Temperature and Reaction Rate

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

The activation energy is the minimum energy barrier for a reaction pathway. Raising temperature changes the distribution of particle energies.

1 When temperature rises and the pathway is unchanged, what generally happens to the fraction of reactant particles with enough energy to react?

(1) It decreases.

(2) It increases.

(3) It stays exactly the same.

(4) It immediately becomes zero.

2 Explain why a reaction can run faster at higher temperature even though its activation energy stays the same. [1]

Answer and work

_____

_____

3 Two trials make the same fixed amount of product. Trial A reaches that amount in 20 s and trial B in 40 s. Which trial has the greater average production rate over its measured interval?

(1) Trial A

(2) Trial B

(3) Both are equal.

(4) The shorter time shows a smaller rate.

4 Explain why initial concentration should be held constant when testing the effect of temperature on rate. [1]

Answer and work

_____

_____

Timing a Fixed Product Amount

Use the information below to answer the questions.

A simulation uses the same starting quantities in each trial. The timer stops when 0.120 mol of product has formed.

Trial	Temperature (K)	Time to endpoint (s)
P	290	60
Q	310	40
R	330	30

5 Which trial has the greatest average product formation rate?

(1) P

(2) Q

(3) R

(4) All three are equal.

6 Calculate the average product formation rate in Q in mol/s. [1]

Answer and work

7 How does the average rate in R compare with that in P?

(1) It is half as large.

(2) It is the same.

(3) It is twice as large.

(4) It is four times as large.

8 Use collision theory to explain the measured time difference between P and R. [1]

Answer and work