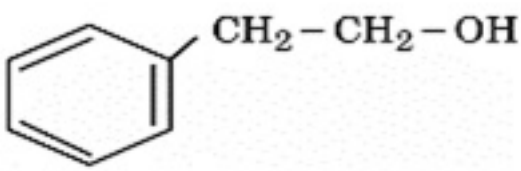
Question Paper Central Outside Delhi 2016 set 3

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. What is the reason for the stability of colloidal sols?
2. Give an example each of a molecular solid and an ionic solid.
3. $Pb(NO_3)_2$ on heating gives a brown gas which undergoes dimerization on cooling? Identify the gas.
4. Write the structure of an isomer of compound C_4H_9Br which is most reactive towards S_N1 reaction.
5. Write the IUPAC name of the given compound:



6. When a coordination compound $Co C1_3.6NH_3$ is mixed with $AgNO_3$,3 moles of AgCl are precipitated per mole of the compound. Write
   i. Structural formula of the complex
   ii. IUPAC name of the complex
7. i. Gas (A) is more soluble in water than Gas (B) at the same temperature. Which one of the two gases will have the higher value of K_H (Henry's constant) and why?
   ii. In non-ideal solution, what type of deviation shows the formation of maximum boiling azeotropes?

Write the structures of the following:

i. BrF_3

ii. XeF_4

8. What happens when:

   i. SO_2 gas is passed through an aqueous solution Fe^{3+} salt?

   ii. XeF_4 reacts with SbF_5?

9. Write the chemical equations involved in the following reactions:

   i. Hoffmann-bromamide degradation reaction

   ii. Carbylamine reaction

10. For a reaction:

    $H_2 + Cl_2 \xrightarrow{h\nu} 2HCl$

    Rate=k

    i. Write the order and molecularity of this reaction.

    ii. Write the unit of k.

11. a. For the complex $[Fe(H_2O)_6]^{3+}$, write the hybridization, magnetic character and spin of the complex. (At. number: Fe=26)

    b. Draw one of the geometrical isomers of the complex $[Pt(en)_2Cl_2]^{2+}$ which is optically inactive.

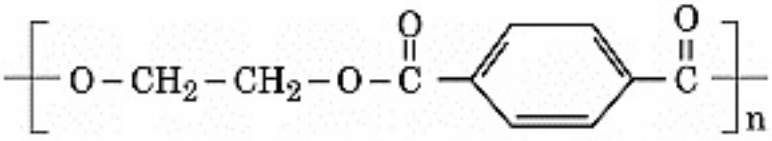
12. i. Write the structural difference between starch and cellulose.

    ii. What type of linkage is present in Nucleic acids?

    iii. Give one example each for fibrous protein and globular protein.

13. i. What is the role of Sulphur in the vulcanization of rubber?

    ii. Identify the monomers in the following polymer:



    iii. Arrange the following polymers in the increasing order of their intermolecular forces: Terylene, Polythene, Neoprene

14. How do you convert:

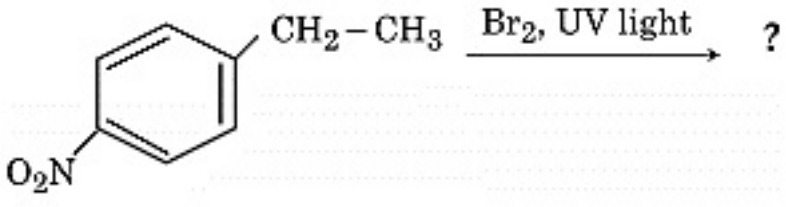
OR

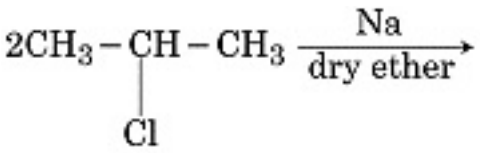
Write the major product(s) in the following:

i. Chlorobenzene to biphenyl

ii. Propene to 1-iodopropane

iii. 2-bromobutane to but-2-ene

iv. 

v. 

vi. $CH_3\text{-}CH_2\text{-}Br \xrightarrow{AgCN} ?$

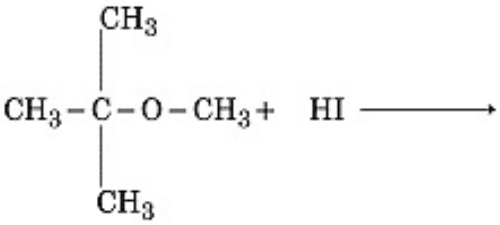
15. Give reasons for the following:

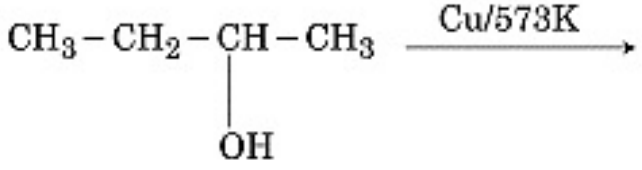
i. Aniline does not undergo Friedal-Crafts reaction.

ii. $(CH_3)_2$ NH is more basic than $(CH_3)_3$ N in an aqueous solution.

iii. Primary amines have higher boiling point than tertiary amines.

