Surface Area and Reaction Rate

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

A reaction between a solid and a solution can occur at exposed solid surfaces. Cubes in this model have six square faces.

1 Which sample generally offers the greatest exposed surface area at the same mass?

(1) One large block

(2) Several large blocks joined into one

(3) Fine powder with particles exposed to the solution

(4) The same solid sealed away from the solution

2 Explain why crushing a solid can change its reaction rate without changing the amount of reactant. [1]

Answer and work

3 Calculate the surface area of a cube with side length 3.0 cm. [1]

Answer and work

4 Which condition should stay fixed when comparing the effect of solid surface area on rate?

(1) Solid mass

(2) The surface area being tested

(3) The number of pieces being tested

(4) The measured time

Comparing Equal Masses of a Solid

Use the information below to answer the questions.

A model starts with a 2 cm cube or eight separate 1 cm cubes of the same solid. Each small cube has all faces exposed. The same solution and temperature are used. The timer stops at the same amount of product.

Trial	Solid form	Time to endpoint (s)
P	One 2 cm cube	72
Q	Eight 1 cm cubes	42

5 Calculate the total exposed surface area of the eight cubes in Q. [1]

Answer and work

6 Which trial has the greater average rate to the endpoint?

(1) P

(2) Q

(3) Both are equal.

(4) The endpoint gives no rate comparison.

7 Compare the surface areas of P and Q and connect the difference to the reaction times. [1]

Answer and work

8 Which change to Q would reduce the area exposed to the solution?

(1) Keep all eight cubes separated.

(2) Press cubes together so some faces touch.

(3) Keep the same volume of solution.

(4) Use the same endpoint.