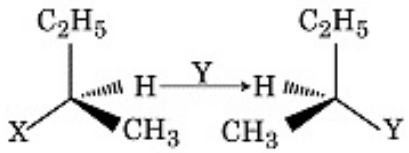
Question Paper East Outside Delhi 2016 set 1

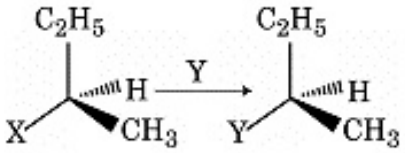
CBSE Class 12 Chemistry

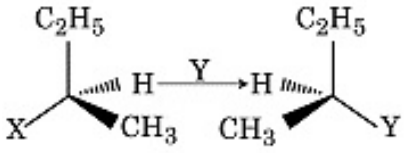
General Instructions:

- All questions are compulsory.
- Questions number 1 to 5 are very short answer questions and carry 1 mark each.
- Questions number 6 to 10 are short answer questions and carry 2 marks each.
- Questions number 11 to 22 are also short answer questions and carry 3 marks each.
- Question number 23 is a value based question and carry 4 marks.
- Questions number 24 to 26 are long answer questions and carry 5 marks each.
- Use log tables, if necessary. Use of calculators is not allowed.

1. **Which of the following reactions is S_N1 type?**

i. 

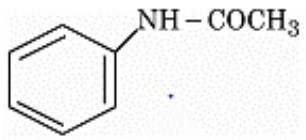
ii. 

Ans. (ii) 

2. **Write the main reason for the stability of colloidal sols.**
   Ans. Like Charged particles cause repulsion/ Brownian motion/ solvation
3. **solution. Identify the gas.$_4$KMnO acidified decolourises gas with pungent smell is evolved which colourless, a $_4SO_2$On heating Copper turnings with conc. H**
   Ans. SO_2
4. **What would be the nature of solid if there is no energy gap between valence band and conduction band?**

Ans. Conductor / Metallic solid.

5. **Write the IUPAC name of the given compound:**



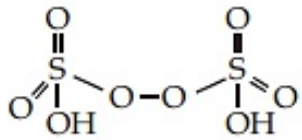
Ans. N-Phenylethanamide/Acetanilide

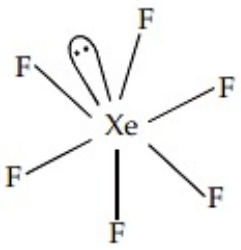
6. **Write two differences between a solution showing positive deviation and a solution showing negative deviation from Raoult's law.**

Ans.

Positive deviation	**Negative deviation**
Observed vapour pressure is greater than expected vapour pressure.	Observed vapour pressure is less than expected vapour pressure
A-B interaction <A-A&B-B	A-B interaction> A-A & B-B

7. **Write the structure of the following molecules:**

(i) 

(ii) 

Ans.

i. $H_2S_2O_8$

ii. XeF_6

8. **An organic compound 'X' having molecular formula C_4H_8O gives orange-red ppt. with 2,4-DNP reagent. It does not reduce tollens' reagent but gives yellow ppt. of iodoform on heating NaOI. Compound X on reduction with $LiAlH_4$ gives compound 'Y' which with undergoes dehydration reaction on heating with conc. H_2SO_4. Identify**

the compounds X and Y.But-2-eneto form

Ans. X: CH_3-Co-CH_2-CH_3/Butan-2-one

Y:CH_3-CH(OH)-CH_2-CH_3/Butane-2-ol

9. **When a coordination compound $PtCl_4.6NH_3$ is mixed with $AgNO_3$, 4 moles of AgCl are precipitated per mole of the compound? Write:**
   1. **Structural formula of the complex**
   2. **IUPAC name of the complex**

   Ans.

   i. $[Pt(NH_3)_6]Cl_4$

   ii. Hexaammineplatinum (IV) chloride

10. **Show that the time required for completion of $\frac{3}{4}$ th of reaction of first order is twice that of half-life ($t\frac{1}{2}$) of the reaction.**

    OR

    Derive integrated rate equation for rate constant of a zero order reaction.

