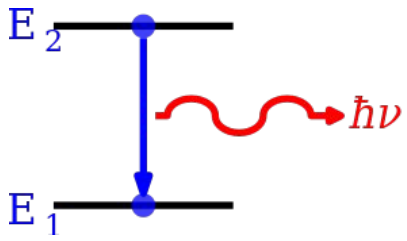
# CMY 133 (2019)

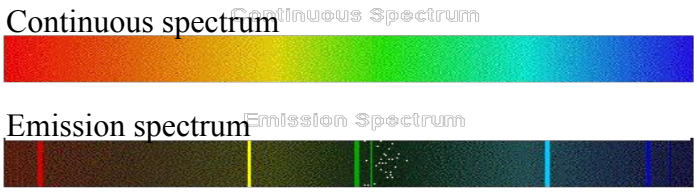
## Practical 6: Emission Spectra & Spectroscopy

Lab coat & Safety glasses
Microkit not required
Bring scissors and a glue stick. Sticky Tape is recommended. A Craft Knife is optional and at your own risk.
Pre-prac questions are required for entry into the lab.

**Required self-study: Kotz et al. 10th & 9th Ed.**
**10th ed. Section 6.1 – 6.3 PP 277 - 289**
**9th ed. Section 6.1 – 6.3 PP 220 - 233**

Have you ever seen a green flame or a purple flame? When alkali metals are heated their outermost electrons are easily excited into a higher energy level. However these electrons cannot remain in the excited state and therefore fall back down to the ground energy state. When the electrons fall down they emit energy of a characteristic wavelength and this generates an emission spectrum. There are many possible electron transitions for each atom and each transition has a specific energy difference. This means that each element emits light of a characteristic colour in the visible region of the electromagnetic spectrum and each elements emission spectrum is unique. An emission spectrum can thus be used in chemical analysis in order to identify elements present and how much of the element is present.




### Experiment 1: The Mini Spectroscope (Schwabacher, 1999)

**Flow Diagram not required for this experiment**

**Aim:** Build a mini spectroscope and use it to observe different types of light sources.

When white light is passed through a prism the light is split into the colours of the rainbow. This is due to the fact that white light is made up of the combination of these colours. Spectroscopes contain a prism or diffraction grating which is able to spread light waves out according to their wavelengths, with shorter wavelengths being deflected or diffracted more than longer ones. The electromagnetic spectrum including the visible spectrum is arranged in order of wavelengths with red having the longest wavelength and violet the shortest. Not all colours of the rainbow are always present in what we interpret as white light. Light from an incandescent bulb is spread into a continuous spectrum with one colour running into the next, while fluorescent lights show distinct banding. Coloured light is often a blend of different colours and when viewed through a spectroscope can be broken up into its constituents.

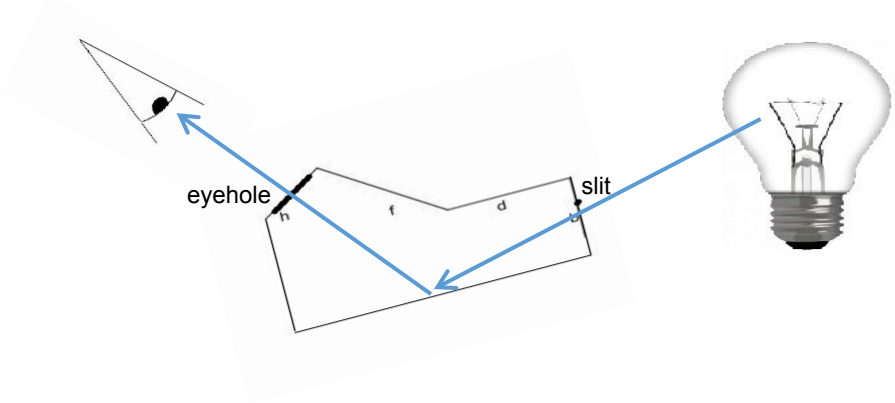
**Apparatus and equipment**

| | |
|---|---|
| Mini Spectroscope template | Scissors |
| Piece of CD | Glue (Pritt or similar) |
| Various light sources | Ruler |

**Procedure:**

1. Carefully cut out the ***slit (a-b)*** and the ***rectangular eyehole (g-h)*** first, ask for assistance if required. Do not change the dimensions of the ***slit*** and the ***rectangular eyehole.*** TIP: Practice cutting with your ruler and opened scissors on a piece of cardboard that will not be part of the final mini spectroscope.
2. Cut the provided template out. Cut along the solid lines. Do not cut along any dotted lines. Do not cut the area marked for the CD.
3. Glue the CD piece in place, make sure the iridescent shiny side of the CD wedge is exposed. Take care not to get glue or fingerprints on the shiny side of the CD.
4. Fold along the dotted lines.
5. Complete the Mini Spectroscope by folding it into a little box. Glue the edges closed (a to a, b to b, etc.) so that they don't leak light, but do not cover the slit. Glue flaps in alphabetical order. Unlabelled flaps need not be glued.

6. Look in by the ***rectangular eyehole*** and aim the ***slit*** at the overhead fluorescent lights in the lab. You may need to tilt the spectroscope to view all the bands.




7. Repeat step 5 with the other sources of light provided.