

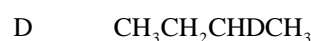
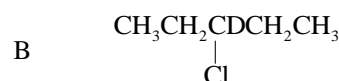
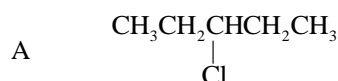
Unit 1

Questions 1 – 8

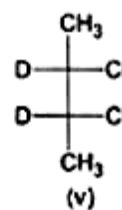
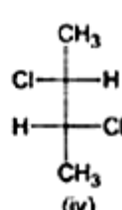
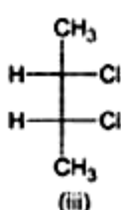
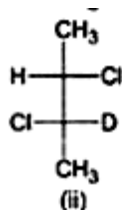
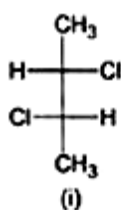
An organic compound having a carbon attached to four different groups is optically active. But the opposite is not necessarily true, i.e. not all optically active organic compounds have chiral carbons. Presence or absence of chiral centre is not the sufficient criterion for optical activity. The ultimate criterion is presence or absence of either plane or centre of symmetry. Two compounds which are non-superimposable mirror images of each other are called enantiomers.

If a compound contains more than one chiral carbon, new words are required to describe the relationship between various stereoisomers of the compound. Those words are diastereomers and mesomers.

1. Optically active compounds among the following is



2. Which of the following form diastereomeric pair?



A (i) and (ii)

B (ii) and (iii)

C (i) and (iii)

D (iv) and (v)

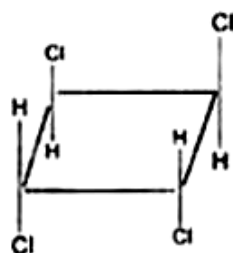
3. Which of the following statements is/are correct about two organic compounds which are stereoisomers?

- A They must be enantiomers
B They must be diastereomers
C They must be constitutional isomers
D None of the above

4. There are two organic compounds which are stereoisomers of each other. Which of the following statements is incorrect?

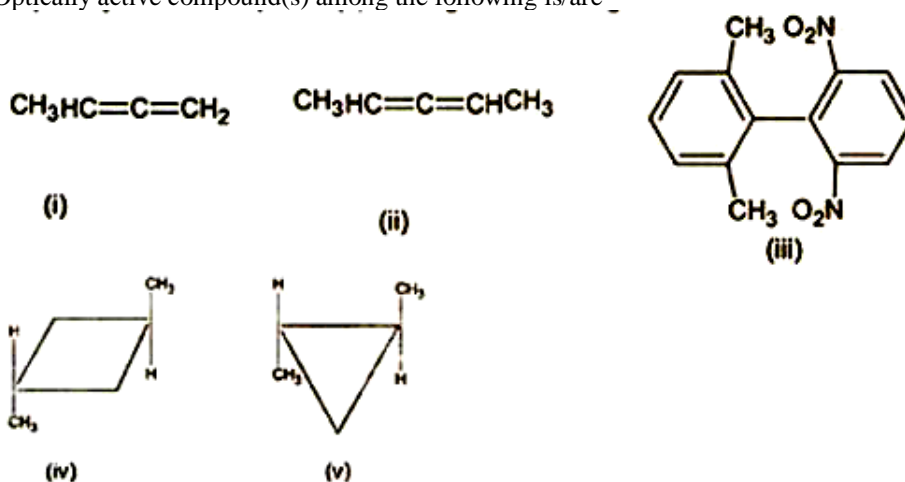
- A They might be enantiomers
B They might be meso isomers
C They might be diastereomers
D They might be tautomers

- 5.



Which of the following statements is/ are correct regarding the above compound?