    Ans.

$$t = \frac{2.303}{k}\log\frac{[A_o]}{[A]}$$

$$t_{3/4} = \frac{2.303}{k}\log\frac{[A_o]}{1/4[A_0]}$$

$$t_{3/4} = \frac{2.303\log 4}{k} \quad \ldots\ldots\ldots(i)$$

$$t_{1/2} = \frac{2.303}{k}\log\frac{[A_o]}{1/2[A_o]}$$

$$t_{1/2} = \frac{2.303\log 2}{k} \quad \ldots\ldots\ldots(ii)$$

Divide equation (i) by (ii)

$$t_{3/4} = \frac{2.303\log 4}{k}$$

$$t_{1/2} = \frac{2.303\log 2}{k}$$

$$t_{3/4} = 2t_{1/2}$$

OR

For zero order reaction

R→P

Rate= $\frac{d(R)}{dt} = K[R]^{\circ}$

d[R]=kdt

Integrating both sides

[R]= -kt+I .....(i)

At t=0 R=$[R]_0$

Substituting in equation (i)

$[R]_o$=-k×O+I

$[R]_o$=I

Substituting the value of I in equation (i)

R=-kt+$[R]_o$

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

11. **An element crystallizes in a b.c.c lattice with cell edge of 400pm. Calculate the density if 250g of this element contain 2.5×10^{24} atoms?**

Ans. In bcc, z=2

$$d = \frac{ZXM}{a^3 XN_o} ....(i)$$

No of atoms = $\frac{W}{M} \times N_o$

$2.5 \times 10^{24} = \frac{250}{M} \times N_0$

$M = \frac{250 \times N_0}{2.5 \times 10^{24}}$ .....(ii)

Putting the value of M in Equation (i)

d= $\frac{2 \times 250g \times N_o}{2.5 \times 10^{24} atoms \times (400 \times 10^{-10} cm)^3} \frac{1}{N_o}$

d=3.125 g/cm^3

12. **Give reasons:**

1. **The ∝-hydrogen atoms of aldehydes and ketones are acidic in nature.**
2. **Oxidation of aldehydes is easier than ketones.**
3. **CH_2=CH-COOH is more acidic than CH_3CH_2-COOH.**

Ans.

i. Due to strong electron withdrawing effect of carbonyl group and resonance stabilization of the conjugate base.
ii. Oxidation of aldehydes involves cleavage of C-H bond whereas oxidation of ketones involve cleavage of C-C bond which is stronger than C-H bond.
iii. Due to greater resonance stabilization / Because of greater electronegativity of sp2 hybridised carbon to which carboxyl carbon is attached

13. **For the first order thermal decomposition reaction, the following data were obtained:**

$C_2H_5Cl(g) \rightarrow C_2H_4(g) + HCl(g)$

Time / sec Total pressure / atm

0	**0.30**
300	**0.50**

Calculate the rate constant.

(Given: log 2=0.301 log 350.4771 log 4=0.6021)

Ans.

$$K = \frac{2.303}{t}\log\frac{P_o}{2p_o - Pt}$$

$$\frac{2.303}{300}\log\frac{0.30}{2\times0.30-0.50}$$

$$= 0.0036\,s^{-1} / 3.6\times10^{-3}\,s^{-1}$$

14. **Define the following terms:**
    i. **Peptization**
    ii. **Zeta potential**
    iii. **Brownian movement**

Ans.

i. The process of converting freshly prepared precipitate into colloidal solution by shaking it with dispersion medium in the presence of a small amount of electrolyte.
ii. The Potential difference between the fixed layer and the diffused/double layer of opposite charges.
iii. Zig-zag movement / random motion

15. **Write the principle behind the following:**
    i. **Vapour phase refining**
    ii. **Chromatography**
    iii. **Froth floatation process**

Ans.

i. The metal is converted into its volatile compound and finally decomposed to give pure metal.
ii. The different components of a mixture are differently adsorbed on an adsorbent.
iii. Mineral particles are wetted by oil and gangue particles by water.

