

2022

Time : 3 hours

Full Marks : 60

*Candidates are required to give their answers
in their own words as far as practicable.*

The figures in the margin indicate full marks.

Answer any five questions in

which questions no 1 is compulsory.

1. Choose the correct alternative for each of the
following questions : 1×12=12

(a) A mixture of two immiscible liquids
(chloroform and water) constitutes a

system having the number of phases
equal to :

(i) Zero

(ii) One

(iii) Two

(iv) Three

(b) For one component system at triple
point the number of degree of freedom
is :

(i) Zero

(ii) One

(iii) Two

(iv) Three

(c) The Gibbs phase rule equation in a
heterogeneous system is :

(i) $F=C+P-2$

- ✓(ii) $F=C-P+2$
(iii) $F=C+P+2$
(iv) $F=C-P-2$
- (d) The degree of freedom for liquid water and water vapour in equilibrium is :
- ✓(i) 0
(ii) 2
✓(iii) 1
(iv) 3
- (e) The rate constant of a second order reaction has unit :
- (i) $\text{mole litre}^{-1} \text{sec}^{-1}$
(ii) $\text{litre mol}^{-1} \text{sec}$
✓(iii) $\text{litre mole}^{-1} \text{sec}^{-1}$
(iv) None of the above
- (f) Rate of which reactions increases with temperature :

- ✓(i) Any reaction
✓(ii) Exothermic reaction
(iii) Endothermic reaction
(iv) None of these
- (g) Which of the following does not affect the rate of a chemical reaction ?
- (i) Enthalpy of the reaction
(ii) Temperature
(iii) Concentration of the reactant
✓(iv) Surface area
- (h) A reaction in which all reactants are in the same phase is called :
- (i) Elementary
(ii) Bimolecular
✓(iii) Homogeneous
(iv) Heterogeneous

(i) The name catalyst was given by :

- (i) Chadwick
- (ii) J J Thomson
- (iii) Berzelius
- (iv) Rutherford

(j) The phenomenon of negative catalysis is also known as :

- (i) Auto catalysis
- (ii) Self catalysis
- (iii) Inhibition
- (iv) Enzyme catalysis

(k) The energy needed to overcome for a reaction to occur is called :

- (i) Activation energy
- (ii) Energy of vapourization

(iii) Specific heat

(iv) Potential energy

(l) The adsorption of hydrogen on charcoal is :

- (i) Physical adsorption
- (ii) Chemical adsorption
- (iii) Sorption
- (iv) None of these

2 Explain the following terms with suitable examples : <https://www.jharkhandstudy.com> 12

(a) Phase

(b) Component

(c) Degree of freedom. How are they related ?

3 Draw a labelled phase diagram of water system and discuss its salient features. 12

4 Derive an expression for the rate constant of a first order reaction. 9

- (b) Write unit of rate constant for first order reaction. 3
5. Describe two methods for the determination of order of a reaction. 12
6. (a) Derive the Arrhenius equation for the effect of temperature on the rate of reaction. 8
- (b) Define activation energy. 4
7. (a) What do you understand by the term adsorption? What are the factors which affect adsorption? 6
- (b) Distinguish between physical adsorption and chemical adsorption. 6
8. Derive Michaelis-Menten equation for enzyme catalysed reaction. 12
9. Define catalysis. What are the general characteristics of catalysed reaction?

Differentiate clearly between homogeneous and heterogeneous catalysis with suitable examples.

10. Explain the following terms : 3×4=12
- (a) Rate of reaction
- (b) Molecularity of a reaction
- (c) Triple point
- (d) Auto catalyst

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