

Supplementary Material

Removal efficiency and energy consumption optimisation for carbamazepine degradation in wastewater by electrohydraulic discharge

E. Gwanzura¹, D. Ramjugernath¹, and S. A. Iwarere^{1,2**}

¹Discipline of Chemical Engineering, School of Engineering, University of KwaZulu-Natal, Durban, South Africa

²Department of Chemical Engineering, Faculty of Engineering, Built Environment and Information Technology, University of Pretoria, Hatfield 0028, Pretoria, South Africa

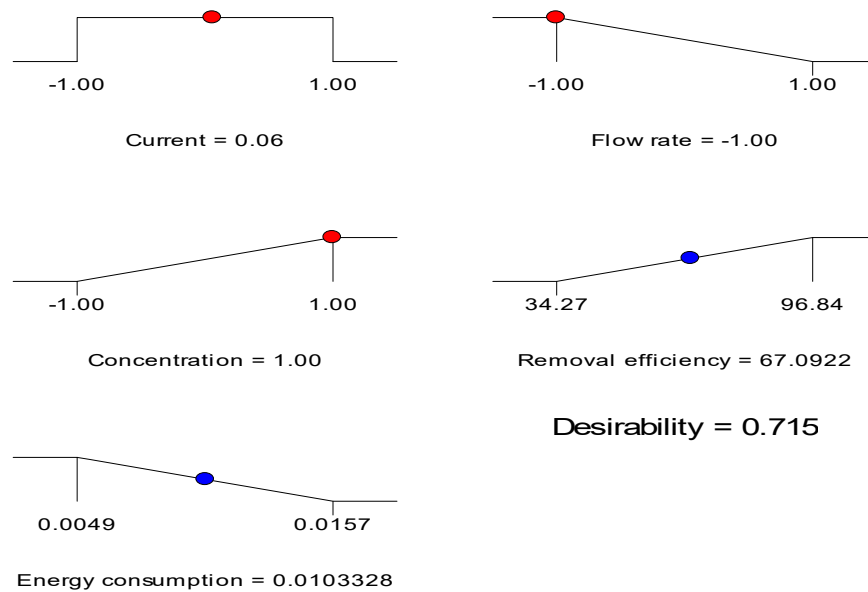


Fig. S1. Sample numerical solution presented as a ramp (numerical solutions 1)

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^{**}Corresponding author: samuel.iwarere@up.ac.za

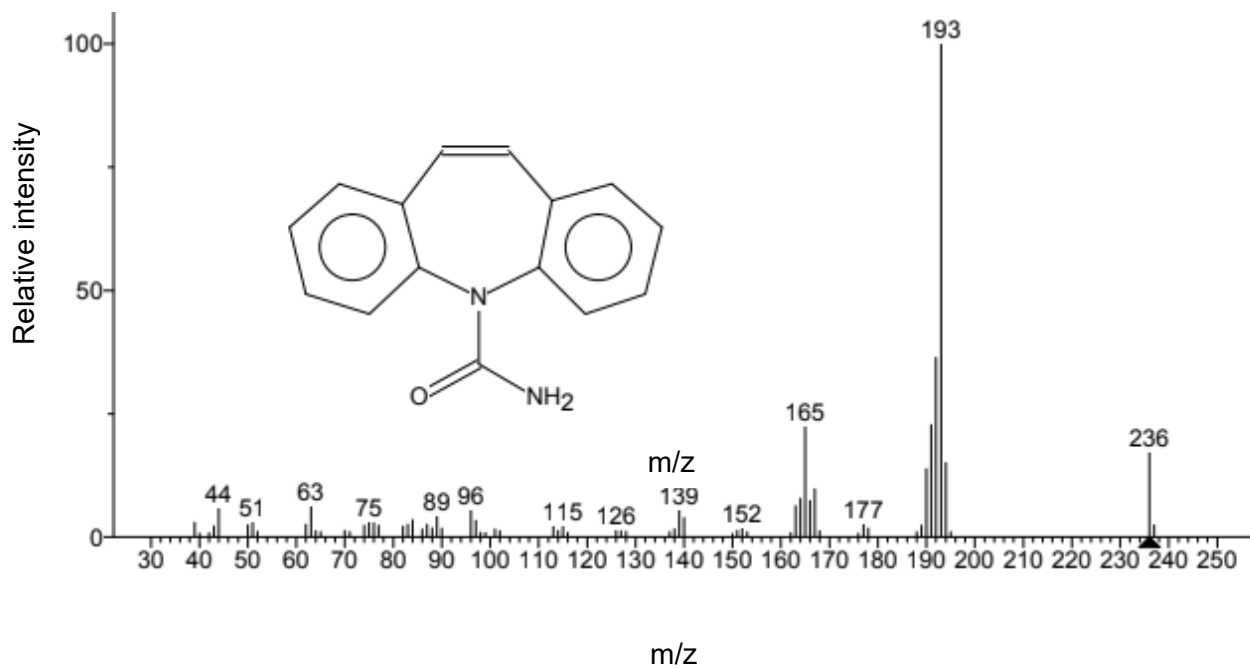


Fig. S2. Chromatogram of pure CBZ by GC-MS in scan mode characterised by the CBZ m/z base fragments (193, 236 and 165)

