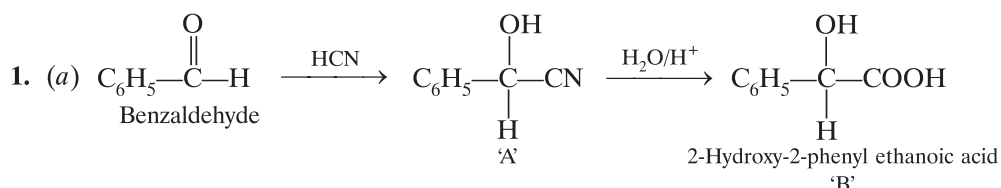


Answers to RCH/Set-1



2. (b) Phosgene, COCl_2

3. (c) $6 + 3 = 9$ [$\text{C}_2\text{O}_4^{2-}$ and 'en' are didentate ligands]

$$x + 0 - 2 - 1 = 0 \Rightarrow x = +3$$

4. (d) Benzene diazonium tetra fluoroborate is water insoluble and stable at room temperature.

$$5. (b) M = \frac{W \times 1000}{M \times V_{\text{mL}}} = \frac{5 \times 1000}{40 \times 450} = \frac{5}{18}$$

$$= 0.278 \text{ M}$$

6. (a) $\text{A} \rightarrow 3$ (Wurtz reaction)

$\text{B} \rightarrow 1$ (Dow's reaction)

$\text{C} \rightarrow 4$ (Wurtz-Fittig reaction)

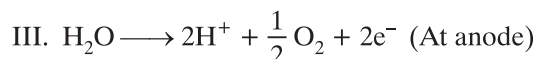
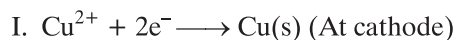
$\text{D} \rightarrow 2$ (Fittig reaction)

7. (a) It is due to least steric hinderance.

8. (c) C-3' contains -OH group.

9. (d) V^{4+} is blue in colour due to presence of unpaired electron, it absorbs light from visible region, undergo $d-d$ transition and radiates blue colour.

10. (b) I and III



11. (d) p -nitro benzoate ion is most stable \because $-\text{NO}_2$ is strong electron withdrawing group.

12. (b) Straight chain $>$ Branched chain, Higher molar mass leads to higher boiling point.

13. (d)

14. (c)

15. (b)

16. (b)

17. A.

$$\frac{\pi_1 V_1}{\pi_2 V_2} = \frac{RT_1}{RT_2}$$

$$\frac{0.6}{0.3} \times \frac{V_1}{V_2} = \frac{283}{293}$$

$$\frac{V_1}{V_2} = \frac{283}{2 \times 293} = 0.474$$

$$\frac{V_2}{V_1} = 2.10$$

OR

B.

$$\pi_{\text{NaCl}} = 3 \times \pi_{\text{MgCl}_2} \quad \dots (i)$$

$$2 \times C_{\text{NaCl}} \times RT = 3 \times C_{\text{MgCl}_2} \times RT$$

$$\Rightarrow C_{\text{NaCl}} = \frac{3 \times 0.2}{2} = 0.3\text{M}$$

18.

$$k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$$

$$\Rightarrow k = \frac{2.303}{30 \text{ min}} \log \frac{[R]_0}{\frac{80}{100} [R]_0} = \frac{2.303}{30} [\log 5 - \log 4] \quad \left[\because [R] = [R]_0 - \frac{20}{100} [R]_0 \right]$$

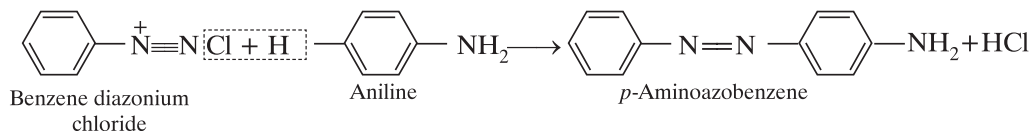
$$= \frac{2.303}{30} [0.6990 - 0.6021]$$

$$k = \frac{2.303}{30} \times 0.0969 = 7.43 \times 10^{-3} \text{ min}^{-1}$$

$$t_{1/2} = \frac{0.693}{k} = \frac{0.693 \times 30}{2.303 \times 0.0969} = \frac{0.3010 \times 30}{0.0969}$$