- A It is optically inactive due to plane or centre of symmetry.
B It is optically inactive as it is a non-enantiomer.
C Being chiral it is optically active
D It is optically active due to the presence of C_2 axis of symmetry.
6. A sample of organic compound(s) is found to have optical rotation of $+20^\circ$. Which of the following statements is incorrect about the given sample?
- A The sample might be a d-isomer
B The compound must be containing chiral carbon
C The sample might be a mixture of d and l isomers in unequal amounts
D The compound(s) in the sample must be chiral
7. Optically active compound(s) among the following is/are _



- A (i), (ii) and (v)
B (i), (ii), (iv) and (v)
C (ii), (iii) and (v)
D (ii), (iii), (iv) and (v)
8. Which of the following statements is/are true about the compound (iv) given in the previous question?
- A It is optically inactive due to the presence of plane of symmetry.
B It is optically active due to the presence of centre of symmetry.
C It is optically active due to the absence of all elements of symmetry.
D None of the above

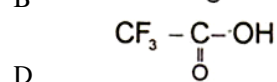
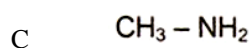
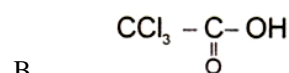
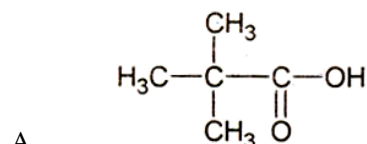
Unit 2

Questions 9 – 13

Acidic and basic nature of organic compound depends upon inductive effect. Acidic strength of organic acid increases with increase in electron withdrawing group or $-I$ group and decreases with increase in electron releasing group or $+I$ group. Basic strength of organic compound having just opposite relationship with inductive effect, i.e. basic strength $\propto +I$ effect $\propto 1/-I$ effect. The other factor which explains acidic strength is distance of electron withdrawing group. An acid dissociation constant, K_a , (also known as acidity constant, or acid-ionization constant) is a quantitative measure of the strength of an acid in solution. It is the equilibrium constant for a chemical reaction known as dissociation in the context of acid-base reactions.

$$\text{HA} \rightleftharpoons \text{A}^- + \text{H}^+, K_a = \frac{[\text{A}^-][\text{H}^+]}{[\text{HA}]}$$

9. Which one is strong acid among these?



10. The strongest base is

- A $\text{CH}_3\text{-CH}_2\text{-OH}$
B H_2O
C $\text{CH}\equiv\text{CH}$
D $\text{CH}_2=\text{CH}_2$

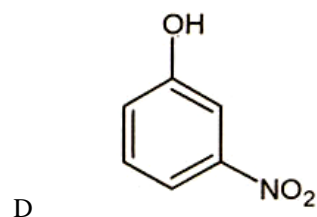
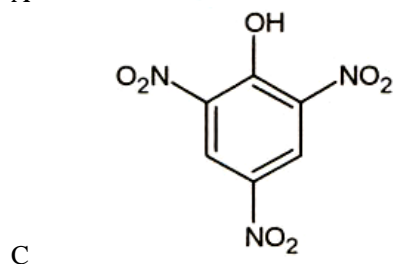
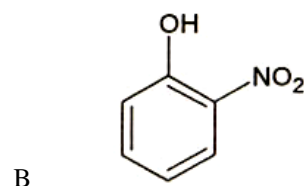
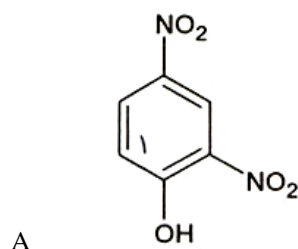
11. Which of the following acid having highest K_a value?

- A $\text{C}_6\text{H}_5\text{COOH}$
B HCOOH
C $\text{CH}_3\text{-COOH}$
D $\text{Cl-CH}_2\text{-CO-OH}$

12. Which of the following is strongest base?

- A $(\text{CH}_3)_2\text{NH}$
B $(\text{CH}_3)_3\text{N}$
C $\text{CH}_3\text{-CH}_2\text{-NH}_2$
D $\text{Cl-CH}_3\text{-NH}_2$