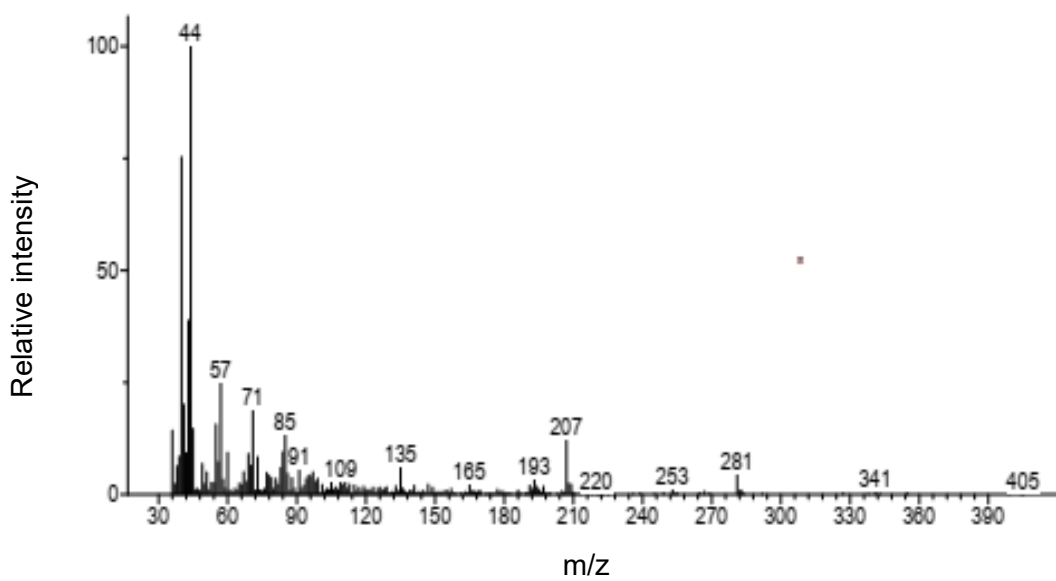
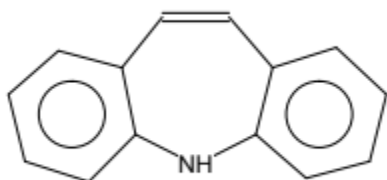


Fig. S3. Mass spectra fragments CBZ after 10 minutes of plasma treatment at 0.45 A and 0 L/min

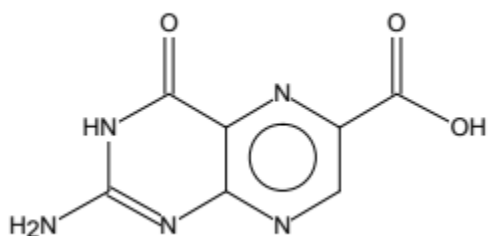


Name: Iminostilbene

Formula: C₁₄H₁₁N

Exact Mass: 193.089149

Fig. S4 Potential initial CBZ degradation by-products



Name: Pterin-6-carboxylic acid

Formula: C₇H₅N₅O₃

MW: 207 Exact Mass: 207.039239

Fig. S5 Potential final CBZ degradation by-products

Table S1. GC-FID oven program for quantitative analysis

Ramp (°C/min)	Set temp (°C)	Hold time (min)
	100	1.7
100	220	1
10	270	0

Table S2. Linear regression of the calibration data for GC-FID measurements

Parameter	Value
Calibration range (mg/L)	0 – 50
Slope	2845
Standard error of slope (S_e)	273
Correlation coefficient (R^2)	0.9998
LOD (mg/L)	0.28
LOQ (mg/L)	0.96

Table. S3. Results of the recovery studies (n=3)

Spiked Level(mg/L)	Mean recovery (%)	RSD%
1.2	83.1	10.3
5	83.7	1.8
10	84.0	1.4
20	85.3	1.1
40	88.1	0.7

Table S4. GC-FID intraday variability

QC concentration (mg/L)	Measured (n=3)	RSD%
1.5	1.51±0.17	11.51
20	25.10±0.25	0.98
35	35.07±0.13	0.35

Table S5. GC-FID inter-day variability

QC concentration (mg/L)	Measured (n=6)	RSD%
1.5	1.49±0.15	10.17
20	25.09±0.19	0.78
35	35.17±0.26	0.74

Table S6. Five sample solutions satisfying the optimisation criteria

Solution number	Current (A)	Flow rate (L/min)	Concentration mg/L	Removal Efficiency (%)	Electric energy consumption (kWh)	Desirability
1	0.06	-1.0	1	67.09	0.0103	0.715
2	0.04	-1.0	1	66.57	0.0102	0.714
3	0.03	-1.0	1	66.19	0.0101	0.714
4	0.12	-1	1	68.92	0.0106	0.714
5	0.07	-0.99	1	67.27	0.0103	0.714

Table S7. GC-MS oven program for qualitative analysis

Ramp (°C/min)	Set temp (°C)	Hold (min)
	80	1
30	225	1
4	231	1
14	280	1
45	300	6