electric	-elekthrikhi
25. electricity	ugesi
26. electric charge	## none
27. electric current	ukuhamba kukagesi
28. electrolysis	## none
29. electrolyte	## none
30. electron	## none
31. electroplating	ukwemboza into ngoqweqwe lwensimbi ngokusebenzisa ugesi
32. element	i-elementi
33. emulsion	uluyikiza
34. energy	amandla
35. environment	indalo/imvelo
36. ether	i-itha
37. empirical formula	umthetho ofinqiwe
38. gas	igesi
39. homogenous	-luhlobo lunye
40. gold	igolide
41. hydrogen	ihayidrojini
42. heat	ukushisa
43. iron	insimbi
44. ion	inhlansigesi
45. leaves	## none
46. light	ukukhanya
47. liquid	uketshezi
48. magnetic filed	isigaba esinozibuthe
49. magnetic waves	amagagasi anozibuthe
50. magnetite	imagnethayithi
51. mass	ingqumbi/isisindo
52. metal	insimbi
53. molecule	imolekhuli
54. molten	-ncibilikile
55. monomer	imonoma
56. N Symbol	uphawu N /isifanekiso N
57. nickel	## none
58. oxidation	## none
59. particles	izinhlayiya
60. process	inqubo
61. property	isimo
62. radiation	## none
63. radioactive element	i-elementi enemisebengozi

64. radioactive metallic element	i-elementi esansimbi enemisebengozi
65. reaction	ukulumbana kwezithako
66. reduction	## none
67. separation	ukwehlukanisa
68. science	isayensi
69. solid	## none
70. solute	okuncibilikiswayo
71. solution	incibikiselo
72. solvent	isincibilikisi
73. speed	isivinini/ijubane
74. spin	-shwila
75. substance	utho
76. synonym	isinonimu
77. unit	## none
78. vapour	umhwamuko
79. volume	umthamo
80. water	amanzi
81. work	umsebenzi
82. X-ray	i-eksireyi
83. zero	iqanda

None: Term without equivalents. .

Nevertheless, new translation equivalents were created in collaboration with the subject field specialist/expert due to the absence of the translation equivalents in the sources consulted, refer to Appendix D.

The total number of the terms without translation equivalents is 139. Their term equivalents are to be created. This process will be explained in the following paragraphs.

Below is a list of total terms whose term equivalents were not found in the consulted texts, i.e *English-Zulu/Zulu-English dictionary* (1990) by Doke, Malcolm, Sikakana & Vilakazi*; Scholar's Zulu Dictionary* (1995) by Dent & Nyembezi*; IsiZulu Terminology & Orthography No.4* (1993) by the IsiZulu Language Board; the *Multilingual Natural Science Nguni* (2008) by the NLS and *Science Terms* (2006) by the Department of Education

1.	acetate ions
2.	actinides
3.	alkenes

4. alkanones
5. anode
6. anions
7. aqueous solution
8. aqueous system
9. boiling point
10. bonding electrons
11. butane
12. carbonated water
13. cathode
14. cations
15. centres
16. charged particles
17. chemical formula
18. chemical separation
19. chemical reaction
20. chromium (Cr)
21. CL
22. coke
23. colloid
24. colloidal dispersion
25. colloidal particles
26. colloidal sulphur
27. concentration gradient
28. condensed liquid
29. constant pressure
30. copper sulphate
31. coulombs
32. covalent bond
33. cyclotron
34. debye
35. decompose
36. diamagnetic
37. diamagnetism
38. diatomic
39. diethyl ether
40. dilution
41. dimer
42. dipole
43. dipole moment
44. diprotic (acid)
45. distillation
46. double bond
47. dubnium
48. dysprosium (Dy)
49. E
50. effervescence
51. effuse

52. effussion
53. einsteinium
54. electric waves
55. electrical circuit
56. electrochemical
57. electrochemical cell
58. electrochemical reaction
59. electrochemistry
60. electrodes
61. electrolyte solution
62. electrolytic cell
63. electromagnetic radiation
64. electromotive force
65. electron affinity
66. electron configuration
67. electron density
68. electron pair
69. electron spin
70. electronegativity
71. electroplate
72. electro-reduction reaction
73. electrovalent bond
74. (empirica) formula
75. emulsify
76. emulsified
77. end point
78. endothermic
79. enthalpy
80. enthalpy change
81. equivalent point
82. ethanoic acid
83. ethoxy ethane
84. ethylene (C_2H_4)
85. external conductor
86. G
87. gamma rays
88. gas exchange
89. Hydrogen ions
90. Hydrogen protons
91. H^+ ions
92. H_2O
93. HCL molecule
94. higher concentration
95. homogenous mixture
96. homogenous substance
97. hydrated
98. hydrogen chloride (HCL)
99. imaginary axis

100.	ionic bond
101.	isotopes
102.	lanthinides
103.	lower concentration
104.	measure
105.	medium
106.	mercury
107.	metallic element
108.	Na^+
109.	NaCL
110.	negative electrode (cathode)
111.	negative electron charge
112.	negative ion (anion)
113.	NH_3
114.	nuclear reactor
115.	organic compound
116.	orbital
117.	orbital arrangement
118.	oxidation reduction reaction
119.	periodic
120.	Periodic Table
121.	pH
122.	physical state
123.	point
124.	polar molecules
125.	positive
126.	Positive electrode (anode)
127.	positive ions (cations)
128.	potential
129.	potential difference/voltage
130.	radio waves
131.	silvery metallic element
132.	simple compound
133.	spin arrangement
134.	spin orientation
135.	stable dispersion
136.	symbol
137.	titration
138.	Vanadium (V)
139.	visible light

2.4 Term creation in collaboration with a subject field specialist/expert

The creation of terms is done in collaboration with the subject field specialist/expert from the University of Pretoria: Department of Chemistry Studies. The meaning of the source text (English) is found and understood with the help of the subject field expert. Then the terms are created based on these definitions, in collaboration with

the subject field specialist/expert. The technical translator needs to concentrate on understanding the description, the function and the effect of a concept and he/she should havea deeper understanding of word-formation processes in isiZulu.

List of terms and their created term equivalents

1. acetate ions	ama-ayoni e-asethethi
2. actinides	ama-akthinayidi
3. alkenes	ama-alikhini
4. alkanones	ama-alikhenoni
5. anode	ama-anodi
6. anions	ama-anyoni
7. aqueous solution	isolushini eyisincibikalisi esingamanzi
8. aqueous system	uhlelo lwesincibikalisi samanzi
9. boiling point	izinga lokubila
10. bonding electrons	ama-elekthroni akubhondi
11. butane	ibhutheni
12. carbonated water	amanzi anekhabhonidayoksayidi
13. cathode	ikhathodi
14. cations	amakheshini
15. centres	izindawo
16. charged particles	izinhlayiya ezinamashaji
17. chemical formula	ifomula yamakhemikhali
18. chemical separation	inhlukano yamakhemikhali
19. chemical reaction	inqubo yeri-ekshini yamakhemikhali
20. chromium (Cr)	ikhroniyamu (Cr)
21. coke	okokubasela umlilo
22. CL	i-CL
23. colloid	ikholodi
24. colloidal dispersion	ukuhlakazeka kwekholodi
25. colloidal particles	izinhlayiya zekholodi
26. colloidal sulphur	isalifa yekholodi
27. concentration gradient	umehlukokuqoqana
28. condensed liquid	umhwamuko ophendulwe uketshezi
29. constant pressure	ingcindezi engaguquki
30. copper sulphate	i-copper sulphate
31. coulombs	amakholombi
32. covalent bond	ikhovalenti-bhondi/ibhondi eyikhovalenti
33. cyclotron	i-cyclotron
34. debye	i-debye
35. decompose	ukudikhomposa
36. diamagnetic	idayamagnethikhi
37. diamagnetism	idayamagnethizimu
38. diatomic	idayathomikhi
39. diethyl ether	i-diethyl ether
40. dilution	ukuhlambulula
41. dimer	idima

42. dipole	idayipholi
43. dipole moment	idayipholi-momenti
44. diprotic (acid)	(i-esidi) -dayiphrothikhi
45. distillation	idistileshini
46. double bond	ibhondimbili
47. dubnium	idubhiyamu
48. dysprosium (Dy)	idiphroziyamu
49. E	i-E
50. effervescence	okuzoyizayo
51. effuse	-phuma
52. effussion	ukuphuma
53. einsteinium	i-einsteinium
54. electric waves	amagagasi kagesi
55. electrical circuit	isekhethi ye-elekthrikhi
56. electrochemical	i-elekthrokhemikhali
57. electrochemical cell	iseli e-elekthrokhemikhali
58. electrochemical reaction	iri-ekshini elethrokhemikhali
59. electrochemistry	i-elekthrokhemisi
60. electrodes	ama-elekthrodi
61. electrolyte solution	isolushini ye-elekthrolayithi
62. electrolytic cell	iseli e-elekthrolithikhi
63. electromagnetic radiation	iradiyeshini e-elekthromagnethikhi
64. electromotive force	amandla okuhamba kukagesi
65. electron affinity	i-elekthroni-afinithi
66. electron configuration	ukuhleleka kwama-elekthroni
67. electron density	idensithi yama-elekthroni
68. electron pair	ipheya lama-elekthroni
69. electron spin	ukupininiza kwama-elekthroni
70. electronegativity	i-elekthronegethivithi
71. electroplate	emboza into ngoqweqwe lwenzimbi ngokusebenzisa ugesi
72. electro-reduction reaction	iri-ekshini ye-elekthroridakshini
73. electrovalent bond	i-elekthrovalenti-bhondi/ibhondi e-elekthrovalenti
74. (empirical) formula	isifanekiso sama-elementi
75. emulsify	-yikiza
76. emulsified	-yikiziwe
77. end point	indiphoyinti
78. endothermic	-endothemikhi
79. enthalpy	i-enthalpy
80. enthalpy change	ukuguquka kwe-enthalpy
81. equivalent point	iphoyinti ekhwivalenti
82. ethanoic acid	ithayonikhi esidi
83. ethoxy ethane	i-ethoxy ethane
84. ethylene (C_2H_4)	i-ethylene (C_2H_4)
85. external conductor	isidlulisi ngaphandle
86. G	i-G
87. gamma rays	ama-gamma reyi

88. gas exchange	ukushintshana kwamagesi
89. Hydrogen ions	ama-ayoni ehayidrojini
90. Hydrogen protons	amaphrothoni ehayidrojini
91. H^+ ions	ama-ayoni e-H^+
92. H_2O	i-H_2O
93. HCL molecule	imolekhuli ye-HCL
94. higher concentration	izinga eliphezulu lokuqoqana
95. homogenous mixture	ingxube ehlobolunye
96. homogenous substance	into ehlobolunye
97. hydrated	okuhayidrethiwe
98. hydrogen chloride (HCL)	i-hydrogen chloride (HCL)
99. imaginary axis	imajinari eksisi
100. ionic bond	i-ayonikhi-bhondi/ibhondi ye-iyonikhi
101. isotopes	ama-asothophu
102. lanthanides	amalenthanayidi
103. lower concentration	izinga eliphansi lokuqoqana
104. measure	isilinganiso
105. medium	imidiyamu
106. mercury	imekhuri
107. metallic element	i-elementi esansimbi
108. Na^+	i-Na^+
109. NaCL	i-NaCL
110. negative electrode (cathode)	i-elekthrodi enegethivi (ikhathodi)
111. negative electron charge	ishaji elinegethivi le-elekthroni
112. negative ion (anion)	i-ayoni enegethivi (ama-anyoni)
113. NH_3	i-NH_3
114. nuclear reactor	isilawuli sokungqubuzana kwamanyukilasi
115. organic compound	ikhampawundi enekhabhoni
116. orbital	i-obhithali
117. orbital arrangement	ukuhleleka kwama-elekthroni ku-obhithali
118. oxidation reduction reaction	iri-ekshini ye-oksideshini-ridakshini
119. periodic	ngezikhathi ezithile
120. Periodic Table	isihleli sama-elementi
121. pH	i-pH
122. physical state	isimomumo
123. point	iphoyinti
124. polar molecules	amamolekhuli angamaphola
125. positive	okuphozithivi
126. Positive electrode (anode)	i-elekthrodi ephozithivi (i-anodi)
127. positive ions (cations)	ama-ayoni aphozithivi (amakheshiyoni)
128. potential	ikhono
129. potential difference/voltage	isilinganisi sekhono likagesi
130. radio waves	amagagasi okusakaza
131. silvery metallic element	i-elementi esiliva esansimbi
132. simple compound	ikhampawundi eqondile
133. spin arrangement	ukuhleleka kwama-elekthroni ngokushwila kwama-athomu
134. spin orientation	isikhundla sokushwila

135.	stable dispensation	ukusabalala okusimeme
136.	symbol	uphawu
137.	titration	ithithreshini
138.	Vanadium (V)	iVanadiyamu (V)
139.	Visible light	ukukhanya okubonakalayo

There are 139 terms that were created/formed in collaboration with the subject field specialist/expert. These terms with created translation equivalents are then added to the list of terms for which translation equivalents were already found in the existing sources. In this manner the final (source language) term list with possible isiZulu translation equivalents is created, as can be seen in Appendix C.

2.5 Summary

As was explained in this chapter, in order to do a technical translation into isiZulu such as the one found in Appendix E, terminological data should first be created from the terms excerpted from the corpus and provided with the isiZulu translation equivalents. To this end, a terminological data was compiled by collating terms that were semi-automatically extracted from the source text, supplemented by terms manually extracted from the English dictionary entries definitions (source text).

The isiZulu translation equivalents were found from the existing sources and those that were not found from these sources were created. See Appendix C for the complete term list/DIY glossary with all possible isiZulu translation equivalents. These equivalents were back translated (see Appendix C) for validation reasons, i.e. to identify vagueness in the equivalents provided; as these are technical terms.

However, before this DIY glossary/term list is used for the translating the source text (see Appendix E), it was necessary to determine which of the various isiZulu translation equivalents should be selected for use in the translation task. Because these translation equivalents were to be used as lemmata in the QEDC, the insertable equivalents were mostly preferred (see Appendix D) for the English chemistry dictionary entries and their definitions. In any technical translation task absolute consistency in the use of terminology is of the utmost importance. As (a) not all the isiZulu term equivalents could be found in existing reference sources consulted and some equivalents needed to be created and (b) most of the source

language terms have more than one isiZulu translation equivalent (as found in the various sources), it is up to the isiZulu technical translator to create their own terminology list/glossary. To this end, and in collaboration with the subject field expert/specialist, a 'legitimised' DIY glossary/term list for the translation of the source text was created. Finally, specific terms were chosen as isiZulu translation equivalents for use in the QEDC, inter alia, taking into consideration a potential target user of the dictionary and that these equivalents were to be used as lemmata.

The consolidated term list/glossary was therefore used not only as a DIY glossary/term list to translate the source text, but will also be used in this study as data in an analysis of the translation and term formation strategies used in finding isiZulu translation equivalents for the English chemistry terms. In the next chapter the various strategies used will be identified and broadly analysed statistically with reference to the translation and term formation strategies listed by Baker (1992: 26–41), and Mtintsilana & Morris (1998: 110–112).

CHAPTER 3: AN ANALYSIS OF THE TRANSLATION AND TERM FORMATION STRATEGIES USED

3.1 Introduction

In this chapter, the various strategies used to find isiZulu translation equivalents for the chemistry source terms as discussed in Chapter 2 as listed in the term list/DIY glossary are identified and broadly analysed statistically with reference to the term formation strategies listed by Baker (1992: 26–42) and Mtintsilana & Morris (1988: 110–112).

3.2 Analysis of translation strategies used to solve problems of non-equivalence

The term formation strategies listed below have been used to solve problems of non-equivalence in the translation of a highly technical text into isiZulu. (See Appendix E for this translation).

.

3.2 1. Borrowing

Borrowing is the process of forming a term by borrowing from other languages. Borrowing can be done by direct borrowing or transliteration.

3.2.1.1 Direct borrowing

In direct borrowing the terms from other languages (specifically nouns) are not modified according to the target language word (morphological) and sound (phonetic) structure, but they are used as they are and prefixed by a vowel ‘i’ followed by a hyphen. Refer below.

(1)

a) ethoxy ethane	i-ethoxy ethane
b) ampere	i-ampere
c) cyclotron	i- cyclotron
d) debye	i-debye
e) CL	i-CL
f) copper sulphate	i-copper sulphate
g) diethyl ether	i-diethyl ether

h)	E	i-E
i)	Einsteinium	i-Einsteinium
j)	enthalpy	i-enthalpy
k)	ethoxy ethane	i-ethoxy ethane
l)	ethylene (C_2H_4)	i-ethylene (C_2H_4)
m)	G	i-G
n)	H^+ ions	ama-ayoni e-H^+
o)	H_2O	i-H_2O
p)	Hydrogen chloride (HCL)	i-Hydrogen chloride (HCL)
q)	HCL molecule	imolekhuli ye-HCL
r)	Na^+	i-Na^+
s)	NaCL	i-NaCL
t)	NH_3	i-NH_3
u)	pH	i-pH
v)	N	i-N
w)	V	i-V

Note: Regarding directly borrowed terms indicating possessives, a possessive concord is prefixed followed by a hyphen. See examples (1)(n) and (1)(q) above.

3.2.1.2 Transliteration

Transliteration is another form of borrowing. In this process the borrowed terms are modified and adapted to the target language word (morphological) and sound (phonetic) structure—coined terms follow a similar pattern. Wallmach and Kruger (1999:281) refer to this strategy as indigenising a loan word meaning “modifying a word slightly to remove some of the ‘foreigness’ of the word and spelling it according to the orthography of a language which is borrowing the word”. The terms below were transliterated by following the traditional isiZulu sound pattern which is an open syllabic system, i.e. CV, NCV (nasal compounds) or V). Compare the following examples:

(2) (a) alcohol i-a-li-kho-ho-li = i-alikhoholi
V-V-CV-CV-CV-CV

(b) acid i-e-si-di = i-esidi
V-V-CV-CV

(c) alkenes a-ma-a-li-khi-ni = ama-alikheni
V-CV-V-CV-CV-CV

(d) alkenones a-ma-a-li-khe-no-ni = ama-alikhenoni
V-CV-V-CV-CV-CV-CV

(e) anode i-a-no-di = i-anode
V-V-CV-CV

(f) anions a-ma- a-ni-nyo-ni = ama-aninyoni
V-CV-V-CV-NCV-CV

Note that /y/ is regarded as a so-called semi-vowel which has the characteristics of both vowel and consonant, but here marked as C for the sake of convenience.

(g) atom i-a-tho-mu = i-athomu
V-V-CV-CV

(h) base i-bhe-yi-si = ibheyisi
V-CV-CV-CV

(i) butane i-bhu-the-ni =ibhutheni
V-CV-CV-CV

(j) cathode i-kha-tho-di = ikhathodi
V-CV-CV-CV

(k) cations a-ma-khe-shi-yo-ni = amakheshiyoni
V-CV-CV-CV-CV-CV

(l) carbon i-kha-bho-ni = ikhabhoni
V-CV-CV-CV

(m) cathode i-kha-tho-di = ikhathodi
V-CV-CV-CV

(n) cell i-se-li = iseli
V-CV-CV

(o) chemical i-khe-mi-kha-li = ikhemikhali
V-CV-CV-CV-CV

(p) chemical formula — i-fo-mu-la ya-ma-khe-mi-kha-li = ifomula yamakhemikhali
V-CV-CV-CV CV-CV-CV-CV-CV-CV

(q) colloid — i-kho-lo-di = ikholodi
V-CV-CV-CV

(r) coulombs — a-ma-kho-lo-mbi = amakholombi
V-CV-CV-CV-NCV

(s) covalent bond — i-kho-va-le-nti bho-ndi = ikhovalenti bhondi
V-CV-CV-CV-NCV CV-NCV

(t) decompose — u-ku-di-kho-mpo-za = ukudikhompoza
V-CV-CV-CV-NCV-CV

(u) diamagnetic — i-da-ya-ma-gne-thi-khi = idayamagnethikhi
V-CV-CV-NCV-CV-CV-CV

(v) diamagnetism — i-da-ya-ma-gne-thi-zi-mu = idayamagnethizimu
V-CV-CV-CV-CV-CV-CV-CV

(w) diatomic — i-da-ya-tho-mi-khi = idayathomikhi
V-CV-CV-CV-CV-CV

(x) dimmer — i-di-ma = idima
V-CV-CV

(z) dipole — i-da-yi-pho-li = idayipholi
V-CV-CV-CV-CV

(aa) dipole moment — i-da-yi-pho-li mo-me-nti = idayipholi momenti
V-CV-CV-CV-CV CV-CV-NCV

(bb) element — i-e-le-me-nti = i-elementi
V-V-CV-CV-NCV

(cc) endothermic — i-e-ndo-the-mi-khi = i-endothemikhi
V-V-NCV-CV-CV-CV

(dd) equivalent point — i-pho-yi-nti e-khwi-va-le-nti = iphoyinti ekhwivalenti
V-CV-CV-NCV V-CV- CV-CV-NCV

Note that the syllable –khwi- is technically composed of a consonant /kh/ followed by a semi-vowel /w/ followed by a vowel /i/, but marked as CV here for the sake of convenience.