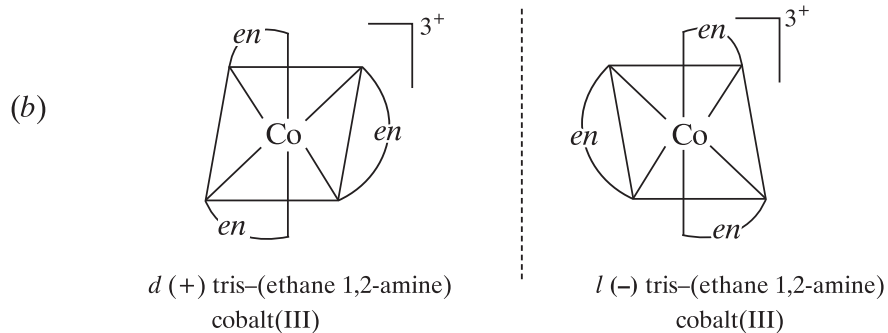
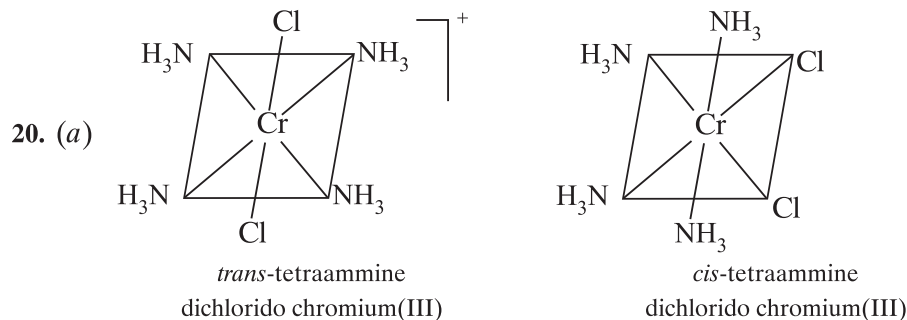
$$t_{1/2} = \frac{9.03}{0.0969} = 93.19 \text{ min}$$

19. (a) **Coupling reaction:** When benzene diazonium chloride reacts with aniline or phenol, orange azo dye is formed.

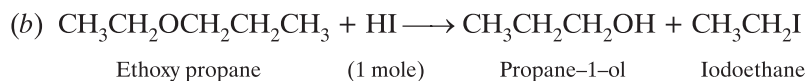
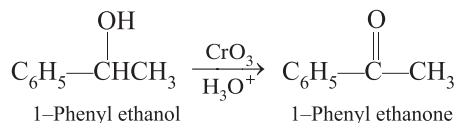


(b) **Carbyl amine reaction:** When primary amine reacts with CHCl_3 and KOH , it forms isocyanide which is an offensive smelling compound.





21. (a) 1-Phenyl ethanol is oxidised by CrO_3



22. $\pi = CRT$, $\pi = 7.65 \text{ atm}$, $T = 37^\circ\text{C} + 273 = 310 \text{ K}$, $R = 0.0821 \text{ L atm K}^{-1} \text{ mol}^{-1}$

$$\Rightarrow 7.65 \times 1 = C \times 0.0821 \times 310 \text{ K} \Rightarrow C = \frac{7.65}{25.451} = 0.3 \text{ mol L}^{-1}$$

Molar mass of Glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) = 180 g/mol

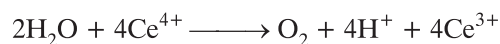
Mass per litre = $0.3005 \times 180 \simeq 54.1 \text{ g}$

23. $\text{Ce}^{4+} + e^- \longrightarrow \text{Ce}^{3+}$ [$E^\circ = 1.60 \text{ V}$] ... (i)

$\text{O}_2 + 4e^- + 4\text{H}^+ \longrightarrow 2\text{H}_2\text{O}$ [$E^\circ = 1.22 \text{ V}$] ... (ii)

Ce will undergo reduction because its E° is higher than that of water.

