

**1. The most basic compound among the following is:-**

- (1) Acetanilide
- (2) Benzylamine
- (3) p-Nitro aniline
- (4) Aniline

**Solution:**

Basicity is inversely proportional to resonance of lone pair electrons. Benzylamine is more basic. The electron pairs do not involve in resonance in benzylamine. In other amines, there is delocalization of lone pair of electron on N atom on the ring. In acetanilide, the delocalization of lone pair of electrons on N atom is due to adjacent CO group.

Hence option (2) is the answer.

**2. Considering the basic strength of amines in aqueous solution, which one has the smallest  $pK_b$  value?**

- (1)  $(CH_3)_3N$
- (2)  $C_6H_5NH_2$
- (3)  $(CH_3)_2NH$
- (4)  $CH_3NH_2$

**Solution:**

Because of resonance, arylamines are less basic than alkyl amines. In arylamines, the lone pair of electrons on N is partly shared with the ring and is less available for sharing with a proton. In alkylamines, the electron releasing alkyl group increases the electron density on nitrogen atom. Hence increases the protonation ability of amines. So, more the number of alkyl groups, higher will be basicity of amine. Because of steric effect, a slight discrepancy occurs in case of trimethyl amine. So  $(CH_3)_2NH$  has the smallest  $pK_b$  value.

Hence option (3) is the answer.

**3. Among the following the molecule with the lowest dipole moment is:-**

- (1)  $CHCl_3$
- (2)  $CH_2Cl_2$
- (3)  $CCl_4$
- (4)  $CH_3Cl$

**Solution:**

Dipole moment of  $CCl_4$  is 0.

The order of dipole moment is  $CCl_4 < CH_3Cl < CH_2Cl_2 < CHCl_3$ .

Hence option (3) is the answer.

**4. Which one of the following compounds will not be soluble in sodium bicarbonate ?**

- (1) Benzene sulphonic acid
- (2) Benzoic acid
- (3) o-Nitrophenol
- (4) 2, 4, 6 – Trinitrophenol

**Solution:**

Benzene sulphonic acid and Benzoic acid are stronger acids and they react with sodium bicarbonate. o-Nitrophenol is a very weak acid and it does not react with sodium bicarbonate. o-Nitrophenol will not be soluble in sodium bicarbonate. 2, 3, 6 - Trinitrophenol is higher in acidity and it reacts with sodium bicarbonate.

Hence option (3) is the answer.

**5. The compound formed in the positive test for nitrogen with the Lassaigne solution of an organic compound is**

- (1)  $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$
- (2)  $\text{Na}_4[\text{Fe}(\text{CN})_5\text{NOS}]$
- (3)  $\text{Fe}(\text{CN})_3$
- (4)  $\text{Na}_3[\text{Fe}(\text{CN})_6]$

**Solution:**

The compound formed in the positive test for nitrogen with the Lassaigne solution of an organic compound is prussian blue coloured complex compound ferric ferrocyanide.

Hence option (1) is the answer.

**6. The general formula  $\text{C}_n\text{H}_{2n}\text{O}_2$  could be for open chain**

- (1) carboxylic acids
- (2) diols
- (3) dialdehydes
- (4) diketones

**Solution:**

The general formula  $\text{C}_n\text{H}_{2n}\text{O}_2$  could be for open chain carboxylic acid or ester.

Hence option (1) is the answer.

**7. Among the following oxoacids, the correct decreasing order of acid strength is :**

- (1)  $\text{HClO}_4 > \text{HClO}_3 > \text{HClO}_2 > \text{HOCl}$
- (2)  $\text{HClO}_2 > \text{HClO}_4 > \text{HClO}_3 > \text{HOCl}$
- (3)  $\text{HOCl} > \text{HClO}_2 > \text{HClO}_3 > \text{HClO}_4$
- (4)  $\text{HClO}_4 > \text{HOCl} > \text{HClO}_2 > \text{HClO}_3$

**Solution:**

Acidic strength is directly proportional to the oxidation number. Increasing acid strength is because of an increase in the oxidation state of the central atom.

Hence option (1) is the answer.