(ee) ether — i-i-tha = i-itha
V-V-CV

(ff) gas	i-ge-si = igesi V-CV-CV
(gg) gold	i-go-li-de = igolide V-CV-CV-CV
(hh) ionic bond	i-a-yo-ni-khi bho-ndi V-V-CV-CV-CV CV-NCV
(ii) mecury	i-me-khu-ri = imekhuri V-CV-CV-CV
(jj) medium	i-mi-di-ya-mu = imidiyamu V-CV-CV-CV-CV
(kk) molecule	i-mo-le-khu-li = imolekhuli V-CV-CV-CV-CV
(ll) monomer	i-mo-no-ma = imonoma V-CV-CV-CV
(mm) negative ion (anion)	i-a-yo-ni e-ne-ge-thi-vi (anyoni) = i-ayoni enegethivi (i-anyoni) V-V-CV-CV V-CV-CV-CV-CV
(nn) nucleus	i-nyu-ki-la-si = inyukilasi V-NCV-CV-CV-CV
(oo) orbital	i-o-bhi-tha-li = i-obhithali V-V-CV-CV-CV
(pp) point	i-pho-yi-nti = iphoyinti V-CV-CV-NCV
(qq) positive ion (cations)	i-a-yo-ni e-pho-zi-thi-vi (amakheshiyoni) V-V-CV-CV V-CV-CV-CV-CV
(ss) positive	o-ku-pho-si-thi-vi = okuphosithivi V-CV-CV-CV-CV-CV
(tt) science	i-sa-ye-nsi = isayensi V-CV-CV-NCV
(uu) silver	i-si-li-va = isiliva V-CV-CV-CV

(vv) synonym	i-si-no-ni-mi = isinonimi V-CV-CV-CV-CV
(ww) unit	i-yu-ni-thi = iyunithi V-CV-CV-CV
(xx) ethanoic acid	i-i-tha-no-yi-khi e-si-di = i-ithanoyikhi esidi V-V-CV-CV-CV-CV V-CV-CV
(yy) radiation	i-ra-di-ye-shi-ni = iradiyeshini V-CV-CV-CV-CV-CV

Terms where the noun stem starts on a vowel commonly occur in borrowed words in isiZulu. Instead of the normal isiZulu syllable structure of CV, the syllable consists of a vowel (V) only, See examples 2 (a); (b); (c); (d); (e); (f), (g); (bb); (cc); (ee); (hh); (mm); (oo); (qq), (ww); (xx) above.

Transliterated terms can also consist of a CCV-pattern and CCCV-pattern. These sounds were previously uncommon in isiZulu, but through borrowing they have become more common. See the CCV- sound pattern in examples (3) (a); (e); (f); (g); (l); (m); (n); (o); (p); (q); (r); (u); (v); and (y) below.

The CCCV sound pattern is also found in transliterated terms as can be seen in examples (3) (b); (c); (d); (h); (i); (j); (k); (s); (t); (w); and (x) below.

(3)

(a) diprotic (acid)	(i-esidi) edayi-<u>phro</u>-thikhi = edayiphrothikhi -CCV-
(b) electric circuit	isekhethi ye-ele-<u>kthri</u>-khi= isekhethi ye-elekthrikhi -CCCV-
(c) electric	i-ele-<u>kthri</u>-khi = i-elethrikhi -CCCV-

(d) bonding electrons — ama-ele-kthro-ni akubhondi = ama-elekthroni akubhondi
-C-C-C-V-

(e) carbon dioxide — ikhabhoni dayo-ksa-yidi
-C-C-V-

(f) carbon monoxide — ikhabhoni mono-ksa-yidi
-C-C-V-

(g) chemical reaction — iri-e-kshi-ni ya-ma-khe-mi-kha-li
-CCV-

(h) chromium — i-khro-niyamu = ikhroniyamu
-C-C-V-

(i) dysprosium — idi-sphro-ziyamu = idisphroziyamu
-CCCV-

(j) electricity — i-ele-kthri-sithi = i-elekthrisithi
-CCCV-
(NB. 'ugesi' is an existing indigenous term which is used interchangeably)

(k) electron — i-ele-kthro-ni = i-elekthroni
-CCCV-

(l) electrovalent bond — i-ele-kthro-valenti bhondi = i-elekthrovalenti bhondi
-CCCV-

(m) hydrogen ions — ama-ayoni ehayi-dro-jini
-CCV-

(n) hydrogen protons — ama-phro-thoni ehayi-dro-jini
-C-C-V- -C-C-V-

(o) hydrogen	ihayi-dro-jini = ihayidrojini -C-C-V-
(p) hydrogen chloride	ihayi-dro-jini kilorayidi = ihayidrojini kilorayidi -C-C-V-
(q) hydrogen ions	amahayi-dro-jini ayoni = amahayidrojini ayoni -C-C-V-
(r) hydrogen protons	amahayi-dro-jini ph-r-o-thoni = amahayidrojini phrothoni -C-C-V-
(s) magnetite	ima-gne-thayithi = imagnethayithi -C-C-V-
(t) negative electrode	i-ele-kthro-di enegethivi = i-elekthrodi enegethivi -C-C-C-V-
(u) negative electrode	i-ele-kthro-di enegethivi = i-elekthrodi enegethivi -C-C-C-V-
(v) negative electron charge	i-ele-kthro-ni eneshaji elinegethivi = i-elekthroni eneshaji elinegethivi -C-C-C-V-
(w) X-rays	ama-e-ksi-reyi = ama-eksireyi -C-C-V-
(x) electrovalent bond	i-ele-kthro-valenti bhondi = i-elekthrovalenti bhondi -C-C-C-V-
(y) positive electrode	i-ele-kthro-di ephozithivi = i-elekthrodi ephozithivi -C-C-C-V-

(z) titration	ithi-tre-shini = ithitreshini -C-C-V-
covalent bond	= ikhovalenti-bhondi (instead of 'ibhondi eyikhovalenti'/'ibhondi yekhovalenti')
ionic bond	= i-ayonikhi-bhondi (instead of 'ibhondi eyi-ayonikhi'/'ibhondi ye-ayonikhi')
ethanoic acid	= i-ithanoyikhi-esidi (instead of 'i-esidi ye-ithanoyikhi')
electrovalent bond	= i-elekthrovalenti-bhondi (instead of 'ibondi ye-elekthrovalenti)
hydrogen ions	= amahayidrojini-ayoni (instead of 'ama-ayoni ehayidrojini')
hydrogen protons	=amahayidrojini-phrothoni (instead of 'amaphrothoni ehayidrojini')

3.2 2. Compounding

Compounding is a process of coining terms by combining two or more words to form one word. Compound words consist of different parts of speech. If compounding is used as a translation strategy to coin a translation equivalent, three aspects of the source term are taken into consideration, which are its description, function and effect. Compare the following examples of terms coined by using this strategy:

(4)

(a) atom	umsukantozonke = umsuka 'root'+(izi)nto 'things'+zonke 'all'/root of all things

(b) ampere	isilinganisimandla=isilinganisi ‘measure’+(a)mandla ‘energy’/energy measure
(c) base	isisekelosithako=isisekelo ‘base’+(i)sithako’/chemical base
(d) cell	inhlayiyakuphila=inhlayiya ’particle’+(yo)kuphila ’of life’/life particle
(e) chemical formula	isifanekisozithako=isifanekiso ‘representation’+(i)zithako ‘chemicals’/chemical representation
(f) chemical separation	inhlukanozithako=inhlukano ’separation’+(i)zithako ‘chemicals’/chemical separation
(g) concentration gradient	umehlukoqoqana=umehluko ‘difference’+qoqana ‘concentration’/difference in concentration
(h) ion	inhlansigesi=inhlansi ’spark’+(u)gesi’electricity’/ electricity spark
(i) monomer	isakhimamolekhuli=isakhi ’builder’+(a)mamolekhuli’ molecules’/molecule builder
(j) pH	isilinganisobumuncu=isilinganiso’measure’ +’soureness’/soureness measure

(k) physical state	isimomumo= isimo'state' +umumo 'form'/ state form
(l) synonym	umqondofana= umqondo 'idea'+(uku)fana 'same'/same idea
(m) titration	inqubosihlaziyi=inqubo 'process'+(i)sihlaziyi'analyser'/ process analyser
(n) concentration gradient	umehlukokushuba=umehluko'difference'+ ukushuba'concentration/concentration difference
(o) diamagnetic	isixoshwazibuthe=isixoshwa'something repelled'+(u)zibuthe'magnet'/something repelled by a magnet
(p) diamagnetism	ukuxoshwazibuthe=ukuxoshwa'being repelled'+(u)zibuthe'magnet'/being repelled by a magnet
(q) diatomic	okuma-athomumbili=okunama-athomu 'something with atoms'+mbili 'two'/something with two atoms
(r) double bond	ibhondimbili=ibhondi 'bond'+mbili'two'/two bonded
(s) electric charge	isidonsamlilo=isidonsa 'attractant'+(u)mlilo'fire'/fire attractant
(t) electrolyte	umbhubhudlogesi/isakhima-ayoni=umbhubhudlo'cold sugar solution'+(u)gesi'electricity'/electrical cold sugar solution / isakhi'builder'ama-ayoni'ions'/ion builder

(u) element	isithakomvelo=isithako 'ingredient'+(i)mvelo'nature'/ nature ingredient

3.2 3. Semantic transfer/shift

Semantic transfer/shift is also known as semantic change or semantic progression. It describes the evolution of word usage—usually to the point that the modern meaning is radically different from the original usage. This process involves the process of attaching new meaning to the existing words by modifying their semantic content. Semantic transfer is one of the techniques of indigenous word-forming patterns. Semantic generalisation (i.e whereby the meaning of a word is extended) as a form of semantic transfer was used in the formation of the following isiZulu translation equivalent:

Electricity = ugesi

Ugesi—Originally meant 'coal gas' (as used for lighting and heat). In modern usage the meaning of the word has been extended to also refer to 'electricity' (as it is also used for lighting and heating). This change is based on similarities between this two things. Now the word has a strong connotation of electricity.

3.2 4. Paraphrasing

Paraphrasing is the process of expressing the meaning of a term using other words. Paraphrasing involves more than one word; sentence alignment is used instead of parallel concordancing. Mtintsilana and Morries (1998: 69) see this strategy as a productive way of extending the indigenous language vocabulary although the disadvantage is that it consists of more than one word, therefore not an insertable translation equivalent.

There are two forms of paraphrasing, (1) paraphrasing using related words (2) paraphrasing using unrelated words (i.e. unpacking the meaning of the source item). Paraphrasing using unrelated words is done by taking all or one or two aspects of a source term (i.e. its description, function and effect) into consideration when paraphrasing. For example, in example (5) (b) below ('ampere'), a 'function' aspect

has been used in the paraphrase ‘isibalo okubalwa ngaso amandla kagesi’ (lit. ‘measure that is used to measure electricity energy’).

3.2.4.1 Translation by paraphrase using unrelated words

The source language word may express a concept which is known in the target culture but simple not lexicalized, that is not ‘allocated’ a target word to express it. If the concepts expressed by the source item are not lexicalised at all in the target language, the paraphrase strategy can still be used in some instances. Instead of a using a related word that is traceable as it is in the source term, the paraphrase may be based on unpacking the meaning of the source term. This strategy is indicated in the following examples:

(5)

atom	intwanyana encane ingangoba ayinakubuye ivithizwe (lit.’small thing that cannot be broken down’)
ampere	isibalo okubalwa ngaso amandla kagesi (lit.’measure that is used to measure electricity energy’)
carbon	isithako semvelo esinenani lamaphrothoni noma lama-elekthroni ayisi-6 kwi-athomu yayo, esingesiyo insimbi esenezimo ezimbili (okuyidayimane kanye nomsizi) esitholakala kuyiso sibe singaxutshwe nalutho kwishakholi, entuthwini, nasemalahleni. (lit.’a chemical element of atomic number 6, a non-metal which has two forms (diamond and graphite) and which occurs in impure form of charcoal, soot, and coal’)
carbon monoxide	isisi semoto (lit.’car smoke’)
chemical	isithako semvelo (lit.’natural ingredient’)

colloidal dispersion	uhlobo lwengxube olunezimpawu elunezingxenye ezingafani (lit.'type of mixture with properties that have different parts')
condense	ukuphendula kube ngamanzi/uketshezi (lit.'change to water/liquid')
current	ukuhamba kwe-elekthrisithi (lit.'movement of electricity')
dehydrated	okuncishelwe ngamanzi (lit.'short of water')
electron	into encane ye-athomu kangangokuba ingeze yacazwa,eneshaji elinegethivi ehambisa ugesi ezintweni eziqinile (lit. 'smallest thing of an atom that cannot be further broken down, containing negative charge that conducts electricity in solid substances'
element	into engumsuka wezinye izinto/ cf. isishisisi sikagesi (lit. 'something which is a root from which other things develop/cf. heater by means of electricity')
empirical formula	isiboniso esilula sama-elementi ento (lit. 'simple representation of an element of a thing')
emulsion	umuthi oxutshwe namafutha (lit. 'medicine mixed with oil')

end point	isilinganiso sezinga lenani lebheyisi elilingana nenani le-esidi elikhonjiswa ngokushintsha kombala ngesikhathi kwenziwa ithithreshini (lit. 'estimation of the amount of a base equal to the amount of acid which is indicated by means of colour change during titration')
endothermic	inqubo edonsa ukushisa kwangaphandle (lit. 'process whereby an external heat is pulled')
enthalpy	isilinganiso samandla esisetshenziswa ikakhulukazi ukufunda ngenququko yamakhemikhali ezinto (lit. 'energy measure used to read about chemical change in things')
enthalpy change	inguquko esilinganisweni samandla ikakhulukazi esetshenziswa ukufunda ngenguquko yamakhemikhali ezintweni (lit. 'change in energy measure mostly used to read about chemical change in things')
environment	indawo okuhlalwa phakathi kwayo/inhlalo yendawo/ ubunjalo bendawo (lit.' a place for staying/place for mode of life/condition of a place)
equivalent point	izinga lapho inani lebheyisi lilingana nenani le-esidi ngesikhathi kwenziwa ithithreshini (lit. point where the amount of a base is equal to the amount of an acid during titration')
ethanoic acid	uketshezi olungenambala olunephunga elikhakhayo (lit. 'colourless liquid with a sour taste')

ether	uketshezi olusatshwala/cf. umoya osesibhakabhakeni (lit. ‘alcoholic liquid’/cf. air in the atmosphere)
formula	amazwi aklanywe kafuphi ukuze afumbathe umthetho ophethe leyo nto okukhulunywa ngayo/umthetho ofinqiwe (lit. ‘summary of words containing a law guiding what is referred to’)
G	uphawu lwamandla akhululekile e-Gibbs (lit. symbol for Gibbs free energy’)
gamma rays	imisebe engenelayo ehamba amafushane kunawama-eksreyi esikhaleni esinezingxenye zogesi (lit. penetrative rays moving by means of self increasing waves shorter than those of X-rays in a space with parts of electricity’)
H	uphawu lwehayidrojini (lit. Hydrogen symbol’)
hydrogen	umoya oyigesi othi uma uhlanganiswa ne-oksijini kuvele amanzi (lit. air in the form of a gas, when reacting with oxygen water is produced’)
homogenous	uhlobo lunye/zinhlobo ezifanayo (lit. ‘same type/same types’)
hydrated	-qukethe amanzi (lit. ‘containing water’)
imaginary axis	umfanekiso womzilaphenduka

	(lit. ‘representative of a turning path’)
lanthanides	ama-elementi avela phansi komhlaba ayivelakancane (lit. ‘scarce underground elements’)
liquid	into engamanzi (lit. ‘something watery.)
molecule	ubuncane bokugcina uma into ibuye icoliswe, incishiswe futhi ayisoze ibe yileyo nto okuqalwe ngayo/okuncinyane kakhulu (lit. ‘smallest state of entity that cannot be broken into tiny bits, reduced and which cannot be returned to its original form/smallest particle’)
monomer	inhlayiyana ehlanganisekayo nezinye izinhlayiya (lit. ‘particle that can be joined with other particles’)
negative ion/anion	i-athomu elahlekelwe ngama-elekthroni (lit. ‘atom that has lost electrons’)
nickel	uhlobo lwensimbi emhlophe evama ukuhlanganiswa nezinye izinsimbi/uhlobo lwensimbi emhlophe elukhuni emhloshana (lit. ‘white metal that is usually combined with other metals’/white hard metal type’)
nuclear reactors	isilawuli sokugqubuzana kwamanyukilasi/isilawuli sokulawula ukushintsha kwemvelo kwe-asothophi ye-elementi ibe ngeyenye i-elementi (lit. ‘nucleus reaction controller/controller that controls natural change of an isotope of one element to be an isotope of another element’)

nucleus	ubuphakathi bento, into ephakathi kwezinye, kuyilapho ezinye ziqoqelene kuyo (lit.core part of a thing/a thing inside other things surrounded by those things')
orbital	indawo eku-athomu noma eku-molekhuli engathathwa ngama-elethroni angafika kwamabili vo. (lit. 'space in the atom or molecule which can be occupied by up to two electrons')
oxidation	ukulahleka kwama-elethroni/ukulumbana ne-oksijini (lit. 'loss of electrons/addition of oxygen')
oxidation reduction reaction	ukudluliswa kwama-elekthroni (lit. 'electron transfer')
Periodic Table	isihleli sama-elementi (lit. 'arranger of electrons')
positive	ukulahleka kwama-elekthroni (lit. 'loss of electrons')
positive ion	i-athomu noma imolekhuli elahlekelwe ngama-elekthroni (lit.'atom or molecule that has lost electrons')
potential difference	isilinganisi samandla kagesi (lit. 'measure of electrical energy')
property	okuvezwa ku- (lit.'what is produced in')

radiation	ukukhishwa kwemisebe/ukushisa kwemisebe (lit. 'release of waves/heat of waves')
reaction	ukulumbana kwezithako (lit. 'combination of compounds')
science	isifundo semvelo (lit.'study of nature')
solid	into eqinile njengetshe (lit. 'something hard like a stone')
solute	okuncibiliswayo (lit. 'what is being dissolved')
titration	inqubo esetshenziswa ukuthola inani lokuncibilike kusolushini engaziwa (lit. 'process used to determine an amount of a dissolved substance in an unknown solution')
volume	indawo yokumumatha (lit. 'area of capacity')

3.2 4.2 Translation by paraphrase using related words

This strategy is used when the concept expressed by the source item is lexicalised in the target language but in a different form. If there is no equivalent in the target language for a particular form in the source text, that particular form is replaced by an appropriate paraphrase, depending on the meaning they convey. Unlike in translating by paraphrase using unrelated word, when translating by paraphrase using related word, the meaning of the source term is expressed using one/more word/words that are traceable as it is/they are in the translation equivalent. Compare the following examples in this regard:

(6)

1.	aqueous solution	isolushini eyisincibikalisi esingamanzi (lit. ‘watery solution dissolvent’)
2.	carbonated water	amanzi anekhabhonidayoksayidi encibilikile (lit. ‘water containing dissolved carbon dioxide’)
3.	chemical	okuphathelene namakhemikhali (lit. ‘related to chemicals’)
4.	colloidal sulphur	isalifa yekholodi (lit. ‘sulphur in a colloid’)
5.	charged electrons	ama-elekthroni anamashaji (lit. ‘electrons with charges’)
6.	chemical separation	inhlukano yamakhemikhali (lit. ‘separation of chemicals’)
7.	colloidal dispersion	ukuhlakazeka kwekholodi (lit. ‘dispersal of colloid’)
8.	colloidal particles	izinhlayiya zekholodi (lit. ‘particles of colloid’)
9.	constant pressure	ingcindezi engaguquki (lit.’pressure that does not change’)
10.	electrochemical cell	iseli ye-elekthrokhemikhali (lit. ‘cell of electrochemical’)
11.	electrochemical reaction	iri-ekshini ye-elekthrokhemikhali (lit. ‘reaction of electrochemical’)
12.	electrical circuit	isekhethi ye-elekthrikhi

	(lit.'circuit of electricity')
13. electrolyte solution	isolushini ehambisa ama-ayoni (lit. 'solution that conducts ions')
14. electric charge	ubungako bukagesi (lit.'amount of electricity')
15. electric current	ukuhamba kukagesi/umsinga kagesi (lit.'movement of electricity/electric current')
16. electric waves	amagagasi amandla kagesi (lit.'waves of electrical energy')
17. electrical circuit	umzila ovalekile ohambisa ugesi (lit.'closed path which transfer electricity')
18. electrochemical	isixhumanisizinto kumzila ovalekile kagesi (lit.'things connector in a closed electrical path')
19. electrochemical cell	iseli eyisixhumanisizinto kumzila ovalekile kagesi (lit.'cell that is a things connector in a closed electrical path')
20. electrochemical reaction	ukulumbana kwezithako kusixhumanisizinto kumzila ovalekile kagesi (lit.'joining together of compounds in a thing connector in a closed electrical path')
21. electrochemistry	ukufunda ngenqubo yenguquko yezithako emngceleni yezihambisi zikagesi ngama-elekthroni kanye nezihambisi zikagesi ngama-ayoni.

