

Technical Analysis Sample

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ENGR 115

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Input Paramerters	
Temperature (K)	296.35
Pressure (atm)	1.01
Gas Constant R [L*atm/molK]	0.0821
Energy of H ₂ (kJ/mol)	237

Final Efficiencies (%)	
Run 1	0.010
Run 2	0.010
Run 3	0.008
Average	0.009

Run 1 Data

Time (seconds)	H ₂ Volume (ml)	Voltage (V)	Current (A)
0	0	-	-
90	5	12.18	0.36
180	10	12.18	0.38
270	15	12.18	0.39
330	20	12.18	0.4
450	25	12.17	0.42

Run 2 Data

Time (seconds)	H ₂ Volume (ml)	Voltage (V)	Current (A)
450	25	12.17	0.42
510	30	12.18	0.42
630	35	12.17	0.43
720	40	12.17	0.45
780	45	12.17	0.45
870	50	12.17	0.46

Run 3 Data

Time (seconds)	H ₂ Volume (ml)	Voltage (V)	Current (A)
870	50	12.17	0.46
960	55	12.17	0.47
1050	60	12.16	0.48
1140	65	12.16	0.49
1230	70	12.16	0.5
1320	75	12.16	0.5

Run 1 Calculations

Power (W)	Electrical Energy In (J)	Mols H ₂ (mols)	Chemical Energy Out (kJ)	Effeciency (%)
-	-	-	-	-
4.3848	394.632	0.00020756	0.049191678	0.012
4.6284	416.556	0.00020756	0.049191678	0.012
4.7502	427.518	0.00020756	0.049191678	0.012
4.872	292.32	0.00020756	0.049191678	0.017
5.1114	613.368	0.00020756	0.049191678	0.008