16. **Calculate the freezing point of a solution when 3 g of $CaCl_2$ (M=111 g mol^{-1}) was dissolved in 100 g of water, assuming $CaCl_2$ undergoes complete ionization. (K_f for water =1.86 K kg mol^{-1})**

Ans.

$$\Delta T_f = i \times k_f \times m$$

$$\Delta T_f = i \times k_f \times \frac{w_s}{M_s} \times \frac{1000}{W_A}$$

$$\Delta T_f = 3 \times 1.86 \times \frac{3}{1111} \times \frac{1000}{100}$$

$$\Delta T_f = 1.50k$$

$$\Delta T_f = T^\circ_f - T_f$$

$$T_f = T^\circ - \Delta T_f$$

$$= 273 - 1.5 / 273.15 - 1.50$$

$$= 271.5K / 27.65K$$

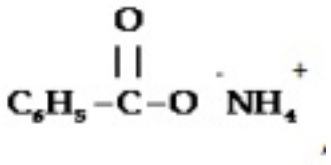
17. **Give reasons:**
    i. **Red phosphorus is less reactive than white phosphorus.**
    ii. **Sulphur shows greater tendency for catenation than oxygen.**
    iii. **ClF_3 is known but FCI_3 is not known.**

    Ans.

    i. Due to greater angular strain of white phosphorus whereas red phosphorus has polymeric structure.
    ii. Due to stronger S-S single bond than O-O single bond.
    iii. Due to absence of d-orbital in Fluorine.

18. **Complete the following reactions:**
    1. **C_6H_5-COOH** $\xrightarrow{NH_3} A \xrightarrow{heat} B \xrightarrow{Br_2/KOH}$ **C**
    2. **C_6H5No_2** $\xrightarrow{Fe/HCl} A \xrightarrow[273-278K]{NaNO_2+HCl} B \xrightarrow{CuCN} C$

    Ans.

    i. a. 

    b. **$C_6H_5NH_2$**

    c. $C_6H_5 - \overset{O}{\overset{\|}{C}} - NH_2$

    ii. a. **$C_6H_5NH_2$**

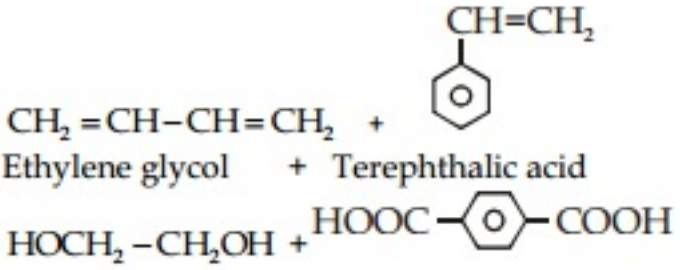
    b. **C_6H_5CN**

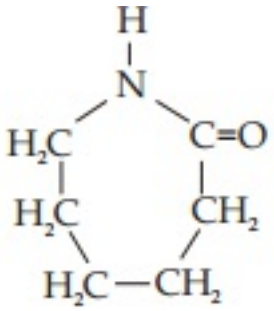
    c. $C_6H_5N_2^+Cl^-$

19. **Write the name of monomers and their structures in the following:**
    (i) Buna-S
    (ii) Terylene
    (iii) Nylon-6

    Ans.

    i. 1,3 butadiene + Styrene

ii. 

iii. Caprolactum 

20. i. **Write the name of monosaccharides which are obtained after the hydrolysis of Lactose.**
    ii. **What type of bonding is responsible for the stability of a-helix?**
    iii. **Write the difference between Nucleotide and Nucleoside.**

