

## Kerala Plus Two Exam 2026

### Chemistry- Preliminary Answer key

(This is a preliminary key and may contain errors)

#### Part I: 1 Score Each (Answer any 4)

1. **Cathode Product:** (b) Na.
2. **Half-life (1st Order):** (c) Rate constant ( $t_{1/2} = 0.693/k$ ).
3. **Chelating Ligand:** (d)  $C_2O_4^{2-}$  (Oxalate ion).
4. **Least Reactive ( $S_N1$ ):** (c) Chlorobenzene (due to resonance and  $sp^2$  carbon).
5. **Polysaccharide:** (d) cellulose.

#### Part II: 2 Scores Each (Answer any 8)

- 6. Saline injection: To ensure the solution is **isotonic** with blood cells, preventing hemolysis (bursting) or plasmolysis (shrinking).
- 7. Gibbs Energy:  $\Delta G^\circ = -nFE^\circ = -2 \times 96500 \times 1.1 = -212.3 \text{ kJ/mol}$ .
- 8. (i) Activation Energy: Minimum extra energy reactants need to form an activated complex. **(ii) Catalyst:** Lowers activation energy, providing a faster reaction path.
- 9. Rate Constant:  $k = \frac{2.303}{t} \log \frac{[R]_0}{[R]} = \frac{2.303}{60} \log \frac{1.24 \times 10^{-2}}{0.20 \times 10^{-2}}$ .
- 10. Products: **X:**  $CH_3CH_2Cl$ . **Y:**  $CH_3F$  (Swarts reaction).
- 11.  $S_N1$  vs  $S_N2$ :  $S_N1$  is two-step with carbocation intermediate;  $S_N2$  is one-step with a transition state.
- 12. (i) Poisonous gas: **Phosgene** ( $COCl_2$ ). **(ii) Conversion:** Friedel-Crafts alkylation of chlorobenzene with  $CH_3Cl$  and anhydrous  $AlCl_3$ .
- 13. Methanol: Catalytic hydrogenation of  $CO$ :  $CO + 2H_2 \xrightarrow{ZnO-Cr_2O_3} CH_3OH$ .
- 14. Distinction: **Iodoform test;** acetaldehyde gives yellow precipitate ( $CHI_3$ ), formaldehyde does not.
- 15. Conversion: Nitrobenzene  $\xrightarrow{Sn/HCl}$  Aniline  $\xrightarrow{Br_2(aq)}$  2, 4, 6-Tribromoaniline.

**Part III: 3 Scores Each (Answer any 8)**

- 16. Molar Mass:  $M = \frac{WRT}{\pi V} = \frac{1.26 \times 0.083 \times 300}{2.57 \times 10^{-3} \times 0.2} \approx 61,022 \text{ g/mol}$ .
- 17. **Rusting:** Anode:  $Fe \rightarrow Fe^{2+} + 2e^-$ ; Cathode:  $O_2 + 4H^+ + 4e^- \rightarrow 2H_2O$ .
- 18. **(i) Order vs Molecularity:** Order is experimental and can be fractional/zero; Molecularity is theoretical and always a whole number. **(ii) Pseudo order:** A higher-order reaction behaving as first-order (e.g., acid hydrolysis of ester).
- 19. (i) Zn, Cd, Hg have full d-shells ( $d^{10}$ ). **(ii)** Due to small size and high ionic charge. **(iii)**  $Sc^{3+}$  is  $d^0$  (no d-d transition);  $Ti^{3+}$  is  $d^1$  (d-d transition possible).
- 20.  $K_2Cr_2O_7$ : Chromite ore +  $Na_2CO_3 \rightarrow$  Sodium chromate  $\xrightarrow{H^+}$  Sodium dichromate  $\xrightarrow{KCl}$   $K_2Cr_2O_7$ .
- 21. **(i)** Both are diamagnetic;  $[Ni(CN)_4]^{2-}$  is square planar ( $dsp^2$ ),  $[Ni(CO)_4]$  is tetrahedral ( $sp^3$ ). **(ii)**  $[Co(NH_3)_4(H_2O)Cl]Cl_2$ .
- 22. (i) d-orbitals split into lower energy  $e$  and higher energy  $t_2$ . **(ii)** Does not explain the color or spectra of complexes.
- 23. Phenol +: **(i)** 2,4,6-Tribromophenol. **(ii)** Benzene. **(iii)** Picric acid.

**Part IV: 4 Scores Each (Answer any 4)**

- 27. **(i) Henry's Law:**  $p = K_H \chi$ . Used in soda bottles and scuba tanks. **(ii)** .
- 28. **(i)**  $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$ ;  $E_{cell} = E_{cell}^\circ - \frac{0.059}{2} \log \frac{[Zn^{2+}]}{[Cu^{2+}]}$ . **(ii)** Conductivity decreases with dilution; Molar conductivity increases.
- 29. **(i)** Primary valency (ionizable/oxidation state); Secondary valency (non-ionizable/coordination number). **(ii)** Facial (fac) and Meridional (mer) isomers.
- 30. **(i)** A: Tripropylborane; B: Propan-1-ol. **(ii)** Cumene  $\xrightarrow{O_2}$  Cumene hydroperoxide  $\xrightarrow{H^+/H_2O}$  Phenol + Acetone.
- 31. **(i) Aldol:**  $2CH_3CHO \xrightarrow{\text{dil. NaOH}} CH_3CH(OH)CH_2CHO$ . **(ii)** (a) Etard reaction ( $CrO_2Cl_2$ ); (b) Reduction with  $LiAlH_4$ .