

## CHEMISTRY

Time allowed : 3 Hours

Maximum Marks : 70

### General Instructions :-

1. Candidates are required to give their answers in their own words as far as practicable.
2. Marks allotted to each question are indicated against it.

### Special instructions :-

1. You must write question paper series in the circle at top left side of title page of your answer sheet.
2. Do not leave blank pages in your answer book.
3. All the questions are compulsory. Internal choices have been given in some questions.
4. Question no. 1 to 7 are multiple choice type question (M.C.Q.). Choose one correct answer among four options.
5. Questions no. 8 to 10 are very short answer type questions carrying one mark each. Answer these in about one sentence or one word.
6. Questions No. 11 to 16 are short answer type question carrying 2 (two) marks each. Answer these in about 30 words each.
7. Questions no. 17 to 27 are short answer type questions carrying 3 (three) marks each. Answer these questions in about 40 words.
8. Questions no. 28 to 30 are long type questions of 5 (five) marks.
9. Use log tables if necessary. Calculator is not allowed.

- Q1. Which element is having the highest electro-affinity :  
(a) O (b) Cl (c) F (d) N 1
- Q2. How many no. of  $\pi$ -covalent bonds are present in single molecule of ethyne.  
(a) 1 (b) 2 (c) 3 (d) 4 1
- Q3. The correct electronic configuration of chromium atom (Cr.) is : 1  
(a)  $[\text{Ar}]3d^54s^1$  (b)  $[\text{Ar}]3d^4s^2$  (c)  $[\text{Ar}]3d^64s^0$  (d)  $[\text{Ar}]4d^54s^1$
- Q4. Which substance having the highest entropy.  
(a) Water (b) Ice (c) Air (d)  $\text{H}_2$  gas 1
- Q5. Conjugate acid of  $\text{NH}_2^-$   
(a)  $\text{NH}_2\text{OH}$  (b)  $\text{NH}_4^+$  (c)  $\text{NH}^{2-}$  (d)  $\text{NH}_3$  1
- Q6. Oxidation state of Fe in  $\text{Fe}_3\text{O}_4$  is :  
(a) +2 (b) +3 (c)  $+\frac{8}{3}$  (d)  $+\frac{2}{3}$  1
- Q7. The least abundant isotope of hydrogen is :  
(a)  ${}^1_1\text{H}$  (b)  ${}^2_1\text{D}$  (c)  ${}^3_1\text{T}$  (d) both a and b 1

- Q8. Write the formula of Plaster of Paris. 1
- Q9. Define inert pair effect. 1
- Q10. Write the IUPAC - name of isopentane 1
- Q11. Write four differences between orbit and orbital. 2
- Q12. Draw the shape of the :  
 (a)  $\pi^*2p_x$  molecular orbital (b)  $\sigma 2p_z$  molecular orbital. 2
- Q13. Explain the following :-  
 (a) Why bond angle in water is lesser than that of ammonia molecule ?  
 (b) Explain why  $\text{BeH}_2$  molecule has a zero dipole moment although, the Be-H bonds are polar.  $1 \times 2 = 2$
- Q14. Derive the ideal gas equation. 2
- Q15. Calculate the density of ammonia ( $\text{NH}_3$ ) at  $30^\circ\text{C}$  and 5 bar pressure. 2
- Q16. Write the construction and working of Normal Hydrogen electrode (N.H.E.) 2  
 OR  
 Write the construction and working of electro-chemical cell.
- Q17. (a) Define the Law of Multiple Proportion. 1  
 (b) Calculate the no. of atoms of each kind present in 10.6 gm.  $\text{Na}_2\text{CO}_3$ . 2
- Q18. (a) Define the following :-  
 (i) Hund's Rule (ii) Bohr Bury's Rule 2  
 (b) List the value of all quantum No. for an electron present in 4f orbital. 1
- Q19. (a) Why the size of cation always smaller than its parent atom. 2  
 (b) Arrange the following ions in the order of decreasing their size :-  
 $\text{Mg}^{2+}$ ,  $\text{Al}^{3+}$ ,  $\text{O}^{2-}$  1
- Q20. (a) Write the four uses of hydrogen peroxide. 2  
 (b) Why do we store sodium metal in kerosene oil and not in water ? 1
- Q21. Write the biological importance of Sodium and Potassium.  
 OR  
 Write the Solvay process for the manufacture of Sodium Carbonate. ( $\text{Na}_2\text{CO}_3$ ). 3
- Q22. Explain the structure of diborane. 3
- Q23. Explain the following :-  
 (a) Why  $\text{CCl}_4$  can not be hydrolysed while  $\text{SiCl}_4$  can be easily hydrolysed.  
 (b) Why is graphite good conductor of electricity but diamond is not although both are made up of carbon element.  
 (c) Why is  $\text{CO}_2$  gas but  $\text{SiO}_2$  solid.  $3 \times 1 = 3$

- Q24. What is homologous series ? Write its important characteristics. Explain it by taking suitable example. 3
- Q25. Write the IUPAC - name of the following :-
- (a)  $(\text{CH}_3)_2\text{CH} - \underset{\text{CH}_3}{\text{CH}} - \text{CH} = \underset{\text{CH}_3}{\text{C}} - \text{CH}_2 - \text{CH}_3$
- (b)  $\text{CH}_3 - \underset{\text{C}_2\text{H}_5}{\text{CH}} - \text{CH}_2 - \underset{\text{CH}_3}{\text{CH}} - \text{C}_2\text{H}_5$
- (c)  $\text{CH}_2 = \underset{\text{CH}_3}{\text{C}} - \text{CH} - \underset{\text{CH}_3}{\text{C}} \equiv \text{CH}$  3
- Q26. Write a note on the following :-
- (a) Decarboxylation Reaction
- (b) Wurtz Reaction
- (c) Ozonolysis 3
- Q27. What is green house effect ? What are its effects ? 3
- Q28. (a) Drive relationship between  $\Delta H$  and  $\Delta E$ . 3
- (b) Propane has structure  $\text{CH}_3 - \text{CH}_2 - \text{CH}_3$ . Calculate the enthalpy changes ( $\Delta H^\circ$ ) for reaction :-  
 $\text{C}_3\text{H}_8(\text{g}) + \text{SO}_2(\text{g}) \longrightarrow 3\text{CO}_2(\text{g}) + 4\text{H}_2\text{O}(\text{g})$   
 Bond energy of various bonds are :-  
 C - C (347 KJ/mol), C - H (414 KJ/mole)  
 O = O (498 KJ/mol) C = O (741 KJ/mole)  
 O - H (464 KJ/mol) 2
- Q29. (a) Write the application of equilibrium constant. 2
- (b) The pH of a tomato juice is 4.4. Calculate  $[\text{H}_3\text{O}^+]$  and  $[\text{OH}^-]$ . 2
- (c) Write a note on common ion effect. 1
- OR
- (a) Calculate the solubility of  $\text{PbCl}_2$  if its solubility product is  $1.0 \times 10^{-6}$  at 298 K. 2
- (b) Write a note on hydrolysis of salt. 2
- (c) Write Lewis concept of acid and base. 1
- Q30. (a) What happens when :-
- (i) Propene is treated with HBr.
- (ii) Benzene is treated with methyl chloride in the presence of anh.  $\text{AlCl}_3$ .
- (iii) Chloroform is treated with silver powder and heat.  $3 \times 1 = 3$
- (b) Prove that phenolic gr ( $-\text{OH}$ ) is ortho and para directing gr. 2