Chemistry Questions and Answers – Inductive Effect

1. Electronegativity is defined as the power of an atom in a molecule to __________
   a) Repel electrons towards itself
   b) Attract electrons towards itself
   c) Expand itself
   d) All of the mentioned
   Answer: b
   Explanation: Electronegativity is defined as the power of an atom in a molecule to attract electrons towards itself. Fluorine is the most electronegative element.

2. The factors on which electronegativity depends upon __________
   a) Valence state of atom
   b) Hybridisation
   c) Both valence state and hybridisation
   d) None of the mentioned
   Answer: c
   Explanation: The factors on which electronegativity depends upon is valence state of atom and hybridisation.

3. How does the electronegativiy get affected with the negative oxidation state?
   a) It decreases
   b) It increases
   c) It remains constant
   d) None of the mentioned
   Answer: a
   Explanation: Electronegativity decreases with the negative oxidation state since the tendency to attract an electron will decrease with the negative charge of the anion.

4. The electronegativity of sp² hybridised atom will be __________
   a) 3.29
   b) 2.48
   c) 3.69
   d) 2.75
   Answer: d
   Explanation: The electronegativity of sp² hybridised atom will be 2.75. Fluorine is the most electronegative element.

5. Which of the following is a permanent electron displacement effect?
   a) Inductomeric
   b) Electromeric
   c) Inductive
   d) All of the mentioned
   Answer: c
   Explanation: Inductive effect is the permanent electron displacement effect and inductomeric and electromeric are temporary electron displacement effects.

6. Arrange the following groups in the order of decreasing (+I) effect.
   a) C₆H₅O⁻ > COO⁻ > CR₃ > CHR₂ > H
   b) C₆H₅O⁻ > H > CR₃ > CHR₂ > COO⁻
   c) CR₃ > C₆H₅O⁻ > H > COO⁻ > CHR₂
d) \(C_6H_5O^- > COO^- > CHR_2 > CR_3 > H\)
Answer: a
Explanation: The correct order is- \(C_6H_5O^- > COO^- > CR_3 > CHR_2 > H\).

7. Arrange the following groups in the order of decreasing (-I) effect.
   a) CN > F > Br > Cl > COOH > I > H
   b) COOH > CN > F > Br > Cl > I > H
   c) H > COOH > CN > I > Cl > F > Cl
   d) CN > COOH > F > Cl > Br > I > H
Answer: d
Explanation: The correct order is- \(CN > COOH > F > Cl > Br > I > H\).

8. Which of the following is an application of inductive effect?
   a) Bond length
   b) Dipole moment
   c) Strength of carboxylic acids
   d) All of the mentioned
Answer: d
Explanation: Bond length, dipole moment and strength of carboxylic acids are some of the applications of inductive effect.

9. Relative basic strength of amines does not depend upon ___________
   a) Inductive effect
   b) Mesomeric effect
   c) Steric effect
   d) Stabilisation of cation by hydration
Answer: b
Explanation: Relative basic strength of amines does not depend upon mesomeric effect. This effect is used in a qualitative way and describes the electron withdrawing or releasing properties of substituents based on relevant resonance structures.

10. Due to presence of \(C – X\) polar bond in alkyl halide, alkyl halides are ___________
    a) More reactive than corresponding alkane
    b) Less reactive than corresponding alkane
    c) Equally reactive as corresponding alkane
    d) None of the mentioned
Answer: a
Explanation: Due to the presence of \(C – X\) polar bond in alkyl halide, alkyl halides are more reactive than corresponding alkane.

Chemistry Questions and Answers – Electromeric Effect

1. Which of the following is a temporary effect brought into play at the requirement of attacking reagent?
   a) Inductive effect
   b) Mesomeric effect
   c) Electromeric effect
   d) Inductomeric effect
Answer: c
Explanation: Electromeric effect is a temporary effect brought into play at the requirement of attacking reagent. Electromeric effect refers to a molecular polarizability effect occurring by an intra-molecular electron displacement.

2. Select the correct statement from the following option.
   a) When multiple bonds are present between two different atoms, electromeric shift towards the more electronegative atom takes place
   b) When multiple bonds are present between two similar atoms, the first possibility is symmetric alkenes or alkynes
   c) When multiple bonds are present between two similar atoms, the second possibility is asymmetric alkenes or alkynes
   d) All of the mentioned
   Answer: d
   Explanation: When multiple bonds are present between two different atoms, electromeric shift towards the more electronegative atom takes place. When multiple bonds are present between two similar atoms, the first possibility is symmetric alkenes or alkynes and the second possibility is asymmetric alkenes or alkynes.

3. Select the correct statement from the following option.
   a) Conjugate effect is stronger than (-I) effect
   b) Conjugate effect is weaker than (-I) effect
   c) Conjugate effect is same as (-I) effect
   d) None of the mentioned
   Answer: a
   Explanation: Conjugate effect is stronger than (-I) effect. Conjugate effect (or delocalization) is an effect in which molecular orbitals (MOs) are conjugated to new molecular orbitals that are more delocalized and therefore generally lower in energy.

4. When the complete transfer of π-electrons take place away from the atom at the requirement of attacking agent, it is called __________
   a) (-E) effect
   b) (+E) effect
   c) (-I) effect
   d) (+I) effect
   Answer: b
   Explanation: When the complete transfer of π-electrons takes place away from the atom at the requirement of attacking agent, it is called (+E) effect.

5. The positively charged and electron deficient compounds which have a tendency to form a bond by accepting the electron pair are known as __________
   a) Electrophiles
   b) Nucleophiles
   c) Homophiles
   d) All of the mentioned
   Answer: a
   Explanation: The positively charged and electron deficient compounds which have a tendency to form a bond by accepting the electron pair are known as electrophiles.

6. Which of the following is an example of lewis base?
   a) ZnCl₂
   b) BF₃
c) NH₃  
d) FeCl₂  
View Answer  
Explanation: NH₃ is an example of lewis base and ZnCl₂, BF₃ and FeCl₂ are the examples of lewis acid.

7. Which of the following is an incorrect statement about the nucleophiles?  
a) They are electron rich  
b) They possess an empty orbital to receive the electron pair  
c) They attack electron deficient centres  
d) Examples are: OH⁻, NH₃, H₂O etc  
View Answer  
Explanation: Nucleophiles possess an unshared electron pair which is not firmly held to the nucleus. All the other options are correct. They are electron rich and attack on electron deficient centres. Examples are: OH⁻, NH₃, H₂O etc.

8. Lewis acids are examples of nucleophilic reagents.  
a) True  
b) False  
View Answer  
Explanation: Lewis acids are the examples of electrophilic reagents and Lewis bases are the examples of nucleophilic reagents.

9. Those groups which are electron repelling and have lesser electron attracting power than hydrogen show __________  
a) (+E) effect  
b) (-E) effect  
c) (-I) effect  
d) (+I) effect  
View Answer  
Answer: d  
Explanation: Those groups which are electron repelling and have lesser electron attracting power than hydrogen show (+I) effect.

10. Which of the following molecule will show highest dipole moment?  
a) CH₃Cl  
b) CH₃Br  
c) CH₃F  
d) CH₃I  
View Answer  
Explanation: CH₃F will show the highest dipole moment because it is the most electronegative compound.