Exercise 5.14 – Analysis of kinetics data

Q514-01 For the following reaction: $A + 2B \longrightarrow 2C + D$
the initial rate for the disappearance of reactant A at time=0s was 2.0×10^{-2} mol dm^{-3} s^{-1}. What is the rate of disappearance of reactant B at t = 0s in mol dm^{-3} s^{-1}?

A. 1.4×10^{-1}
B. 4.0×10^{-2}
C. 2.0×10^{-2}
D. 4.0×10^{-4}

Q514-02 For the following reaction: $A + 2B \longrightarrow 2C + D$
the initial rate for the disappearance of reactant B at time=0s was 6.0×10^{-2} mol dm^{-3} s^{-1}. What is the rate of appearance of reactant D at t = 0s in mol dm^{-3} s^{-1}?

A. 1.4×10^{-1}
B. 4.0×10^{-2}
C. 3.0×10^{-2}
D. 4.0×10^{-4}

Q514-03 For the following reaction: $N_2 + 3H_2 \longrightarrow 2NH_3$
If the initial rate for the disappearance of the nitrogen at time=0s is 220 dm^3 s^{-1}. What is the rate of disappearance of hydrogen at t = 0s in dm^3 s^{-1}?

A. 110
B. 220
C. 330
D. 660

Q514-04 The reaction for generation of ammonia in the Haber process is as follows:

$$N_2 + 3H_2 \longrightarrow 2NH_3$$

If the initial rate for the disappearance of the hydrogen at time=0s is 100 dm^3 s^{-1}. What is the rate of appearance of ammonia gas at t = 0s in dm^3 s^{-1}?

A. 150
B. 100
C. 66.7
D. 300

Q514-05 In an experiment to measure the rate of a reaction, 240 cm^3 of gas was collected in 2 minutes. Which of the following is the most *likely* value for the initial rate of gas production?

A. 2 cm^3 s^{-1}
B. 6 cm^3 s^{-1}
C. 0 cm^3 s^{-1}
D. 1 cm^3 s^{-1}

Q514-06 During the reaction between iron filings and 100cm^3 of 2.00 mol dm^{-3} sulphuric acid the average rate of reaction was 0.002 mol dm^{-3} s^{-1} over the first 20 seconds. Calculate the volume of gas released in this time (take Molar gas volume at room temperature = 24 dm^3).

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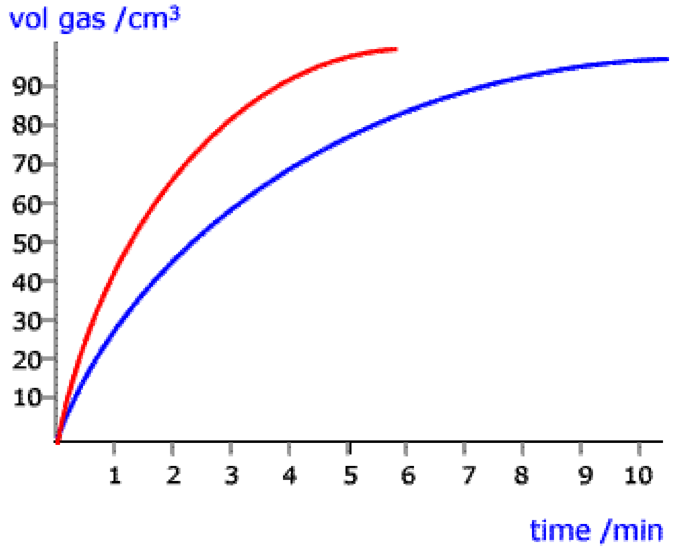
Q514-07 In an experiment to measure the rate of decomposition of 20 vol hydrogen peroxide, using a transition metal oxide as catalyst, 100cm^3 of the hydrogen peroxide released 24cm^3 of oxygen gas in 200s. Calculate the average rate of decomposition in terms of hydrogen peroxide. concentration.

Q514-08 A student measured the mass loss in the reaction between marble chips and 100cm^3 hydrochloric acid. In 100s the mass decreased by 0.72 g. If the inital concentration of the acid was 1.00 mol dm^{-3}, calculate the final concentration of the acid and the average rate of reaction.

Q514-09 In an experiment to measure the rate of reaction between zinc metal and 100cm^3 of 1.00 mol dm^{-3} hydrochloric acid, a student collected 240cm^3 of hydrogen gas in 20s. Calculate the concentration of the acid after 20s and hence the average rate in terms of rate of change of concentration of the acid concentration. (take Molar gas volume at room temperature = 24 dm^3)

Q514-10 The graph below shows the volume of carbon dioxide gas produced against time, when excess calcium carbonate is added to x cm^3 of 2.0 mol dm^{-3} of hydrochloric acid (blue line). Which of the following changes could result in the red line?



A. Using the same volume (x cm^3) of 1.0 mol dm^{-3} HCl.
B. Using double the mass of calcium carbonate
C. Using half the volume (x cm^3) of 4.0 mol dm^{-3} HCl.
D. Cooling the mixture