	(lit.' study of compound interaction processes at the border of electron conducting electricity and ion conducting electricity')
22. magnetic field	isigaba esinozibuthe/indawo enozibuthe/indawo enamandla ezungeze uzibuthe (lit. 'section with magnet/area with magnet/region of force around magnets')
23. magnetic waves	amagagasi kazibuthe (lit. 'magnetic waves')
24. polar molecules	amamolekhuli angamaphola (lit.'polar molecules')
25. acetic acid	i-esidi etholakala kuviniga (lit.'acid found in vinegar')
26. silvery metallic element	i-elementi esiliva esansimbi (lit. 'silver metal-like element')
27. radio active element	i-elementi ekhipha imisebe eyingozi ehambisana nokushintsha kwe-asothophu ye-elementi ibe ngeyenye i-elementi (lit. 'element that releases dangerous waves related to change of an isotope of one element to be an isotope of another element')
28. radio active metallic element	i-elementi esansimbi ekhipha imisebe eyingozi (lit. 'metal-like element that emits dangerous waves')
29. metallic element	i-elementi enezimpawu zensimbi

	(lit. ‘element with metal properties’)
30. electrovalent bond	ibhondi enenani lama-elekthroni elingatholwa noma elingalahlwa ngama-athomu ekwenzeni ama-ayoni (lit. ‘bond with the amount of electrons that can be lost or received by atoms to form ions’)
31. electron spin	ukupininiza kwama-elekthroni (lit. ‘spinning of electrons’)
32. electron affinity	ukukhululwa kwamandla ngesikhathi i-elekthroni ifakwa kuyi-athomu eyigesi (lit. ‘release of energy when an electron is added to a gaseous atom’)
33. electron configuration	ukuma kwama-elekthroni aku-athomu (lit.’ arrangement of electrons in an atom’)
34. spin orientation	isikhundla sokupininiza (lit. ‘spinning position’)
35. electron density	ukuminyana kwama-elekthroni (lit. compactness of electrons’)
36. electron pair	ipheya lama-elekthroni (lit. ‘pair of electrons’)
37. electrolytic cell	iseli e-elekthrolithikhi (lit. ‘cell that is electrolytic’)
38. electromagnetic radiation	iradiyeshini e-elekthromagnethikhi (lit. ‘radiation of electromagnetic’)

39.	equivalent point	izinga lobukhwivalenti (lit. 'level of equivalence')
40.	electro-reduction reaction	iri-ekshini ye-elekthroridakshini (lit. 'reaction of electro-reduction)
41.	external conductor	isihambisikharenti ngaphandle (lit. 'conductor carrying current externally')
42.	orbital arrangement	ukuhleleka kwama-elekthroni ku-obhithali (lit. 'arrangement of electrons in an orbital')
43.	polar molecules	amamolekhuli angamaphola (lit. 'molecules that are polar')
44.	visible light	ukukhanya okubonakalayo (lit. 'light that can be seen')

.**3.2 5. Synonym richness of the vocabulary**

This is not a word-forming strategy; (Mtintsilana & Morris, 1988: 110–112) points out that the African languages continue to enrich their vocabularies through borrowing. For instance a term may be coined, while a transliterated term is also in use. According to Fellmann & Fishman (quoted by Van Huyssteen, 1999: 183) modernisation pursued within an indigenous framework seems the best option. According to Abdulaziz (quoted by Van Huyssteen, 1999:183) this type of coining means that the borrowing of international terms should be mixed with the coining of local terms so as to preserve the identity of the African languages. Van Huyssteen (1999: 183) points out that the terms that are coined by means of borrowing can be preferred to the indigenous word by many isiZulu speakers. Compare the following terms:

(7)

a) ugesi (electricity) i-elekthrisithi

b)	ugesi (current)	ikharenti
c)	umsukantozonke (atom)	i-athomu
d)	inhlansigesi (ion)	i-ayoni
e)	isithakomvelo (element)	i-elementi
f)	isisekelosithako (base)	ibheyisi
g)	inhlayiyakuphila (cell)	iseli
h)	inqubosihlaziyi (titration)	ithithreshini

3.2.6 Translating by a more general word (superordinate)

This method is used to overcome a lack of specificity in the target language compared to the source language. Refer to the example below:

(8) English: iron (hyponym of 'metal')
IsiZulu: insimbi (means both 'iron' (hyponym) and 'metal' (superordinate))

Note however that (as indicated in Appendixes D and E) the isiZulu technical translator and subject field specialist/expert solve this ambiguity/lack of specificity in the TL by distinguishing between the above superordinate and hyponym as follows:

(9)	superordinate 'metal;	IsiZulu: insimbi
	hyponym 'iron'	IsiZulu: i-ayoni

3.2.7 Translating by a more specific word (hyponym)

A hyponym is a more specific word that usually falls under an umbrella term (i.e. a superordinate). In this study, for example, the word 'solution' in the SL, which is a superordinate (umbrella word), has been translated as 'umbhubhudlo' (hyponym) in isiZulu. However, the isiZulu translation equivalent is in fact a hyponym (a more specific word), since the target language lacks a superordinate word in this case. Compare:

- SL: solution (superordinate) (solution that comprises any solvent and any solute, e.g. dissolved solid or gas)

- TL: umbhubhudlo (hyponym) (a solution that comprises water (solvent) and sugar (solute)

IMPORTANT: It should be noted that the use of this strategy in this instance (as it was found in one of the existing source) is inappropriate because it brings about ambinguities, hence a loan word “isolushini” preferred instead of “umbhubhudlo"

3.3 Summary and broad statistical analysis of translation/term formation strategies used

In Appendix D an indication is given of which isiZulu terms have been selected by the isiZulu technical translator and subject field specialist/expert in order to translate the ST (as given in Appendix E). Based on the data in Appendix D, the various translation/term formation strategies that were used to solve the problems of non-equivalence when translating the English chemistry terms into isiZulu are summarised below. A broad statistical analysis of these strategies is also provided below, based on the selection made by the isiZulu technical translator and subject field specialist/expert in ‘legitimasing’ the terminology to be used in the translation of the ST (by utilising this DIY term list/glossary).

Based on an analysis of the choices made by the technical translator and subject field specialist (as can be seen in Appendixes D and E) it is evident that the most popular strategy chosen in the translation of a highly technical text such as this ST, is to utilise borrowed terms (utilising direct borrowing and/or borrowing with transliteration). These borrowed terms are chosen, even if (due to the synonym richness of the isiZulu vocabulary—see 3.2 5. earlier) any number of other equivalents for a particular term already/also exist, be it a ready translation equivalent, a paraphrase or both, with these alternative terms often consisting of indigenous terms as opposed to the selected borrowed term. In Appendix D therefore, 85 out of a total of 239 SL terms, i.e. 36% of terms, are borrowings where other (often indigenous) alternatives already/also exist.

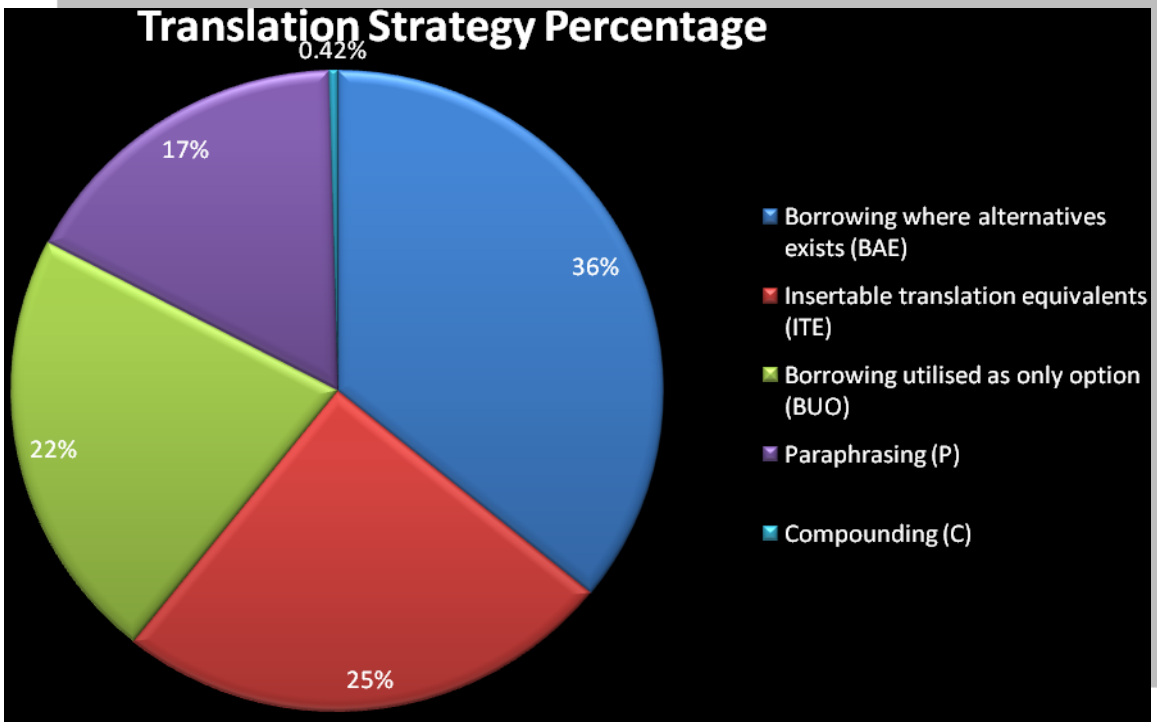
In 25% of cases (i.e. 59 out of a total of 239 SL terms) ready (i.e. insertable) translation equivalents (ITE) have been selected. These are all indigenous isiZulu terms.

In 22% of cases (52 terms out of a total of 239) borrowings are utilised (as the **only** option available/provided (BUO)—in contrast to the scenario that was sketched in the first paragraph under point 3.3 above), be it direct borrowings (DB) or borrowing through transliteration (BWT).

In 17% of cases (39 terms out of a total of 239) paraphrasing is used, with paraphrasing using related words (PRW), outnumbering the use of paraphrasing using unrelated words (PUW) by about 6 to 1.

It is also clear from the term selection for use in the translation of the ST (see Appendixes D and E) that both the translator and subject field specialist/expert prefer directly insertable translation equivalents rather than, for example, paraphrases that could be cumbersome. The predominance of borrowing as term formation strategy can probably be ascribed to the highly technical nature of the ST. It is, however, heartening to note that after borrowing, the most preferred strategy is the use of ready translatable equivalents, i.e. indigenous isiZulu terms.

3.3.1 Term formation strategies used per percentage



CHAPTER 4: CONCLUSION

4. Introduction

This is the last chapter of this study. This chapter seeks to give a concise round up of what was discussed in this study, thus the summary. It will also look at what was observed as well as the contribution and suggestions.

4.1 Summary

In chapter 1 (par. 1.3) it is stated that the aim of this mini-dissertation is to investigate and analyse statistically the term formation strategies used for isiZulu term equivalents for the Quadrilingual Explanatory Dictionary of Chemistry.
For this purpose the term list/DIY glossary (see Appendix D) was created for the purpose of providing the isiZulu translation equivalents for the 50 English chemistry terms and their definitions in the Quadrilingual Explanatory Dictionary, which comprises English, Afrikaans, isiZulu and Sepedi (see Appendix E). This term list/DIY glossary was also used for investigation and statistically analysis of the term formation strategies used as explained in Chapter 3 above. Borrowing was found to be the most strategy used, followed by paraphrase, then compounding. The figures were shown graphically.

4.2 Observations

As indicated in the previous paragraph, borrowing seemed to be the most preferred strategy in the translation of this highly technical text, chemistry terms , even though, in many cases, indigenous terms and/or paraphrases exist alongside the preferred borrowed terms. The extensive use of borrowing as a term formation strategy could be attributed to the need of insertable translation equivalents as they will be used as lemmata.
Furthermore, Van Huyssteen (1999: 183) points out that terms that are coined by means of borrowing can be preferred to newly formed (indigenous) translation equivalents by many isiZulu speakers. Based on the data provided in Appendix D, I seem to agree with her. This was evident where an expert and I preferred borrowed translation equivalents to newly formed indigenous terms for the translation of the English chemistry terms. This status quo could be attributed to the need for these terms to be internationally recognisable. Compare:

English term	Indigenous term	Preferred Borrowed term
atom	umsukazonke	i-athomu
copper	ithusi	ikhopha
element	isithakomvelo	i-elementi
cell	inhlayiyakuphila	iseli
current	umsinga	ikharenti

It is also observed that in some instances transliterated translation equivalents were formed and used more frequently than their indigenous term counterparts. This practice of forming new terms while indegenous terms exist (Madiba (1997) refers to as a process of semantic richnesss) has a negative impact on the one to one relationship of a concept and its term. In my opinion, this state of affairs is a result of the slow process of the standardisation of isiZulu terms, particularly in highly technical fields such as the field of chemistry.

It was also observed that the direct borrowing strategy was mostly used in providing the equivalents for most chemical names (found in the Periodic Table) as well as their symbols, whereas indirect borrowing strategy was mostly used in providing equivalents to nouns, descriptive nouns as well as adjectives.

There were instances where I as the technical translator addressed ambiguities in the equivalents that were found in some of existing sources. For instance, in one source the same translation equivalent was provided for three different terms; ‘inhlayiya’ for ‘molecule’, ‘particle’ and ‘cell’. Then ‘inhlayiya ‘was adopted for ‘particle’ and loan words were used for the other two terms, i.e. for ‘cell’ (iseli) and ‘molecule’ (imolekhuli).

Another ambinguity was addressed by a loan word (refer to section 3.2.7) where a superordinate term ‘solution’ (a mixture comprising any solvent and any solution) was provided a hyponym term ‘umbhubudlo’ (a mixture comprising water (solvent) and sugar (solute). This is not applicable, thus a loan word ‘isolushini’ was formed and preferred as an appropriate equivalent.

4.3 Contributions

The isiZulu translation equivalents for chemistry terms formed by the technical translator in this study might be accepted and standardised at some stage, thus contributing in the chemistry terminology.

4.4 Suggestions

Extracting data from a hard copy text used as a corpus is time consuming, this was evident enough when I was extracting the chemistry terms manually from the chemistry dictionary entries definitions. Thus I suggest, with the growing technology as well as availability of corpus-processing tools in mind), that more potential corpus-processing tools users, such as terminologists, practitioners, language teachers, students, etc be trained on the whole process of processing data to be used as electronic corpus, starting from the process of selection, preparation and arrangement of texts electronically to be used as corpus with an aim of using corpus-processing tools for exctracting terminological data automatically or semi-automatically as this will not only speed up the process of term extraction, but will also allow a researcher/terminologist to exctract more data from the massive corpus. And this also fast-track the terminology development. However, terminography and lexicography projects, such as the one that gave rise to this study need funding.

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APPENDIXES

APPENDIX A: KEYWORDS (KEYNESS) LIST EXTRACTED BY WAY OF WORDSMITH TOOLS

1 WORD KEYWORDS

N	WORD	FREQ.	CHEMCO R4.TXT %	FREQ.	ENGREF 1.LST %	KEYNESS	
1	N	46	3.47	757	491.7		0
2	G	21	1.58	736	193.1		0
3	E	23	1.74	1,268	0.01		0
4	ELECTRON	11	0.83	2	190.4		0
5	IONS	8	0.6	0	146.5		0
6	ELECTRONS	6	0.45	3	98.4		0
7	SUBSTANCE	11	0.83	559	93		0
8	ATOM	7	0.53	72	80.9		0
9	CHEMICAL	7	0.53	107	75.6		0
10	COMPOUND	7	0.53	119	74.2		0
11	DIPOLE	4	0.3	0	73.3		0
12	DEBYE	4	0.3	0	73.3		0
13	V	11	0.83	1,391	0.01	73.2	0
14	SYMBOL	7	0.53	134	72.6		0
15	HYDROGEN	5	0.38	16	68.5		0
16	MOLECULE	4	0.3	1	68.3		0
17	REACTION	7	0.53	201	67		0
18	ELECTRODES	4	0.3	4	62.2		0
19	ELECTRIC	6	0.45	209	55.2		0
20	DIPROTIC	3	0.23	0	54.9		0

21	ELECTROCHEMICAL	3	0.23	0	54.9		0
22	COLLOIDAL	3	0.23	0	54.9		0
23	CL	3	0.23	0	54.9		0
24	ELECTROLYSIS	3	0.23	0	54.9		0
25	ENTHALPY	3	0.23	0	54.9		0
26	ELECTROLYTE	3	0.23	0	54.9		0
27	SOLUTION	6	0.45	253	52.9		0
28	DISPERSION	4	0.3	17	52.8		0
29	DISSOLVED	5	0.38	94	52		0
30	ELECTROLYTIC	3	0.23	1	50.4		0
31	A	70	5.28	253,352	2.02	49.6	0
32	DENSITY	4	0.3	30	48.6		0
33	DILUTE	3	0.23	2	48.2		0
34	NEGATIVE	5	0.38	162	46.7		0
35	LIQUID	5	0.38	166	46.4		0
36	ATOMIC	4	0.3	41	46.3		0
37	SOLVENT	3	0.23	4	45.4		0
38	ATOMS	4	0.3	63	43		0
39	MOLECULES	3	0.23	7	42.7		0
40	FORMULA	4	0.3	67	42.5		0
41	AN	22	1.66	34,805	0.28	42.3	0
42	PROCESS	6	0.45	644	41.9		0
43	SYNONYM	3	0.23	9	41.4		0
44	CARBON	3	0.23	13	39.5		0
45	SPIN	4	0.3	102	39.2		0

46	CELL	5	0.38	353	39	0
47	ELEMENT	5	0.38	356	38.9	0
48	UNIT	4	0.3	111	38.6	0
49	GAS	5	0.38	379	38.3	0
50	BOND	4	0.3	116	38.2	0
51	DECOMPOSITION	3	0.23	19	37.4	0
52	MONOXIDE	2	0.15	0	36.6	0
53	SOLUTE	2	0.15	0	36.6	0
54	ELECTRONEGATIVITY	2	0.15	0	36.6	0
55	ELECTROPLATING	2	0.15	0	36.6	0
56	ELECTROMOTIVE	2	0.15	0	36.6	0
57	DIATOMIC	2	0.15	0	36.6	0
58	DIMER	2	0.15	0	36.6	0
59	DISTILLATE	2	0.15	0	36.6	0
60	HCL	2	0.15	0	36.6	0
61	TITRATION	2	0.15	0	36.6	0
62	DISSOCIATION	2	0.15	0	36.6	0
63	CURRENT	5	0.38	524	35.1	0
64	DIFFUSION	3	0.23	30	34.8	0
65	HOMOGENEOUS	3	0.23	41	33	0
66	PROTONS	2	0.15	1	32.8	0
67	OXIDATION	2	0.15	1	32.8	0
68	ENDOTHERMIC	2	0.15	1	32.8	0
69	ELECTRODE	2	0.15	1	32.8	0
70	SULPHATE	2	0.15	1	32.8	0

71	H	5	0.38	672	32.7		0
72	WATER	9	0.68	5,835	0.05	31.5	0
73	CONCENTRATION	3	0.23	63	30.5		0
74	ORBITAL	2	0.15	3	29.9		0
75	AQUEOUS	2	0.15	4	29		0
76	ACID	3	0.23	86	28.7		0
77	POINT	7	0.53	3,625	0.03	27.5	0
78	PERIODIC	3	0.23	111	27.2		0
79	IS	32	2.42	104,609			0
80	PARTICLES	3	0.23	134	26.1		0
81	SEPARATION	3	0.23	187	24.1	0.000001	

2 WORD KEYWORDS

N	WORD	FREQ.	CHEMCO R4.TXT %	FREQ.	ENGREF 1.LST %	KEYNESS
1	N THE	17	1.28	0	311.5	0
2	N A	15	1.13	0	274.8	0
3	OF THE	12	0.91	0	219.8	0
4	OF A	9	0.68	0	164.9	0
5	IN THE	7	0.53	0	128.2	0
6	N SYMBOL	7	0.53	0	128.2	0
7	A SUBSTANCE	6	0.45	0	109.9	0
8	THE PROCESS	6	0.45	0	109.9	0
9	IS THE	6	0.45	0	109.9	0
10	OF AN	5	0.38	0	91.6	0
11	IN A	5	0.38	0	91.6	0
12	TO THE	4	0.3	0	73.3	0
13	A A	4	0.3	0	73.3	0

14	ATOMIC NUMBER	4	0.3	0	73.3	0
15	IT IS	4	0.3	0	73.3	0
16	DIPOLE MOMENT	4	0.3	0	73.3	0
17	A SOLUTION	4	0.3	0	73.3	0
18	AN ATOM	4	0.3	0	73.3	0
19	THAT IS	3	0.23	0	54.9	0
20	ELEMENT IN	3	0.23	0	54.9	0
21	PROCESS OF	3	0.23	0	54.9	0
22	THE ELECTRON	3	0.23	0	54.9	0
23	ELECTRIC CURRENT	3	0.23	0	54.9	0
24	THE DIPOLE	3	0.23	0	54.9	0
25	DISSOLVED IN	3	0.23	0	54.9	0
26	IN GROUP	3	0.23	0	54.9	0
27	IN AN	3	0.23	0	54.9	0
28	IN WATER	3	0.23	0	54.9	0
29	NUMBER #	3	0.23	0	54.9	0
30	POINT IN	3	0.23	0	54.9	0
31	PERIODIC TABLE	3	0.23	0	54.9	0
32	GROUP #	3	0.23	0	54.9	0
33	OF TWO	3	0.23	0	54.9	0
34	FROM A	3	0.23	0	54.9	0
35	MOMENT OF	3	0.23	0	54.9	0
36	WHICH IS	3	0.23	0	54.9	0
37	WITH ATOMIC	3	0.23	0	54.9	0
38	A REACTION	3	0.23	0	54.9	0

39	CHEMICAL COMPOUND	3	0.23	0	54.9	0
40	THROUGH A	3	0.23	0	54.9	0
41	THE PERIODIC	3	0.23	0	54.9	0
42	A CHEMICAL	3	0.23	0	54.9	0
43	A HOMOGENEOUS	3	0.23	0	54.9	0
44	A GAS	3	0.23	0	54.9	0
45	TWO HYDROGEN	2	0.15	0	36.6	0
46	UNIT OF	2	0.15	0	36.6	0
47	OF CARBON	2	0.15	0	36.6	0
48	TWO ELECTRODES	2	0.15	0	36.6	0
49	WHICH AN	2	0.15	0	36.6	0
50	WITH THE	2	0.15	0	36.6	0
51	USED TO	2	0.15	0	36.6	0
52	WHEN IT	2	0.15	0	36.6	0
53	WHEN A	2	0.15	0	36.6	0
54	THE FORMATION	2	0.15	0	36.6	0
55	THAT OF	2	0.15	0	36.6	0
56	THE AMOUNT	2	0.15	0	36.6	0
57	THE SEPARATION	2	0.15	0	36.6	0
58	SYMBOL H	2	0.15	0	36.6	0
59	THE HEAT	2	0.15	0	36.6	0
60	THE DIFFUSION	2	0.15	0	36.6	0
61	THE POTENTIAL	2	0.15	0	36.6	0
62	TWO ATOMS	2	0.15	0	36.6	0
63	TO ANOTHER	2	0.15	0	36.6	0

