

Collision Theory Catalysts

GCSE Chemistry · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Explain, using collision theory, why powdered marble reacts faster with acid than marble chips of the same mass. (3 marks)

Step 1 · Surface area

Powder has a much larger surface area to volume ratio.

Step 2 · Collisions

More particles are exposed to the acid, so collisions are more frequent.

Step 3 · Rate

More collisions per second means a faster rate.

Answer: Larger surface area → more frequent collisions → faster

Check: Say 'more frequent' or 'more collisions per second', not just 'more collisions'.

2. Now try one with the steps

Explain why increasing the concentration of acid increases the rate of its reaction with magnesium. (2 marks)

Step 1 · Particles

Step 2 · Collisions

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Name four factors that affect the rate of a chemical reaction. [4]

2. State the two conditions needed for a collision to result in a reaction. [2]

3. Explain why increasing concentration increases the rate of reaction. [2]
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4. Explain why increasing the surface area of a solid increases the rate of reaction. [2]
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5. Define the term catalyst. [1]
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6. State the name given to catalysts in living cells. [1]
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7. Explain why increasing the pressure of a gaseous reaction increases its rate. [2]
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8. Explain two reasons why increasing temperature increases the rate of reaction. [4]
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9. Explain how a catalyst increases the rate of a reaction. [2]
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10. Calculate the total surface area, in cm^2 , of a cube with sides of 2 cm. [1]
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11. The 2 cm cube is cut into eight 1 cm cubes. Calculate their total surface area in cm^2 . [1]
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12. A rough rule is that a 10°C rise doubles the rate of some reactions. If the rate is 0.05 g/s at 20°C , use this rule to estimate the rate at 40°C in g/s . [2]
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13. Explain why a catalyst is not written reactant in the equation for a reaction. [1]

14. Explain why increasing temperature has a larger effect on rate than the increase in collision frequency alone would suggest. [2]

4. Before you hand it in

"More collisions" without saying per second

Say 'more frequent collisions' or 'more collisions per second'.

"Catalysts give the particles more energy."

A catalyst lowers the activation energy by providing a different pathway.

"Increasing concentration makes collisions more energetic."

Concentration, pressure and surface area change collision frequency only.