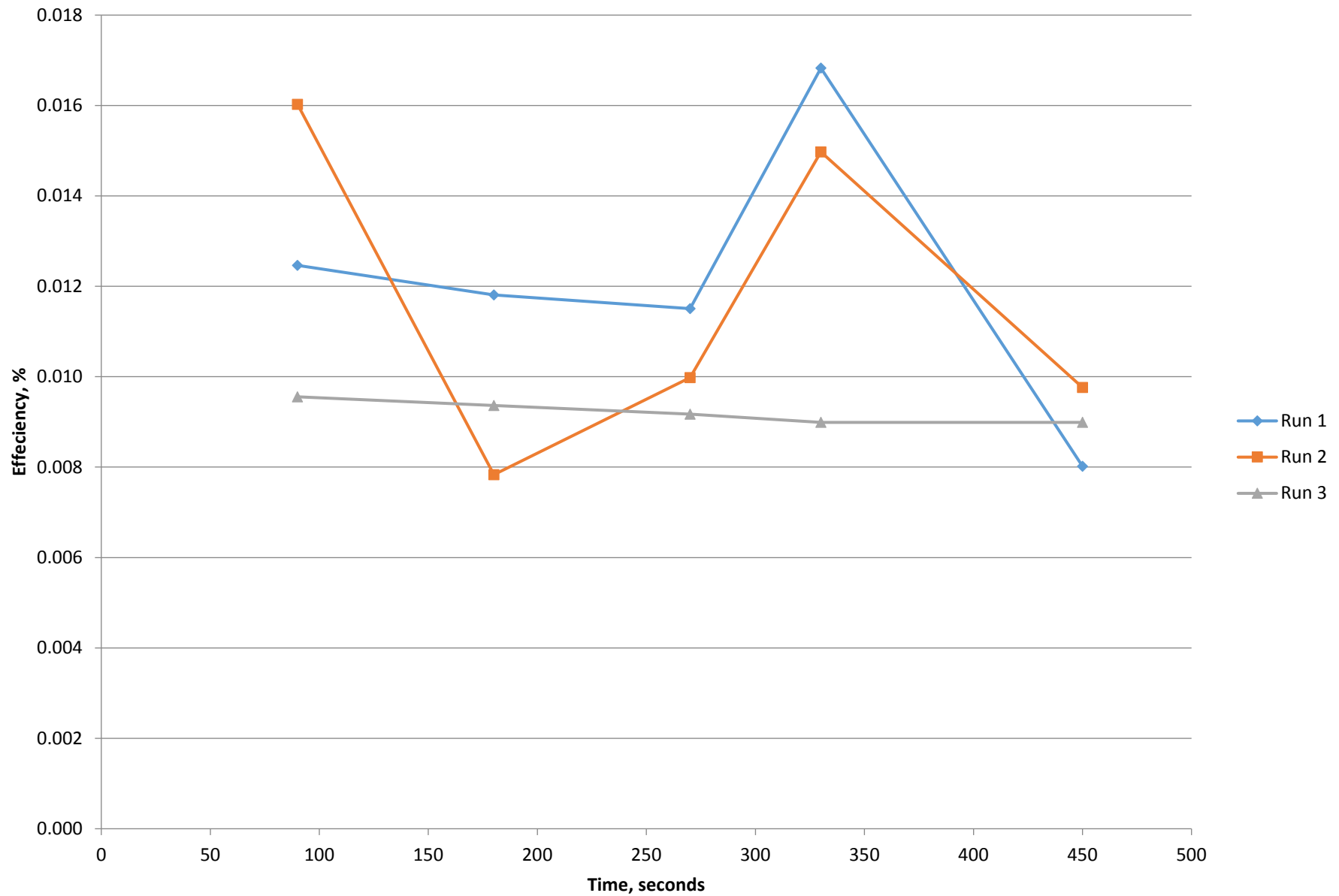
Run 2 Calculations

Power (W)	Electrical Energy In (J)	Mols H ₂ (mols)	Chemical Energy Out (kJ)	Effeciency (%)
-	-	-	-	-
5.1156	306.936	0.00020756	0.049191678	0.016
5.2331	627.972	0.00020756	0.049191678	0.008
5.4765	492.885	0.00020756	0.049191678	0.010
5.4765	328.59	0.00020756	0.049191678	0.015
5.5982	503.838	0.00020756	0.049191678	0.010

Run 3 Calcuations

Power (W)	Electrical Energy In (J)	Mols H ₂ (mols)	Chemical Energy Out (kJ)	Effeciency (%)
-	-	-	-	-
5.7199	514.791	0.00020756	0.049191678	0.010
5.8368	525.312	0.00020756	0.049191678	0.009
5.9584	536.256	0.00020756	0.049191678	0.009
6.08	547.2	0.00020756	0.049191678	0.009
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Electrolyzer Efficiency Graph



Input Paramerters	
Temperature (K)	296.35
Pressure (atm)	1.01
Gas Constant R [L*atm/molK]	0.0821
Energy of H ₂ (kJ/mol)	237

Final Efficiencies (%):	
Run 1	3.0
Run 2	1.0
Run 3	0.7
Average	1.6

Run 1 Data			
Time (seconds)	H ₂ Volume (ml)	Voltage (V)	Current (A)
0	70	0.745	0.35
30	68	0.771	0.35
60	66	0.68	0.35
90	52	0.711	0.37
120	50	0.661	0.33
150	40	0.73	0.35

Run 2 Data			
Time (seconds)	H ₂ Volume (ml)	Voltage (V)	Current (A)
180	40	0.703	0.35
210	38	0.533	0.25
240	32	0.812	0.3
270	30	0.805	0.32
300	28	0.8	0.32
330	26	0.805	0.31

Run 3 Data			
Time (seconds)	H ₂ Volume (ml)	Voltage (V)	Current (A)
360	25	0.794	0.28
390	24	0.773	0.28
420	22	0.766	0.27
450	20	0.759	0.27
480	19	0.721	0.26
510	18	0.654	0.28

Run 1 Calculations				
Power (W)	Electrical Energy In (J)	Mols H ₂ (mols)	Chemical Energy Out (kJ)	Effeciency (%)
0.26075	7.8225	0.002905838	0.688683489	8.8
0.26985	8.0955	8.30239E-05	0.019676671	0.2
0.238	7.14	0.000581168	0.137736698	1.9
0.26307	7.8921	8.30239E-05	0.019676671	0.2
0.21813	6.5439	0.00041512	0.098383356	1.5
0.2555	7.665	0.001660479	0.393533422	5.1

Run 2 Calculations				
Power (W)	Electrical Energy In (J)	Mols H ₂ (mols)	Chemical Energy Out (kJ)	Effeciency (%)
0.24605	7.3815	8.30239E-05	0.019676671	0.3
0.13325	3.9975	0.000249072	0.059030013	1.5
0.2436	7.308	8.30239E-05	0.019676671	0.3
0.2576	7.728	8.30239E-05	0.019676671	0.3
0.256	7.68	8.30239E-05	0.019676671	0.3
0.24955	7.4865	0.001079311	0.255796725	3.4

Run 3 Calculations				
Power (W)	Electrical Energy In (J)	Mols H ₂ (mols)	Chemical Energy Out (kJ)	Effeciency (%)
0.22232	6.6696	4.1512E-05	0.009838336	0.15
0.21644	6.4932	8.30239E-05	0.019676671	0.30
0.20682	6.2046	8.30239E-05	0.019676671	0.32
0.20493	6.1479	4.1512E-05	0.009838336	0.16
0.18746	5.6238	4.1512E-05	0.009838336	0.17
0.18312	5.4936	0.000747215	0.17709004	3.22

Fuel Cell

