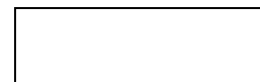


**BRIKS ACADEMY**  
**CHEMISTRY MODEL QUESTION PAPER - 02**



Time: 3 hours

Subject: CHEMISTRY  
SET- 2

Max. Marks: 70

1. Question paper has **FIVE** parts having **52** questions. All parts are compulsory.
2. a. Part-A carries 20 marks. Each question carries 1 mark.  
b. Part-B carries 10 marks. Each question carries 2 marks.  
c. Part-C carries 18 marks. Each question carries 3 marks.  
d. Part-D carries 10 marks. Each question carries 5 marks.  
e. Part-E carries 12 marks. Each question carries 3 marks.
3. In Part-A questions, **first attempted answer** will be considered for awarding marks.
4. Write balanced chemical equations and draw neat labelled diagrams and graphs wherever necessary.
5. Direct answer to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6. Use log tables and simple calculator if necessary (use of scientific calculator is not allowed).

**PART-A**

I. Select the correct option from the given choices:

**15 × 1 = 15**

1. The prefix pico stands for  
a)  $10^{-10}$                       b)  $10^{-12}$                       c)  $10^{-6}$                       d)  $10^{+10}$
2. The number of moles of solutes dissolved in kg of solvent is  
a) Molarity                      b) Molality  
c) Mole fraction                      d) % w/v
3. Atoms with identical atomic number but different mass number are known as  
a) isotones                      b) isobars                      c) nucleons                      d) isotopes
4. The size of the anion will be ..... as that of neutral atom  
a) same                      b) large                      c) small                      d) none of these
5. Linear molecule among the following is  
a)  $H_2O$                       b)  $NH_3$                       c)  $BF_3$                       d)  $CO_2$
6. Bond order is an inverse measure of  
a) Bond length                      b) Bond angle                      c) Bond dissociation enthalpy                      d) Stability
7. Which of the following is not correct?  
a)  $\Delta G$  is zero for a reversible reaction  
b)  $\Delta G$  is +ve for a spontaneous reaction  
c)  $\Delta G$  is -ve for a spontaneous reaction  
d)  $\Delta G$  is +ve for a non-spontaneous reaction
8. In thermodynamics, which one of the following properties is not an intensive property.  
a) Pressure                      b) temperature                      c) volume                      d) density

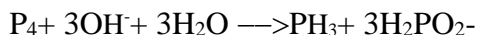
9. It is not possible to attain equilibrium in

- a) Closed system
- b) Isolated
- c) Open system
- d) None of these

10. For the reaction  $\text{SO}_2(\text{g}) + \frac{1}{2} \text{O}_2 \rightleftharpoons \text{SO}_3(\text{g})$ , if  $K_p = K_c \times (\text{RT})^{\Delta n}$ , then  $\Delta n$  value is

- a) 1
- b) -1
- c)  $-\frac{1}{2}$
- d)  $+\frac{1}{2}$

11. Identify the correct statement with reference to the given reaction



- a) P is undergoing reduction only
- b) P is undergoing oxidation only
- c) P is undergoing oxidation and reduction
- d) H is undergoing neither oxidation nor reduction

12. The IUPAC name for  $\text{CH}_3\text{COCH}_2\text{CH}_2\text{COOH}$

- a) 1-Hydroxy pentane-1,4-dione
- b) 1,4-dioxo pentanone
- c) 1-Carboxy butane-3-one
- d) 4-Oxo pentanoic acid

13. The principle involved in paper chromatography is

- a) Adsorption
- b) partition
- c) solubility
- d) volatility

14. Arrange the following in decreasing order of their boiling points

- i) n-Butane
  - ii) 2-methyl butane
  - iii) n-pentane
  - iv) 2,2-dimethyl propane
- a) i > ii > iii > iv
- b) ii > iii > iv > i
- c) iv > iii > ii > i
- d) iii > ii > iv > i

15. During ozonolysis of  $\text{CH}_2=\text{CH}_2$  if hydrolysis is made in the absence of Zn dust the product formed is

- a)  $\text{HCHO}$
- b)  $\text{HCOOH}$
- c)  $\text{CH}_2\text{OHCH}_2\text{OH}$
- d)  $\text{CH}_3\text{OH}$

II. Fill in the blanks by choosing the appropriate word from those given in the brackets:

(thiophene, isolated system, decreases,  $-\text{NO}_2$ ,  $\text{He}_2$ )

5 × 1 = 5

16. -----molecule does not exist

17. System in which there is no exchange of matter, work or energy from surrounding is called-----.

18. When the Hof asolution decreases, its hydroxyl ion concentration is \_\_\_\_\_.

19. -----is the example of heterocyclic compound.