64	TO #	2	0.15	0	36.6	0
65	TO FORM	2	0.15	0	36.6	0
66	SULPHATE	2	0.15	0	36.6	0
67	THE UNIT	2	0.15	0	36.6	0
68	SEPARATION OF	2	0.15	0	36.6	0
69	SUBSTANCE THAT	2	0.15	0	36.6	0
70	WORK OR	2	0.15	0	36.6	0
71	CHARGES IN	2	0.15	0	36.6	0
72	COMBINATION OF	2	0.15	0	36.6	0
73	COMPOUND INTO	2	0.15	0	36.6	0
74	CELL N	2	0.15	0	36.6	0
75	CARBON MONOXIDE	2	0.15	0	36.6	0
76	CAPABLE OF	2	0.15	0	36.6	0
77	DIFFUSION OF	2	0.15	0	36.6	0
78	DILUTE #	2	0.15	0	36.6	0
79	COMPOUNDS OR	2	0.15	0	36.6	0
80	DENSITY N	2	0.15	0	36.6	0
81	COPPER SULPHATE	2	0.15	0	36.6	0
82	DIPROTIC WHEN	2	0.15	0	36.6	0
83	A NEGATIVE	2	0.15	0	36.6	0
84	A RADIOACTIVE	2	0.15	0	36.6	0
85	ACID IS	2	0.15	0	36.6	0
86	A LIQUID	2	0.15	0	36.6	0
87	A COMPOUND	2	0.15	0	36.6	0
88	ATOM IS	2	0.15	0	36.6	0

89	AND NEGATIVE	2	0.15	0	36.6	0
90	AND WATER	2	0.15	0	36.6	0
91	AMOUNT OF	2	0.15	0	36.6	0
92	AN ELECTRON	2	0.15	0	36.6	0
93	AN ELECTRIC	2	0.15	0	36.6	0
94	MIXTURE IS	2	0.15	0	36.6	0
95	HOMOGENEOUS MIXTURE	2	0.15	0	36.6	0
96	HYDROGEN IONS	2	0.15	0	36.6	0
97	IONS PROTONS	2	0.15	0	36.6	0
98	FROM THE	2	0.15	0	36.6	0
99	FOUND IN	2	0.15	0	36.6	0
100	FORMATION OF	2	0.15	0	36.6	0
101	IS USED	2	0.15	0	36.6	0
102	METALLIC ELEMENT	2	0.15	0	36.6	0
103	IS CAPABLE	2	0.15	0	36.6	0
104	IS FORMED	2	0.15	0	36.6	0
105	IS DIPROTIC	2	0.15	0	36.6	0
106	DISSOLVED SUBSTANCE	2	0.15	0	36.6	0
107	ELECTROLYTIC CELL	2	0.15	0	36.6	0
108	ELECTROMOTIVE FORCE	2	0.15	0	36.6	0
109	ELECTRON CONFIGURATION	2	0.15	0	36.6	0
110	ELECTROCHEMICAL CELL	2	0.15	0	36.6	0
111	DURING WHICH	2	0.15	0	36.6	0
112	FOR A	2	0.15	0	36.6	0

113	END POINT	2	0.15	0	36.6	0
114	ENTHALPY CHANGE	2	0.15	0	36.6	0
115	ELECTRON DENSITY	2	0.15	0	36.6	0
116	EMPIRICAL FORMULA	2	0.15	0	36.6	0
117	ELECTRONS ARE	2	0.15	0	36.6	0

3 WORD KEYWORDS

N	WORD	FREQ.	CHEMCO	FREQ.	ENGREF	KEYNESS
	1.LST %			R4.TXT %		
1	ELEMENT IN GROUP	3	0.23	0	54.9	0
2	DIPOLE MOMENT OF	3	0.23	0	54.9	0
3	THE DIPOLE MOMENT	3	0.23	0	54.9	0
4	GROUP # OF	3	0.23	0	54.9	0
5	OF THE PERIODIC	3	0.23	0	54.9	0
6	IN GROUP #	3	0.23	0	54.9	0
7	THE PROCESS OF	3	0.23	0	54.9	0
8	WITH ATOMIC NUMBER	3	0.23	0	54.9	0
9	THE PERIODIC TABLE	3	0.23	0	54.9	0
10	ATOMIC NUMBER #	3	0.23	0	54.9	0
11	N THE PROCESS	3	0.23	0	54.9	0
12	N THE ELECTRON	2	0.15	0	36.6	0
13	OF A SOLUTION	2	0.15	0	36.6	0
14	OF AN ATOM	2	0.15	0	36.6	0
15	OF A SUBSTANCE	2	0.15	0	36.6	0
16	N SYMBOL H	2	0.15	0	36.6	0
17	TWO HYDROGEN IONS	2	0.15	0	36.6	0

18	THE FORMATION OF	2	0.15	0	36.6	0
19	WHEN IT IS	2	0.15	0	36.6	0
20	SEPARATION OF A	2	0.15	0	36.6	0
21	THAT OF THE	2	0.15	0	36.6	0
22	THE DIFFUSION OF	2	0.15	0	36.6	0
23	THE AMOUNT OF	2	0.15	0	36.6	0
24	A CHEMICAL COMPOUND	2	0.15	0	36.6	0
25	COPPER SULPHATE	2	0.15	0	36.6	0
26	COMBINATION OF TWO	2	0.15	0	36.6	0
27	DIPROTIC WHEN IT	2	0.15	0	36.6	0
28	FOUND IN THE	2	0.15	0	36.6	0
29	A HOMOGENEOUS MIXTURE	2	0.15	0	36.6	0
30	CELL N A	2	0.15	0	36.6	0
31	A SUBSTANCE THAT	2	0.15	0	36.6	0
32	AN ELECTRIC CURRENT	2	0.15	0	36.6	0
33	N A SUBSTANCE	2	0.15	0	36.6	0
34	METALLIC ELEMENT IN	2	0.15	0	36.6	0
35	IT IS CAPABLE	2	0.15	0	36.6	0
36	N A REACTION	2	0.15	0	36.6	0
37	HOMOGENEOUS MIXTURE IS	2	0.15	0	36.6	0
38	HYDROGEN IONS PROTONS	2	0.15	0	36.6	0
39	IS USED TO	2	0.15	0	36.6	0
40	IS CAPABLE OF	2	0.15	0	36.6	0
41	IS DIPROTIC WHEN	2	0.15	0	36.6	0

4 WORD KEYWORDS

N	WORD	FREQ.	CHEMCO R4.TXT %	FREQ.	ENGREF 1.LST %	KEYNESS
1	IN GROUP # OF	3	0.23	0	54.9	0
2	GROUP # OF THE	3	0.23	0	54.9	0
3	THE DIPOLE MOMENT OF	3	0.23	0	54.9	0
4	OF THE PERIODIC TABLE	3	0.23	0	54.9	0
5	WITH ATOMIC NUMBER #	3	0.23	0	54.9	0
6	ELEMENT IN GROUP #	3	0.23	0	54.9	0
7	WHEN IT IS CAPABLE	2	0.15	0	36.6	0
8	TWO HYDROGEN IONS PROTONS	2	0.15	0	36.6	0
9	A HOMOGENEOUS MIXTURE IS	2	0.15	0	36.6	0
10	IS DIPROTIC WHEN IT	2	0.15	0	36.6	0
11	DIPROTIC WHEN IT IS	2	0.15	0	36.6	0
12	N THE PROCESS OF	2	0.15	0	36.6	0
13	IT IS CAPABLE OF	2	0.15	0	36.6	0
14	METALLIC ELEMENT IN GROUP	2	0.15	0	36.6	0

5 WORD KEYWORDS

N	WORD	FREQ.	CHEMCO R4.TXT %	FREQ.	ENGREF 1.LST %	KEYNESS
1	ELEMENT IN GROUP # OF	3	0.23	0	54.9	0
2	GROUP # OF THE PERIODIC	3	0.23	0	54.9	0
3	IN GROUP # OF THE	3	0.23	0	54.9	0
4	METALLIC ELEMENT IN GROUP # 5	2	0.15	0	36.6	0
5	WHEN IT IS CAPABLE OF	2	0.15	0	36.6	0
6	IS DIPROTIC WHEN IT IS	2	0.15	0	36.6	0

7	DIPROTIC WHEN IT IS CAPABLE	2	0.15	0	36.6	0

APPENDIX B: TERMS EXTRACTED MANUALLY FROM THE ORIGINAL ENGLISH (SL) DEFINITIONS (i.e. THE SOURCE TEXT)

1. acetate ions
2. acetic acid
3. acid
4. actanides
5. alkanones
6. alkenes
7. ampere
8. anions
9. anode
10. atomic number
11. aqueous system
12. aqueous solution
13. base
14. boiling point
15. bonding electrons
16. butane
17. carbon dioxide
18. carbonated water
19. cathode
20. cations
21. centres
22. charged particles
23. chemical action
24. chemical compound
25. chemical separation
26. chemicals
27. chromium
28. coke
29. colloidal dispersion
30. colloidal particles
31. colloidal sulphur
32. concentration gradient
33. condense
34. condensed liquid
35. constant pressure
36. control rods
37. copper
38. copper sulphate
39. coulombs
40. covalent bond
41. cyclotron
42. dehydration
43. diamagnetism
44. diatomic
45. diethyl ether
46. dilution

47. dimmer
48. dissociation
49. dissolution
50. dissolve
51. dissolved substance
52. distill
53. distillate
54. distillation
55. distribution
56. double bond
57. dubnium
58. dysprosium
59. effects
60. effervesce
61. effervescence
62. effusion
63. einsteinium
64. electric current
65. electric waves
66. electrical circuit
67. electricity
68. electrochemical reaction
69. electrochemistry
70. electrolyte solution
71. electrolytes
72. electrolytic cell
73. electromagnetic radiation
74. electromotive force
75. electron
76. electron affinity
77. electron configuration
78. electron density
79. electron pair
80. electron spin
81. electroplate
82. electroplating
83. electrovalent bond
84. emission
85. empirical formula
86. emulsified
87. emulsify
88. emulsion
89. end point
90. endothermic
91. energy
92. enthalpy change
93. environment
94. equivalent point
95. ether
96. ethoxy ethane

97. ethylene
98. external conductor
99. force
100. gamma rays
101. gas exchange
102. gold
103. heat
104. hydrated
105. hydrogen chloride
106. hydrogen ions
107. imaginary axis
108. ionic bond
109. iron
110. isotopes
111. lanthanides
112. leaves
113. air
114. light
115. magnetic field
116. magnetic waves
117. magnetite
118. magnets
119. mass
120. measure
121. medium
122. mercury
123. metal
124. mixture
125. molten
126. monomers
127. negative charge
128. negative electric charge
129. negative electrode
130. negative ions
131. neutron
132. nickel
133. nuclear reactors
134. nucleus
135. orbital
136. orbital arrangement
137. organic compound
138. oxidation
139. oxidation-reduction reaction
140. physical state
141. polar molecule
142. positive charge
143. positive electrode
144. positive ions
145. potential
146. potential difference

147. process
148. property
149. protons
150. radiation
151. radio waves
152. radioactive element
153. radioactive metallic element
154. reduction
155. science
156. silver
157. silvery metallic element
158. simple compounds
159. simplest chemical formula
160. solid
161. solute
162. speed
163. spin arrangement
164. spin orientation
165. stable dispersion
166. state
167. strength
168. system
169. titration
170. vapour
171. visible light
172. volume
173. work
174. X-rays
175. zero

APPENDIX C: TERM LIST/GLOSSARY: ENGLISH-ISIZULU, WITH BACK-TRANSLATIONS

SL (Eng.) term	IsiZulu translation equivalent(s)	Back-translation of the TL (isiZulu) translation equivalent
acetic acid	-muncu/-munyu/i-esidi etholakala kuviniga/ i-asethikhi esidi	sour/vinegar acid/acetic acid
acetate ions	ama-iyoni e-asethethi	acetate ions
acid	ili-asidi/ i-asidi/ i-esidi/uketshezi olushisayo	acid/ liquid that burns
actinides	ama-akthinayidi	actinides
air	umoya	air
alkenes	ama-alikhini	alkenes
alkanones	ama-alikhenoni	alkanones
anode	i-anodi	anode
anoins	ama-anyoni	anoins
ampere	i-ampere/isibalo okubalwa ngaso amandla kagesi/ isilinganisimandla	ampere/a measure used to measure electrical power/energy measure
aqueous solution	isolushini eyisincibikalisi esingamanzi	watery solution dissolvent
aqueous system	uhlelo lwesincibikalisi esingamanzi	watery dissolvent system
atom	i-athomu/isincinci/ imvithimvithi/okunci/ intwanyana encane ingangoba ayinakubuye ivithizwe/ intwanyana/ isithako semvelo esibuncane obungenakubuye buncishiswe sisale kuseyiso leso sithako/ umsukazonke	atom/a very smallest thing/small pieces/a small thing/ a small that cannot be broken into pieces/a natural ingredient that is so small that cannot be reduced to its original ingredient/is an originator for all
atomic number	inani lamaphrothoni kunyukilasi ye-athomu/ inombolo ye-athomu	A number of protons in the nucleus of an atom/atomic number
base	ibhesi/ibheyisi/ isisekelosithako	base/a base ingredient
boiling point	isimo sokubila	in a boiling state
bond	isibopho/ibhondi	Bond
bonding electrons	ama-elekthroni akubhondi	electrons that are on the bond
butane	ibhutheni	buthane
carbon	ikhabhoni/ isithako semvelo esikhona cishe kuzo zonke izinto	carbon/a natural substance found in all living organisms

SL (Eng.) term	IsiZulu translation equivalent(s)	Back-translation of the TL (isiZulu) translation equivalent
	eziphilayo	
carbon dioxide (CO_2)	ikhabhonidayoksayidi (CO_2)/isikhunta	carbon dioxide/mould
carbon monoxide (CO)	ikhabhonimonoksayidi (CO) /isisi semoto	carbon monoxide/smoke produced by cars
carbonated water	amanzi anekhabhonidayoksayidi encibilikile	water containing dissolved carbon dioxide
cathode	ikhathodi	cathode
cations	amakheshini	cations
cell	iseli/inhlayiyakuphila	cell/life unit
centres	izindawo/izikhungo	places/centres
charged particles	izinhlayiya ezinamashaji	particles with charges
chemical	-phathelene nekhemisteli/ -thakiweyo/isithako semvelo/ikhemikheli/ ikhemikhali	related to chemistry chemical/natural ingredient/chemical
chemical compound	isiqa esakhiwe ngama-elementi amabili nangaphezulu/ ikhampawundi yekhemikhali	substance made up of two or more elements/a compound of an element
chemical formula	isifanekisozithako/ ikhemikhali-fomula/ ifomula yekhemikhali	representation of a chemical/formula for chemical
chemical separation	inhlukanozithako/ inhlukano yamakhemikhali	chemical separation
chemical reaction	iri-ekshini yamakhemikhali	chemical reaction
chromium (Cr)	ikhroniyamu	chromium
coke	isiqa sokubasela umlilo	solid fuel
CL	i-CL	CL
colloid	ikholodi/uhlobo lwengxube olunezimpawu ezinezingxenye ezingafani	colloid/heterogenous mixture
colloidal dispersion	ukuhlakazeka kwekholodi	dispersion of a colloid
colloidal particles	izinhlayiya zekholodi	colloidal particles
colloidal sulphur	isalifa yekholodi/isibabule sekholodi	colloidal sulphur
compound	inhlanganisela/imvange/ ingxube/okuthakiwe/ ingxube/ikhampawundi	a mixture/ mixture/mixture/that is mixed together/compound
concentration	ukushunqisa ingqikithi yomuthi ukuze ibe namandla kakhulu/ ukuqoqana/okuqoqene/ ukujiya/ukushuba	to make medicine more stronger/ collected together/that is collected together/become thick/become thick
concentration	umehlukoqoqana	difference in the amount of solute

SL (Eng.) term	IsiZulu translation equivalent(s)	Back-translation of the TL (isiZulu) translation equivalent
gradient		
condense	-phendula kube ngamanzi/-guqula kube wuketshezi/-jiyisa	changes into water/ convert into liquid/thicken
condensed liquid	uketshezi olumsulwa	A pure liquid
conductor	into yokudlulisa ukufudumala nokunye/ into ezwela ukushisa/ isidlulisigesi	substance that transfers heat and other things/ substance that is sensitive to heat/ substance that transfer electricity
constant pressure	ingcindezi engaguquki	pressure that does not change
copper (Cu)	ithusi/ikhopha	copper
coulombs	amakholombi	coulombs
covalent bond	ikhovalenti bhondi	covalent bond
current	ukuhamba kwelekthrisithi/ ukuhamba kukagesi/ umsinga/ikharenti/ ugesi	movement of electricity/wave/current/ electricity
cyclotron	i-cyclotron	cyclotron
debye	i-debye	debye
decomposition	ukubola/idikhomposishini	decay/decomposition
decomposition reaction	ukubihlika kwekhampawundi emagatshagatsha ibe yizingxenye zayo ezingehlukaniswe/ ukubola/ yinqubokubola/ idikhomposishini/ iri-ekshini yedikhomposishini	breaking down of a complex compound into its smaller parts that cannot be separated/decay/ decomposition process/ decomposition/a reaction of a decomposition
dehydrated	okuncishelwe ngamanzi/ okukhishwe amanzi/ okudihayidrethiwe	loose water/its water has been taken out / dehydrated
dehydration	ukomisa/ukukhipha amanzi/idihayidreshini	to dry out/removal of water/dehydration
density	ukuzima/ isisindo/ ukuminyana/ukucinana/ ukuzima/isisindo/ ukuminyana/ isisindomthamo/idensithi	weight/closely packed/density/volume weight/density
diamagnetic	isixoshwazibuthe/ -dayamagnethikhi	what is repelled by a magnet/diamagnetic
diamagnetism	ukuxoshwazibuthe/ idayamagnethisimu	magnet repulsion/diamagnetism
diatomic	okuma-athomumbili/ idayathomikhi	composed of only two atoms/diatomic

diethyl ether	i-diethyl ether	diethyl ether
diffuse	-xubana	mixing
diffusion	ukuxubana	mixing with one another
dilute	ukuhlambulula/ukuthela amanzi	weaken/add water
dimer	idima	dimer
dipole	uhlelo lukazibuthe olupholimbili/ okudayipholi	magnetic system with two poles/dipole.
dipole moment	amandla kazibuthe opholimbili ngasekugcineni kwezinhlangothi zombili olunye luneshaji enegethivi olunye oliphosethivi/idayipholi momenti	magnet with two poles one having a negative charge at one end and negative charge at the other/dipole moment.
diprotic (acid)	(i-esidi) enamaphrothoni amathathu angaba ama-ayoni/ (i-esidi) edayiphrothikhi	acid with three protons that can be ions/diprotic (acid)
dispersion	inhlazane/ukudamuka/ ukuhlakazeka/inhlukano	dispersing/distribution/scattering
dissociate	-hlukana	dissociate
dissociation	ukwahlukana/inhlukano	formation of ions from a compound bonded by an ionic bond/separation/ dissociation
dissolved	-ncibilikile/ -hlakazekile/ -gqamukile/-buhlukile	dissolved/separated/broken/crumble
distill	ukuthonsisa/ukupheka into ize ibe yisitimu/ukubekelela amathonsi,wona ageleze abe ngugologo	-instil/to cook a liquid until it becomes a steam/collect drops and they flow until they become a brandy.
distillate	ukukhongozela amathonsi esisi/ ukuconsa/ uketshezi olumsulwa olukhongozelwa ngesikhathi senqubo yedistileshini/ idistilethi	collect drops of vapour/drip/pure liquid that is collected during distillation/ distillate
distillation	Indlela yokuhlukanisa uketshezi engxubeni ngokubilisa uketshezi bese umhwamuko uguquka uba wuketshezi bese lukhongozelwa/ ukucwenga/idistileshini	procedure used for separating liquid from a mixture by boiling the liquid that is then condensed and collected/filtering/ distillation.
double bond	ibhondimbili	two-bonded
dubnium	idubhiyamu	dubnium

