

CHEMISTRY  
GROUP : FIRST

DGK-11-1-23

OBJECTIVETIME: 20 MINUTES  
MARKS: 17

NOTE: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

**QUESTION NO. 1**

- 1 The solubility product of AgCl is  $2.0 \times 10^{-10} \text{ mol}^2 \text{ dm}^{-6}$ . The maximum concentration of  $\text{Ag}^+$  ion in solution is  
(A)  $2.0 \times 10^{-10} \text{ mol dm}^{-3}$  (B)  $1.41 \times 10^{-5} \text{ mol dm}^{-3}$  (C)  $1.0 \times 10^{-10} \text{ mol dm}^{-3}$  (D)  $4.0 \times 10^{-20} \text{ mol dm}^{-3}$
- 2 18 g glucose is dissolved in 90 g of water the relative lowering of vapour pressure is equal to  
(A)  $\frac{1}{5}$  (B) 5.1 (C)  $\frac{1}{51}$  (D) 6
- 3 The oxidation number of oxygen in  $\text{OF}_2$  is  
(A) +1 (B) +2 (C) -2 (D) -1
- 4 If salt bridge is not used between two half cells the voltage  
(A) Decreases rapidly (B) Decreases slowly (C) Does not change (D) Drop to zero
- 5 The unit of rate constant is same as that of rate of reaction in  
(A) First order reaction (B) Second order reaction (C) Third order reaction (D) Zero order reaction
- 6 The number of moles of  $\text{CO}_2$  which contain 16 g of Oxygen  
(A) 0.25 (B) 0.50 (C) 1.0 (D) 1.5
- 7 The number of isotopes of Tin are  
(A) 3 (B) 7 (C) 9 (D) 11
- 8 Solvent extraction is an equilibrium process and is controlled by  
(A) Law of mass action (B) Distribution law (C) The amount of solvent used  
(D) The amount of solute used
- 9 The partial pressure of oxygen in air is  
(A) 116 torr (B) 159 torr (C) 180 torr (D) 190 torr
- 10 The order of rate of diffusion of gases  $\text{NH}_3$ ,  $\text{SO}_2$ ,  $\text{Cl}_2$  and  $\text{CO}_2$  is  
(A)  $\text{NH}_3 > \text{SO}_2 > \text{Cl}_2 > \text{CO}_2$  (B)  $\text{NH}_3 > \text{CO}_2 > \text{SO}_2 > \text{Cl}_2$  (C)  $\text{Cl}_2 > \text{SO}_2 > \text{CO}_2 > \text{NH}_3$   
(D)  $\text{NH}_3 > \text{CO}_2 > \text{Cl}_2 > \text{SO}_2$
- 11 When water freezes at  $0^\circ\text{C}$  its density decreases due to  
(A) Cubic structure of Ice (B) Empty spaces present in structure of Ice (C) Change of bond length  
(D) Change of bond angle
- 12 The molecules of  $\text{CO}_2$  in dry ice forms the  
(A) Ionic crystals (B) Covalent crystals (C) Molecular crystals (D) Metallic crystals
- 13 When 6d orbital is complete the entering electron goes into  
(A) 7f (B) 7s (C) 7p (D) 7d
- 14 Which of following molecule has zero dipole-moment  
(A)  $\text{NH}_3$  (B)  $\text{CHCl}_3$  (C)  $\text{H}_2\text{O}$  (D)  $\text{BF}_3$
- 15 In endothermic reaction the heat content of  
(A) Product is more than that of reactants (B) Reactants is more than that of products  
(C) Surrounding increases (D) Reactant and product is equal
- 16 Enthalpy of atomization of Na-metal is  
(A) 90 kJ/mole (B) 108 kJ/mole (C) 120 kJ/mole (D) 130 kJ/mole
- 17 pH of human blood is maintained at  
(A) 7.0 (B) 7.35 (C) 8.0 (D) 8.5



CHEMISTRY  
GROUP : FIRST

DGK-11-1-23

SUBJECTIVE  
SECTION-ITIME : 2:40 HOURS  
MARKS : 68

QUESTION NO. 2 Write short answers of any Eight (8) parts of the following

16

i	Calculate the mass in kilogram of $2.6 \times 10^{20}$ molecules of $\text{SO}_2$
ii	Name any four methods for the separation of isotopes
iii	Differentiate between ion and molecular ion
iv	What is the difference between natural and artificial plasma ?
v	Derive Boyle's law from kinetic molecular theory of gases
vi	Gases deviate from ideal behavior more at $0^\circ\text{C}$ than at $100^\circ\text{C}$ . Give the reason
vii	What do you mean by line spectrum ? Give an example
viii	Write down the reactions when slow neutrons hit the copper metal
ix	What is $n + \ell$ rule ?
x	Define standard enthalpy of formation. Give an example
xi	Define the term heat and work
xii	What are endothermic reactions ? Give an example