Ans.

i. β D - galactose and β D-glucose/ galactose and glucose.
ii. Hydrogen bond.
iii. Nucleotide=Base+Sugar+Phosphate group
Nucleoside=Base+Sugar

21. a. **For the complex $[CoF6]^{3-}$, write the hybridization type, magnetic character and spin nature of the complex. (At.number : Co=27)**
    b. **Why is the complex $[Co(en)_3]^{3+}$ more stable than the complex $[COF_6]^{3-}$?**

Ans.

a. sp^3d^2
Paramagnetic
High spin
b. As (en) is bidentate chelating ligand & F- is a monodentate ligand.

22. **How do you convert:**
    i. **Chlorobenzene to toluene**
    ii. **But-1-ene to But-2-ene**

iii. **Ethanol to Ethyl iodide**

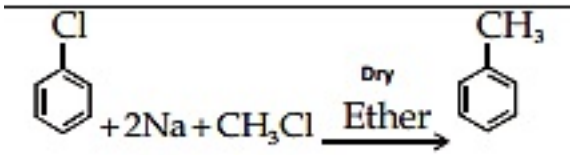
OR

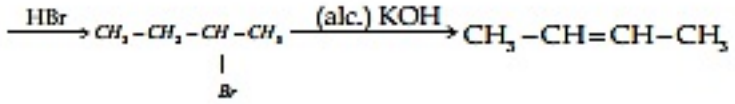
What happens when:

i. **n-butyl chloride is treated with alcoholic KOH.**
ii. **2-chloropropane is treated with sodium in the presence of dry ether.**
iii. **Chlorobenzene is treated with CH_3Cl in the presence of anhydrous $AlCl_3$.**

Write the chemical equations involved in the above reactions.

Ans.

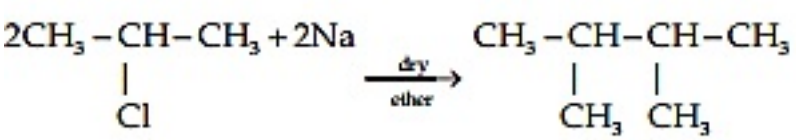
i. 

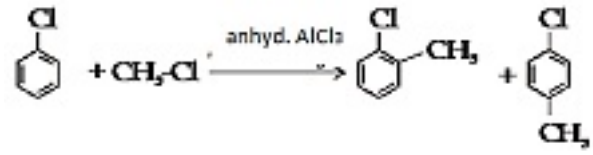
ii. 

iii. $C_2H_5OH \xrightarrow{Red\,P/I_2} C_2H_5I$

OR

i. $CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}Cl + alcKOH \rightarrow CH_2\text{-}CH_2\text{-}CH\text{-}CH_2 / CH_3\text{-}CH\text{-}CH\text{-}CH_3$

ii. 

iii. 

23. **Due to hectic and busy schedule, Mr.Singh started taking junk food in the lunch break and slowly became habitual of eating food irregularly to excel in his field. One day during meeting he felt severe chest pain and fell down. Mr. Khanna, a close friend of Mr.Singh, took him to doctor immediately. The doctor diagnosed that Mr.Singh was suffering from acidity and prescribed some medicines. Mr.Khanna**

advised him to eat homemade food and change his lifestyle by doing Yoga, meditation and some physical exercise. Mr.Singh followed his friend's advice and after few days he started feeling better.

After reading the above passage, answer the following: reason.

1. **What are the values (at least two) displayed by Mr.Khanna?**
2. **What are antacids? Give one example.**
3. **Would it be advisable to take antacids for a long period of time? Give**

Ans.

i. Caring nature, supportive, aware (any other two suitable values)

ii. Antacids are the medicines used to control acidity in stomach.
Ex – mixture of aluminium and magnesium hydroxide / sodium hydrogen carbonate / Zantac / Ranitidine

iii. No, Excessive antacid can make the stomach alkaline and trigger the production of more acids.

