16.1 Rate Expression & Reaction Mechanism

Question Paper

Course	DP IB Chemistry
Section	16. Chemical Kinetics (HL only)
Topic	16.1 Rate Expression & Reaction Mechanism
Difficulty	Easy

Time allowed: 10

Score: /5

Percentage: /100

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Question 1

Which of the following statements about the rate-determining step are correct?

1. It has the highest activation energy
2. It can be used to deduce the rate expression
3. It is the slowest step in the reaction mechanism

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

[1 mark]

Question 2

The rate information below was obtained for the following reaction at a constant temperature:

$$A + 2B \rightarrow C + 2D$$

Experiment	Initial [A] / mol dm^{-3}	Initial [B] / mol dm^{-3}	Initial rate / mol dm^{-3} s^{-1}
1	0.25	0.25	3.5×10^{-4}
2	0.25	0.50	To be calculated

The rate equation for this reaction is $rate = k$ [**B**]

What is the initial rate of reaction for experiment 2, in mol dm^{-3} s^{-1}?

A. $(4 \times 3.5 \times 10^{-4})$

B. $(2 \times 3.5 \times 10^{-4})$

C. 3.5×10^{-4}

D. $(0.5 \times 3.5 \times 10^{-4})$

[1 mark]

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Question 3

The rate equation for the reaction between A and B is:

$$\text{Rate} = k[A][B]$$

What are the correct units for the rate constant of this rate equation?

A. $mol^{-1}\,dm^{3}\,s^{-1}$

B. $mol^{-2}\,dm^{6}\,s^{-1}$

C. $mol^{2}\,dm^{-6}\,s^{-1}$

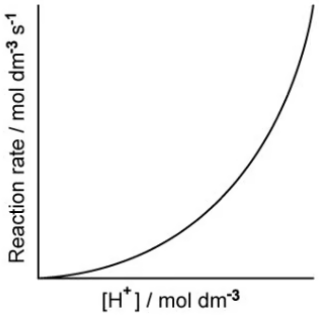
D. $mol\,dm^{-3}\,s^{-1}$

[1 mark]

Question 4

The rate information below was obtained for the following reaction at a constant temperature:

$$5Br^{-}(aq) + BrO_3^{-}(aq) + 6H^{+}(aq) \rightarrow 3Br_2(aq) + 3H_2O(l)$$



What is the order of reaction with respect to $[H^{+}]$?

A. One

B. Two

C. Six

D. Zero

[1 mark]

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Question 5

The mechanism for the following reaction between nitrogen(II) oxide and carbon monoxide is shown.

$$NO_2(g) + CO(g) \rightarrow NO(g) + CO_2(g)$$

Step 1: $NO_2 + NO_2 \rightarrow NO_3 + NO$ slow step

Step 2: $NO_3 + CO \rightarrow NO_2 + CO_2$ fast step

What rate expression is consistent with the mechanism?

A. Rate = k [NO_2] [CO]

B. Rate = k [NO_3] [CO]

C. Rate = k [NO_2]^2

D. Rate = k [NO_2]

[1 mark]

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