13. In the following compounds maximum acidic character is

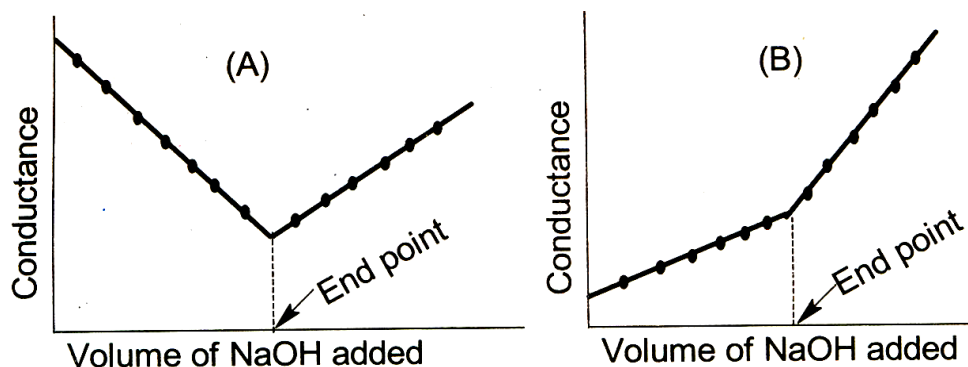


Unit 3

Questions 14 - 15

Following two graphs are based on the conductometric titration (Titration based on changes in the electrical conductance of a solution) of acid-base reaction. The underlying principles of conductometric titration are that the solvent and any molecular species in solution exhibit only negligible conductance; and the conductance of a dilute solution rises as the concentration of ions is increased. It is accepted that in a given concentration, the hydrogen ion and the hydroxyl ion are much better conductors than any of the other ions.

Answer the questions given at the end of it.



14. Select the correct statement:

- A Graph A is for weak monobasic acid while graph B is for monobasic strong acid.
- B Graph A is for strong monobasic acid and graph B is for weak dibasic acid.
- C Graph A is for weak monobasic acid and graph B is for weak dibasic acid.
- D Graph A is for strong monobasic acid and graph B is for weak monobasic acid.

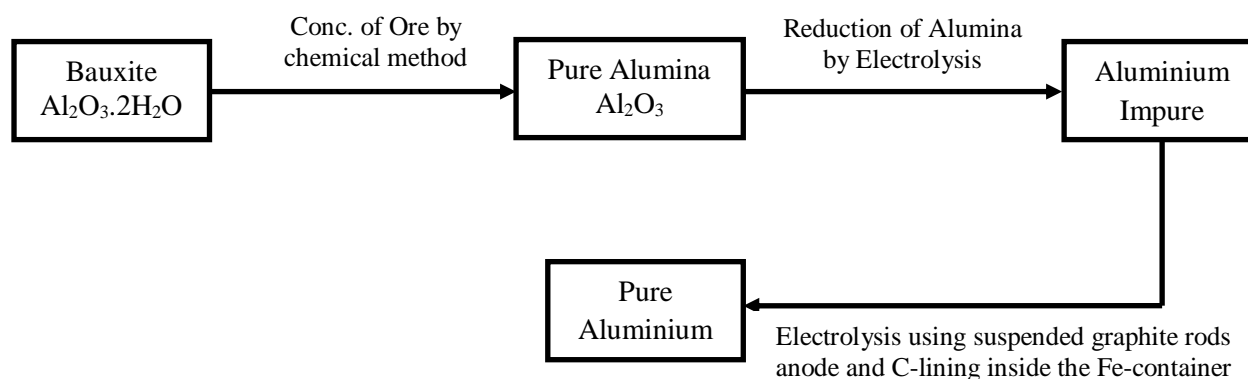
15. In graph B, there is increase in conductance before (though slightly) and after the end point. This is due to:

- A Formation of NaCl type salt from strong acid which is hydrolysed releasing NaOH
 $\text{NaCl} + \text{H}_2\text{O} \leftrightarrow \text{NaOH} + \text{HCl}$
- B Formation of CH_3COONa salt from weak acid which is hydrolysed releasing NaOH
- C Ionisation of water
- D Autoprotolysis of water

Unit 4

Questions 16 - 20

Extraction of Aluminium can be understood by:



Electrolytic reduction of Al_2O_3 : At 900°C , Fluorspar (CaF_2) is used to make Al_2O_3 a good conductor of electricity. As cryolite has greater electrochemical stability, it does not dissociate itself but increases the dissociation of Al_2O_3 . Metallic aluminium is liberated at the cathode.