Net cell reaction:

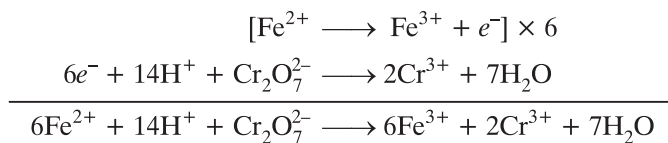


$$E^\circ_{\text{cell}} = E^\circ_{\text{Ce}^{4+}/\text{Ce}^{3+}} - E^\circ_{\text{O}_2/\text{H}_2\text{O}} = 1.60 \text{ V} - 1.228 = 0.372 \text{ V}$$

Since, E° is positive, therefore, reaction is spontaneous i.e., Ce^{4+} will undergo reduction.

24. (a) It is because Nucleophile attacks from back side i.e. opposite side to halogen atom, therefore, optical inversion takes place.
- (b) It is because side products formed are SO_2 and HCl gases, which can be easily removed to get pure alkyl halide.
- (c) This is due to the reason that dipole moment is product of charge and distance and distance is more in C—Cl bond than C—F bond.

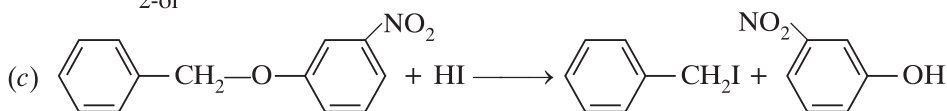
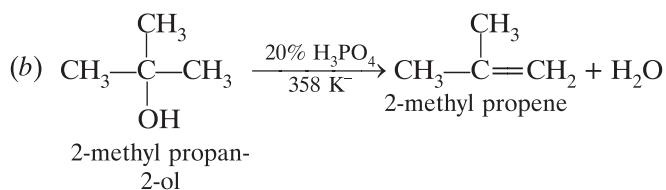
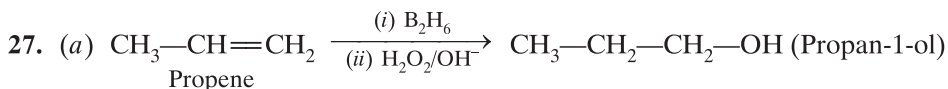
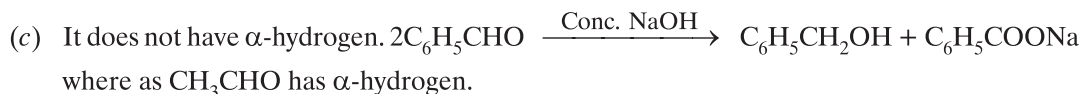
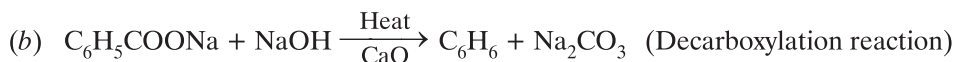
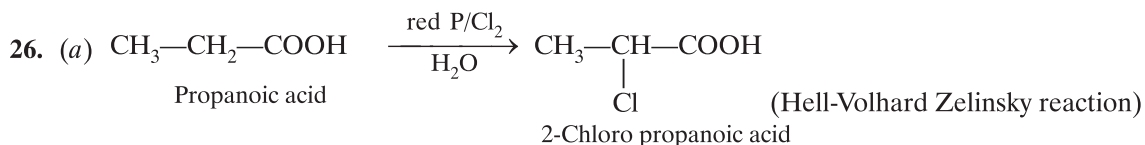
25. (a) Oxidation of ferrous salt by dichromate ion:

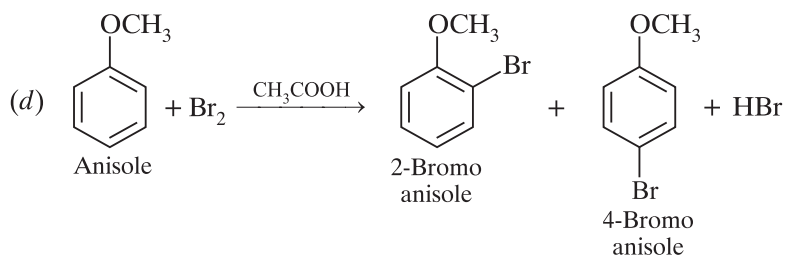


- (b) The decrease in atomic and ionic size with increase in atomic number in lanthanoid is called lanthanoid contraction.

