

16.1 Rate Expression & Reaction Mechanism

Question Paper

Course	DIPB Chemistry
Section	16. Chemical Kinetics (HL only)
Topic	16.1 Rate Expression & Reaction Mechanism
Difficulty	Medium

Time allowed: 10
Score: /5
Percentage: /100

Question 1

Which of the following statements about the rate constant, k , are correct?

- I. High values of k are associated with fast reactions
- II. The rate constant is affected by temperature
- III. The units of k are independent of the orders of reaction

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

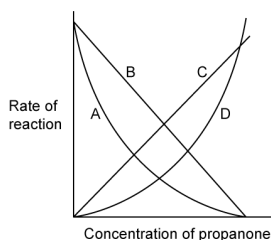
[1 mark]

Question 2

A student experimentally determined the rate expression for the reaction between iodine and propanone to be:

$$\text{Rate} = k [\text{H}^+] [\text{C}_3\text{H}_6\text{O}]$$

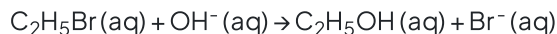
Which graph is consistent with this information?



[1 mark]

Question 3

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



$[\text{C}_2\text{H}_5\text{Br}] / \text{mol dm}^{-3}$	$[\text{OH}^-] / \text{mol dm}^{-3}$	Rate / $\text{mol dm}^{-3} \text{s}^{-1}$
3.0×10^{-3}	2.0×10^{-2}	4.0×10^{-4}
6.0×10^{-3}	2.0×10^{-2}	8.0×10^{-4}
6.0×10^{-3}	4.0×10^{-2}	1.6×10^{-3}

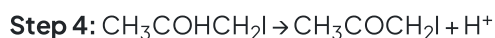
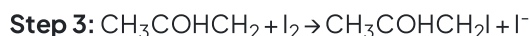
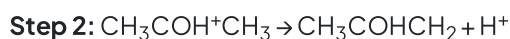
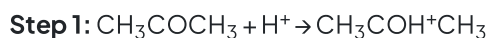
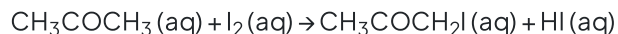
What are the orders of reaction with respect to $\text{C}_2\text{H}_5\text{Br}$ and OH^- ?

- A. $\text{C}_2\text{H}_5\text{Br}$ is first order and OH^- is first order
- B. $\text{C}_2\text{H}_5\text{Br}$ is first order and OH^- is second order
- C. $\text{C}_2\text{H}_5\text{Br}$ is second order and OH^- is first order
- D. $\text{C}_2\text{H}_5\text{Br}$ is second order and OH^- is second order

[1 mark]

Question 4

The mechanism for the following reaction between iodine and propanone is shown.



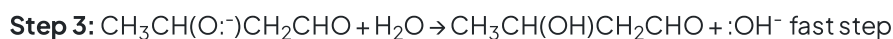
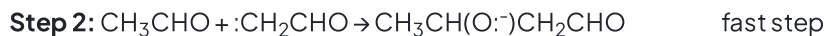
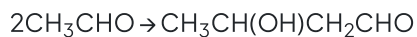
Which classifications of CH_3COCH_3 , H^+ and $\text{CH}_3\text{COHCH}_2$ are correct?

	CH_3COCH_3	H^+	$\text{CH}_3\text{COHCH}_2$
A	Intermediate	Intermediate	Catalyst
B	Reactant	Intermediate	Product
C	Reactant	Catalyst	Intermediate
D	Reactant	Product	Intermediate

[1 mark]

Question 5

The proposed mechanism for the following reaction where ethanal dimerises in dilute alkaline solution to form 3-hydroxybutanal is shown.



Which of the following statements is **not** correct?

- A. The rate expression is $\text{rate} = [\text{CH}_3\text{CHO}][\text{OH}^-]$
- B. Step 1 is the rate-determining step
- C. OH^- is a catalyst
- D. Steps 2 and 3 have a lower activation energy than step 1

[1 mark]