Acid Strength and Conjugate Base Stability

Chemistry · Answer Key · 15 Questions

1. As the pK of an acid increases, what happens to its strength?

A) Increases
B) Decreases
C) Stays the same
D) Becomes neutral

2. What is the primary factor to consider when identifying the most acidic proton in a molecule?

A) The number of hydrogen atoms
B) The electronegativity of the atom bonded to hydrogen
C) The stability of the negative charge on the conjugate base
D) The presence of double bonds

3. Which of the following factors contributes to the stabilization of a negative charge on a conjugate base, thereby increasing the acidity of the parent acid?

A) Electron-donating groups
B) Resonance
C) Increased atomic radius in a group
D) Decreased S-character in hybridization

4. According to the text, acidity increases when moving in which direction across a row of the periodic table?

A) Right to left
B) Left to right
C) Up to down
D) Down to up

5. How do inductive effects from electron-withdrawing groups influence the acidity of an acid?

A) They decrease acidity.
B) They have no effect on acidity.
C) They increase acidity.
D) They make the acid neutral.

6. What is the effect of increased S-character in the hybridization of the atom carrying a negative charge on the conjugate base, in terms of acidity?

A) It decreases acidity.
B) It has no effect on acidity.
C) It increases acidity.
D) It makes the acid a stronger base.

7. In the given structural comparison, which proton is identified as the most acidic?

A) Ha
B) Hb
C) Hc
D) All are equally acidic

8. Why is Hc considered the most acidic proton in the provided example?

A) The negative charge is on a carbon atom.
B) The negative charge is stabilized by resonance and located on oxygen.
C) The conjugate base has no stabilization.
D) The hybridization is sp3.

9. Compared to Ha and Hb, why is the conjugate base of Hc more stable?

A) The charge is on carbon.
B) The charge is on oxygen and stabilized by resonance.
C) There is no resonance stabilization.
D) The electronegativity of oxygen is lower than carbon.

10. Which of the following is NOT listed as a factor that can stabilize the charge on a conjugate base and increase acidity?

A) Type of element
B) Inductive effects
C) Steric hindrance
D) Hybridization effects

11. The text states that the acidity increases down a column of the periodic table. This is related to which factor?

A) Hybridization
B) Resonance
C) Inductive effects
D) Type of element

12. If a conjugate base is resonance stabilized, what is the effect on the acidity of the parent acid?

A) Acidity decreases.
B) Acidity remains unchanged.
C) Acidity increases.
D) The parent acid becomes a strong base.

13. In the comparison of Ha, Hb, and Hc, which proton is the least acidic?

A) Ha
B) Hb
C) Hc
D) Cannot be determined from the text

14. The hybridization of the atom carrying the negative charge on the conjugate base for Ha is described as:

A) sp
B) sp2
C) sp3
D) Not specified

15. What does the notation 'A?' represent in the context of an acid 'HA'?

A) The acid itself
B) The conjugate base of the acid
C) A proton
D) A neutral molecule