The National Orthodox School Shmaisani

The National Orthodox School/ Shmessani

Name: .KEY... **Lab report (2) /Surface area and reaction rate**

Date: **Grade 8CS all sections**

---

1) Writing a fully focused research question

What is the effect of ------changing the surface area of a solid (calcium carbonate) ---- on the rate of chemical reaction--------measured by ----the mass loss---- in ----a specific time-----?

2) Hypothesis: ***Outline a hypothesis to predict the outcome of the experiment and explain it using logical scientific reasoning (what do you think is going to happen).***

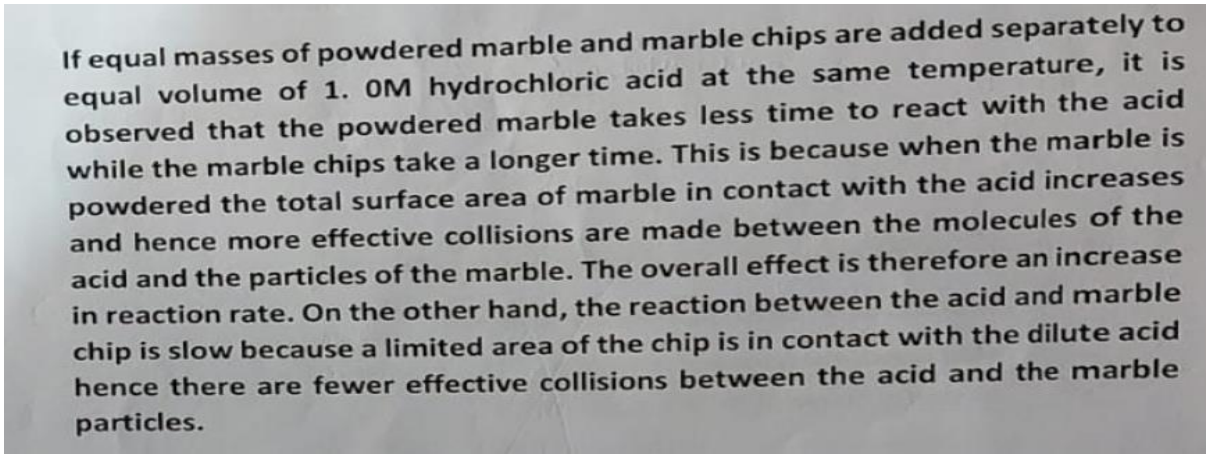
If the _surface area of a solid_____ _____changes _____

(State the IV) (increase, decrease, or change)

then the __rate of reaction (mass loss)_____ will _____change_____

(State the DV) (increase, decrease, stay the same, or change)

3) Scientific explanation for hypothesis *(This is the explanation to the previous hypothesis. Why do you think that your hypothesis is correct? Explain it in detail with reasons and causes.*



4) Manipulating the variables:

Controlled Variable	How will you keep this controlled? Stating the values and the equipment that you will be using	How could it affect your results if not controlled?
Same volume of acid/ Same mass of marble chips	Using measuring cylinder/ using a top-pan balance	Different amount of the product will be produced.
Same concentration of acid	Use the same sample (bottle) of the acid	More particles will be involved in the reaction.
Same temperature	Using a thermometer	Particles will have more kinetic energy, so they will have stronger collisions and higher rate of reaction

5) Materials and Method:

- **State your materials [number needed + units] (Be descriptive, example: 10cm^3 graduated cylinder)**

..... g calcium carbonate

..... ml hydrochloric acid

cotton

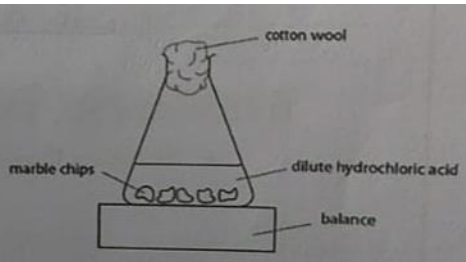
conical flask

top-pan balance

stopwatch.