20. Meta-directing group in aromatic electrophilic substitution reaction is -----.

### PART-B

III. Answer any five of the following. Each question carries two marks.

5 × 2 = 10

21. Define enthalpy? Give the relation with internal energy, pressure and volume.

22. What are buffer solutions? How are they classified?

23. Explain why cations are smaller and anions are larger than their parent atom.

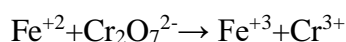
24. Give any two sigma and pi bond.

25. Explain the geometry of  $\text{BF}_3$  molecule using VSEPR theory.
26. Lewis dot structure of a)  $\text{CO}_3^{2-}$  b)  $\text{O}_3$
27. Using the stock notation, represent the following compound (i)  $\text{CuO}$ , (ii)  $\text{MnO}_2$ .
28. Write any two difference between inductive and resonance effect.
29. What are the necessary condition for any system to be aromatic?

### PART-C

**IV. Answer any three of the following. Each question carries three marks. 3 × 3 = 09**

30. Define electro gain enthalpy of an element. How does it vary along a period and down a group in the periodic table?
31. Explain the shape, hybridization of  $\text{CH}_4$  molecule using VBT theory?
32. Explain electronic configuration, bond order and magnetic property of oxygen molecule using MOT
33. Define octet rule. Write any two limitations.
34. Balance the chemical equation by oxidation number method (in acidic medium)



**V. Answer any three of the following. Each question carries three marks. 3 × 3 = 09**

35. a) Write the relationship between  $^\circ\text{C}$ ,  $^\circ\text{K}$  and  $^\circ\text{F}$ .  
b) what is limiting reagent?
36. Write any three postulates of Bohr model of an atom.
37. For the element with atomic number 30.  
i) Write the electronic configuration      ii) How many unpaired electrons present in it?  
iii) To which block of the periodic table it belongs?
38. Derive an expression for mechanical work done for isothermal reversible expansion of an ideal gas.
39. State Le Chatelier's principle. What is the effect of temperature on the equilibrium if the reaction is exothermic?
40. Explain the following with an example.  
a) Enthalpy of formation  
b) Enthalpy of combustion  
c) Enthalpy of solution

### PART-D

**VI. Answer any two of the following. Each question carries five marks. 2 × 5 = 10**

41. a) What is the type of hybridisation of carbon atoms marked as a, b, c and d in the following compound



- a) What is carbocation? Write the decreasing order of stability among  $1^\circ$ ,  $2^\circ$  and  $3^\circ$  carbocations. (3+2)
42. a) Explain the principle and calculations involved in the estimation of halogen in the organic compound.  
b) What are carbocations? (4 + 1)

43. a) An alkene 'A' on ozonolysis gives a mixture of ethanal and methanal. Write the chemical reaction and IUPAC name of 'A'.

b) Explain Wurtz reaction with a suitable example. (3 + 2)

44. a) Explain the mechanism of Friedel-Craft's alkylation of benzene.

b) Give an example of electron donating and electron withdrawing group. (3 + 2)

**VII. Answer any four of the following. Each question carries three marks. 4 × 3 = 12**

45. An organic compound contains 57.14% of carbon, 6.16% Hydrogen, 9.52% Nitrogen and 27.18% oxygen. Calculate the empirical formula and molecular formula. If its molecular mass is 294.3 gm/mole.

46. Dinitrogen and dihydrogen react with each other to produce ammonia according to the following chemical equation.

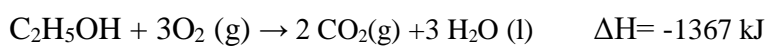
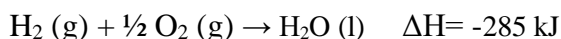
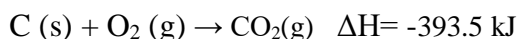


Calculate the mass of ammonia produced if  $2 \times 10^3$  g dinitrogen reacts with  $1 \times 10^3$  g of dihydrogen.

47. Calculate the wavenumber and wavelength of the first line in the Lyman series of the hydrogen spectrum. (Given:  $R_H = 1.09677 \times 10^7 \text{ m}^{-1}$ )

48. Calculate the energy of the photon having a wavelength of 589 nm in J.

49. Calculate the heat of formation of ethyl alcohol, from the following data



50. Calculate the total work done when one mole of a gas expands isothermally and reversibly from an initial volume of  $10 \text{ dm}^3$  to a final volume of  $20 \text{ dm}^3$  at 298 K. ( $R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$ )

51. Calculate  $\Delta G^0$  for the hydrolysis of sucrose. The equilibrium constant  $K_c$  is  $2 \times 10^{-3}$  at 300 K. ( $R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$ )

52. The pH of 0.1 M monobasic acid, HA is 4.5. Calculate the concentration of  $\text{H}_3\text{O}^+$ ,  $\text{A}^-$  and HA at equilibrium and degree of dissociation.

1.

