C6 Rates of Reaction Pack for Year 10

**Facts**

**Rate of reactions:**

* The rate of a chemical reaction can be found by measuring the amount of reactant that has been used up or the amount of product that has formed over time.
	+ - $Mean rate of reaction=\frac{quantity of reactant used}{time taken}$
		- $Mean rate of reaction=\frac{quantity of product formed}{time taken}$
* Factors which can affect the rate of the reaction are:
	+ The concentration of reactants in the solution
	+ The pressure of reacting gases
	+ The surface are of solid reactants
	+ The temperature
	+ Catalysts
* Collision theory states that reactions can only occur when particles collide with enough energy. The minimum amount of energy that particles must have to react is called the activation energy.
* When you increase the concentration, pressure or surface area of reactants, the frequency of collisions is increased. This increases the rate of reaction as there will be a greater frequency of successful collisions.
* Increasing the temperature increases the energy of the reactant particles and the frequency of collisions. The particles are colliding more frequently and with more energy and so the rate of reaction is increased.
* Catalysts increase the rate of the chemical reaction by providing a different pathway for the reaction to take place. They decrease the activation energy required for the reaction to occur.
* Catalysts are not used up in a chemical reaction. Different reactions need different catalysts.

**Task 1: Watch Free Science lessons (if you can) and do a mind map of the information**

**GCSE Science Chemistry (9-1) Mean Rate of Reaction**

**GCSE Science Chemistry (9-1) Using tangents to determine rate**

**GCSE Science Chemistry (9-1) Effect of concentration on rate**

**GCSE Science Chemistry (9-1) Required practical 5: Rates of reaction**

**GCSE Science Chemistry (9-1) Effect of surface area on rate**

**GCSE Science Chemistry (9-1) Effect of temperature on rate**

**GCSE Science Chemistry (9-1) Catalysts**

**Task 2: Test yourself! Answer these quick fire questions.**



**Task 3: Answer these questions**

1. How can changes in the following quantities be used to measure the rate of a reaction?
2. Concentration of reactant;
3. Volume of gas produced;
4. Concentration of product;
5. Explain briefly what is meant by ‘rate of reaction.’

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1. What is activation energy?

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1. What are the 4 things that can change the rate of a reaction?
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**Task 4: Answer this Longer Answer Question**

Briefly outline collision theory and use it to explain how surface area, pressure and temperature affect the rate of a reaction.

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**Task 5: Answer these questions about an experiment about rate**

## Aim: You are going to design an experiment to determine if surface area affects the rate of reaction. You will perform this experiment by putting different sized marble chips (calcium carbonate) into a boiling tube.

List the apparatus you will be using:

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Draw a diagram to show how the apparatus will be set up

How are you going to perform the experiment? What is your method?

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How are you going to keep it a fair test?

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| --- | --- | --- |
| Tube | "Size of marble" | Time to stop fizzing (s) |
| A | Whole (uncrushed) | 100 |
| B | Small pieces | 50 |
| C | Powder | 20 |

Results table

What do your results show? Answer the aim and explain why and how it shows this. Use science to explain why this was shown. Draw diagrams to help.

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**Task 6: Answer this graphical question.**

1. State the equation used to deduce the rate of a reaction.
2. Plot the following data onto the axes on the next page and then answer the questions.

|  |  |
| --- | --- |
| Time /s | Mass /g |
| 0 | 280.0 |
| 30 | 279.3 |
| 60 | 278.7 |
| 90 | 278.2 |
| 120 | 278.0 |
| 150 | 277.9 |
| 180 | 277.8 |
| 210 | 277.7 |
| 240 | 277.7 |
| 270 | 277.7 |

1. Draw a line of best fit on your graph.
2. At what time does the reaction stop? How can you tell?

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