16. Write the final product (s) in each of the following reactions:

(a) 

(b) 

(c) $C_6H_5\text{-}OH \xrightarrow[(ii)H^+]{(i)CHCl_3+aq.NaOH}$

17. Give reasons:

i. SO_2 is reducing while TeO_2 is an oxidizing agent.

ii. Nitrogen does not form pentahalide.

iii. ICl is more reactive than I_2.

18. Calculate the boiling point of solution when 4 g of $MgSO_4$ (M=120 g mol^{-1}) was dissolved in 100 g of water, assuming $MgSO_4$ undergoes complete ionization.

(k_b for water50.52 K kg mol^{-1})

19. i. Name the method of refining of nickel
    ii. What is the role of cryolite in the extraction of aluminium?
    iii. What is the role of limestone in the extraction of iron from its oxides?
20. Define the following terms:
    i. Lyophilic colloid
    ii. Zeta potential
    iii. Associated colloids
21. 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 3=0.4771, log 4=0.6021)

22. An element crystallizes in a b.c.c. lattice with cell edge of 500pm. The density of the element is 7.5g cm^{-3}. How many atoms are present in 300 g of the element?
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:

    i. What are the values (at least two) displayed by Mr. Khanna?
    ii. What are antacids? Give one example.
    iii. Would it be advisable to take antacids for a long period of time? Give reason.

24. a. Account for the following:

1. Mn shows the highest oxidation state of +7 with oxygen but with fluorine it shows the highest oxidation state of +4.
2. $Cr^{2+}$is a strong reducing agent.
3. Cu^{2+}salts are coloured while Zn^{2+} salts are white.

b. Complete the following equations:

1. $2MnO_2 + 4KOH + O_2 \longrightarrow$
2. $Cr_2O_7^{2-} + 14H^+ + 6I^- \rightarrow$

OR

a. The elements of 3d transition series are given as:
Sc Ti V Cr Mn Fe Co Ni Cu Zn

b. Answer the following:

i. Write the element which shows maximum number of oxidation states.Give reason.
ii. Which element has the highest m.p?
iii. Which element shows only +3 oxidation state?
iv. Which element is a strong oxidizing agent in +3 oxidation state and why?

25. a. Write the structures of A and B in the following reactions:

i. $CH_3COCl \xrightarrow{H_2, Pd\text{-}BaSO_4} A \xrightarrow{H_2N\text{-}OH} B$

ii. $CH_3MgBr \xrightarrow[2\,H_3O^+]{1\,CO_2} A \xrightarrow{PCl_5} B$

b. Distinguish between:

i. C_6H_5-$COOH_3$ and C_6H_5-CHO
ii. CH_3COOH and HCOOH

c. Arrange the following in the increasing order of their boiling points:
CH_3CHO, CH_3COOH, CH_3CH_2OH

OR

a. Write the chemical reaction involved in Wolff-Kishner reduction.

b. Arrange the following in the increasing order of their reactivity towards nucleophilic addition reaction:

$C_6H_5COCH_3$, CH_3-CHO, CH_3COCH_3

c. Why carboxylic acid does not give reactions of carbonyl group?

d. Write the product in the following reaction

$CH_3CH_2CH{=}CH_2CH \xrightarrow[2.H_2O]{1.(i\text{-}Bu)_2AlH}$

e. A and B are two functional isomers of compound C_3H_6O. On heating with NaOH and I_2, isomer B forms yellow precipitate of iodoform whereas isomer A does not form any precipitate. Write the formulae of A and B.

26. a. Calculate E°cell for the following reaction at 298K:

$2Al(s)1+3Cu^{2+}(0.01M) \rightarrow 2A]^{3+}$ (0.01M) + 3Cu(s)

Given: E_{cell} =1.98 V

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

Given: $E°\ (A^{2+}/A)$ =-2.37V: $E°\ (B^{2+}/B)$ =-0.14V

OR

a. The conductivity of 0.001 mol L^{-1} solution of CH_3COOH is $3.905x10^{-5}$ S cm^{-1} calculate its molar conductivity and degree of dissociation (∝).

Given $\lambda°(H^+)$ =349.6 S cm^2 mol^{-1} and $\lambda°(CH_3COO\text{-})$ =40.9 Scm^2 mol^{-1}

b. Define electrochemical cell. What happens if external potential applied becomes greater than $E°_{cell}$ of electrochemical cell?