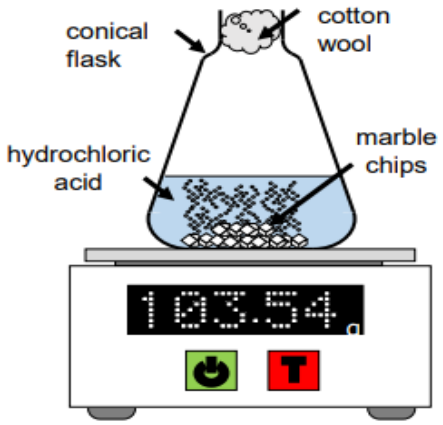
- **Method: What are the steps of the investigation?**

1. Place about .....cm^3 of ....M hydrochloric acid (an excess) in a conical flask on a top pan balance and place a piece of cotton wool in the neck of the flask.



(The cotton wool prevents the acid from splashing on the pan).

2. Add .....g lumps of marble. Note the total mass and immediately start the stop-watch.
3. Record the mass every 10 seconds in the table below
4. Repeat the experiment using powdered marble and take the same measurements.



6) Results

- **Data**

Time (sec)	Mass of large marble chips and acid (g)	Mass of small marble chips and acid (g)
0	103.54	103.54
20	103.52	103.50
40	103.51	103.49
60	103.50	103.48
80	103.49	103.48
100	103.48	103.48
120	103.48	103.48
Total Mass loss (g)	0.06	0.06

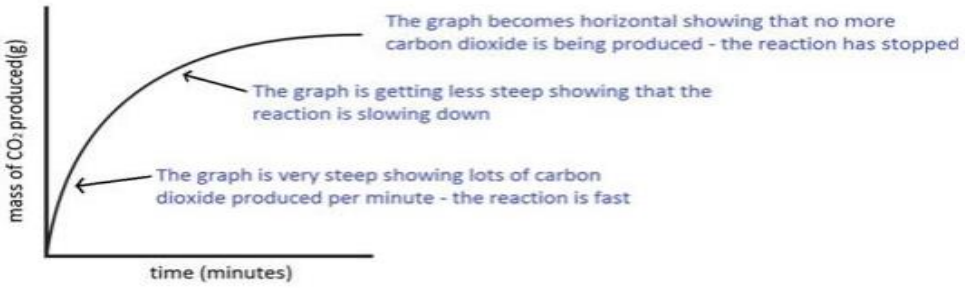
The reaction is the fastest at the beginning

Greatest mass loss at the first 20 sec

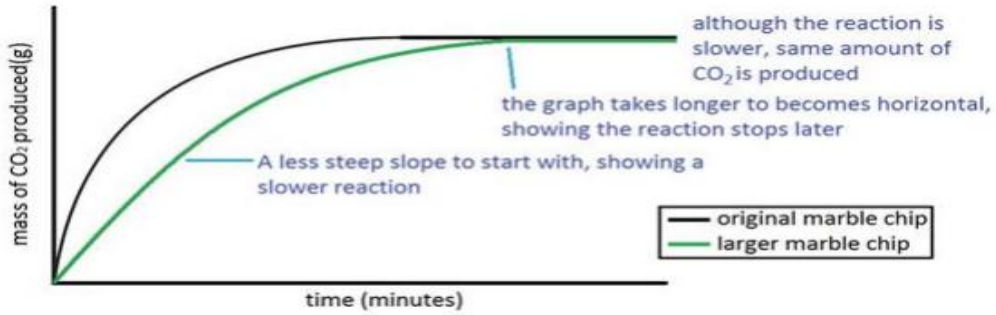
Reaction stopped here

Reaction stopped here

Same mass loss because we used same volume and mass of the reactants at the beginning



- **On the same graph paper plot the results of the reaction between the <u>small marble chips</u> and hydrochloric acid.**



7) Conclusion and evaluation:

- **Restating the purpose (hypothesis)**

If the surface area of a solid changes, then the mass loss will change.

- **Interpret your data and describe a conclusion based on your results.**

The table shows that it took the small marble chips (powder) 20 seconds to lose 0.05g of CO_2 where it took the large lumps 60 seconds to lose the same mass of CO_2. Also, it took the powder marble chips 60 seconds to finish the reaction and 100 seconds to finish the reaction using the large lumps.

- **Determine whether the original hypothesis was supported or rejected by the investigation?**

It was supported.