Effects/Consequences:

- Lanthanoids resemble each other due to similar ionic size.
- There is resemblance between properties of $4d$ and $5d$ transition series elements due to similar ionic size. (any one)





28. (a) Cu^{2+} has 1 unpaired electron undergoes *d-d* transitions where as Zn^{2+} does not have unpaired electron, therefore, Cu^{2+} is blue and Zn^{2+} is colourless.

(b) It is due to greater effective nuclear charge in Fe^{2+} (26) than Mn^{2+} (25).

(c) Pd(46): $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^0 4d^{10}$

29. I. $\Lambda_m = \frac{1000 \kappa}{C}$

where, Λ_m = Molar conductivity ($\text{S cm}^2 \text{mol}^{-1}$)

κ = Specific conductance (S cm^{-1})

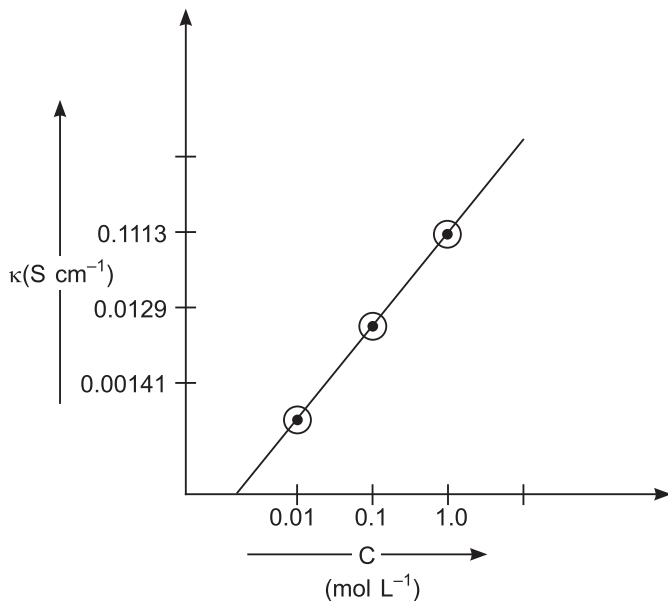
C = Molar concentration (mol L^{-1})

II. (a) H^+ due to high mobility

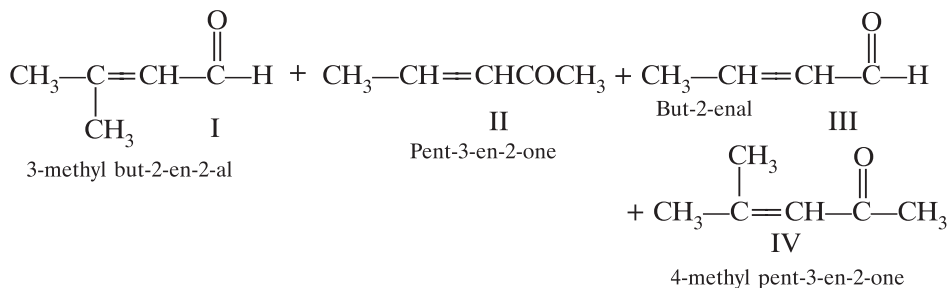
OR

Kohlrausch law is used to determine Λ_m° of weak electrolyte \therefore curve can't be extrapolated.

III.