dysprosium (Dy)	Idisphroziyamu (i-Dy)	dysprosium (Dy)
E	i-E	E
effect	okubangwayo/ umphumela/umthelela	caused/result/reinforcement
effervesce	-zoyizisa/-gqwambisa/-bilisa	effervesce/come out in small drops/ ferment
effervescence	ukuzoyiza	effervescence
effuse	-phuma/-khipha	effuse/take out
effussion	ukuphuma/ukukhipha	coming out/taking out
einsteinium	i-einsteinium	einsteinium
electric	-phathelene nogesi/ kagesi/-elethrikhi	related to electricity/that uses electricity/of electricity
electric charge	isidonsamlilo/ubungako bukagesi/ ishaji le-elekthrikhi	fire puller/an amount of electricity/electric charge
electric current	ukuhamba kukagesi/ kwe-elekthrisithi/umsinga kagesi	a movement of electricity/electric wave
electricity	ugesi/i-ekthrisithi/ i-elethrikhi	electricity
electric waves	amagagasi kagesi	electric waves
electrical circuit	umzila okuhambisa ugesi/isekhethi ye-elekthrikhi	path in which electricity moves/electric circuit
electrochemical	isixhumanisi zinto kumzila ovalekile kagesi/ i-elekthrokhemikhali	two half cells properly that produces electricity/a connector of things in a closed electrical path/electrochemical
electrochemical cell	iseli eliyisixhumanisi zinto kumzila ovalekile kagesi/ iseli e-elekthrokhemikhali	cell that is a connector of things in a closed electrical path/cell that is electrochemical
electrochemical reaction	ukulumbana kwezithako kusixhumanisi zinto kumzila ovalekile/ iri-ekshini ye-elekthrokhemikhali	mixing of chemical compounds in a closed path/a reaction of electrochemical
electrochemistry	ukufunda ngenqubo yezithako emngceleni yezihambisi zikagesi ngama-elekthroni kanye nezihambisi zikagesi ngama-iyoni/ i-elekthrokhemisi	part of chemistry that deals with the interaction between electricity and chemicals, in particular two half- cells properly connected producing electricity
electrodes	isikhiphi-singenisi sama-ayoni kusihambisi ma-ayoni esiwuketshezi noma esiyijeli/ ama-elekthrodi	a metal strip connecting and binding two half-cells that produce electricity/ ion remover and taker in ion liquid or gel conductor/electrodes
electrolysis	ukucwenga usawoti	separating salt by means of electricity/electrolysis

	ngogesi/i-elekthrolisisi	
electrolyte	isakhima-ayoni/ ingxubeyokudlulisa ugesi/ i-elekthrolayithi	substance that make up ions in water and conduct electricity/electrical solution/an ion builder/a solution that conducts electricity/electrolyte
electrolyte solution	isolushini eyisihambisi ma-ayoni/isolushini ye-elekthrolayithi	ion conducting solution/electrolyte solution
electrolytic cell	iseli eguquka nokwesithako ngesikhathi ikharenti idlula kusolushini eyisihambisi ma-ayoni/yiseli e-elekthronikhi	cell that changes chemically when a current is passed through a solution that conducts ions/ electrolytic cell
electromagnetic radiation	ukuzandisa kwamagagasi esikhaleni esinezingxenye zogesi/iradiyeshini e-elekthromagnethikhi	energy in the form of waves comprises of sections of magnet and electricity that take turns in going forward and backwards caused by the speed of an electrical charge passing in a space/ electromagnetic radiation
electromotive force	umehluko wamandla phakathi kwama-elekthrodi amabili/amandla okuhamba kukagesi	is the potential difference between two half-cells connected together
electron	into encane ye-athomu kangangokuba ingeze yacazwa eneshaji elinegethivi ehambisa ugesi ezintweni eziqinile/ i-elekthroni	simplest particle that cannot be broken down of an atom with a negative charge that carries electricity in solid substances/electron
electron affinity	ukukhululwa kwamandla ngesikhathi i-elekthroni ifakwa kuyi-athomu eyigesi/i-elekthroni afinithi	release of energy when an electron is added to an atom that is in a gaseous state/electron affinity
electron configuration	ukuma kwama-elekthroni aku-athomu/ukuhleleka kwama-elekthroni	order of electrons in an atom/arrangement of electrons in an atom
electron density	ukuminyana kwama-elekthroni/ idensithi yama-elekthroni	electrons in a crowded condition/ electron density
electron pair	ipheya lama-elekthroni/ ama-elekthroni ahamba ngamabili	pair of electrons/electrons moving in twos
electron spin	ukupininiza kwama-elekthroni/ukushwila kwama-elekthroni	spinning of electrons/moving of electrons
electronegativity	ikhono le-athomu lokudonsela ngakuyo i-elekthroni lokwabelana/ elekthronegethivithi	the ability of an atom to attract a shared electron pair to itself / electronegativity
electroplate	uku-elekthropletha/	electroplate/ coat a metal with a thin film of another

	emboza into ngoqweqwe lwensimbi ngokusebenzisa ugesi	metal using an electricity
electroplating	ukwemboza insimbi ngoqweqwe lwesiliva ngokusebenzisa ilekthrisithi noma ngogesi/ emboza into ngoqweqwe lwensimbi ngokusebenzisa ugesi/ elekthroplethingi	coating of a metal with a thin film of another metal using electricity/ electroplating
electro-reduction reaction	ukufakwa kwama-elekthroni ukwenza ama-ayoni ukuba abe negethivi/iri-ekshini ye-elekthroridakshini	addition of electrons to form negative ions/ reaction of electro-reduction
electrovalent bond	i-elekthrovalenti bhondi/ibhondi enenani lama-elekthroni elingatholwa noma elingalahlwa ngama-athomu ekwenzeni ama-ayoni	electrovalent bond/bond that has an number electrons that can be gained or lost by an atom to form ions
element	into engumsuka wezinye izinto isithako semvelo/ isithakomvelo/ i-elementi/isishisisi sikagesi	basic substance of other natural compounds / natural gradient/element/electric heat causal.
empirical formula	isiboniso esilula sama-elementi ento/isifanekiso ma-elementi	simple formula of elements of things/simple representation of elements
emulsion	ukuyikiza/umuthi oxutshwe namafutha	emulsion / medicine mixed with oil
emulsify	yikizisa	emulsify
emulsified	-yikizayo	emulsified
end point	isilinganiso sezinga lenani lebheyisi elilingana nenani le-esidi elikhonjiswa ngokushintsha kombala ngesikhathi kwenziwa ithithreshini/indiphoyinti	an estimated equivalence point indicated by a color change indicator during titration/end point
endothermic	-endothemikhi	endothermic
energy	isidlakadlaka/amandla/ ukuqinisa/ukucophelela	power/energy/tighten/careful
enthalpy	isilinganiso samandla esisetshenziswa ikakhulukazi ukufunda ngenguquko yamakhemikhali ezinto/ i-enthalpy	energy measure that is used mostly in reading change in chemicals of things/enthalpy

enthalpy change	inguquko esilinganisweni samandla esisetshenziswa ikakhulukazi ukufunda ngenguquko yamakhemikhali ezinto/ukuguquka kwe-enthalpy	a change in energy measure that is used in reading change in chemicals of things in particular/a change of enthalpy
environment	inhlalo okuhlalwa phakathi kwayo/inhlalo yendawo/ ubunjalo bendawo/imvelo	area where living organisms live / a condition of a place/nature of a place/ environment
equivalent point	izinga lapho inani lebheyisi lilingana nenani le-esidi ngesikhathi kwenziwa ithithreshini/ iphoyinti ekhwivalenti	the point at which the amount of a base equals to the amount of acid during titration/ equivalent point
ethanoic acid	uketshezi olungenambala olunephunga elikhakhayo/i-esidi ye-ethanowikhi	clear liquid that has an acidic smell/ethanoic acid
ether	umoya osesibhakabhakeni/ umuthi osetshenziswa njengesidakamizwa/ i-itha/uketshezi olusatshwala	air in the sky/medicine that is used as a drug/ether/ liquid that have similar characteristics as alcohol
ethoxy ethane	i-ethoxy ethane	ethoxy ethane
ethylene (C_2H_4)	i-ethylene (C_2H_4)	ethylene (C_2H_4)
external conductor	isidlulisi ngaphandle/ isidlulisi esingenamthelela wangaphandle	external conductor / a conductor that is not affected by external factors
(molecular) formula	amazwi aklanywe kafuphi ukuze afumbathe umthetho ophethe leyo nto okukhulunywa ngayo/umthetho ofingqiwe /ifomula yemolekhuli	set of words with a guiding law for the thing that is being referred to/ a shortened law/(molecular) formula
G	uphawu lwe-Gibbs free energy/i-G	a symbol for Gibbs free energy/G
gamma rays	imisebe engenelayo ehamba ngamagagasi azandisayo amafushane kunawe-X-reyi esikhaleni esinezingxenye zogesi/ama-gamma reyi	penetrative rays of a very self increasing short wavelength when compared to those of X-rays/gamma rays
gas	ugesi/igesi	electricity/gas
gas exchange	ukushintshana kwamagesi	gasous exchange
gold (Au)	igolide	gold
H	uphawu lwe-hayidrojini/ i-H	hydrogen symbol/H

hydrogen (H)	ihayidrojini (H)/umoya ongugesi othi uma uhlanganiswa ne-oksijini kuvele amanzi	first element in the periodic table, it has one proton and one electron /hydrogen (H) / a gas when reacting with oxygen result in water formation
hydrogen ions	ama-ayoni ehayidrojini	hydrogen ions
hydrogen protons	amaphrothoni ehayidrojini	hydrogen protons
H^+ ions	ama-ayoni e-H^+	H^+ ions
H_2O	i-H_2O	H_2O
HCL molecule	imolekhuli ye-HCL	HCL molecule
higher concentration	izinga eliphezulu lokushuba/izinga eluphezulu lokujiya/ izinga eliphezulu lokuqoqana	high level of thickness / high level of strong ness/high level of compactness
homogenous	-luhlobo lunye/-zinhlobo ezifanayo	same type/types that are alike
homogenous mixture	ingxube enezimpawu ezifanayo kuyona yonke/ ingxube ehlobolunye	a mixture with same properties throughout/same type mixture
homogenous substance	into ehlobo lunye	homogeneous matter with definite composition (elements and compounds)/ same type matter
heat	ukushisa/ukufudumala	heat/warmth
hydrated	isixubaniso samanzi nezinye izinto/ okuqukethe amanzi/ okuhayidrethedi	some ionic compounds retain water molecules when dried, such compounds are referred to as hydrated compounds, e.g. $CuSO_4.5H_2O$, $NiCl_2.6H_2O$./a water compound combined with another compound or element combined chemically with water/ a substance containing water/hydrated
hydrogen (H)	umoya ongugesi othi uma uhlanganiswa ne-oksijini kuvele amanzi/ ihayidrojini (H)	first element in the list of elements , it has one proton and one electron/hydrogen (H)
hydrogen chloride (HCL)	i-hydrogen chloride (HCL)	hydrogen chloride (HCL)
imaginary axis	umfanekiso womzila phenduka/imajinari eksisi	representation of an rotating imaginary path/imaginary axis
ionic bond	i-iyonikhi bhondi	ionic bond
ion	i-iyoni/inhlansigesi	Ions/electricity particle
iron (Fe)	insimbi/i-ayoni (Fe)	metal/iron (Fe)
isotopes	amasothophu	isotopes
lanthinides	ama-elementi avela phansi komhlaba ayivelakancane/ amalenthanayidi	elements that come from below/the earth/that are scarce /lanthanides
leaves	amaqabu/amagqabu/ amacembe	leaves
light	ukukhanya	light
liquid	into engamanzi/ ingovungovu/ uketshezi	something watery/liquid

lower concentration	izinga lokushuba eliphansi/izinga lokujiya eliphansi/izinga lokuqoqana eliphansi	low level of thickness/low level of strongness/low level of compactness
magnetic field	isigaba esinozibuthe/ indawo enozibuthe/ indawo enamandla ezungeze uzibuthe	section with magnet / area with magnet/area with force around magnet.
magnetic waves	amagagasi kazibuthe	waves of a magnet
magnetite	imagnethayithi	magnetite
mass	ingqumbi/isisindo	mass/weight
measure	isilinganiso	measure
medium	imidiyamu	medium
metal	insimbi/okusansimbi	metal/something like metal
metallic element	i-elementi enezimpawu zensimbi/i-elementi esansimbi	an element with properties of a metal/ element that is like a metal
molecule	okuncinyane kakhulu/ imolekhuli/ ubuncane bokugcina uma into ibuye icoliswe incishiswe futhi ayisoze ibe yileyo nto okuqalwe ngayo	that is very small/molecule/ smallest particle that cannot be made fine, reduced and returned to its original state after being broken down
molten	okuncibilikile	molten
monomer	imonoma/ isakhimamolekhuli/ inhlayiya/ ehlanganisekayo	monomer/a builder of molecules/a particle that can be joined
N	i-N	N
N Symbol	uphawu/isifaneko N	N Symbol
Na^+	i-Na^+	Na^+
NaCL	i-NaCL	NaCL
negative	-phikayo/-landulayo/ -phambene na-/okunegethivi/ -okulahlekelwe ngama-elekthroni	deny/negatory/oppose to/negative/lost of electrons
negative electrode (cathode)	i-elekthrodi enegethivi (ikhathodi)/i-elekthrodi elahlekelwe ngama-elekthroni	electrode that is negative (cathode)/an electrode that has lost electrons
negative electron charge	i-elekthroni enegethivi	a charge of an electron that is negative
negative ion (anion)	i-iyoni anegethivi (ama-anyoni) /i-athomu elahlekelwe ngama-elekthroni	ion that is negative (anion)/an atom that has lost electrons
NH_3	i-NH_3	NH_3
nickel	uhlobo lwensimbi	a white type of metal that is usually combined with

	emhlophe evama ukuhlanganiswa nezinye izinsimbi/uhlobo lwensimbi elukhuni emhloshana/inikheli	other metals/a hard whitish type of a metal/nickel
nuclear reactor	isilawuli sokungqubuzana kwamanyukilasi/ isilawuli sokulawula ukushintsha kwemvelo kwesothophi ye-elementi ibe ngenye i-elementi	a controller of a nuclear reaction/a controller that controls a natural change of an isotope of one element into an isotope of another element.
nucleus	ubuphakathi kwento, into ephakathi kwezinye, kuyilapho ezinye ziqoqelene kuyo/ inyukilasi	central part of a thing/thing inside other things where things are collected to it/nucleus
organic compound	ikhampawundi e-oganikhi/ ikhampawundi enekhabhoni	compound that is organic/a compound containing carbon
orbital	indawo eku-athomu noma eku-molekhuli engathathwa ngama-elekthroni angafika kwamabili vo/i-obhithali	a space in an atom or molecule that can be occupied by up to two electrons/orbital
orbital arrangement	ukuhleleka kwama-elekthroni ku-obhithali	an arrangement of electrons in an orbital
oxidation	ukulumbana ne-oksijini/ ukulahleka kwama-elekthroni / i-oksideshini	a combination with oxygen/loss of electrons/oxidation
oxidation reduction reaction	ukudluliswa kwama-elekthroni/iri-ekshini ye-oksideshini-ridakshini	transfer of electrons/ oxidation reduction reaction
particles	amahlayihlayi/imizwayi/ izinhlayiya	particles
periodic	ngezikhathi/-velayo/ nezikhathi	periodic/coming up/with times
Periodic Table	isihleli ma-elementi	arranger of elements
pH	isilinganisobumuncu/i-pH	measure of acidity or alkanity of a solution/pH
physical state	isimomumo/isimo	physical state/state
point	iphoyinti	point
polar molecules	amamolekhuli angamaphola	molecules which are polar
positive	ukulahleka kwama-elekthroni/ okuphozithivi	loss of electrons/something positive
Positive electrode (anode)	i-elekthrodi ephozithivi (i-anodi)/i-elekthrodi eyamukele ama-elekthroni	positive electrode (anode)/an electrode that has accepted electrons
positive ions (cations)	i-athomu noma imolekhuli elahlekelwe	an atom or molecule that has lost electrons/ ions that are positive (cations)

	ngama-elekthroni/ama-ayoni aphozithivi (amakheshiyoni)	
potential	ikhono/amandla	ability/potential
potential difference/voltage	isilinganisi sekhono likagesi/ukukalwa kukagesi ngama-volt.	measure of ability of electricity/measure of electricity in volts.
process	ukuqhubeka/ukuhamba/ inqubo/ukwenza	progress/move/process/perform
property	okuvezwa ku-/isimo/isici	what is produced from/state/criterion
radiation	ukukhishwa ngemisebe/ iradiyeshini	released in rays/radiation
radio waves	amagagasi okusakaza	waves of radio broadcasting
radioactive element	i-elementi ekwazi ukukhipha imisebe noma izinhlayiya okugijima ngesikhulu isivinini/ i-elementi ekhipha amandla ahambisana nokushintsha kwe-asothophu ye-elementi ibe ngeyenye i-elementi/ukuhlukana kwenyukilasi ku-elementi/ i-elementi erayido-ekthivi/i-elementi eyisikhiphimisebe	an element that has ability to release rays or particles moving in a very high speed/an element that release energy that is related to the conversion of an isotope of an element into that of another element/disintegration of a nucleus in an element/element that is radioactive/rays releasing element
radioactive metallic element	i-elementi esansimbi ekhipha imisebe eyingozi/i-elementi esansimbi eradiyo-ekthivi/i-elementi esansimbi eyisikhiphimisebe	Element that is like a metal that releases dangerous rays/an element that is like a metal that is radioactive/an element that is like a metal that releases rays
reaction	ukuphatheka/ okuphendulwa ngayo/ukulumbana kwezithako/iri-ekshini	feeling/manner of responding/combination of ingredients/iri-ekshini
reduction	ukunciphisa/iridakshini	to reduce/reduction
separation	isehlukaniso/ ukwehlukanisa/ ukwehlukana	separation/dividing/separation
science	isayensi/isifundo sendabuko/isifundo sezemvelo	science/ study of origin/study of nature
silver	isiliva	silver
silvery metallic element	i-elementi esiliva esansimbi	element that is silver and which is like a metal
solid	into eqinile njengetshe/ okujiyile/okusatshe/	a hard like stone matter/concentrated/ stone like/solidified/something solid/hard

	okunqumile/okusongele/ okusasigaxa/okuqinile	
simpler compound	ikhampawundi eqondile/ikhampawundi elula	simpler compound/light compound
solute	okuncibilikiswayo/ isincibikaliswa	something that is dissolved/something that being dissolved
solution	umbhubhudlo/ incibikiliselo/isolushini/ ingxube/inhlanganisela	solution/a liquid in which one or more substances have been dissolved/mixture/.
solvent	uketshezi oluncibilikisayo/ isincibikalisi	A dissolving liquild/solvent
speed	ukushesha/ijubane/ isiqubu/isivinini	speed
spin	-shwila/-pininiza	spin
spin arrangement	ukuhleleka kwama-elekthroni ngokupininiza ku-athomu	an arrangement of spinning electrons in an atom
spin orientation	isikhundla sokupininiza	spinning position
stable dispersion	ukusabalala okusimeme/ ukusabalala okuzinzile	stable dispersion
substance	isiqa/utho	substance/thing
symbol	uphawu/isifaneko	symbol/representation
synonym	isinonimi/umqondofana/ igama elimqondofana	synonym/same idea/synonymous word
tiltration	inqubosihlaziyi/isu elisetshenziswa ukubona inani lokuncibilike kusolushini engaziwa/ithithreshini	analytical procedure/ a strategy used to determine the amount of what has been dissolved in an unknown solution/titration
unit	okukodwa/umuvo/ isigamu/iyunithi	one/a number above a completed ten/section/unit
Vanadium (V)	iVanadiyamu (V)	vanadium (V)
vapour	umhwamuko/isisi/ isitshodo	vapour
visible light	ukukhanya okubonakalayo	a light that can be seen
volume	ivolumu/indawo yokumumatha/umthamo/ ubuningi	volume/area of capacity/quantity/plural
water (H_2O)	amanzi	water
work	umsebenzi	work
X-ray	i-eksreyi/imisebe ye-X-reyi/i-X-reyi	X-ray
zero	ilize/iqanda/uziro/okungekho/unothi/isikhathi samanqamu (zero hour)	nothing/egg/zero/absent/note/zero hour

APPENDIX D: TERM LIST/GLOSSARY: ENGLISH-ISIZULU, WITH AN INDICATION OF WHY TERMS WERE CHOSEN AS TRANSLATION EQUIVALENTS FOR USE IN TRANSLATING THE SOURCE TEXT

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
acetic acid	-muncu/-munyu/i-esidi etholakala kuviniga/ i-asethikhi esidi	i-asethikhi esidi	Is the preferred term equivalent
acetate ions	ama-iyoni e-asethethi	ama-ayoni e-asethethi	Is the preferred term equivalent
acid	ili-asidi/ i-asidi/ i-esidi/uketshezi olushisayo	i-esidi	Is the preferred term equivalent
actinides	ama-akthinayidi	ama-akthinayidi	Is the preferred term equivalent
air	umoya	umoya	Is the preferred term equivalent
alkenes	ama-alikhini	ama-alikhini	Insertable translation equivalent
alkanones	ama-alikhenoni	ama-alikhenoni	Insertable translation equivalent
anode	i-anodi	ama-anodi	Insertable translation equivalent
anoins	ama-anyoni	ama-anyoni	Insertable translation equivalent
ampere	i-ampere/isibalo okubalwa ngaso amandla kagesi/ isilinganisimandla	i-ampere	Insertable translation equivalent
aqueous solution	isolushini eyisincibikalisi esingamanzi	isolushini eyisincibikalisi esingamanzi	
aqueous system	uhlelo lwesincibikalisi esingamanzi	uhlelo lwesincibikalisi samanzi	
atom	i-athomu/isincinci/ imvithimvithi/okunci/ intwanyana encane ingangoba ayinakubuye ivithizwe/ intwanyana/ isithako semvelo esibuncane obungenakubuye buncishiswe sisale kuseyiso leso sithako/ umsukazonke	i-athomu	Insertable translation equivalent
atomic number	inani lamaphrothoni kunyukilasi ye-athomu/	Inombolo ye-athomu	Insertable translation equivalent