QUESTION NO. 3 Write short answers of any Eight (8) parts of the following

16

i	Define heat of hydration. Give example
ii	How do you justify that freezing points are depressed due to the presence of solutes ?
iii	What do you mean by discontinuous solubility curve ?
iv	Differentiate between Homogeneous and Heterogeneous catalysis
v	How the mechanism of a chemical reaction can help to point out the rate determining step ?
vi	What is the effect of temperature on the activation energy of a reaction ?
vii	Define sublimation. Give an example
viii	How desiccator is used to dry the catalysts ?
ix	What is solvent extraction ?
x	Define cleavage plane. Give an example
xi	Water and the ethanol can mix easily in all proportions. Why ?
xii	How will you Justify that the structure of ice is just like that of diamond ?

QUESTION NO. 4 Write short answers of any Six (6) parts of the following

12

i	Define bond order. Give an example
ii	What is bond energy ? Give an example
iii	What is $\text{AB}_3$ type molecule according to VSEPR theory ? Give an example
iv	What is Le Chatelier's principle ?
v	What is common ion effect ? Give an example
vi	How equilibrium constant $K_c$ is helpful in prediction of direction of reaction ?
vii	What is voltaic cell ?
viii	What is the function of salt bridge ?
ix	What is Nickel-Cadmium battery ?

**SECTION-II**

Note: Attempt any Three questions from this section

Q.5 (A)	Define yield. Differentiate between actual and theoretical yield. How percentage yield can be calculated	1+2+1
(B)	$250 \text{ cm}^3$ of hydrogen is cooled from $127^\circ\text{C}$ to $-27^\circ\text{C}$ by maintaining the pressure Constant. Calculate the new volume of the gas at this low temperature	4
Q.6 (A)	Define ionic solids. Discuss properties of ionic solids in detail	4
(B)	Define enthalpy of neutralization. Also discuss the glass calorimeter in detail	4
Q.7 (A)	Write down measurement of $e/m$ value of electron by J.J. Thomson with diagram	3+1
(B)	The solubility of $\text{PbF}_2$ at $25^\circ\text{C}$ is $0.64 \text{ g cm}^{-3}$ . Calculate the $K_{sp}$ molar mass of $\text{Pb}$ is $207 \text{ g. mole}^{-1}$ $F = 19 \text{ g. mole}^{-1}$	4
Q.8 (A)	What is MOT ? How it explain the structure of oxygen molecule	4
(B)	Explain fuel cell in detail	4
Q.9 (A)	What are colligative properties ? Explain lowering of vapour pressure	1+3
(B)	Write four characteristics of a catalyst	1+1+1+1



## CHEMISTRY

GROUP : SECOND

DGK-11-2-23

## OBJECTIVE

TIME: 20 MINUTES

MARKS: 17

NOTE: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

## QUESTION NO. 1

- 1 27 g of Al will react completely with how much of O<sub>2</sub> to produce Al<sub>2</sub>O<sub>3</sub>  
(A) 8 g of O<sub>2</sub> (B) 16 g of O<sub>2</sub> (C) 24 g of O<sub>2</sub> (D) 32 g of O<sub>2</sub>
- 2 The phenomenon of isotopy was first discovered by  
(A) Soddy (B) Berzelius (C) Rutherford (D) Dalton
- 3 The solid which undergo sublimation  
(A) NaCl (B) KBr (C) I<sub>2</sub> (D) KCl
- 4 Pressure remaining constant at which temperature the volume of gas will become twice of what it is at 0 °C  
(A) 546 °C (B) 200 °C (C) 546 K (D) 273 K
- 5 Critical temperature of water vapours is  
(A) 647.6 K (B) 405.6 K (C) 384.7 K (D) 304.3 K
- 6 In order to raise the boiling point of water up to 110 °C the external pressure should be  
(A) Between 760 torr and 1200 torr (B) Between 200 torr and 760 torr (C) 765 torr (D) Any value of pressure
- 7 Which of the following is pseudo solid  
(A) CaF<sub>2</sub> (B) Glass (C) NaCl (D) NH<sub>4</sub>Cl
- 8 Orbitals having same energy are called  
(A) Hybrid orbitals (B) Valence orbitals (C) Degenerate orbitals (D) d - orbitals
- 9 Which of the following species has unpaired electron in antibonding molecular orbital  
(A) O<sub>2</sub><sup>2+</sup> (B) N<sub>2</sub><sup>2-</sup> (C) B<sub>2</sub> (D) F<sub>2</sub>
- 10 The heat of atomization of chlorine is  
(A) 90 kJ/mole (B) 95 kJ/mole (C) 110 kJ/mole (D) 121 kJ/mole
- 11 The net heat change in a reaction is same whether it is brought about in one or several steps. It is known as  
(A) Henry's law (B) Joule-principle (C) Hess's law (D) Law of conservation of energy
- 12 Equilibrium constant for the reaction at 2000 °C  $2 \text{HF}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{F}_2(\text{g})$  is  
(A) 10<sup>-5</sup> (B) 10<sup>-7</sup> (C) 10<sup>-9</sup> (D) 10<sup>-13</sup>
- 13 pH value for 1.0 M HCl solution is  
(A) 0.0 (B) 0.5 (C) 0.7 (D) 0.8
- 14 A solution of glucose is 10 % w/v. The volume in which 1 g mole is dissolved will be  
(A) 1 dm<sup>3</sup> (B) 1.8 dm<sup>3</sup> (C) 200 cm<sup>3</sup> (D) 900 cm<sup>3</sup>
- 15 A single cell in lead accumulator battery provides  
(A) 1 volt (B) 2 volts (C) 3 volts (D) 4 volts
- 16 Reaction which is responsible for production of electricity in voltaic cell is  
(A) Redox reaction (B) Oxidation reaction (C) Reduction reaction (D) Hydrolysis
- 17 With increase of 10 °C temperature the rate of reaction doubles. This increase in rate of reaction is due to  
(A) Decrease in activation energy of reaction  
(B) Decrease in number of collision between reactant molecules  
(C) Increase in activation energy of reactants (D) Increase in number of effective collisions

