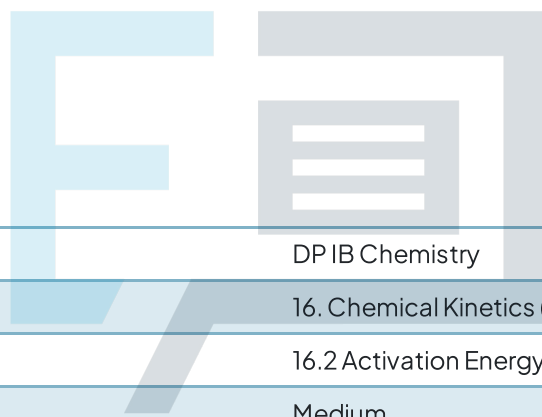




16.2 Activation Energy

Question Paper

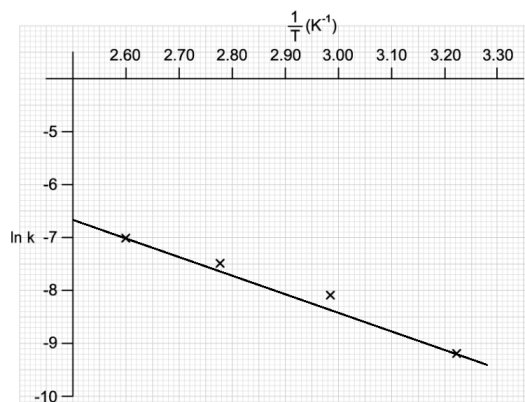


Course	DP IB Chemistry
Section	16. Chemical Kinetics (HL only)
Topic	16.2 Activation Energy
Difficulty	Medium

Exam Papers Practice

To be used by all students preparing for DP IB Chemistry HL
Students of other boards may also find this useful

Question 1



Which of the following statements about the Arrhenius plot are correct?

- I. The gradient has a value of E_a / R
- II. The intercept on the y-axis is $\ln A$
- III. The Arrhenius plot will give a value for activation energy in $J mol^{-1}$

- 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 following information was obtained for the rate constant, k , for a reaction at $25\text{ }^\circ\text{C}$

A	E_a	R
$2.57 \times 10^9 \text{ s}^{-1}$	96.2 kJ mol^{-1}	$8.31 \text{ J K}^{-1} \text{ mol}^{-1}$

Which expression correctly represents how to calculate the rate constant, k ?

- A. $k = (2.57 \times 10^9) \times e^{(-96.2/8.31 \times 25)}$
- B. $k = (2.57 \times 10^9) \times e^{(-96.2/8.31 \times 298)}$
- C. $k = (2.57 \times 10^9) \times e^{(-96200/8.31 \times 25)}$
- D. $k = (2.57 \times 10^9) \times e^{(-96200/8.31 \times 298)}$

[1 mark]

Question 3

The following experimental data was collected.

Activation energy, E_a	111 kJ mol ⁻¹
Rate constant, k	$1.30 \times 10^{-4} \text{ mol}^{-1} \text{ dm}^3 \text{ s}^{-1}$
Arrhenius constant, A	$4.55 \times 10^{13} \text{ mol}^{-1} \text{ dm}^3 \text{ s}^{-1}$

Which expression correctly calculates the temperature of the reaction?

$$\text{A. } T = \frac{111}{8.31 \times (\ln 4.55 \times 10^{13} - \ln 1.30 \times 10^{-4})}$$

$$\text{B. } T = \frac{111 \times 10^3}{8.31 \times (\ln 4.55 \times 10^{13} - \ln 1.30 \times 10^{-4})}$$

$$\text{C. } T = \frac{111 \times 10^3}{8.31 \times (\ln 1.30 \times 10^{-4} - \ln 4.55 \times 10^{13})}$$

$$\text{D. } T = \frac{111 \times 10^3}{(8.31 \times 10^{-3}) \times (\ln 4.55 \times 10^{13} - \ln 1.30 \times 10^{-4})}$$

[1 mark]

Question 4

Consider the following statements:

- I. Many reactions show a doubling of the rate with a temperature increase of 10K
- II. The units of k for a second order reaction are $\text{mol}^{-1} \text{ dm}^3 \text{ s}^{-1}$
- III. In the Arrhenius equation, A relates to the energy requirements of the collisions

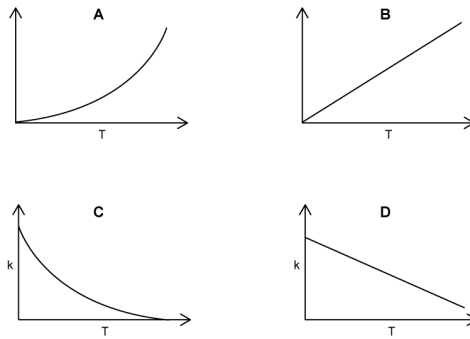
Which statements are correct?

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

[1 mark]

Question 5

Which graph shows the correct relationship between the rate constant, k , and temperature?



[1 mark]



Exam Papers Practice