SATISH SCIENCE ACADEMY

DHANORI PUNE-411015

CHEMISTRY

Class 12 - Chemistry

Time Allowed: 3 hours   **Maximum Marks: 70**

General Instructions:

The question paper is divided into **four sections**:

1. **Section A**

   - Q. No. 1 contains **Ten multiple choice type** of questions carrying **One mark** each.

   - Q. No. 2 contains **Eight very short answer type** of questions carrying **One mark** each.

2. **Section B**

   - Q. No. 3 to Q. No. 14 contain **Twelve short answer type** of questions carrying **Two marks** each. (Attempt any Eight).

3. **Section C**

   - Q. No. 15 to Q. No. 26 contain **Twelve short answer type** of questions carrying **Three marks** each. (Attempt any Eight).

4. **Section D**

   - Q. No. 27 to Q. No. 31 contain **Five long answer type** of questions carrying **Four marks** each. (Attempt any Three).

5. Use of the log table is allowed. Use of calculator is not allowed.

6. Figures to the right indicate full marks.

7. For each MCQ, correct answer must be written along with its alphabet. e.g., (a).... / (b) ...../ (c)...... / (d)....... Only first attempt will be considered for evaluation.

8. Physical constants:- i) ------------------------ ii) ----------------------- iii) -----------------------

Section A

1. **Select and write the correct answer:**   **[10]**

    (a) To prepare n-type semiconductor, the impurity to be added to silicon should have the following number of valence electrons: **[1]**

         a) 5   b) 4

         c) 3   d) 2

    (b) The species which acts as an conjugate acid as well as base is: **[1]**

         a) NH_4OH b) H_2SO_4

         c) HSO_4^- d) CO_3^{2-}

(c) For the reaction $2A \longrightarrow 3C$ the reaction rate is equal to: **[1]**

    a) $-\frac{1}{3} \times \frac{d[A]}{dt}$ b) $\frac{d[A]}{dt}$

    c) $-\frac{d[A]}{dt}$ d) $-\frac{1}{2} \times \frac{d[A]}{dt}$

(d) Which of the following ion is colourless? **[1]**

    a) Co^{2+} b) Ni^{2+}

    c) Fe^{2+} d) Zn^{2+}

(e) The CORRECT formula of a complex having IUPAC name Tetraamminedibromoplatinum(IV) bromide is _____. **[1]**

    a) $[PtBr(NH_3)_4]Br_2$ b) $[PtBr_2(NH_3)_4]Br_2$

    c) $[PtBr_2(NH_3)_4]Br$ d) $[PtBr(NH_3)_4]Br$

(f) $CH_3 - CH_2 - Br \xrightarrow[\Delta]{\text{Alcoholic } KOH} B \xrightarrow{HBr} C \xrightarrow{\text{Na / elether}} D$, the compound D is _____. **[1]**

    a) ethane   b) n-pentane

    c) propane   d) n-butane

(g) Propene on oxidation with diborane in presence of alkaline hydrogen peroxide gives _____. **[1]**

    a) propan-2-ol   b) allyl alcohol

    c) propan-1-ol   d) propan-1, 2-diol

(h) Name the reagent which on reaction with glucose confirms the presence of five hydroxyl groups in glucose: **[1]**

    a) Bromine water   b) Acetic anhydride

    c) Dilute nitric acid   d) Hydroxyl amine

(i) ZWT in green chemistry stands for: **[1]**

    a) zubl water technology   b) zero waiting time

    c) zhen wu tang   d) zero waste technology

(j) Compound having general formula $\underset{H}{\overset{R}{>}}C\underset{OR}{\overset{OR}{<}}$ is called _____. **[1]**

    a) acid anhydride   b) diester

    c) hemiacetal   d) acetal

2. **Answer the following:** **[8]**

  (a) Define green chemistry. **[1]**

  (b) Write the formula of Hinsberg's reagent. **[1]**

  (c) Why is chloroform stored in dark coloured bottles? **[1]**

  (d) Arrange the following in the increasing order of the property mentioned: **[1]**
    $HOCl, HClO_2, HClO_3, HClO_4$ (acidic strength)

  (e) Write the formula of Tetraamminedichloroplatinum(IV) chloride. **[1]**

  (f) Define osmosis. **[1]**

  (g) Define Extensive property. **[1]**

  (h) Define reference electrode. **[1]**

Section B

Attempt any 8 questions

3. Define lanthanoid contraction. Explain its effects. **[2]**

4. Define boiling point. Write the formula to determine molar mass of a solute using freezing point depression method. **[2]**

5. Write two advantages of nanoparticles and nanotechnology. **[2]**

6. What is the action of the following reagents on ethanol? **[2]**

    i. Thionyl chloride

    ii. Mixture of red phosphorus and bromine

    iii. Acidified potassium dichromate

7. Write use and environmental effect of CFC. **[2]**

8. Define acids and bases according to Bronsted-Lowry theory. **[2]**

9. Convert benzene diazonium chloride into benzene. **[2]**

10. Three moles of an ideal gas are expanded isothermally from $15dm^3$ to $20dm^3$ at constant external pressure of 1.2 bar. Estimate the amount of work in Joules. **[2]**

