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Chemistry 12

Lab 1B: Factors Affecting Reaction Rate

1 Purpose

2 Procedure

2.1 Concentration Test Procedure

1. Two similar samples of $CaCO_3$ rocks were picked and weighed.
2. The weight of a beaker was measured and the scale zeroed.
3. 50.0mL of 1.0M HCl was poured into the beaker.
4. The weight of the HCl and a $CaCO_3$ rock combined was measured and recorded.
5. The $CaCO_3$ rock was dropped into the beaker.
6. Weight measurements of the system were taken every 30 seconds for 5 minutes.
7. The process was repeated with the other rock in 3.0M HCl.

2.2 Temperature and Surface Area Test Procedure

1. 50.0mL of room temperature water was poured into two beakers, and 50.0mL of boiling water into another beaker.
2. 3 denture tablets were picked and weighed.
3. A beaker with water was zeroed on the scale.
4. A denture tablet was dropped into the water and weight measurements were taken every 30 seconds for 5 minutes, stopping once fully dissolved.
5. This was done 3 times. A control test with room temperature water. A heated test with boiling water, and a surface area test with a denture tablet crushed into a fine power.

3 Data/Observations

3.1 Concetration Test

3.1.1 Concentration Test Data

Table 1: Initial Parameters of Open $CaCO_3$(s) and HCl(aq) Reaction.

Parameter	**Test 1**	**Test 2**
Concentration HCl (M)	1.0	3.0
Mass HCl (g)	17.9	32.5
Mass CaCO3 (g)	10.6	13.7
Mass Total (g)	28.5	46.2

Table 2: Change in Mass Over Time of an Open $CaCO_3$(s) and HCl(aq) Reaction.

Time	**Test 1 Mass (g)**	**Test 2 Mass (g)**
0:00	28.5	46.1
0:30	28.3	46.0
1:00	28.3	45.8
1:30	28.2	45.6
2:00	28.1	45.4
2:30	28.0	45.3
3:00	28.0	45.1
3:30	27.9	45.0
4:00	27.9	44.9
4:30	27.9	44.9
5:00	27.8	44.8

The mass data collected here is the sum of the mass of the HCl(aq) solution and the $CaCO_3$(s) rock.

3.1.2 Concentration Test Observations

3.2 Temperature and Surface Area Test Data

3.2.1 Our Group's Data

Table 3: Initial Parameters of Open Denture Tablet Reactions.

Parameter	**Test 1 (Control)**	**Test 2 (Crushed)**	**Test 3 (Heated)**
Crushed	no	yes	no
Heated	no	no	yes
Mass Beaker-Water (g)	98.0	75.6	80.9
Mass Tablet (g)	2.6	2.5	2.5

Table 4: Change in Mass Over Time of Open Denture Tablet Reactions.

Time	**Test 1 Mass (g)**	**Test 2 Mass (g)**	**Test 3 Mass (g)**
0:00	2.5	2.5	2.5
0:30	2.5	2.4	2.4
1:00	2.5	2.4	2.4
1:30	2.5	2.4	2.4
2:00	2.5	2.4	2.4
2:30	2.5	2.4	—
3:00	2.5	2.3	—
3:30	2.5	2.3	—
4:00	2.5	—	—
4:30	2.5	—	—
5:00	2.4	—	—

The mass data collected here is based on the mass of the denture tablet. The scale was zeroed with the beaker and water. Data was not collected after the tablet was fully dissolved.

