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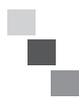
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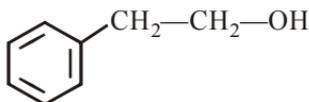
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# 2016 Solved Paper (All India)

## GENERAL INSTRUCTIONS

- (i) All questions are compulsory.
- (ii) Question number **1 to 5** are very short answer questions and carry **1** mark each.
- (iii) Question number **6 to 10** are short answer questions and carry **2** marks each.
- (iv) Question number **11 to 22** are also short answer questions and carry **3** marks each.
- (v) Question number **23** is a value based question and carry **4** marks.
- (vi) Question number **24 to 26** are long answer questions and carry **5** marks each.
- (vii) Use log tables, if necessary. Use of calculator is not allowed.

1. Write the IUPAC name of the given compound :



2. Write the structure of an isomer of compound  $C_4H_9Br$  which is most reactive towards  $S_N1$  reaction.
3. What is the reason for the stability of colloidal sols ?
4. Give an example each of a molecular solid and an ionic solid.
5.  $Pb(NO_3)_2$  on heating gives a brown gas which undergoes dimerization on cooling ? Identify the gas.
6. 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  $k$ .
7. Write the chemical equations involved in the following reactions :
  - (i) Hoffmann-bromamide degradation reaction
  - (ii) Carbylamine reaction
8.
  - (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 ?
9. When a coordination compound  $CoCl_3 \cdot 6NH_3$  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

10. Write the structures of the following :

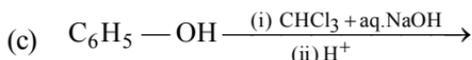
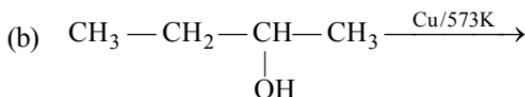
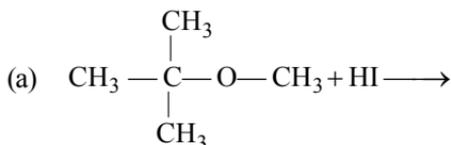
- (i)  $\text{BrF}_3$   
 (ii)  $\text{XeF}_4$

OR

What happens when :

- (i)  $\text{SO}_2$  gas is passed through an aqueous solution  $\text{Fe}^{3+}$  salt ?  
 (ii)  $\text{XeF}_4$  reacts with  $\text{SbF}_5$  ?

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

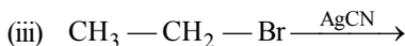
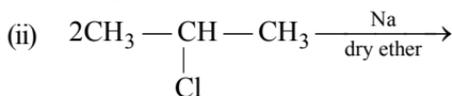
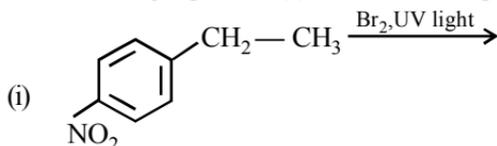


12. How do you convert :

- (i) Chlorobenzene to biphenyl  
 (ii) Propene to 1-iodopropane  
 (iii) 2-Bromobutane to but-2-ene

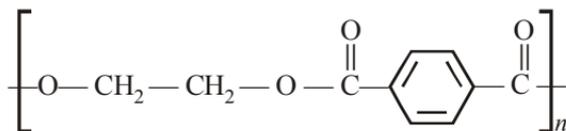
OR

Write the major product(s) in the following :

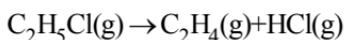


13. (i) Write the structural difference between starch and cellulose.  
 (ii) What type of linkage is present in nucleic acids ?  
 (iii) Give one example each for fibrous protein and globular protein.
14. (i) Name the method of refining of nickel  
 (ii) What is the role of cryolite in the extraction of aluminium ?  
 (iii) What is the role of limestone in the extraction of iron from its oxides ?