CHEMISTRY  
GROUP : SECONDSUBJECTIVE  
SECTION-ITIME : 2:40 HOURS  
MARKS : 68

DGR-11-2-23

QUESTION NO. 2 Write short answers of any Eight (8) parts of the following

16

i	What is molecular ion ? How it can be generated ?
ii	Differentiate between Empirical formula and Molecular formula
iii	No individual Neon atom in the sample of the element has a mass of 20.18 amu. Justify
iv	What is aqueous tension ? How you can find pressure of a gas over water in the laboratory ?
v	Write two causes for deviation from ideality
vi	Derive the value of ideal gas constant ' R ' when the pressure is in Nm <sup>-2</sup> and volume in m <sup>3</sup>
vii	The e/m value for positive rays obtained from hydrogen gas is 1836 times less than that of cathode rays. Justify it
viii	Write shapes of p-orbital
ix	State Heisenberg's uncertainty principle. Write its mathematical form
x	Define enthalpy of combustion. Give one example
xi	Differentiate between system and surrounding
xii	What exothermic reaction ? Give one example

QUESTION NO. 3 Write short answers of any Eight (8) parts of the following

16

i	What is discontinuous solubility curve ? Give one example
ii	Define mole fraction. Give its mathematical form
iii	What do you mean by water of crystallization ? Give two examples
iv	Define the term " Activation of catalyst "
v	What is pseudo first order reaction ? Give an example
vi	Define heterogeneous catalysis with an example
vii	Earthenware vessels keep water cool. Explain with reason
viii	Define Transition temperature with an example
ix	Write down any two uses of liquid crystals
x	State distribution law
xi	What is the difference between Gooch's crucible and sintered glass crucible ?
xii	Define crystallization. What is basic principle of crystallization ?

QUESTION NO. 4 Write short answers of any Six (6) parts of the following

12

i	What is bond order ? Give example
ii	Why water molecule has bent structure rather than tetrahedral geometry ?
iii	What is Electronegativity ?
iv	What are Basic Buffers ? Give example
v	Define law of mass action
vi	Reaction is exothermic but still the temperature of 400 – 500 °C is required to increase the yield of SO <sub>3</sub> . Give reason
vii	Define oxidation state. Give example
viii	What is electrolytic conduction ?
ix	Define Electro Chemical series

SECTION-II

Note: Attempt any Three questions from this section

8 × 3 = 24

Q.5 (A)	Discuss the existence of an atom through experimental evidence of an atom
(B)	What pressure is exerted by a mixture of 2.0 g of H <sub>2</sub> and 8.0 g of N <sub>2</sub> at 273 K in a 10 dm <sup>3</sup> vessel
Q.6 (A)	What are molecular solids ? Give their properties
(B)	Discuss first law of thermodynamics and prove that $\Delta E = q_v$
Q.7 (A)	Describe J.J Thomson experiment to measure e/m value of electron
(B)	The solubility product of Ag <sub>2</sub> CrO <sub>4</sub> is $2.6 \times 10^{-2}$ at 25 °C . Calculate the solubility of the compound
Q.8 (A)	What is meant by VSEPR theory ? Explain in detail , Also discuss structures of BF <sub>3</sub> and CH <sub>4</sub> in the light of VSEPR theory
(B)	Discuss electrode potential. How electrode potential is measured by SHE
Q.9 (A)	What are non ideal solutions discuss their types and give three examples of each
(B)	What is chemical kinetics ? How do you compare chemical kinetics with chemical equilibrium