Electrolyte: (Al_2O_3 +Cryolite)

Cathode: Graphite inside the Fe contain

16. The purpose of adding cryolite is:
- A To increase the electrical conductivity of pure aluminium
 - B To lower the melting point of Al_2O_3
 - C To remove the impurities as slag
 - D To increase the Al% in the yield
17. Coke powder is spreaded over the molten electrolyte due to:
- A Prevent the heat radiation from the surface
 - B Prevent the corrosion of graphite anode
 - C Prevent oxidation of molten aluminium by air
 - D Both (A) and (B)
18. The function of fluorspar (CaF_2) is:
- A To decrease the melting point of electrolyte
 - B To increase electrolytic conductivity power
 - C To remove the impurities as slag
 - D All of the above
19. The molten electrolytes contain Na^+ , Al^{3+} , Ca^{2+} but only Al gets deposited at cathode because:
- A Standard reduction potential of Al is more than those of Na & Ca.
 - B Standard oxidation potential of Al is more than those of Na & Ca.
 - C Discharge potential Al^{3+} is higher than Na^+ & Ca^{2+} .
 - D Graphite reacts only with Al^{3+} and not with Na^+ & Ca^{2+} .
20. What is wrong if anode is made of nickel instead of graphite?
- A Ni is costly.
 - B Anode will be affected by produced Cl_2 .
 - C Graphite remain unaffected by produced Cl_2 .
 - D Ni may be affected by high temperature.

Unit 5

Questions 21 – 25

In organic compounds, coordination compounds often show various types of isomerism. The isomerism can be categorized in two main types:

- (A) Structural isomerism
- (B) Stereo or space isomerism

Structural isomerism arises due to the difference in structures of coordination compounds while stereo or space isomerism arises on account of the different positions and arrangements of ligands (atoms or groups) in space around the metal ion.

Structural isomerism can be classified in following types:

- (I) Ionisation isomers- which give different ions in solution, e.g. $[\text{CoBr}(\text{NH}_3)_5]\text{SO}_4$ and $[\text{Co}(\text{SO}_4)(\text{NH}_3)_5]\text{Br}$.
- (II) Hydrate isomers- which differ in H_2O as ligand or as hydration, e.g. $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$, $[\text{CrCl}(\text{H}_2\text{O})_5]\text{Cl}_2 \cdot \text{H}_2\text{O}$, and $[\text{CrCl}_2(\text{H}_2\text{O})_4]\text{Cl} \cdot 2\text{H}_2\text{O}$.
- (III) Linkage isomers- which differs in atom linked to metal atom, e.g. $[\text{Co}(\text{NO}_2)(\text{NH}_3)_5]^{2+}$ and $[\text{Co}(\text{ONO})(\text{NH}_3)_5]^{2+}$.
- (IV) Coordination isomers- which involve interchange of ligands, e.g. $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ and $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$.
- (V) Coordination position isomerism- which arises in the bridged complexes due to the difference in the attachment of ligands with the metal atoms.
21. Which of the following coordination compounds, exhibits ionization isomerism?
- A $[\text{Cr}(\text{NH}_3)_6]\text{Cl}_3$
B $[\text{Cr}(\text{ox})_3]^{3-}$
C $[\text{Cr}(\text{en})_3]\text{Cl}_3$
D $[\text{Cr}(\text{NH}_3)_5\text{Br}]\text{SO}_4$
22. The pair $[\text{Co}(\text{NH}_3)_5\text{NO}_3]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{NO}_3$ will exhibit
- A Hydrate isomerism
B Linkage isomerism
C Ionisation isomerism
D Coordinate isomerism
23. How many hydrate isomers are possible with the formulae $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$?
- A Six
B Four
C Three
D Two
24. The compounds $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$, $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2 \cdot 2\text{H}_2\text{O}$ and $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl} \cdot 2\text{H}_2\text{O}$ exhibit
- A Linkage isomerism
B Geometrical isomerism
C Ionisation isomerism
D Hydrate isomerism
25. The total number of possible isomers for the complex compound $[\text{Cu}(\text{NH}_3)_4][\text{PtCl}_4]$ are
- A Three
B Six
C Five
D Four

Mail us your answers at key@prepgenie.com and we will evaluate it for you. Once the evaluation is completed we will send you your scores along with the actual answer key.