15. Give reasons :
- $\text{SO}_2$  is reducing while  $\text{TeO}_2$  is an oxidizing agent.
  - Nitrogen does not form pentahalide.
  - $\text{ICl}$  is more reactive than  $\text{I}_2$ .
16. (a) For the complex  $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ , write the hybridization, magnetic character and spin of the complex.  
(At. number :  $\text{Fe} = 26$ )
- (b) Draw one of the geometrical isomers of the complex  $[\text{Pt}(\text{en})_2\text{Cl}_2]^{2+}$  which is optically inactive.
17. An element crystallizes in a *bcc* lattice with cell edge of 500 pm. The density of the element is  $7.5 \text{ g cm}^{-3}$ . How many atoms are present in 300 g of the element ?
18. (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.
19. For the first order thermal decomposition reaction, the following data were obtained :



Time/sec	Total pressure/atm
0	0.30
300	0.50

Calculate the rate constant.

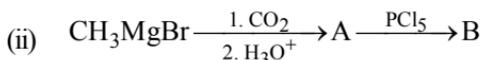
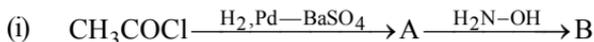
(Given :  $\log 2 = 0.301$ ,  $\log 3 = 0.4771$ ,  $\log 4 = 0.6021$ )

20. Give reasons for the following :
- Aniline does not undergo Friedel-Craft's reaction.
  - $(\text{CH}_3)_2\text{NH}$  is more basic than  $(\text{CH}_3)_3\text{N}$  in an aqueous solution.
  - Primary amines have higher boiling point than tertiary amines.
21. Define the following terms :
- Lyophilic colloids
  - Zeta potential
  - Associated colloids

22. Calculate the boiling point of solution when 4g of  $\text{MgSO}_4$  ( $M = 120 \text{ g mol}^{-1}$ ) was dissolved in 100 g of water, assuming  $\text{MgSO}_4$  undergoes complete ionization.  
( $K_b$  for water =  $0.52 \text{ K kg mol}^{-1}$ )
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. Once 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 home made 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 :

- What are the values (at least two) displayed by Mr. Khanna ?
  - What are antacids ? Give one example
  - Would it be advisable to take antacids for a long period of time ? Give reason.
24. (a) Write the structures of A and B in the following reactions:



(b) Distinguish between :

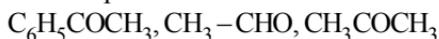


(c) Arrange the following in the increasing order of their boiling points :

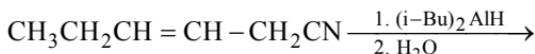


**OR**

- (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) Why a carboxylic acid does not give reactions of carbonyl group ?
- (d) Write the product in the following reaction



- (e) A and B are two functional isomers of the 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.
25. (a) Calculate  $E^0_{\text{cell}}$  for the following reaction at 298 K:  
 $2Al(s) + 3Cu^{2+}(0.01M) \rightarrow 2Al^{3+}(0.01M) + 3Cu(s)$   
 Given :  $E_{\text{cell}} = 1.98 V$
- (b) Using the  $E^0$  values of A and B, predict which is better for coating the surface of iron [ $E^0_{(Fe^{2+}/Fe)} = -0.44V$ ] to prevent corrosion and why?  
 Given :  $E^0_{(A^{2+}/A)} = -2.37V$ ;  $E^0_{(B^{2+}/B)} = -0.14V$
- OR**
- (a) The conductivity of  $0.001 \text{ mol L}^{-1}$  solution of  $CH_3COOH$  is  $3.905 \times 10^{-5} \text{ S cm}^{-1}$ . Calculate its molar conductivity and degree of dissociation ( $\alpha$ ).  
 Given  $\lambda^0(H^+) = 349.6 \text{ S cm}^2 \text{ mol}^{-1}$  and  $\lambda^0(CH_3COO^-) = 40.9 \text{ S cm}^2 \text{ mol}^{-1}$
- (b) Define electrochemical cell. What happens if external potential applied becomes greater than  $E^0_{\text{cell}}$  of electrochemical cell?
26. (a) Account for the following :
- Mn shows the highest oxidation state of +7 with oxygen but with fluorine, it shows the highest oxidation state of +4.
  - $Cr^{2+}$  is a strong reducing agent.
  - $Cu^{2+}$  salts are coloured, while  $Zn^{2+}$  salts are white.
- (b) Complete the following equations :
- $2MnO_2 + 4KOH + O_2 \xrightarrow{\Delta}$
  - $Cr_2O_7^{2-} + 14H^+ + 6I^- \longrightarrow$

**OR**

The elements of 3d transition series are given as :

Sc Ti V Cr Mn Fe Co Ni Cu Zn

Answer the following :

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



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