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
	inombolo ye-athomu		
base	ibhesi/ibheyisi/ isisekelosithako	ibheyisi	Insertable translation equivalent
boiling point	isimo sokubila	isimo sokubila	Insertable translation equivalent
bond	isibopho/ibhondi	ibhondi	Is the preferred term equivalent
bonding electrons	ama-elekthroni akubhondi	ama-elekthroni akubhondi	Insertable translation equivalent
butane	ibhutheni	ibhutheni	Insertable translation equivalent
carbon	ikhabhoni/ isithako semvelo esikhona cishe kuzo zonke izinto eziphilayo	ikhabhoni	Is the preferred term equivalent
carbon dioxide (CO_2)	ikhabhonidayoksayidi (CO_2)/isikhunta	ikhabhonidayoksayidi (CO_2)	Is the preferred term equivalent
carbon monoxide (CO)	ikhabhonimonoksayidi (CO) /isisi semoto	ikhabhonimonoksayidi (CO)	Is the preferred term equivalent
carbonated water	amanzi anekhabhonidayoksayidi encibilikile	amanzi anekhabhonidayoksayidi encibilikile	
cathode	ikhathodi	ikhathodi	Is the preferred term equivalent
cations	amakheshini	amakheshini	Is the preferred term equivalent
cell	iseli/inhlayiyakuphila	iseli	Is the preferred term equivalent
centres	izindawo/izikhungo	izindawo	Is the preferred term equivalent
charged particles	izinhlayiya ezinamashaji	izinhlayiya ezinamashaji	Is the preferred term equivalent
chemical	-phathelene nekhemisteli/ -thakiweyo/isithako semvelo/ikhemikheli/ ikhemikhali	ikhemikhali	Is the preferred term equivalent
chemical compound	isiqa esakhiwe ngama-elementi amabili nangaphezulu/ ikhampawundi yekhemikhali	ikhampawundi yekhemikhali	Is the preferred term equivalent
chemical formula	isifanekisozithako/ ikhemikhali-fomula/ ifomula yekhemikhali	ifomula yekhemikhali	Is the preferred term equivalent

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
chemical separation	inhlukanozithako/ inhlukano yamakhemikhali	inhlukano yamakhemikhali	Is the preferred term equivalent
chemical reaction	iri-ekshini yamakhemikhali	iri-ekshini yamakhemikhali	Is the preferred term equivalent
chromium (Cr)	ikhroniyamu	ikhroniyamu	Is the preferred term equivalent
coke	isiqa sokubasela umlilo/i-coke	isiqa sokubasela umlilo	
CL	i-CL	i-CL	Is the preferred term equivalent
colloid	ikholodi/uhlobo lwengxube olunezimpawu ezinezingxenye ezingafani	ikholodi	Is the preferred term equivalent
colloidal dispersion	ukuhlakazeka kwekholodi	ukuhlakazeka kwekholodi	Is the preferred term equivalent
colloidal particles	izinhlayiya zekholodi	izinhlayiya zekholodi	Is the preferred term equivalent
colloidal sulphur	isalifa yekholodi/isibabule sekholodi	isalifa yekholodi	Is the preferred term equivalent
compound	inhlanganisela/imvange/ ingxube/okuthakiwe/ ingxube/ikhampawundi	ikhampawundi	Is the preferred term equivalent
concentration	ukushunqisa ingqikithi yomuthi ukuze ibe namandla kakhulu/ ukuqoqana/okuqoqene/ ukujiya/ukushuba	ukuqoqana	Is the preferred term equivalent
concentration gradient	umehlukoqoqana	umehlukoqoqana	Is the preferred term equivalent
condense	-phendula kube ngamanzi/-guqula kube wuketshezi/-jiyisa	-phendula umhwamuko noma igesi ibe ngamanzi	Is the preferred term equivalent
condensed liquid	uketshezi olumsulwa	uketshezi olumsulwa	Is the preferred term equivalent
conductor	into yokudlulisa ukufudumala nokunye/ into ezwela ukushisa/ isidlulisigesi	isidlulisigesi	Insertable translation equivalent
constant pressure	ingcindezi engaguquki	ingcindezi engaguquki	Is the preferred term equivalent
copper (Cu)	ithusi/ikhopha	ithusi	Is the preferred term equivalent

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
coulombs	amakholombi	amakholombi	Insertable translation equivalent
covalent bond	ikhovalenti bhondi	ikhovalenti bhondi	Insertable translation equivalent
current	ukuhamba kwelekthrisithi/ ukuhamba kukagesi/ umsinga/ikharenti/ ugesi	ikharenti	Is the preferred term equivalent
cyclotron	i-cyclotron	i-cyclotron	Is the preferred term equivalent
debye	i-debye	i-debye	Is the preferred term equivalent
decomposition	ukubola/idikhomposishini	idikhomposishini	Is the preferred term equivalent
decomposition reaction	ukubihlika kwekhampawundi emagatshagatsha ibe yizingxenye zayo ezingehlukaniswe/ ukubola/ yinqubokubola/ idikhomposishini/ iri-ekshini yedikhomposishini	iri-ekshini yedikhomposishini	Is the preferred term equivalent
dehydrated	okuncishelwe ngamanzi/ okukhishwe amanzi/ okudihayidrethiwe	okudihayidrethiwe	Is the preferred term equivalent
dehydration	ukomisa/ukukhipha amanzi/idihayidreshini	idihayidreshini	Is the preferred term equivalent
density	ukuzima/ isisindo/ ukuminyana/ukucinana/ ukuzima/isisindo/ ukuminyana/ isisindomthamo/idensithi	idensithi	Is the preferred term equivalent
diamagnetic	isixoshwazibuthe/ -dayamagnethikhi	-dayamagnethikhi	Is the preferred term equivalent
diamagnetism	ukuxoshwazibuthe/ idayamagnethisimu	idayamagnethisimu	Is the preferred term equivalent
diatomic	okuma-athomumbili/ idayathomikhi	idayathomikhi	Is the preferred term equivalent
diethyl ether	i-diethyl ether	i-diethyl ether	Is the preferred term equivalent
diffuse	-xubana	-xubana	Insertable translation equivalent
diffusion	ukuxubana	ukuxubana	Insertable translation

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
			equivalent
dilute	ukuhlambulula/ukuthela amanzi	ukuhlambulula	Insertable translation equivalent
dimer	idima	idima	Insertable translation equivalent
dipole	uhlelo lukazibuthe olupholimbili/ okudayipholi	okudayipholi	Insertable translation equivalent
dipole moment	amandla kazibuthe opholimbili ngasekugcineni kwezinhlangothi zombili olunye luneshaji enegethivi olunye oliphosethivi/idayipholi momenti	idayipholi momenti	Insertable translation equivalent
diprotic (acid)	(i-esidi) enamaphrothoni amathathu angaba ama-ayoni/ (i-esidi) edayiphrothikhi	(i-esidi) edayiphrothikhi	Is the preferred term equivalent
dispersion	inhlazane/ukudamuka/ ukuhlakazeka/inhlukano	inhlukano	Is the preferred term equivalent
dissociate	-hlukana	-hlukana	Is the preferred term equivalent
dissociation	ukwahlukana/inhlukano	ukwahlukana	Is the preferred term equivalent
dissolved	-ncibilikile/ -hlakazekile/ -gqamukile/-buhlukile	-ncibilikile	Is the preferred term equivalent
distill	ukuthonsisa/ukupheka into ize ibe yisitimu/ukubekelela amathonsi,wona ageleze abe ngugologo	ukuthonsisa	Is the preferred term equivalent
distillate	ukukhongozela amathonsi esisi/ ukuconsa/ uketshezi olumsulwa olukhongozelwa ngesikhathi senqubo yedistileshini/ idistilethi	idistilethi	Is the preferred term equivalent
distillation	Indlela yokuhlukanisa uketshezi engxubeni ngokubilisa uketshezi bese umhwamuko uguquka uba wuketshezi bese lukhongozelwa/	idistileshini	Is the preferred term equivalent

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
	ukucwenga/idistileshini		
double bond	ibhondimbili	ibhondimbili	Is the preferred term equivalent
dubnium	idubhiyamu	idubhiyamu	Is the preferred term equivalent
dysprosium (Dy)	Idisphroziyamu (i-Dy)	idisphroziyamu	Is the preferred term equivalent
E	i-E	i-E	Is the preferred term equivalent
effect	okubangwayo/ umphumela/umthelela	umthelela	Is the preferred term equivalent
effervesce	-zoyizisa/-gqwambisa/-bilisa	ukuzoyizisa	Is the preferred term equivalent
effervescence	ukuzoyiza	ukuzoyiza	Is the preferred term equivalent
effuse	-phuma/-khipha	-phuma	Is the preferred term equivalent
effussion	ukuphuma/ukukhipha	ukuphuma	Is the preferred term equivalent
einsteinium	i-einsteinium	i-einsteinium	Is the preferred term equivalent
electric	-phathelene nogesi/ kagesi/-elethrikhi	-elekthrikhi	Is the preferred term equivalent
electric charge	isidonsamlilo/ubungako bukagesi/ ishaji le-elekthrikhi	ishaji le-elekthrikhi	Is the preferred term equivalent
electric current	ukuhamba kukagesi/ kwe-elekthrisithi/umsinga kagesi	umsinga kagesi	Is the preferred term equivalent
electricity	ugesi/i-ekthrisithi/ i-elethrikhi	ugesi	Is the preferred term equivalent
electric waves	amagagasi kagesi	amagagasi kagesi	Is the preferred term equivalent
electrical circuit	umzila okuhambisa ugesi/isekhethi ye-elekthrikhi	isekhethi ye-elekthrikhi	Is the preferred term equivalent
electrochemi-cal	isixhumanisi zinto kumzila ovalekile kagesi/ i-elekthrokhemikhali	i-elekthrokhemikhali	Insertable translation equivalent
electrochemi-cal cell	iseli eliyisixhumanisi zinto kumzila ovalekile kagesi/ iseli e-elekthrokhemikhali	iseli ye-elekthrokhemikhali	Is the preferred term equivalent
electrochemi-cal reaction	ukulumbana kwezithako kusixhumanisi zinto kumzila ovalekile/	iri-ekshini ye-elekthrokhemikhali	Is the preferred term equivalent

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
	iri-ekshini ye-elekthrokhemikhali		
electrochemi-stry	ukufunda ngenqubo yezithako emngceleni yezihambisi zikagesi ngama-elekthroni kanye nezihambisi zikagesi ngama-iyoni/ i-elekthrokhemisi	i-elekthrokhemisi	Is the preferred term equivalent
electrodes	isikhiphi-singenisi sama-ayoni kusihambisi ma-ayoni esiwuketshezi noma esiyijeli/ ama-elekthrodi	ama-elekthrodi	Is the preferred term equivalent
electrolysis	ukucwenga usawoti ngogesi/i-elekthrolisisi	i-elekthrolisisi	Is the preferred term equivalent
electrolyte	isakhima-ayoni/ ingxube yokudlulisa ugesi/ i-elekthrolayithi	i-elekthrolayithi	Is the preferred term equivalent
electrolyte solution	isolushini eyisihambisi ma-ayoni/isolushini ye-elekthrolayithi	isolushini ye-elekthrolayithi	Is the preferred term equivalent
electrolytic cell	iseli eguquka nokwesithako ngesikhathi ikharenti idlula kusolushini eyisihambisi ma-ayoni/yiseli e-elekthronikhi	iseli e-elekthrolithikhi	Is the preferred term equivalent
electromagne-tic radiation	ukuzandisa kwamagagasi esikhaleni esinezingxenye zogesi/iradiyeshini e-elekthromagnethikhi	iradiyeshini ye-elekthromagnethikhi	Is the preferred term equivalent
electromotive force	umehluko wamandla phakathi kwama-elekthrodi amabili/amandla okuhamba kukagesi	amandla okuhamba kukagesi	Is the preferred term equivalent
electron	into encane kangangokuba ingeze yacazwa eneshaji, ephethe ilekthroni/ i-elekthroni	i-elekthroni	Is the preferred term equivalent
electron affinity	ukukhululwa kwamandla	i-elekthroni afinithi	Is the preferred term

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
	ngesikhathi i-elekthroni ifakwa kuyi-athomu eyigesi/i-elekthroni afinithi		equivalent
electron configuration	ukuma kwama-elekthroni aku-athomu/ukuhleleka kwama-elekthroni	ukuhleleka kwama-elekthroni	Is the preferred term equivalent
electron density	ukuminyana kwama-elekthroni/ idensithi yama-elekthroni	idensithi yama-elekthroni	Is the preferred term equivalent
electron pair	ipheya lama-elekthroni/ ama-elekthroni ahamba ngamabili	ipheya lama-elekthroni	Is the preferred term equivalent
electron spin	ukupininiza kwama-elekthroni/ukushwila kwama-elekthroni	ukupininiza kwama-elekthroni	Is the preferred term equivalent
electronegati-vity	ikhono le-athomu lokudonsela ngakuyo i-elekthroni lokwabelana/ elekthronegethivithi	elekthronegethivithi	Insertable translation equivalenti
electroplate	uku-elekthropletha/ emboza into ngoqweqwe lwensimbi ngokusebenzisa ugesi	emboza into ngoqweqwe lwensimbi ngokusebenzisa ugesi	Is the preferred term equivalent
electroplating	ukwemboza insimbi ngoqweqwe lwesiliva ngokusebenzisa ilekthrisithi noma ngogesi/ emboza into ngoqweqwe lwensimbi ngokusebenzisa ugesi/ elekthroplethingi	ukwemboza into ngoqweqwe lwensimbi ngokusebenzisa ugesi	Is the preferred term equivalent
electro-reduction reaction	ukufakwa kwama-elekthroni ukwenza ama-ayoni ukuba abe negethivi/iri-ekshini ye-elekthroridakshini	iri-ekshini ye-elekthro-ridakshini	Is the preferred term equivalent
electrovalent bond	i-elekthrovalenti bhondi/ibhondi enenani lama-elekthroni elingatholwa noma elingalahlwa ngama-athomu ekwenzeni ama-ayoni	i-elekthrovalenti bhondi	Insertable translation equivalent
element	into engumsuka wezinye izinto isithako semvelo/ isithakomvelo/	i-elementi	Is the preferred term equivalent

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
	i-elementi/isishisisi sikagesi		
empirical formula	isiboniso esilula sama-elementi ento/isifanekiso ma-elementi	isifanekiso esilula sama-elementi	Is the preferred term equivalent
emulsion	ukuyikiza/umuthi oxutshwe namafutha/ uluyikiza	uluyikiza	Is the preferred term equivalent
emulsify	-yikizisa	-yikizisa	Is the preferred term equivalent
emulsified	-yikiziwe	-yikiziwe	Is the preferred term equivalent
end point	isilinganiso sezinga lenani lebheyisi elilingana nenani le-esidi elikhonjiswa ngokushintsha kombala ngesikhathi kwenziwa ithithreshini/indiphoyinti	indiphoyinti	Is the preferred term equivalent
endothermic	-endothemikhi	-endomethikhi	Is the preferred term equivalent
energy	isidlakadlaka/amandla/ ukuqinisa/ukucophelela	amandla	Is the preferred term equivalent
enthalpy	isilinganiso samandla esisetshenziswa ikakhulukazi ukufunda ngenguquko yamakhemikhali ezinto/ i-enthalpy	i-enthalpy	Is the preferred term equivalent
enthalpy change	inguquko esilinganisweni samandla esisetshenziswa ikakhulukazi ukufunda ngenguquko yamakhemikhali ezinto/ukuguquka kwe-enthalpy	ukuguquka kwe-enthalpy	Is the preferred term equivalent
environment	inhlalo okuhlalwa phakathi kwayo/inhlalo yendawo/ ubunjalo bendawo/imvelo	imvelo	Insertable translation equivalent
equivalent point	izinga lapho inani lebheyisi lilingana nenani le-esidi ngesikhathi kwenziwa ithithreshini/ iphoyinti ekhwivalenti	iphoyinti ekhwivalenti	Is the preferred term equivalent

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
ethanoic acid	uketshezi olungenambala olunephunga elikhakhayo/i-esidi ye-ethanowikhi	i-esidi ye-ethanowikhi	Is the preferred term equivalent
ether	umoya osesibhakabhakeni/ umuthi osetshenziswa njengesidakamizwa/ i-itha/uketshezi olusatshwala	i-itha	Insertable translation equivalent
ethoxy ethane	i-ethoxy ethane	i-ethoxy ethane	Insertable translation equivalent
ethylene (C_2H_4)	i-ethylene (C_2H_4)	i-ethylene (C_2H_4)	Insertable translation equivalent
external conductor	isidlulisi ngaphandle/ isidlulisi singenamthelela wangaphandle	isidlulisi ngaphandle	Is the preferred term equivalent
(molecular) formula	amazwi aklanywe kafuphi ukuze afumbathe umthetho ophethe leyo nto okukhulunywa ngayo/umthetho ofingqiwe /ifomula yemolekhuli	ifomula yemolekhuli	Is the preferred term equivalent
G	uphawu lwe-Gibbs free energy/i-G	i-G	Is the preferred term equivalent
gamma rays	imisebe engenelayo ehamba ngamagagasi azandisayo amafushane kunawe-X-reyi esikhaleni esinezingxenye zogesi/ama-gamma-reyi	ama-gamma-reyi	Is the preferred term equivalent
gas	ugesi/igesi	igesi	Is the preferred term equivalent
gas exchange	ukushintshana kwamagesi	ukushintshana kwamagesi	Is the preferred term equivalent
gold (Au)	igolide	igolide	Is the only term
H	uphawu lwe-hayidrojini/ i-H	i-H	Insertable translation equivalent
hydrogen (H)	ihayidrojini (H)/umoya ongugesi othi uma uhlanganiswa ne-oksijini kuvele amanzi	ihayidrojini (H)	Insertable translation equivalent
hydrogen ions	ama-iyoni ehayidrojini	ama-ayoni ehayidrojini	Is the only equivalent
hydrogen	amaphrothoni	amaphrothoni	Is the only equivalent

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
protons	ehayidrojini	ehayidrojini	
H^+ ions	ama-iyoni e-H^+	ama-ayoni e-H^+	Is the only equivalent
H_2O	i-H_2O	i-H_2O	Is the only equivalent
HCL molecule	imolekhuli ye-HCL	imolekhuli ye-HCL	Is the only equivalent
higher concentration	izinga eliphezulu lokushuba/izinga eluphezulu lokujiya/ izinga eliphezulu lokuqoqana	izinga eliphezulu lokuqoqana	Is the preferred term equivalent
homogenous	-luhlobo lunye/-zinhlobo ezifanayo	-hlobolunye	Is the preferred term equivalent
homogenous mixture	ingxube enezimpawu ezifanayo kuyona yonke/ ingxube ehlobolunye	ingxube yohlobolunye	Is the preferred term equivalent
homogenous substance	into ehlobo lunye	into ehlobo lunye	Is the only equivalent
heat	ukushisa/ukufudumala	ukushisa	Is the preferred term equivalent
hydrated	isixubaniso samanzi nezinye izinto/ okuqukethe amanzi/ okuhayidrethedi	okuhayidrethiwe	Is the preferred term equivalent
hydrogen (H)	umoya ongugesi othi uma uhlanganiswa ne-oksijini kuvele amanzi/ ihayidrojini (H)	ihayidrojini (H)	Is the preferred term equivalent
hydrogen chloride (HCL)	i-hydrogen chloride (HCL)	i-hydrogen chloride (HCL)	Is the preferred term equivalent
imaginary axis	umfanekiso womzila phenduka/imajinari eksisi	imajinari eksisi	Is the preferred term equivalent
ionic bond	i-iyonikhi bhondi	i-iyonikhi bhondi	Is the only translation equivalent
ion	i-iyoni/inhlansigesi	ama-iyoni	Is the preferred term equivalent
iron (Fe)	insimbi/i-ayoni (Fe)	i-ayoni (Fe)	Is the preferred term equivalent
isotopes	amasothophu	amasothophu	Is the only translation equivalent
lanthinides	ama-elementi avela phansi komhlaba ayivelakancane/ amalenthanayidi	amalenthanayidi	Insertable translation equivalent
leaves	amaqabu/amagqabu/ amacembe	amacembe	Is the preferred term equivalent
light	ukukhanya	ukukhanya	Is the preferred term equivalent

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
liquid	into engamanzi/ ingovungovu/ uketshezi	uketshezi	Is the preferred term equivalent
lower concentration	izinga lokushuba eliphansi/izinga lokujiya eliphansi/izinga lokuqoqana eliphansi	izinga lokuqoqana eliphansi	Is the preferred term equivalent
magnetic field	isigaba esinozibuthe/ indawo enozibuthe/ indawo enamandla ezungeze uzibuthe	isigaba esinozibuthe	Is the preferred term equivalent
magnetic waves	amagagasi kazibuthe	amagagasi kazibuthe	Is the preferred term equivalent
magnetite	imagnethayithi	imagnethayithi	Is the preferred term equivalent
mass	ingqumbi/isisindo	isisindo	Is the preferred term equivalent
measure	isilinganiso	isilinganiso	Is the preferred term equivalent
medium	imidiyamu	imidiyamu	Is the preferred term equivalent
metal	insimbi/okusansimbi	insimbi	Is the preferred term equivalent
metallic element	i-elementi enezimpawu zensimbi/i-elementi esansimbi	i-elementi esansimbi	Is the preferred term equivalent
molecule	okuncinyane kakhulu/ imolekhuli/ ubuncane bokugcina uma into ibuye icoliswe incishiswe futhi ayisoze ibe yileyo nto okuqalwe ngayo	imolekhuli	Is the preferred term equivalent
molten	okuncibilikile	okuncibilikile	Is the only translation equivalent
monomer	imonoma/ isakhimamolekhuli/ inhlayiya/ ehlanganisekayo	imonoma	Is the preferred term equivalent
N	i-N	i-N	Is the only translation equivalent
N Symbol	uphawu/isifaneko N	uphawu N	Is the preferred term equivalent
Na^+	i-Na^+	i-Na^+	Is the only translation equivalent
NaCL	i-NaCL	i-NaCL	Is the only translation equivalent