3.2.2 Talan & Edward's Data

3.2.3 Temperature & Surface Area Test Observations

4 Analysis

4.1 Concentration Test Analysis

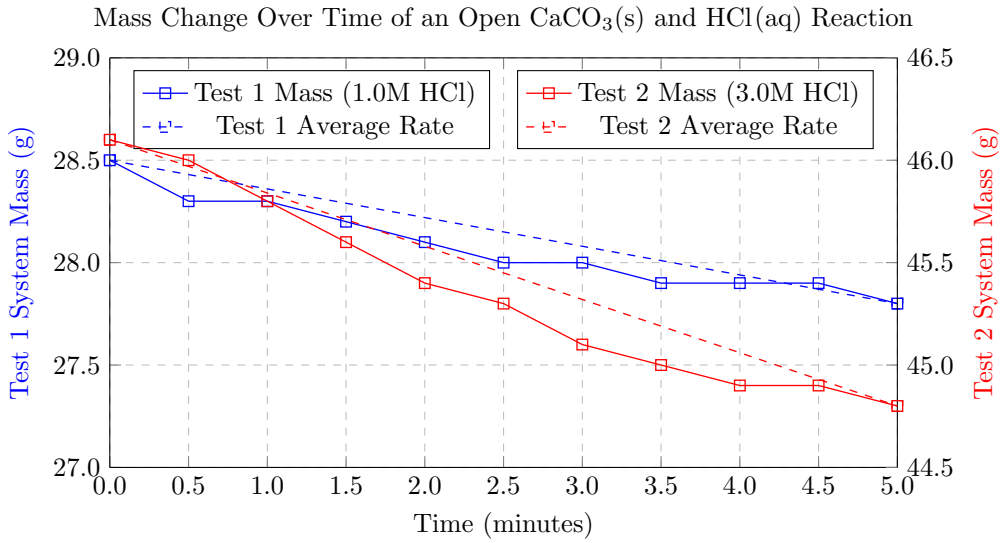

Figure 1: Change in mass of the system with average rates.

4.2 Temperature & Surface Area Test Analysis

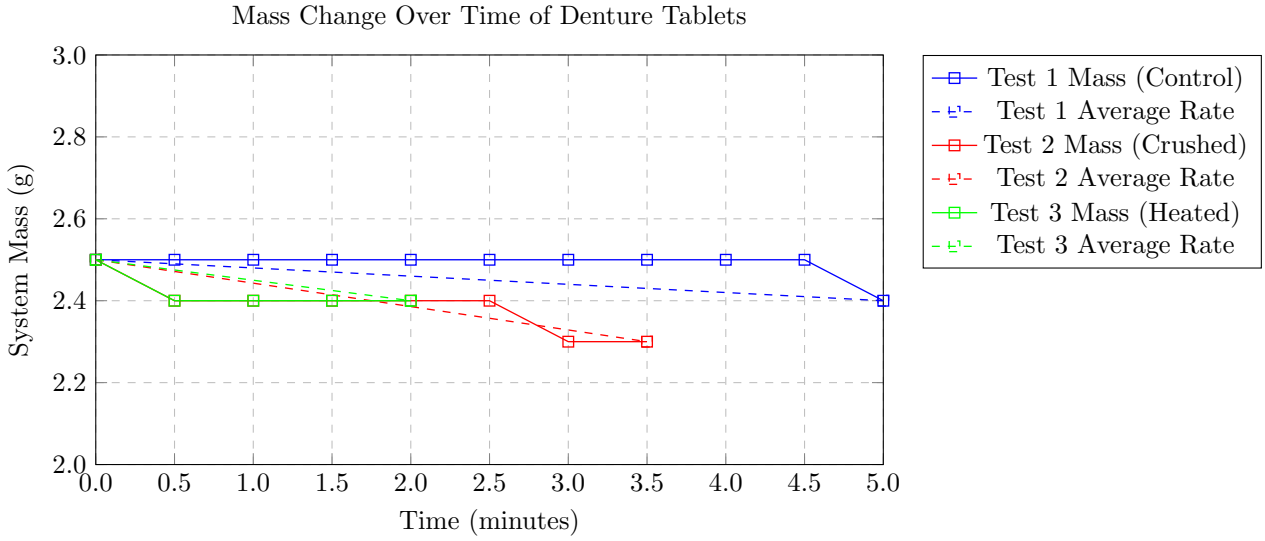

Figure 2: Change in mass of the system with average rates for temperature and surface area test.

5 Conclusion