Concentration and Reaction Rate

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

Concentration describes the number of solute particles per volume. Under otherwise similar conditions, more reactant particles in that volume can increase collision frequency.

1 At equal volume, which sample contains the most particles of the same solute?

(1) 0.10 M

(2) 0.20 M

(3) 0.30 M

(4) All contain the same number.

2 Explain why increasing one reactant’s concentration can speed a reaction at constant temperature. [1]

Answer and work

3 Which change makes it harder to isolate the effect of concentration on reaction rate?

(1) Keep temperature fixed.

(2) Use the same amount of the other reactant.

(3) Raise both concentration and temperature together.

(4) Use the same measurement interval.

4 Two samples contain equal moles of a reactant but occupy different volumes. Explain why their concentrations may differ. [1]

Answer and work

Comparing Initial Product Formation

Use the information below to answer the questions.

A model reacts dissolved X with Y. The table gives product formed in the first 2.0 seconds of each trial. Temperature, volume, and the initial Y concentration are fixed.

Trial	Initial X concentration (M)	Product in first 2.0 s (mmol)
P	0.10	0.8
Q	0.20	1.5
R	0.30	2.1

5 Which trial has the highest average production rate in the measured interval?

(1) P

(2) Q

(3) R

(4) All are equal.

6 Calculate the average production rate in Q over the measured interval. [1]

Answer and work

7 Which statement is supported by the three measured trials?

(1) Higher X concentration is associated with greater product formation in the fixed interval.

(2) Increasing X concentration always lowers the measured rate.

(3) The amount of product doubles exactly from P to Q.

(4) Y concentration increases from P to R.

8 A student says tripling the X concentration tripled the measured rate. Evaluate this claim with the data. [1]

Answer and work