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
negative	-phikayo/-landulayo/ -phambene na-/okunegethivi/ okulahlekelwe ngama-elekthroni	okunegethivi	Is the preferred term equivalent
negative electrode (cathode)	i-elekthrodi enegethivi (ikhathodi)/i-elekthrodi elahlekelwe ngama-elekthroni	i-elekthrodi enegethivi (ikhathodi)	Is the preferred term equivalent
negative electron charge	Ishaji elinegethivi le-elekthroni	Ishaji elinegethivi le-elekthroni	Is the preferred term equivalent
negative ion (anion)	i-iyoni anegethivi (ama-anyoni) /i-athomu elahlekelwe ngama-elekthroni	i-ayoni enegethivi (ama-anyoni)	Is the preferred term equivalent
NH_3	i-NH_3	i-NH_3	Is the only equivalent
nickel	uhlobo lwensimbi emhlophe evama ukuhlanganiswa nezinye izinsimbi/uhlobo lwensimbi elukhuni emhloshana/inikheli	inikheli	Is the preferred term equivalent
nuclear reactor	isilawuli sokungqubuzana kwamanyukilasi/ isilawuli sokulawula ukushintsha kwemvelo kwesothophi ye-elementi ibe ngenye i-elementi	isilawuli sokungqubuzana kwamanyukilasi	Is the preferred term equivalent
nucleus	ubuphakathi kwento, into ephakathi kwezinye, kuyilapho ezinye ziqoqelene kuyo/ inyukilasi	inyukilasi	Is the preferred term equivalent
organic compound	ikhampawundi e-oganikhi/ ikhampawundi enekhabhoni	ikhampawundi enekhabhoni	Is the preferred term equivalent
orbital	indawo eku-athomu noma eku-molekhuli engathathwa ngama-elekthroni angafika kwamabili vo/i-obhithali	i-obhithali	Insertable translation equivalent
orbital arrangement	ukuhleleka kwama-elekthroni ku-obhithali	ukuhleleka kwama-elekthroni ku-obhithali	Is the preferred term equivalent

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
oxidation	ukulumbana ne-oksijini/ ukulahleka kwama-elekthroni / i-oksideshini	i-oksideshini	Is the preferred term equivalent
oxidation reduction reaction	ukudluliswa kwama-elekthroni/iri-ekshini ye-oksideshini ridakshini	iri-ekshini ye-oksideshini ridakshini	Is the preferred term equivalent
particles	amahlayihlayi/imizwayi/ izinhlayiya	izinhlayiya	Is the preferred term equivalent
periodic	ngezikhathi/-velayo/ nezikhathi	ngezikhathi	Is the preferred term equivalent
Periodic Table	isihleli ma-elementi	Isihleli ma-elementi	Is the preferred term equivalent
pH	isilinganisobumuncu/i-pH	i-pH	Is the preferred term equivalent
physical state	isimomumo/isimo	isimomumo	Is the preferred term equivalent
point	iphoyinti	iphoyinti	Is the preferred term equivalent
polar molecules	amamolekhuli angamaphola	amamolekhuli angamaphola	Is the preferred term equivalent
positive	ukulahleka kwama-elekthroni/ okuphozithivi	okuphozithivi	Is the preferred term equivalent
Positive electrode (anode)	i-elekthrodi ephozithivi (i-anodi)/i-elekthrodi eyamukele ama-elekthroni	i-elekthrodi ephozithivi (i-anodi)	Is the preferred term equivalent
positive ions (cations)	i-athomu noma imolekhuli elahlekelwe ngama-elekthroni/ama-iyoni aphozithivi (amakheshiyoni)	ama-iyoni aphozithivi (amakheshiyoni)	Is the preferred term equivalent
potential	ikhono/amandla	ikhono	Is the preferred term equivalent
potential difference/voltage	isilinganisi sekhono likagesi	isilinganisi sekhono likagesi	Is the preferred term equivalent
process	ukuqhubeka/ukuhamba/ inqubo/ukwenza	inqubo	Is the preferred term equivalent
property	okuvezwa ku-/isimo/isici	isici	Is the preferred term equivalent
radiation	ukukhishwa ngemisebe/ iradiyeshini	iradiyeshini	Is the preferred term equivalent
radio waves	amagagasi okusakaza	amagagasi okusakaza	Is the preferred term equivalent
radioactive	i-elementi ekwazi	i-elementi	Is the preferred term

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
element	ukukhipha imisebe noma izinhlayiya okugijima ngesikhulu isivinini/ i-elementi ekhipha amandla ahambisana nokushintsha kwe-asothophu ye-elementi ibe ngeyenye i-elementi/ukuhlukana kwenyukilasi ku-elementi/ i-elementi erayido-ekthivi/i-elementi eyisikhiphimisebe	eyisikhiphimisebe	equivalent
radioactive metallic element	i-elementi esansimbi ekhipha imisebe eyingozi/i-elementi esansimbi eradiyo-ekthivi/i-elementi esansimbi eyisikhiphimisebe	i-elementi esansimbi eyisikhiphimisebe	Is the preferred term equivalent
reaction	ukuphatheka/ okuphendulwa ngayo/ukulumbana kwezithako/iri-ekshini	iri-ekshini	Is the preferred term equivalent
reduction	ukunciphisa/iridakshini	iridakshini	Is the preferred term equivalent
separation	isehlukaniso/ ukwehlukanisa/ ukwehlukana	ukwehlukana	Is the preferred term equivalent
science	isayensi/isifundo sendabuko/isifundo sezemvelo	isayensi	Is the preferred term equivalent
silver	isiliva	isiliva	Is the only translation equivalent
silvery metallic element	i-elementi esiliva esansimbi	i-elementi esiliva esansimbi	Is the preferred term equivalent
solid	into eqinile njengetshe/ okujiyile/okusatshe/ okunqumile/okusongele/ okusasigaxa/okuqinile	okuqinile	Is the preferred term equivalent
simpler compound	ikhampawundi eqondile/ikhampawundi elula	ikhampawundi eqondile	Is the preferred term equivalent
solute	okuncibilikiswayo/ isincibikaliswa	isincibikaliswa	Is the preferred term equivalent
solution	Umbhubhudlo/	isolushini	Is the preferred term

SL (Eng.) term	IsiZulu translation equivalent(s)	Term selected for use in the isiZulu translation	Reason(s) for selecting the particular isiZulu term equivalent
	incibikiliselo/isolushini/ ingxube/inhlanganisela		equivalent
solvent	uketshezi oluncibilikisayo/ isincibikalisi	isincibikalisi	Is the preferred term equivalent
speed	ukushesha/ijubane/ isiqubu/isivinini	isivinini	Is the preferred term equivalent
spin	-shwila/-pininiza	-pininiza	Is the preferred term equivalent
spin arrangement	ukuhleleka kwama-elekthroni ngokupininiza ku-athomu	ukuhleleka kwama-elekthroni ngokupininiza ku-athomu	Is the preferred term equivalent
spin orientation	isikhundla sokupininiza	isikhundla sokupininiza	Is the preferred term equivalent
stable dispersion	ukusabalala okusimeme/ ukusabalala okuzinzile	ukusabalala okuzinzile	Is the preferred term equivalent
substance	isiqa/utho	utho	Is the preferred term equivalent
symbol	uphawu/isifaneko	uphawu	Is the preferred term equivalent
synonym	isinonimi/umqondofana/ igama elimqondofana	igama elimqondofana	Is the preferred term equivalent
tiltration	inqubosihlaziyi/isu elisetshenziswa ukubona inani lokuncibilike kusolushini engaziwa/ithithreshini	ithithreshini	Is the preferred term equivalent
unit	okukodwa/umuvo/ isigamu/iyunithi	iyunithi	Is the preferred term equivalent
Vanadium (V)	iVanadiyamu (V)	iVanadiyamu (V)	Is the preferred term equivalent
vapour	umhwamuko/isisi/ isitshodo	umhwamuko	Is the preferred term equivalent
visible light	ukukhanya okubonakalayo	ukukhanya okubonakalayo	Is the only translation equivalent
volume	ivolumu/indawo yokumumatha/umthamo/ ubuningi	ivolumu	Is the preferred term equivalent
water (H_2O)	amanzi	amanzi	Is the only translation equivalent
work	umsebenzi	umsebenzi	Is the only translation equivalent
X-ray	i-eksreyi/imisebe ye-X-reyi/i-X-reyi	Ama-X-reyi	Is the preferred term equivalent
zero	ilize/iqanda/uziro/okungekho/unothi/isikhathi	uziro	Is the preferred term equivalent

APPENDIX E: SOURCE AND TARGET TEXTS

English
current (*n*) *Symbol **I***. Electric charges in motion. It is the amount of charge (in coulombs) moving through an electrical circuit per time unit (in seconds). The unit of current is ampère.

Afrikaans
stroom (*n*) *Simbool **I***. Elektriese ladings in beweging. Stroom is die hoeveelheid lading (in coulomb) wat deur 'n elektriese stroombaan per tydseenheid (in sekondes) beweeg. Stroom se eenheid is ampère.

IsiZulu
ikharenti (n) *Uphawu **I***. Amashaji e-elekthrikhi ahambayo. Inani lamashaji (ngamakholombi) ahamba kusekhethi ye-elekthrikhi ngesikhathi (ngemizuzwana). Iyunithi lekharenti yi-ampère

Sepedi

English
cyclotron (*n*) A device which is used to accelerate charged particles.

Afrikaans
siklotron (*n*) 'n Instrument waarmee die bewegingspoed van gelaaide deeltjies versnel word.

IsiZulu
i-cyclotron (*n*) Okokwenza izinhlayiya ezinamashaji ukuba zisheshe.

Sepedi

English
decomposition (*n*) A reaction involving the chemical separation of a given compound into two or more simple compounds or substances, e.g. $2H_2O \rightarrow 2H_2 + O_2$. *Synonym* **decomposition reaction**. ♣ **decompose** (*v*).

Afrikaans
ontbinding (*n*) 'n Reaksie wat meebring dat 'n bepaalde verbinding afgebreek word tot twee of meer eenvoudiger verbindings, bv. $2H_2O \rightarrow 2H_2+O_2$. *Sinoniem* **ontbindingsreaksie**. ♣ **ontbind** (*w*).

IsiZulu
idikhompozishini (n) Yiri-ekshini ebandakanya ukwehlukana kwamakhemikhali aleyo khampawundi ibe ngamakhampawundi aqondile amabili noma ngaphezulu noma ibe yizinto ezimbili noma ngaphezulu, isb. $2H_2O \rightarrow 2H_2 + O_2$. *Umqondofana* **inqubo yedikhompozishini**. ♣ ukudikhompoza (*v*).

Sepedi

English
dehydration (*n*) The removal of water from any substance, e.g. $CuSO_4.5H_2O$ (hydrated copper sulphate) → $CuSO_4 + 5H_2O$ (dehydrated copper sulphate + water).
Opposite **hydration**. ♣ **dehydra**

Afrikaans
dehidrasie (*n*) Die onttrekking van water uit enige stof, bv. $CuSO_4.5H_2O$ (gehidreerde kopersulfaat) → $CuSO_4 + 5H_2O$ (gedehidreerde kopersulfaat + water). *Sinoniem* **dehidratasie**.
Teenoorgestelde **hidrasie**. ♣ **dehidreer** (*w*).

IsiZulu
idihayidreshini (n) Ukukhishwa kwamanzi kunoma yiluphi utho, isb. $CuSO_4.5H_2O$ (yi-copper sulphate ehayidrethiwe) → $CuSO_4 + 5H_2O$ (yi-copper sulphate edihayidrethiwe + amanzi).
Okumqondophikisa **ihayidreshini**. ♣ **ukudihayidretha** (*v*).

Sepedi

English
density (*n*) Mass per unit of volume, e.g. the density of mercury is 13,5 $g.cm^{-3}$.

Afrikaans
digtheid (*n*) Massa per volume-eenheid, bv. die digtheid van kwik is 13,5 $g.cm^{-3}$.

IsiZulu
idensithi (*n*) Isisindo seyunithi yevolumu, isib. idensithi yemekhuri engama-13,5 $g.cm^{-3}$.

Sepedi

English
diamagnetism (*n*) The property of a substance that causes an externally applied magnetic field to be reduced within the substance. ♣ **diamagnetic** (*a*).

Afrikaans
diamagnetisme (*n*) Die eienskap van 'n stof wat meebring dat 'n ekstern aangelegde magnetiese veld in die stof verlaag word. ♣ **diamagneties** (*a*).

IsiZulu
idayamagnethisimu (*n*) Isimo sento esidala ukwehla kwesigaba sikazibuthe esifakwe ngaphandle ngaphakathi kwaleyo nto. ♣ **okudayamagnethikhi** (*a*).

Sepedi

English
diatomic (*a*) A substance is diatomic when each molecule consists of two atoms, e.g. carbon monoxide (CO); hydrogen chloride (HCl).

Afrikaans
diatomies (*a*) 'n Stof is diatomies wanneer elke molekule uit twee atome bestaan, bv. koolstofmonoksied (CO); waterstofchloried (HCl).

IsiZulu
okuyidayathomikhi (*a*) Utho luba dayathomikhi uma leyo naleyo molekhuli inama-athomu amabili, isb. ikhabhoni monoksayidi (CO); i-hydrogen chloride (HCl).

Sepedi

English
diethyl ether (*n*) An organic compound with the *formula* **$(CH_3)_2O$**. *Synonym* **ether**[1] (trivial name), ethoxy ethane**.**

Afrikaans
diëtieleter (*n*) 'n Organiese verbinding met die *formule* **$(CH_3)_2O$**. *Sinoniem* **eter**[1] (triviaalnaam), etoksiëtaan.

IsiZulu
i-diethyl ether (*n*) yi-oganikhi khampawundi *enefomula* **$(CH_3)_2O$**. *Okumqondofana* **i-ether**[1] (igama ngqo), i-ethoxy ethane**.**

Sepedi

English
diffusion (*n*) The process during which a substance moves from a higher to a lower concentration. **a**. The diffusion of gases is the process whereby gases mix together, reducing any concentration gradient to zero, e.g. in gas exchange between plant leaves and air. **b**. The diffusion of solutions involves free movement of molecules or ions of a dissolved substance through a solvent. ♣ **diffuse** (v).

Afrikaans
diffusie (*n*) Die proses waartydens 'n stof van 'n hoër na 'n laer konsentrasie beweeg. **a**. Die diffusie van gasse is die proses waardeur gasse vermeng en sodoende enige konsentrasieverskil na nul verlaag, bv. tydens die uitruiling van gasse tussen die blare van plante en lug. **b**. Die diffusie van oplossings behels die vrye beweging van molekule of ione van die opgeloste stof deur die oplosmiddel. ♣ **diffundeer** (*w*).

IsiZulu

ukuxubana (*n*) Yinqubo lapho utho lusuka lapho luqoqene khona luya ngalapho lungaqoqananga khona. **a**. Ukuxubana kwamagesi yilapho amagesi ehlangana ndawonye, ehlisa izinga lokuqoqana liye kuziro, isb. ekushintshaneni kwamagesi phakathi kwamacembe kanye nasemoyeni. **b**. Ukuxubana kwamasolushini kubandakanya ukuhamba ngokukhululeka kwamamolekhuli noma ama-iyoni otho oluncibilikile kusincibikalisi. ♣ **xubana** (v).

Sepedi

English
dilute[1] (*v*) To reduce the strength of a solution, i.e. to lower the concentration of the solute by adding solvent. ♣ **dilution** (*n*).

Afrikaans
verdun[1] (*w*) Om 'n oplossing flouer te maak, d.w.s. om die konsentrasie opgeloste stof te verlaag deur oplosmiddel by te voeg. ♣ **verdunning** (*n*).

IsiZulu
hlambulula[1] (*v*) Ukwehlisa amandla esolushini, okusho ukuthi ukwehlisa izinga lokuqoqana kwesincibikaliswa ngokuthela isincibikalisi. ♣ **ukuhlambulula** (*n*).

Sepedi

English
dilute[2] (*a*) A solution is dilute when the amount of solute is small compared to that of the solvent.

Afrikaans
verdun (*a*) 'n Oplossing is verdun wanneer die hoeveelheid opgeloste stof min is in verhouding tot die hoeveelheid oplosmiddel.

IsiZulu
hlambulukile [2] (*a*) Isolushini isuke ihlambulukile uma inani lesincibikaliswa lilincane uma liqhathaniswa nalelo lesincibikalisi.

Sepedi

English
dimer (*n*) A molecule resulting from the combination of two identical molecules called monomers, e.g. butene (C_4H_8) is a dimer of ethylene (C_2H_4).

Afrikaans
dimeer (*n*) 'n Molekuul wat ontstaan uit die verbinding van twee identiese molekule, genaamd monomere, bv. buteen (C_4H_8) is a dimeer van etileen (C_2H_4).

IsiZulu

idima (*n*) Yimolekhuli edalwa wukuhlangana kwamamolekhuli amabili afanayo abizwa amamonoma, isib. ibhutheni (C_4H_8) iyidima ye-ethylene (C_2H_4).

Sepedi

English
dipole moment (*n*) A measure of the separation between centres of positive and negative charges in polar molecules, e.g. the dipole moment of NaCl = 9,0 debye; the dipole moment of H_2O = 1,85 debye; the dipole moment of NH_3 = 1,47 debye. The unit, debye, is equal to $3{,}335 \times 19^{-30}$Cm.

Afrikaans
dipoolmoment (*n*) Die mate van skeiding tussen die kerne van positiewe en negatiewe ladings in polêre molekule, bv. die dipoolmoment van NaCl = 9,0 debye; die dipoolmoment van H_2O = 1,85 debye; die dipoolmoment van NH_3 = 1,47 debye. Die eenheid, debye, is gelyk aan $3{,}335 \times 10^{-30}$Cm.

IsiZulu
idayipholi momenti (*n*) Yisilinganiso sokwehlukana phakathi kwendawo ephosithivi naleyo enegethivi kumaphola molekhuli, isib. idayipholi momenti ye-NaCl = 9,0 i-debye; idayipholi momenti
ye-H_2O = 1,85 i-debye; idayipholi momenti ye-NH_3 = 1,47 i-debye. Iyunithi, i-debye, ilingana ne-$3{,}335 \times 19^{-30}$Cm.

Sepedi

English
diprotic (*a*) A base is diprotic when it is capable of accepting two hydrogen ions (protons); an acid is diprotic when it is capable of donating two hydrogen ions (protons).

Afrikaans
diproties (*a*) 'n Basis is diproties wanneer dit twee waterstofione (protone) kan ontvang; 'n suur is diproties wanneer dit twee waterstofione (protone) kan skenk.

IsiZulu
edayiphrothikhi (*a*) Ibheyisi isuke idayiphrothikhi uma ikwazi ukwamukela ama-iyoni ehayidrojini amabili (okungamaphrothoni); i-esidi isuke idayaphrothikhi uma ikwazi ukunikela ngama-iyoni ehayidrojini amabili (okungamaphrothoni).

Sepedi

English
dispersion (*n*) A distribution of colloidal particles in a medium,

e.g. in colloidal sulphur the dispersion is the tiny particles of sulphur in the aqueous system. *Synonym* **colloidal dispersion**. ♣ **disperse** (*v*).

Afrikaans
dispersie (*n*) Die verspreiding van kolloïdale deeltjies/partikels in 'n medium, bv. in kolloïdale swael is die dispersie die klein swaeldeeltjies in 'n waterige sisteem. *Sinoniem* **kolloïdale dispersie**.
♣ **dispergeer** (*w*).
IsiZulu
ukuhlakazeka (*n*) Ukusabalala kwezinhlayiya ezikholodi kumidiyamu, isib. kusalfa ekholodi izinhlayiya ezincanyana zesalfa yizo ezisakazekile ezikuhlelo lwesincibikalisi samanzi. *Umqondofana* **ukuhlakazeka okukholodi**. ♣ **ukuhlukana** (*v*).

Sepedi

English
dissociation (*n*) The separation of a compound into simpler compounds or atoms, e.g. the dissociation of acetic acid in water to form H^+ ions and acetate ions. ♣ **dissociate** (*v*)

Afrikaans
dissosiasie (*n*) Die verdeling van 'n verbinding in eenvoudiger verbindings of atome, bv. die dissosiasie van asynsuur in water om H^+-ione en asetaatione te vorm. ♣ **dissosieer** (*w*).

IsiZulu
ukwahlukana (*n*) Ukwehlukana kwamakhampawundi abe ngamakhampawundi aqondile noma abe ngama-athomu, isib. ukwahlukana kwe-asethikhi esidi emanzini ukuze kudaleke ama-iyoni e-H^+ kanye nama-iyoni e-asethethi. ♣ **ukuhlukana** (*v*)

Sepedi

English
dissolve (*v*) When a solid or a gas is dissolved in a liquid, a homogeneous mixture is formed, e.g. sugar can be dissolved in water. ♣ **dissolution** (*n*).

Afrikaans
oplos (*w*) Wanneer 'n vaste stof of 'n gas opgelos word, word ‘n homogene mengsel gevorm. Suiker kan bv. in water opgelos word. ♣ **oplossing** (*n*).

IsiZulu
ncibilikisa (*v*) Uma okuqinile noma igesi kuncibilika oketshezini, kudaleka ingxube yohlobo lunye, isib. ushukela ungancibilikiswa emanzini. ♣ **ukuncibilika** (*n*).

Sepedi

English
dissolved substance (*n*) A substance that changes its physical state when a homogeneous mixture is prepared, and which is present in less than 50% of the resultant mixture.