24. a. **Calculate ΔG° and log K_c for the following reaction at 298 K:**

$2Al(s)+3Cu^{2+}(aq)\rightarrow 2Al^{3+}(aq)+3Cu(s)$

Given: E°_{cell} =2.02 V

b. **Using the E0 values of A and B, predict which is better for coating the surface of iron [$E_0(Fe^{2+}/Fe)5$=-0.44 V] to prevent corrosion and why?**

Given: $E^0(A^{2+}/A)$=-22.37 V: $E^0(B^{2+}/B)$=-0.14 V

OR

a. **The conductivity of 0.001 mol L^{-1} solution of CH_3COOH is 3.905×10^{-5} Calculate its molar conductivity and degree is of dissociation (∝). Given $\lambda^\circ(H^+)$=349.6 S cm^2 mol^{-1} and $\lambda^\circ(CH_3COO^-)$540.9 S cm^2 mol^{-1}**

b. **What type of battery is dry cell? Write the overall reaction occurring in dry cell.**

Ans.

a.

$$\Delta G^{\circ} = -nFE^{\circ}_{cell}$$

$$\Delta G^{\circ} = -6 \times 96500 \times 2.02$$

$$\Delta G^{\circ} = -1169580 J / mol$$

$$E^{\circ}_{cell} = \frac{0.059V}{n} \log kc$$

$$\log kc = \frac{2.02V \times 6}{0.059V}$$

$$= 205.42$$

b. **A. because its E^{o} value is more negative.**

OR

a.

$$\wedge^{c}_{m} = k \times 1000 / C$$

$$= 3.905 \times 10^{-5} \times 1000 / 0.001$$

$$= 39.05 \, Scm^{2} / mole$$

$$CH_3COOH \rightarrow CH_3COO^{-} + H^{-}$$

$$\wedge^{\circ} CH_3COOH = 390.5 \, Scm^{2} / mol$$

$$\alpha = \frac{\wedge_m}{\wedge^{o}_{m}}$$

$$= 3.905 / 390.5$$

$$0.1$$

b. **Primary cell**

Zn+2Nh $^{+}_{4} + 2MNO_2 \rightarrow Zn^{++} + 2NH_3 + 2MnO(OH)$

25. a. **Account for the following:**

i. **Mn_2O_7 is acidic whereas MnO is basic.**

ii. **Zr and Hf exhibit similar properties.**

iii. **Transition metals form a large number of complex compounds.**

b. **Write type of the magnetism preparation shown of K_2MnO_4 from pyrolusite**

ore(MnO_2). Write the type of magnetism shown by $KMnO_4$ and K_2MnO_4.

OR

a. The elements of 3d transition series are given as:

Sc Ti V Cr Mn Fe Co Ni Cu Zn

Answer the following:

i. Copper has exceptionally positive $E^0(M^{2+}/M)$ value. Why?

ii. Which element is a strong reducing agent in 12 oxidation state and why?

iii. Zn^{2+}salts are colourless. Why?

b. Write the preparation of sodium dichromate from chromite ore ($FeCr_2O_4$).

Ans.

a. i. Due to higher oxidation state of Mn in Mn_2O_7

ii. Due to Lathanoid contraction

iii. Due to availbility of vacant d-orbitals.

b. $2MnO_2+4KOH+O_2 \rightarrow 2K_2MnO_4+2H_2O$

$KMnO_4$ diamagnetic

K_2MnO_4 paramagnetic.

OR

a. i. High ionization enthalpy/Low hydration enthalpy.

ii. Cr, Cr^{2+} is oxidized to Cr^{3+} which has stable d^3 / t^3_{2g} orbital configuration.