**8. Ortho-Nitrophenol is less soluble in water than p- and m- Nitrophenols because:**

- (1) Melting point of o-Nitrophenol is lower than those of m- and p- isomers
- (2) o-Nitrophenol is more volatile in steam than those of m- and p- isomers
- (3) o-Nitrophenol shows Intramolecular H-bonding
- (4) o-Nitrophenol shows Intermolecular H-bonding

**Solution:**

Intramolecular H-bonding is present in o-nitrophenol. So solubility in water is decreased.

Hence option (3) is the answer.

**9. The order of basicity of amines in gaseous state is :**

- (1)  $3^\circ > 2^\circ > \text{NH}_3 > 1^\circ$
- (2)  $1^\circ > 2^\circ > 3^\circ > \text{NH}_3$
- (3)  $\text{NH}_3 > 1^\circ > 2^\circ > 3^\circ$
- (4)  $3^\circ > 2^\circ > 1^\circ > \text{NH}_3$

**Solution:**

The basicity is proportional to +I effect. The presence of electron-donating group increases the basicity of amines. The presence of withdrawing group decreases the basicity of amines.

Hence option (4) is the answer.

**10. Which one of the following conformation of cyclohexane is chiral ?**

- (1) Twist boat
- (2) Rigid
- (3) Chair
- (4) Boat

**Solution:**

Twist boat is chiral because it does not have a plane of symmetry.

Hence option (1) is the answer.

**11. Increasing order of stability among the three main conformations (i.e. Eclipse, Anti, Gauche) of 2-fluoroethanol is**

- (1) Eclipse, Gauche, Anti
- (2) Gauche, Eclipse, Anti
- (3) Eclipse, Anti, Gauche
- (4) Anti, Gauche, Eclipse

**Solution:**

Eclipse is least stable and Gauche is most stable.

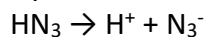
Hence option (3) is the answer.

**12. The conjugate base of hydrazoic acid is :-**

- (1)  $\text{NH}_3^-$
- (2)  $\text{N}_3^-$
- (3)  $\text{N}_2^-$
- (4)  $\text{N}^{-3}$

**Solution:**

Hydrazoic acid is  $\text{HN}_3$ .



Hence option (2) is the answer.

**13. The correct order of increasing basicity of the given conjugate base ( $\text{R} = \text{CH}_3$ ) is:**

- (1)  $\text{RCOO}^- < \text{HC} \equiv \text{C}^- < \text{NH}_2^- < \text{R}^-$
- (2)  $\text{RCOO}^- < \text{HC} \equiv \text{C}^- < \text{R}^- < \text{NH}_2^-$
- (3)  $\text{R}^- < \text{HC} \equiv \text{C}^- < \text{RCOO}^- < \text{NH}_2^-$
- (4)  $\text{RCOO}^- < \text{NH}_2^- < \text{HC} \equiv \text{C}^- < \text{R}^-$

**Solution:**

The basic strength is inversely proportional to the stability of conjugate base. In basicity, if the availability of the electrons is more, then more readily they can be donated to form a new bond to the proton and, hence the stronger base. If bronsted acid is a strong acid then its conjugate base is a weak base.

The correct order of increasing basic strength is  $\text{RCOO}^- < \text{HC} \equiv \text{C}^- < \text{NH}_2^- < \text{R}^-$

Hence option (1) is the answer.

**14. Which types of isomerism is shown by 2,3-dichlorobutane?**

- (1) Diastereo
- (2) Optical
- (3) Geometric
- (4) Structural

**Solution:**

2,3-dichlorobutane shows optical isomerism.

Hence option (2) is the answer.

**15. Due to the presence of an unpaired electron, free radicals are**

- (1) Chemically reactive
- (2) Chemically inactive
- (3) Anions
- (4) Cations

**Solution:**

Due to the presence of an unpaired electron, the free radicals are chemically active.

Hence option (1) is the answer.

**16. Which one the following does not have  $sp^2$  hybridized carbon?**

- (1) Acetone
- (2) Acetamide
- (3) Acetonitrile
- (4) Acetic acid

**Solution:**

Acetonitrile is having only  $sp^3$  and  $sp$  hybridized carbon atoms.

Hence option (3) is the answer.