Afrikaans
opgeloste stof (*n*) 'n Stof waarvan die fisiese toestand verander wanneer 'n homogene mengsel voorberei word, en wat minder as 50% van so 'n mengsel uitmaak.

IsiZulu
utho oluncibilikile (*n*) Utho olushintsha isimomumo lwaso ngesikhathi kudaleka ingxube ehlobo lunye, futhi engaphansi kwama-50% kuleyo ngxube edalekile.

Sepedi

English
distillation (*n*) The process of producing a gas or vapour from a liquid by heating to the boiling point, condensing the vapour, and collecting the distillate (condensed liquid). ♣ **distill** (*v*); **distillate** (*n*).

Afrikaans
distillasie (*n*) Die proses waartydens 'n gas of damp uit 'n vloeistof gevorm word deurdat die vloeistof tot kookpunt verhit word, die damp gekondenseer word, en die distillaat (gekondenseerde vloeistof) opgevang word. ♣ **distilleer** (*w*); **distillaat** (*n*).

IsiZulu
idistileshini (*n*) Inqubo yokwenza igesi noma umhwamuko ngoketshezi ngokulishisisa luze lube sesimeni sokubila, ukuguqula umhwamuko ube ngamanzi, kanye nokukhongozela idistilethi (uketshezi olumsulwa). ♣ **thonsisa** (*v*); **idistilethi** (*n*).

Sepedi

English
double bond (*n*) A covalent bond that is formed by sharing two pairs of electrons between two atoms, e.g. in the alkenes and alkanones.

Afrikaans
dubbelbinding (*n*) 'n Kovalente binding wat gevorm word deurdat twee atome twee pare elektrone deel, bv. by die alkene en alkanone.

IsiZulu
ibhondimbili (*n*) Ikhovalenti bhondi edaleke ngenxa yokwabelanwa kwamapheya amabili ama-elekthroni phakathi kwama-athomu amabili, isib. kuma-alikhini nakuma-alikhenoni.

Sepedi

English
dubnium (*n*) *Symbol* **Db**. A radioactive element in Group 5 of the Periodic Table, with atomic number 105.

Afrikaans
dubnium (*n*) *Simbool* **Db.** 'n Radioaktiewe element in Groep 5 van die Periodieke Tabel, met atoomgetal 105.

IsiZulu
idubhinyamu (*n*) *Uphawu* **Db**. I-elementi eradiyo-ekthivi kuQembu lesi-5 Kusihleli Ma-elementi, enenombolo ye-athomu engu-105.

Sepedi

English
dysprosium (*n*) *Symbol* **Dy**. A silvery metallic element in Group 3 of the Periodic Table (the lanthanides), with atomic number 66. It is used to make magnets and control rods in nuclear reactors.

Afrikaans
disprosium (*n*) *Simbool* **Dy**. 'n Silwerige, metaalagtige element in Groep 3 van die Periodieke Tabel (die lantaniede), met atoomgetal 66. Dit word gebruik vir die maak van magnete, en beheerstawe in kernreaktore.

IsiZulu
idiphroziyamu (*n*) *Uphawu* **Dy**. Yi-elementi esansimbi ecwebezelayo Kuqembu 3 Kusihleli Ma-elementi (okungamalenthanayidi), enenombolo ye-athomu engu-66. Isetshenziselwa ukwenza ozibuthe kanye nezinti zokulawula kuzilawuli zokugqubuzana kwamanyukilasi.

Sepedi

English
effervescence (*n*) The bubbling of a solution of an element or chemical compound as the result of the emission of gas, without the application of heat, e.g. the escape of carbon dioxide from carbonated water. ♣ **effervesce** (*v*); **effervescent** (*a*).

Afrikaans
opbruising (*n*) Die borreling van 'n oplossing van 'n element of 'n chemiese verbinding, wat veroorsaak word deur die vrystelling van 'n gas sonder die aanwending van hitte, bv. die ontsnapping van koolstofdioksied uit gekarboneerde water. ♣ **opbruis** (*w*); **opbruisend** (*a*).

IsiZulu
ukuzoyiza (*n*) Ukuhlihla kwamagwebu esolushini e-elementi noma ekhampawundi yekhemikhali ngenxa yokuphuma kwegesi, ngaphandle kokushisisa, isib. ukuphuma kwekhabhoni dayoksayidi emanzini anekhabhoni encibilikile. ♣ **zoyiza** (*v*); **zoyizayo** (*a*).

Sepedi

English
effusion (*n*) The passage of a gas through a small hole under pressure.
♣ **effuse**.

Afrikaans
effusie (*n*) Die uitstroming van 'n gas deur 'n klein opening wanneer dit onder druk verkeer.

IsiZulu
ukuphuma (*n*) Umgudu okuphuma ngawo igesi oyimbobo encane lapho iphuma ngokumpitsheka.
♣ **phuma**.

Sepedi

English
einsteinium (*n*) *Symbol* **Es**. A radioactive metallic element in Group 3 of the Periodic Table (one of the actanides), with atomic number 99. It has several isotopes with half-lives up to 2 years.

Afrikaans
einsteinium (*n*) *Simbool* **Es**. 'n Radioaktiewe metaalelement in Groep 3 van die Periodieke Tabel (een van die aktiniede), met atoomgetal 99. Dit het verskeie isotope met halveertye tot 2 jaar.

IsiZulu
i-einsteinium (*n*) *Uphawu* **Es**. Yi-elementi esansimbi eyisikhiphimisebe Kuqembu 3 Kuhlelo Ma-elementi (enye yama-actanide), enenombolo ye-athomu engu-99. Inamasothophu amaningana aphila impilo eyisigamu kufikela eminyakeni emi-2.

Sepedi

English
electrochemistry (*n*) A branch of science that is i.a. concerned with the effects of electric current on chemicals, particulary electrolytes, and the generation of electricity by chemical action (as in an electrolytic cell).

Afrikaans
elektrochemie (*n*) 'n Vertakking van die wetenskap wat o.a. gemoeid is met die bestudering van die invloed van elektriese stroom op chemikalieë, veral elektroliete, en die generering van elektrisiteit deur middel van chemise prosesse (soos in 'n elektrolitiese sel).

IsiZulu
i-elekthrokhemisi (*n*) Yigatsha lezesayensi elimayelana nomthelela womsinga kagesi kumakhemikhali, ikakhulukazi kuma-elekthrolayithi, kanye nokudaleka kukagesi ngokwenza kwamakhemikhali (njengasekuseli e-elekthrolithikhi).

Sepedi

English
electrochemical cell (*n*) A combination of two electrodes arranged so that an overall oxidation-reduction reaction produces an electromotive force.

Afrikaans
elektrochemiese sel (*n*) 'n Kombinasie van twee elektrodes wat so gerangskik is dat die oksidasie-reduksiereaksie 'n elektromotoriese krag voortbring.

IsiZulu
iseli e-elekthrokhemikhali (*n*) Inhlanganisela yama-elekthrodi amabili ahlelwe ngendlela yokuthi yonke iri-ekshini ye-oksideshini-ridakshini ikhiqize amandla okuhamba kukagesi.

Sepedi

English
electrochemical reaction (*n*) A reaction during which oxidation as well as reduction take place and where the electrons are transferred via an external conductor.

Afrikaans
elektrochemiese reaksie (*n*) 'n Reaksie waartydens sowel oksidasie as reduksie plaasvind en waarby die elektrone deur ‘n eksterne geleier oorgedra word..

IsiZulu
iri-ekshini ye-elekthrokhemikhali (*n*) Yiri-ekshini lapho kwenzeka i-oksideshini kanye neridakshini nalapho ama-elekthroni edluliswa ngokudlula kusidlulisi sangaphandle.

Sepedi

English

electrolysis (*n*) The decomposition of a chemical compound by passing an electric current through a solution (the electrolyte). The process results in the migration of the ions to the electrodes: positive ions (cations) to the negative electrode (cathode) and negative ions (anions) to the positive electrode (anode).

Afrikaans
elektrolise (*n*) Die ontbinding van 'n chemiese verbinding deur middel van 'n elektriese stroom wat deur 'n oplossing (die elektroliet) gestuur word. Die resultaat van die proses is die verspreiding van die ione na die elektrodes: positiewe ione (katione) na die negatiewe elektrode (katode) en negatiewe ione (anione) na die positiewe elektrode (anode).

IsiZulu
i-elekthrolisisi (*n*) Yidikhompozishini yekhampawundi yekhemikhali eyenzeka ngokudlulisa umsinga kagesi kusolushini (i-elekthrolayithi). Le nqubo idala ukuhamba kwama-iyoni aye kuma-elekthrodi: ama-iyoni aphosethivi (amakheshiyoni) aya kwi-elekthrodi enegethivi (ikhathodi) kanye nama-iyoni anegethivi (ama-enyoni) aya kwi-elekthrodi ephosithivi (i-anodi).

Sepedi

English
electrolyte (*n*) A chemical compound which, when molten or dissolved in solvents like water, will conduct an electric current, e.g. Na^+ and Cl^- in a aqueous solution. ♣ **electrolytic** (*a*).

Afrikaans
elektroliet (*n*) 'n Chemiese verbinding wat 'n elektriese stroom kan gelei wanneer dit gesmelt word of in 'n oplosmiddel soos water opgelos word, bv. Na^+ and Cl^- in 'n waterige oplossing. ♣ **elektrolities** (*a*).

IsiZulu
i-elekthrolayithi (*n*) Ikhampawundi yekhemikhali okuthi uma incibilikile kuzincibikalisi ezifana namanzi, ihambise umsinga kagesi, isib. Na^+ kanye ne- Cl^- kwisolushini yamanzi. ♣
e-elethrolithikhi *(a)*

Sepedi

English
electrolytic cell (*n*) A cell consisting of electrodes immersed in an electrolyte solution for carrying out electrolysis.

Afrikaans
elektroliltiese sel (*n*) 'n Sel bestaande uit elektrodes in 'n elektrolietoplossing om elektrolise te laat plaasvind.

IsiZulu
iseli e-elethrolithikhi (*n*) Iseli equkethe ama-elekthrodi acwile kusolushini e-elekthrolayithi ukuze yenze i-elekthrolisisi.

Sepedi

English
electromagnetic radiation (*n*) Radiation which is propagated through both electric and magnetic waves at the speed of light,
e.g. visible light, gamma rays, X-rays, radio waves.

Afrikaans
elektromagnetiese straling (*n*) Straling wat deur elektriese asook magnetiese golwe teen die spoed van lig voortplant,
bv. sigbare lig, gammastrale, X-strale, radiogolwe.

IsiZulu
iradiyeshini ye-elekthromagnethikhi (*n*) Iradiyeshini ezandisa ngamagagasi kagesi nakazibuthe ngesivivini sokukhanya,
isib. ukukhanya okubonakalayo, ama-gamma ray, ama-X-ray, amagagasi omsakazo.

Sepedi

English
electromotive force (*abbreviation* e.m.f.) (*n*) *Symbol* **E**. The potential difference between the two electrodes of an electrochemical cell.

Afrikaans
elektromotoriese krag (*n*) *Simbool* **E**. Die verskil tussen die potensiale van die twee elektrodes van 'n eletrochemiese sel.

IsiZulu/
amandla okuhamba kukagesi (*isifinyezo* e.m.f.) (*n*) *Uphawu* **E**. Umehluko wamandla kagesi phakathi kwama-elekthrodi amabili eseli e-elekthrokhemikhali.

Sepedi

English
electron (*n*) A particle with a negative electric charge found in the space about the nucleus of an atom.
Compare NEUTRON; PROTON.

Afrikaans
elektron (*n*) 'n Deeltjie, kleiner is as 'n atoom, met 'n negatiewe elektriese lading wat in die ruimte rondom die kern van ‘n atoom voorkom.

Vergelyk NEUTRON; PROTON.

IsiZulu
i-elekthroni (*n*) Inhlayiya eneshaji elinegethivi elisesikhaleni esijikeleza inyukilasi ye-athomu.
Qhathanisa INYUTHRONI; IPHROTHONI.

Sepedi

English
electron affinity (*n*) The work or energy needed in removing an electron from a negative ion.

Afrikaans
elektronaffiniteit (*n*) Die arbeid of energie wat nodig is om 'n elektron van 'n negatiewe ioon te verwyder.

IsiZulu
i-elekthroni afinithi (*n*) Umsebenzi noma ngamandla adingekayo ekususeni i-elekthroni ku-iyoni enegethivi.

Sepedi

English
electron configuration (*n*) The electron configuration of an atom is the orbital and spin arrangement of its electrons.

Afrikaans
elektronkonfigurasie (*n*) Die elektronkonfigurasie van 'n atoom is die orbitaal- en spinrangskikking van die elektrone.

IsiZulu
ukuhleleka kwama-elekthroni (*n*) Ukuhleleka kwama-elekthroni e-athomu kusho ukuhleleka kwe-obhithali kanye nokuhleleka kokupininiza kwama-elekthroni ayo.

Sepedi

English
electron density (*n*) The electron density at a particular point in space in an atom or molecule is the probability that the electron will be found in the region immediately around that point.

Afrikaans

elektrondigtheid (*n*) Die elektrondigtheid op 'n bepaalde punt in die ruimte binne 'n atoom of molekuul is die waarskynlikheid dat die elektron in die onmiddellike omgewing van daardie punt sal voorkom.

IsiZulu
idensithi yama-elekthroni (*n*) Idensithi yama-elekthroni ephoyintini elithile ku-athomu noma kumolekhuli ikhombisa ukuthi kungenzeka i-elekthroni itholakale endaweni eseduze naleyo phoyinti.

Sepedi

English
electronegativity (*n*) The extent to which an atom that is bonded to another atom attracts electrons to itself, e.g. since the electronegativity of the Cl atom is higher than that of the H atom in the HCl molecule, the bonding electrons are closer to Cl. ♣ **electronegative** (*a*)

Afrikaans
elektronegatiwiteit (*n*) Die mate waarin 'n atoom wat aan 'n ander atoom verbind is, elektrone na homself aantrek. Aangesien die elektronegatiwiteit van die Cl-atoom in die HCl-molekuul bv. hoër is as dié van die H-atoom in die HCl-molekuul, is die bindingselektrone nader aan Cl. ♣ **elektronegatief** (*a*)

IsiZulu
i-elekthronegethivithi (*n*) Amandla e-athomu exhumeleke ngawo kwenye i-athomu edonsela ama-elekthroni ngakuyo, isib. njengoba i-elekthronegethivithi ye-athomu ye-Cl ingaphezulu kwaleyo ye-athomu ye-H kumolekhuli ye-HCl, ama-elekthroni akubhondi aseduzane ne-Cl. ♣ **-elekthronegethivi** (*a*)

Sepedi

English
electron pair (*n*) Two electrons with opposite spin orientation sharing one orbital.

Afrikaans
elektronpaar (*n*) Twee elektrone met teenoorgestelde spinrigtings wat een orbitaal deel.

IsiZulu
ipheya lama-elekthroni (*n*) Ama-elekthroni amabili anezikhundla zokupininiza eziphambanayo ku-obhithali eyodwa.

Sepedi

English
electron spin (*n*) The spin of an electron around an imaginary axis.

Afrikaans
elekronspin (*n*) Die spin van 'n elektron om 'n denkbeeldige as.

IsiZulu
ukupininiza kwama-elekthroni (*n*) Ukupininiza kwama-elekthroni ejikeleza kumajinari eksisi.

Sepedi

English
electroplating (*n*) The process of depositing a layer of metal on an article by the process of electrolysis, e.g. electroplating with copper; chromium; nickel; gold; silver. ♣ **electroplate** (*v*).

Afrikaans
elektroplatering (*n*) Die afsetting van 'n metaallaag op 'n artikel deur die proses van elektrolise, bv. elektroplatering met koper; chroom; nikkel; goud; silwer. ♣ **elektroplateer** (*w*).

IsiZulu
ukwemboza into ngoqweqwe lwensimbi ngokusebenzisa ugesi (*n*) Ukwemboza into ngoqweqwe lwensimbi ngenqubo ye-elekthrolisisi, isb. ukwemboza ngethusi; ngekhroniyamu; ngenikheli; ngegolide; ngesiliva. ♣ **emboza into ngoqweqwe lwensimbi ngokusebenzisa ugesi** (*v*).

Sepedi

English
electrovalent bond *See* IONIC BOND.

English
element (*n*) A substance whose atoms all have the same atomic number, e.g. hydrogen (H), gold (Au), iron (Fe).

Afrikaans
element (*n*) 'n Stof waarvan die atome almal dieselfde atoomgetal het, bv. waterstof (H), goud (Au), yster (Fe).

IsiZulu
i-elekthrovalenti-bhondi *Bheka* I-IYONIKHI BHONDI.

Sepedi

English
element (*n*) A substance whose atoms all have the same atomic number, e.g. hydrogen (H), gold (Au), iron (Fe).

Afrikaans
element (*n*) 'n Stof waarvan die atome almal dieselfde atoomgetal het, bv. waterstof (H), goud (Au), yster (Fe).

IsiZulu
i-elementi (*n*) Wutho okungukuthi wonke ama-athomu ayo anenombolo ye-athomu efanayo, isib. ihayidrojini (H), igolide (Au), i-ayoni (Fe).

Sepedi

English
empirical formula (*n*) The simplest chemical formula for a compound, e.g. the empirical formula of ethanoic acid is $C_2H_4O_2$.

Afrikaans
empiriese formule (*n*) Die eenvoudigste chemiese formule vir 'n verbinding, bv. die empiriese formule vir etanoësuur is $C_2H_4O_2$.

IsiZulu
isifanekiso esilula sama-elementi (*n*) Ifomula yekhemikhali eqondile yekhampawundi, isib. isifanekiso esilula se-elementi ye-ithanoyikhi esidi yi-$C_2H_4O_2$.

Sepedi

English
emulsion (*n*) A stable dispersion of one liquid in a second liquid when these liquids are incapable of being mixed to form a homogeneous substance, e.g. oil dispersed in water. ♣ **emulsify** (*v*); **emulsified** (*a*).

Afrikaans
emulsie (*n*) 'n Stabiele dispersie (verspreiding) van twee onmengbare vloeistowwe om 'n homogene stof te vorm. Olie kan bv. 'n emulsie met water vorm. ♣ **emulgeer** (*w*); **geëmulgeerde** (*a*).

IsiZulu
uluyikiza (*n*) Ukusabalala okuzinzile koketshezi kolunye uketshezi kanti lolu ketshezi olubili alukwazi ukuhlangana ukuze kudaleke utho oluhlobolunye, isib. uwoyela osabalele emanzini. ♣ **yikizisa** (*v*); **yikizayo** (*a*).

Sepedi

English
endothermic (*a*) A chemical reaction is endothermic when energy is absorbed from the environment, e.g. the formation of carbon monoxide and hydrogen from coke and water; the formation of magnetite from iron and water.

Afrikaans
endotermies (*a*) 'n Chemiese reaksie is endotermies wanneer energie uit die omgewing geabsorbeer word, bv. die vorming van koolstofmonoksied en waterstof uit kooks en water; die vorming van magnetiet uit yster en water.

IsiZulu
e-endothemikhi (*a*) Iri-ekshini yekhemikhali iyaye ibe endothemikhi uma amandla edonswa ngaphandle, isib. ukudaleka kwekhabhoni monoksayidi kanye nehayidrojini ngokokubasela umlilo okuqinile namanzi; ukudaleka kwemagnethayithi nge-ayoni namanzi.

Sepedi

English
end point (*n*) The end point in a titration is that stage at which an effect, such as a colour change, occurs, indicating that a desired point in the titration has been reached.
Compare EQUIVALENCE POINT.

Afrikaans
endpunt (*n*) Die endpunt in 'n titrasie is die stadium waarop 'n bepaalde effek, byvoorbeeld 'n kleurverandering, waargeneem kan word. Dit is dan 'n aanduiding dat die verlangde punt in die titrasie bereik is. *Sinoniem* **omslagpunt**.
Vergelyk EKWIVALENSIEPUNT

IsiZulu
indiphoyinti (*n*) Indiphoyinti kuthitreshini yilelo zinga lapho umphumela, njengokushintsha kombala, kwenzeka, okukhombisa ukuthi lelo zinga ebelibhekiwe kuthithreshini selificiwe.
Qhathanisa IKHWIVALENSI PHOYINTI.

Sepedi

English
energy (*n*) The potential to do work or to transfer heat.

Afrikaans
energie (*n*) Die potensiaal om werk te doen of hitte oor te dra.

IsiZulu
amandla (*n*) Ikhono lokwenza umsebenzi noma ukudlulisa ukushisa.

Sepedi

English
enthalpy (*n*) *Symbol **H***. The heat content of a substance which accompanies its change from one state to another.

Afrikaans
entalpie (*n*) *Simbool **H***. Die hitte-inhoud van 'n stof, wat gepaard gaan met die toestandsverandering daarvan.

IsiZulu
i-enthalpy (*n*) *Uphawu **H***. Wukushisa okuqukethwe wutho okuhambisana nokuguquka lwayo ukusuka kwesinye isimo kuye kwesinye.

Sepedi

English
enthalpy change (*n*) *Symbol **ΔH***. The enthalpy change for a reaction that occurs at constant pressure is the heat gained or lost by a system.

Afrikaans
entalpieverandering (*n*) *Simbool **ΔH***. Die entalpieverandering van 'n reaksie wat by konstante druk plaasvind, is die hitte wat gedurende die reaksie afgegee of opgeneem word.

IsiZulu
ukushintsha kwe-enthalpy (*n*) *Uphawu **ΔH***. Ukushintsha kwe-enthalpy kuri-ekshini eyenzeka kungcindezi engaguquki kuwukushisa okutholwe noma okulahlwe wuhlelo.
Sepedi