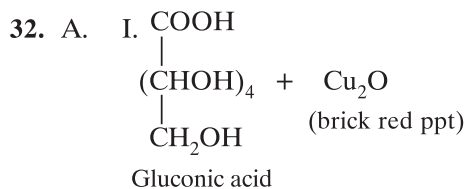
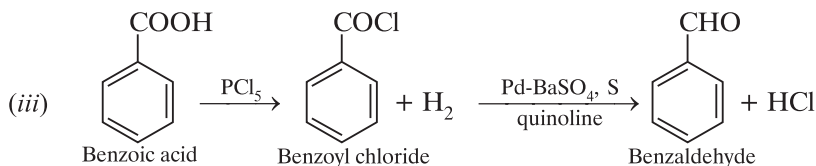
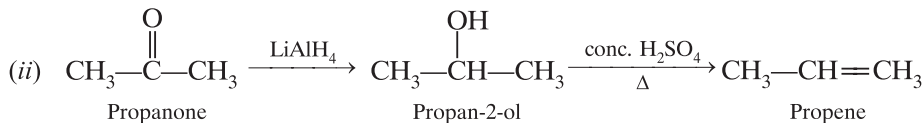
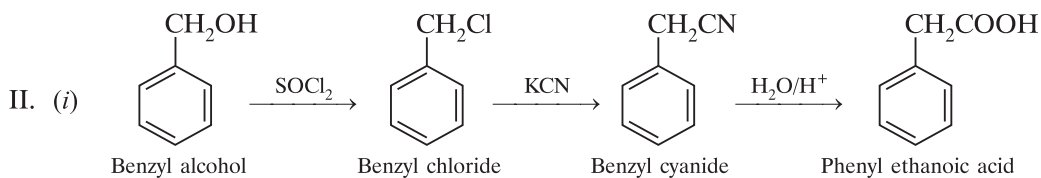
Conductivity increases with increase in concentration because number of ions per unit volume increase.



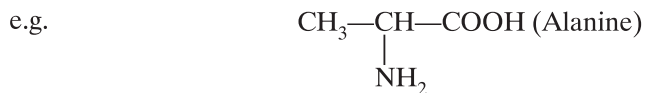
OR

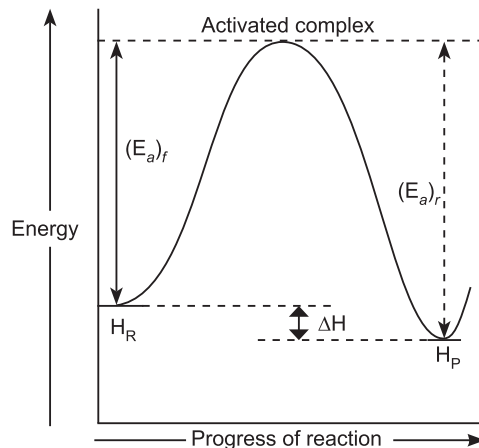
B. I. (i) Add HNO_2 . Secondary amine will form yellow oily compound whereas tertiary amine will form salt, soluble in water.

(ii) Add CHCl_3 and KOH . aniline will give offensive smell due to the formation of phenyl carbylamine (phenyl isocyanide), whereas N-methylaniline will not react



II. Those compounds in which $-\text{NH}_2$ and $-\text{COOH}$ groups are attached to same carbon are called amino acids.





III. It represents most probable kinetic energy. It is kinetic energy possessed by maximum number of molecules.

OR

B. I. Order of reaction is sum of powers to which concentration terms are raised in rate law or rate equation.

In complex reaction, taking place in more than one step, order is determined with the help of slowest step.

Molecularity of each step is determined separately

II. (a) $t_{1/2} = 37.9 \text{ s}$

$$k = \frac{0.693}{t_{1/2}} = \frac{0.693}{37.9 \text{ s}} = 0.0183 \text{ s}^{-1}$$

$$t_{3/4} = \frac{2.303}{k} \log \frac{[R]_0}{[R]_0/4}$$

$$= \frac{2.303 \times \log 4}{k}$$

$$\Rightarrow t_{3/4} = \frac{2.303 \times 0.6021}{0.0183} = \frac{1.386}{0.0183}$$

$$= 75.7377 \text{ seconds.}$$

(b) $k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$

$$\Rightarrow = \frac{2.303}{60} \log \frac{1}{[R]}$$

$$1 \text{ min} = 60 \text{ seconds}$$

$$\Rightarrow \log \frac{1}{[R]} = \frac{0.0183 \times 60}{2.303}$$

$$= 0.4768$$

$$\Rightarrow \frac{1}{[R]} = \text{Antilog } 0.4768 = 2.997$$

$$\Rightarrow [R] = \frac{1}{2.997} = 0.3337$$

\therefore Fraction of PH_3 remains

$$= 0.3337 \text{ or } 33.37\%$$