MODEL QUESTION PAPER

CHEMISTRY
CLASS XII

Time: 3 Hrs.   Max. Marks 70

General Instructions:
1. *All questions are compulsory.*
2. *Marks for each question are indicated against it.*
3. *Q1 to 8 are multiple choice questions.*
4. *Q1 to 5 carry one mark each.*
5. *Q6 to 8 carry two marks each and may have more than one correct answer.*
6. *Q9 to 15 carry two marks each.*
7. *Q16 to 25 carry three marks each.*
8. *Q26 to 28 carry five marks each.*
9. *Use log tables, if necessary.*

1. The molecule, AB of a compound forms cubic lattice where 'A' atoms occupy the corners and B atoms occupy the alternate faces of the unit cell. The formula of the compound is
    (a) A_2B (b) AB_2 (c) AB   (d) A_2B_2 **1**

2. For the given reaction $2A + B \rightarrow C + D$, the rate constant is $1.5 \times 10^{-4}\ s^{-1}$. What is the order of the reaction?
    (a) one   (b) two   (c) zero   (d) three   **1**

3. Which of the following is isostructural with XeF_4?
    (a) ICl_4^{2-} (b) ICl_4^{-} (c) SO_4^{2-} (d) SF_4 **1**

4. What is the coordination number of Co in $[Co(NO_2)_2\ (en)_2]^+$ **1**
    (a) 4   (b) 5   (c) 6   (d) 3

5. $C_6H_5NH_2$ and $C_6H_5CH_2NH_2$ can be distinguished by   **1**
    (a) Fehling's test   (b) Isocyanide test
    (c) Adding $NaNO_2 + HCl$ (d) Iodoform test

Q6-8 may have more than one correct answer.

6. Four metals A, B, C and D have E° values: – 0.76V, 0.34V, –2.13 V and 0.44V respectively. What is the correct order of their increasing oxidising power?   **2**
    (a) A > B > C > D   (b) D > B > A > C
    (c) D > A > B > C   (d) C> D > A > B

7. In which of the following pairs of oxometal ions, the oxidation state of central metal atom is equal to its group number?   **2**
    (a) MnO_4^-, $Cr_2O_7^{2-}$ (b) CrO_4^{2-}, MnO_4^{2-}
    (c) VO_2^+, CrO_4^{2-} (d) VO_2^+, TiO_2^{2+}

8. Starting from bromoethane, the formation of which of the following compound requires more than one step of reaction? **2**
   (a) Methoxyethane   (b) Ethanol
   (c) Ethanoic acid   (d) Ethene

9. An analysis shows that ferrous oxide has the formula $Fe_{0.93} O_{1.00}$. What fraction of iron exists as Fe^{2+} and Fe^{3+}? **2**

10. Explain the following:
    a) One gram of pulverised wood burns faster than one gram piece of wood.
    b) An increase of 10K in temperature rarely doubles the kinetic energy of particles but this much increase in temperature may be enough to double the rate of reaction. **2**

OR

Show that in case of first order reaction the time taken for 99.9% of the reaction to take place is ten times that required for 50% of the reaction.

11. Give reason **2**
    a) PCl_5 acts as an oxidising agent.
    b) Dinitrogen is chemically inert.

12. Discuss the magnetic behaviour of $[Fe(CN)_6]^{3-}$ and $[FeF_6]^{3-}$. **2**

13. Identify A and B in the following reactions : **2**

    (a) $\underset{}{\overset{OH}{\bigcirc}} \xrightarrow[\text{2. H}^+]{\text{1. NaOH/CO}_2} A \xrightarrow{\text{(CH}_3\text{CO)}_2\text{O}} B$

    (b) $A \xrightarrow[\text{2. H}^+]{\text{1. PCC}} CH_3CHO \xrightarrow{I_2/NaOH} B + HCOONa$

14. Give IUPAC name of the ionisation isomer of $[Cr (NH_3)_5Br]SO_4$. Draw the structures of optical isomers of $[CoBr_2(Ox)_2]^{3-}$ **2**

15. In summer, a given sample of milk turns sour at 27°C in 48 hours. In a refrigerator at 2°C, milk can be stored three times longer before it sours. Calculate the activation energy of the souring of milk. $R = 8.31$ JK^{-1} mol^{-1} **2**

16. Find the Gibbs energy change of the cell at 298K. **3**
    $Cr |Cr^{3+} (0.1M)|| Cu^{2+}(0.01M) + |Cu.$
    Given $E° Cr^{3+} / Cr = -0.75V$, $Cu^{2+}/Cu = +0.34V$, $F = 96500C$.