11. Give chemical reactions of glucose with **[2]**

    i. Hydroxylamine

    ii. Bromine water

12. Write the correct condition for spontaneity in terms of Gibbs energy. **[2]**

13. Define: homopolymer and condensation polymer. **[2]**

14. Explain interhalogen compounds. **[2]**

Section C

Attempt any 8 questions

15. Derive the relation between elevation of boiling point and molar mass of solute. **[3]**

16. A face centred cube (fcc) consists of how many atoms? Explain. **[3]**

17. Calculate the time required to deposit 2.4 g of Cu, when 2.03 A of current is passed through $CuSO_4$ solution. (At. mass of $Cu = 63.5\ g\ mol^{-1}$) **[3]**

18. Write the structures of: **[3]**

    i. 3-Chloro-3-ethylhex-1-ene

    ii. 1-Iodo-2,3-dimethylbutane

    iii. 1,3,5-Tribromobenzene

19. The equilibrium constant K_p for the reaction, **[3]**

    $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$ is 130 at $510\ K$.

    Calculate ΔG° for the following reaction at the same temperature:

    $2HI_{(g)} \rightleftharpoons H_{2(g)} + I_{2(g)}$
    [Given: $R = 8.314\ J\ K^{-1}\ mol^{-1}$]

20. Calculate spin only magnetic moment of divalent cation of transition metal with atomic number 25. **[3]**

    Salts of Ti^{4+} are colourless. Give reason.

21. Explain Lewis theory of acids and bases. **[3]**

22. Explain formation of $[CoF_6]^{3-}$ complex with respect to: **[3]**

    i. Hybridisation

    ii. Magnetic properties

iii. Inner/outer complex

iv. Geometry

23. Distinguish between molecularity and order of reaction. **[3]**

24. Write the preparation of benzoic acid from the following: **[3]**

   i. styrene

  ii. Benzamide

  iii. dry ice

25. Explain the trends in the following atomic properties of group 16 elements: **[3]**

   i. Atomic radii

  ii. Ionisation enthalpy

  iii. Electronegativity

  iv. Electron gain enthalpy

26. **Answer the following:** **[3]**

  (a)   Write IUPAC names of the following compounds: **[2]**

i.

ii.
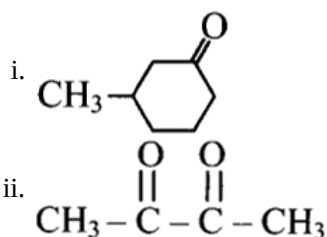
  (b)   Convert benzene diazonium halide into aryl iodide. **[1]**

Section D

Attempt any 3 questions

27. **Answer the following:** **[4]**

  (a)   Derive integrated rate law equation for zero order reaction. **[2]**

  (b)   Write the reactions involved in the zone of reduction in blast furnace during extraction of iron. **[1]**

  (c)   What is nanomaterial? **[1]**

28. **Answer the following:** **[4]**

  (a)   Calculate the work done during the expansion of 2 moles of an ideal gas from $10 dm^3$ to $20 dm^3$ at 298 K in vacuum. **[2]**

  (b)   Write chemical composition of Zieglar-Natta catalyst. **[1]**

  (c)   Define enzymes. **[1]**

29. **Answer the following:** **[4]**

  (a)   Face centred cubic crystal lattice of copper has density of $8.966\ g\ cm^{-3}$. Calculate the volume of the unit cell. **[2]**

      [Given: Molar mass of copper is $63.5\ g\ mol^{-1}$ and Avogadro number N_A is $6.022 \times 10^{23}\ mol^{-1}$]

  (b)   How will you bring about the following conversions: **[2]**

     i. Acetic acid to acetyl chloride

     ii. Methyl cyanide to acetic acid

30. **Answer the following:** **[4]**

  (a)   Calculate the effective atomic number of the central metal atom in the following compounds: **[2]**

i. $K_4Fe(CN)_6$

Fe[Z = 26]

ii. $Cr(CO)_6$

Cr[Z = 24]
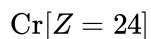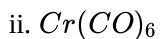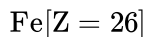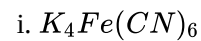
(b) Arrange the following reducing agents in the order of increasing strength under standard state conditions. Justify the answer. **[1]**

Element	$Al_{(s)}$	$Cu_{(s)}$	$Cl^-_{(aq)}$	$Ni_{(s)}$
E^0	-1.66 V	0.34 V	1.36 V	-0.26 V

(c) What is the action of selenium on magnesium metal? **[1]**

31. **Answer the following:** **[4]**

(a) What is the action of hot HI on isopropyl methyl ether? **[2]**

(b) Explain the trends in the following properties with reference to group 16: **[2]**

  i. Atomic radii and ionic radii

 ii. Ionisation enthalpy

iii. Electronegativity.