



DELHI PUBLIC SCHOOL SURAT
CHEMISTRY(THEORY)

Roll No:

Class: XI

Marks: 70

Time Allowed: 3 hours

Instructions:

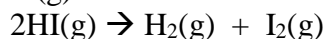
1. All questions are compulsory.
2. Q.No.1 to 5 are very short answer questions, carrying 1 mark each.
3. Q.No. 6 to 12 are short answer questions carrying 2 marks each.
4. Q.No. 13 to 24 are also short answer questions carrying 3 marks each.
5. Q.No. 25 to 27 are long answer question carrying 5 marks .
6. No overall choice is given. However internal choice is given in one question of 2 marks, one question of 3 marks and all questions of 5 marks.
7. Use of Calculators is not allowed. However if required use of Log tables is permitted.

1. Classify the following species into Lewis acids and Lewis bases : [1]
(a) OH^- (b) F^- (c) H^+ (d) BCl_3 .
2. Assign oxidation numbers to the underlined element : (a) $\text{NaH}_2\underline{\text{P}}\text{O}_4$. [1]
3. Define an isolated system? [1]
4. State the law of conservation of energy. [1]
5. The equilibrium constant for a reaction is 10. What will be the value of ΔG^0 ? [1]
[$R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$, $T = 300 \text{ K}$].
6. Calculate the mass of sodium acetate (CH_3COONa) required to make 500 mL of 0.375 molar [2]
aqueous solution. Molar mass of sodium acetate is $82.0245 \text{ g mol}^{-1}$.
7. How does atomic radius vary in a period and in a group? How do you explain the variation? [2]
8. Consider the following species: N^{3-} , O^{2-} , F^- , Na^+ , Mg^{2+} and Al^{3+} [2]
(a) What is common in them?
(b) Arrange them in the order of increasing ionic radii.
9. Draw the Lewis structures for the following molecules : H_2S , SiCl_4 . [2]
10. Write IUPAC names of following: [2]
(i) $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$
(ii) $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{COOH}$

11. a) Define pH. [2]
b) The concentration of hydrogen ion in a sample of soft drink is 3.8×10^{-3} M. what is its pH?

OR

A sample of HI(g) is placed in flask at a pressure of 0.2 atm. At equilibrium the partial pressure of HI(g) is 0.04 atm. What is K_p for the given equilibrium?



12. a) State the conditions of aromaticity. [2]
b) Write one equation for the preparation of benzene.

13. Calculate the mass percent of different elements present in sodium sulphate (Na_2SO_4). [3]

OR

Calculate the amount of carbon dioxide that could be produced when

- a) 1 mole of carbon is burnt in air.
b) 1 mole of carbon is burnt in 16 g of dioxygen.
c) 2 moles of carbon are burnt in 16 g of dioxygen.

14. State : [3]
a) Pauli's exclusion principle
b) Hund's rule
c) Aufbau principle.

15. An electron is in one of the 3d orbitals. Give the possible values of n, l and m_l for this electron. [3]

16. Which hybrid orbitals are used by carbon atoms in the following molecules? [3]
a) $\text{CH}_3\text{-CH}_3$ (b) $\text{CH}_3\text{-CH=CH}_2$ (c) $\text{CH}_3\text{-CH}_2\text{-OH}$

17. a) Density of gas is found to be 5.46 g/dm^3 at 27°C at 2 bar pressure. What will be its density at STP? [3]
b) Critical temperature for CO_2 and CH_4 are 31.1°C and -81.9°C respectively. Which of these has stronger intermolecular forces and why?

18. a) State Dalton's law of partial pressure. [3]
b) Calculate the temperature of 4.0 mol of a gas occupying 5 dm^3 at 3.32 bar. [$R = 0.083 \text{ JK}^{-1} \text{ mol}^{-1}$].

19. Calculate the enthalpy change on freezing of 1.0 mol of water at 10.0°C to ice at -10.0°C . [3]
 $\Delta_{\text{fus}}H = 6.03 \text{ kJ mol}^{-1}$ at 0°C .
 $C_p[\text{H}_2\text{O}(\text{l})] = 75.3 \text{ J mol}^{-1} \text{ K}^{-1}$
 $C_p[\text{H}_2\text{O}(\text{s})] = 36.8 \text{ J mol}^{-1} \text{ K}^{-1}$

OR

- a) In a process, 701 J of heat is absorbed by a system and 394 J of work is done by the system. What is the change in internal energy for the process?
b) Enthalpy of combustion of carbon to CO_2 is $-393.5 \text{ kJ mol}^{-1}$. Calculate the heat released upon formation of 35.2 g of CO_2 from carbon and dioxygen gas.
c) What is adiabatic process?

20. a) State Le Chatelier's principle. [3]
b) At 450 K, $K_p = 2.0 \times 10^{10}/\text{bar}$ for the given reaction at equilibrium.
 $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{SO}_3(\text{g})$. What is K_c at this temperature?

21. a) Give an example of decomposition reaction. [3]
b) Identify the substance oxidised, reduced, oxidising agent and reducing agent for the following reaction: $2\text{AgBr (s)} + \text{C}_6\text{H}_6\text{O}_2(\text{aq}) \rightarrow 2\text{Ag(s)} + 2\text{HBr (aq)} + \text{C}_6\text{H}_4\text{O}_2(\text{aq})$

22. Write chemical equations for : (i) hydrogenation (ii) syngas (iii) water-gas shift reaction. [3]

23. What happens when (i) magnesium is burnt in air (ii) CaO is heated with SiO₂ [3]
(iii) chlorine reacts with slaked lime?

24. Write the name and formula of washing soda. Starting with sodium chloride how would you proceed to prepare sodium carbonate? [3]

25. a) Write IUPAC name and structure of the product obtained by the nitration of benzene [5]
b) Draw the cis and trans structures of hex-2-ene. Which isomer will have higher b.p. and why?
c) Convert ethyne into nitrobenzene.
d) Give example of Wurtz reaction.

OR

- a) What effect does branching of an alkane chain has on its boiling point?
b) Give example of i) Addition reaction ii) combustion reaction?
d) Why benzene is extra ordinary stable though it contains three double bonds?
e) Explain decarboxylation reaction?

26. a) Write structural formulas and IUPAC names for all possible isomers having the number of [5]
double bond as indicated: (a) C₄H₈ (one double bond).
b) In the estimation of sulphur by Carius method, 0.468 g of an organic sulphur compound afforded 0.668 g of barium sulphate. Find out the percentage of sulphur in the given compound.
c) Write one difference between inductive effect and mesomeric effect.

OR

- a) A sample of 0.50 g of an organic compound was treated according to Kjeldahl's method. The ammonia evolved was absorbed in 50 mL of 0.5 M H₂SO₄. The residual acid required 60 mL of 0.5 M solution of NaOH for neutralisation. Find the percentage composition of nitrogen in the compound.
b) Give one example of functional group isomerism and position isomerism.
c) Write one difference between homolysis and heterolysis.

27. a) Give reasons for the following : [2]
i) Concentrated HNO₃ can be transported in aluminium container.
ii) Atomic radius of Ga is lower than that of Al.
b) What happen when B₂H₆ (diborane) is heated with excess of ammonia? [1]
c) Describe inert pair effect. [2]

OR

- a) Give reasons: [3]
i) BCl₃ has zero dipole moment.
ii) Lead is known not to form PbI₄
iii) Graphite is used as a lubricant.
b) What happens when: [2]
i) Boric acid is added to water.
ii) CO is being heated with ZnO.

END OF THE EXAMINATION