

## Questions with Answer Keys

MathonGo

## Q1: 16 March (Shift 1) - Numerical

The decomposition of formic acid on gold surface follows first order kinetics. If the rate constant at 300 K is  $1.0 \times 10^{-3} \text{ s}^{-1}$  and the activation energy  $E_a = 11.488 \text{ kJ mol}^{-1}$ , the rate constant at 200 K is  $\underline{\hspace{2cm}} \times 10^{-5} \text{ s}^{-1}$ . (Round off to the Nearest Integer).

( Given :  $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$  )

## Q2: 16 March (Shift 2) - Numerical

A and B decompose via first order kinetics with half-lives 54.0 min and 18.0 min respectively. Starting from an equimolar non reactive mixture of A and B, the time taken for the concentration of A to become 16 times that of B is  $\underline{\hspace{2cm}}$  min. (Round off to the Nearest Integer).

## Q3: 17 March (Shift 1) - Numerical

For a certain first order reaction 32% of the reactant is left after 570 s. The rate constant of this reaction is  $\underline{\hspace{2cm}} \times 10^{-3} \text{ s}^{-1}$ . (Round off to the Nearest Integer).

[ Given :  $\log_{10} 2 = 0.301, \ln 10 = 2.303$  ]

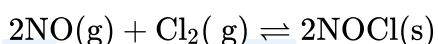
## Q4: 17 March (Shift 2) - Numerical

The reaction  $2 \text{ A} + \text{B}_2 \rightarrow 2 \text{ AB}$  is an elementary reaction.

For a certain quantity of reactants, if the volume

of the reaction vessel is reduced by a factor of 3, the rate of the reaction increases by a factor of  $\underline{\hspace{2cm}}$ . (Round off to the Nearest Integer).

## Q5: 18 March (Shift 1) - Numerical



This reaction was studied at  $-10^\circ\text{C}$  and the

following data was obtained

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run	$[\text{NO}]_0$	$[\text{Cl}_2]_0$	$r_0$
1	0.10	0.10	0.18
2	0.10	0.20	0.35
3	0.20	0.20	1.40

$[\text{NO}]_0$  and  $[\text{Cl}_2]_0$  are the initial concentrations and  $r_0$  is the initial reaction rate. The overall order of the reaction is \_\_\_\_\_.  
(Round off to the Nearest Integer).

## Q6: 18 March (Shift 2) - Numerical

A reaction has a half life of 1 min. The time required for 99.9% completion of the reaction is \_\_\_\_\_ min. (Round off to the Nearest integer)

[ Use :  $\ln 2 = 0.69, \ln 10 = 2.3$  ]

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# Answer Key

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**Q1** (10)

**Q2** (108)

**Q3** (2)

**Q4** (27)

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**Q5** (3)

**Q6** (10)

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