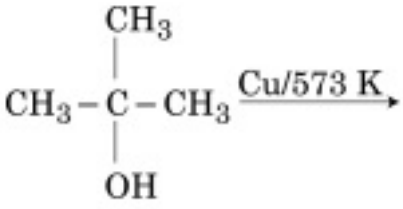
iii. Due to d^{10} configuration/no unpaired electrons.

b. i. $4FeCr_2O_4 + 8Na_2CO_3 + 7O_2 \rightarrow 8Na_2CrO4 + 2Fe_2O3 + 8CO_2$

ii. $2Na_2CrO_4 + 2H^+ \rightarrow Na_2Cr_2O_7 + 2Na^+ + H_2O$

26. a. Write the product(s) in each of the following reactions:

1. $\longrightarrow$ $+HI_3\text{-}O\text{-}CH_5H_6$(i) C

2. 

3. C_6H_5-OH $\xrightarrow{Zn\text{-}dust}$

b. **Write the chemical equations involved in the following reactions:**

1. **Reimer-Tiemann reaction**
2. **Friedal-Crafts alkylation of anisole.**

OR

a. **What happens when:**

1. **Phenol reacts with conc. HNO_3.**
2. **Salicylic acid reacts with $(CH_3CO)_2O/H^+$.**
3. **Ethyl chloride reacts with $NaOCH_3$.**

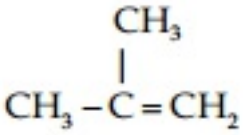
Write the chemical equations involved in the above reactions.

b. **Distinguish between:**

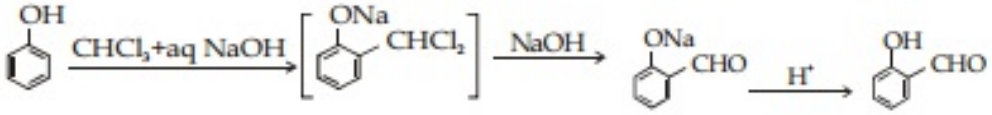
1. **Ethanol and Phenol**
2. **Propan-2-ol and 2-methylpropan-2-ol**

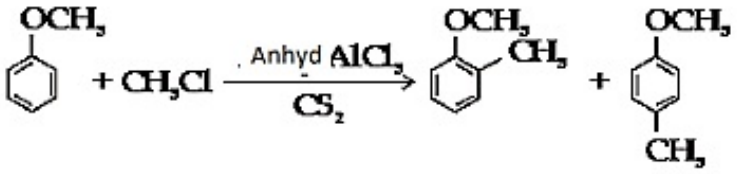
Ans.

a. i. $C_6H_5OH + CH_3I$

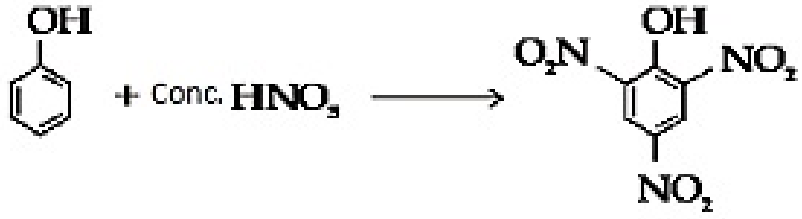
ii. 

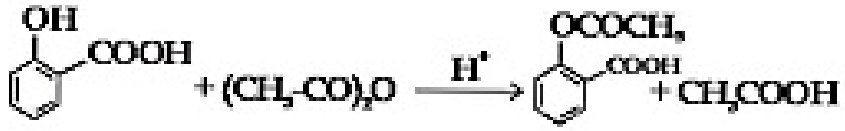
iii. 

b. i. 

ii. 

OR

a. i. 

ii. 

iii. $C_2H_5CI+NaOCH_3 \rightarrow C_2H_5OCH=+NACI$

b. i. **Heat both compounds with NaOH and I_2, Ethanol gives yellow ppt of iodoform. Phenol does not.**

ii. **Heat both compounds with NaOH and I_2, Propan-2ol gives yellow ppt of iodoform. 2-Methylpropan-2-ol does not.**