17. Differentiate between the following **3**
    (a) Multimolecular colloids and macromolecular colloids
    (b) Coagulation and peptisation
    (c) Activity and selectivity of catalyst.

18. Give the principle of contact process for the manufacture of sulphuric acid. **3**
Give an equation to show oxidising property of sulphuric acid.

OR

How will you prepare
a) HBr from NaBr
b) SO_2 from H_2SO_4
c) XeO_3 from XeF_6?

19. Account for the following **3**
a) Transition metals have high enthalpy of atomization.
b) Mn^{2+} compounds are more stable towards oxidation than Fe^{2+} compounds.
c) Cu^{2+} ion is coloured while Zn^{2+} ion is not.

20. Explain with the help of electronic effects, 'generally haloalkenes undergo nucleophilic substitution reactions whereas haloarenes undergo electrophilic substitution reactions'.
3

21. Give IUPAC names of the alkyl halide and the alkoxide required for the preparation of tertiary butyl ethyl ether. Give the products formed when tertiary butyl ethyl ether is treated with an equal number of moles of HI as that of the ether. **3**

22. Account for the following with equations of the reactions involved:
a) Gabriel phthalimide synthesis is preferred for preparation of primary amines. **1½**
b) Explain why pK_b of methanamine is 3.38 while that of aniline is 9.38. **1½**

23. a) A person suffers from RBC deficiency in haemoglobin. Which vitamin deficiency does the person has? Name two food items which should be included in the diet to restore the health back to normal? **1½**
b) Why two strands of DNA are not identical but are complimentary to each other?
1½

OR

Name the products of hydrolysis of **3**
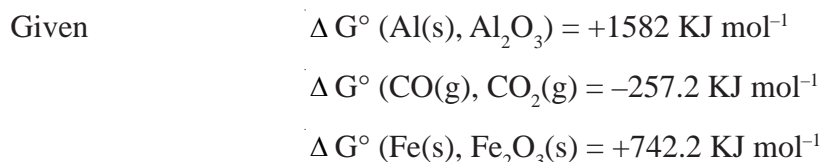a) Protein
b) Nucleotide
c) Lactose.

24. Describe the classification of polymers on the basis of their molecular structure. Give an example of each class. **3**

25. a) While antacids and antiallergic drugs interfere with the function of histamines, why do these not interfere with the function of each other? **1½**
b) What are antidepressants? Give an example. **1½**

26. Discuss the method of extraction of iron from its ore with the help of equations and diagram. Also discuss the thermodynamic principle of the reduction of its oxide into metal. **5**

OR

The choice of reducing agent in a particular case depends on thermodynamic principles. How far do you agree with this statement? Explain the feasibility of the following reduction reactions on the bases of thermodynamic principles.
i) reduction of Al_2O_3 with CO
ii) Reduction of Fe_2O_3 with CO

Given $\Delta G° (Al(s), Al_2O_3) = +1582$ KJ mol^{-1}

$\Delta G° (CO(g), CO_2(g) = -257.2$ KJ mol^{-1}

$\Delta G° (Fe(s), Fe_2O_3(s) = +742.2$ KJ mol^{-1}

27. Ozonolysis of compound 'A' (C_7H_{14}) yields a mixture containing compounds 'B' and 'C'. Both 'B' and 'C' give positive 2.4 - DNP test and Tollen's test. 'B' undergoes Cannizzaro's reaction. 'C' undergoes aldol condensation to give 'D'. 'B' is also obtained by the reaction of 2, 2 –dimethylpropanol with PCC. Deduce the structures of A, B, C and D and justify your answer by giving the equations of the reactions involved.

OR

An aromatic compound 'A' (C_8H_6) reacts with dil. H_2SO_4 and $HgSO_4$ giving 'B', which upon reaction with NaOH and I_2 gives compounds 'C' and 'D'. 'D' upon reaction with soda lime gives a hydrocarbon 'E', which on reaction with CH_3COCl in the presence of anhydrous aluminium chloride gives 'B'. Identify 'A', 'B', 'C', 'D' and 'E' and write the equations of the reactions involved. **5**

28. a) Why osmotic pressure is a better criteria for measuring the molecular mass of macromolecules as compared to elevation of boiling point or depression of freezing point? **2**

b) At 300K, 36g of glucose present in one litre of its solution has an osmotic pressure of 4.98 bar. If the osmotic pressure of the solution is 1.52 bar at the same temperature, what would be its concentration? **3**

OR

a) An aqueous solution containing 4% nonvolatile solute exerts a pressure of 1.002 bar at the normal boiling point of the solvent. What is the molar mass of the solute? **3**
b) Why is common salt used to clear the snow off the road? **1**
c) Why does water stop boiling when sugar is added to it when it is boiling? **1**