



Intro to Chemistry Test - Lesson 5 – Ionic Bond – Answer Key Page 1

1. The fact that water flows downhill, hot things cool off, and atoms bond to other atoms are all examples of:

- A) atoms seeking new sources of energy
- B) atoms attracting and repelling each other
- C) atoms shedding excess energy**
- D) atoms being attracted to other atoms

The correct answer is C. All atoms would prefer to be in a state of low energy, which they can do by shedding gravitational energy by flowing downhill, shedding heat energy by cooling off, and shedding electrical and electromagnetic energy by bonding to other atoms and lowering the energy state of their electrons.

2. Why is sodium so willing to give its single valence electron in ring 3 to chlorine?

- A) Even though sodium's single valence electron is spinning and creating a magnetic field around itself, there is no other electron in ring 3 to be attracted to.
- B) The electrons in sodium's ring 1 and 2 are repelling the single valence electron in ring 3 away from the nucleus.
- C) The valence electron in ring 3 is far enough away from sodium's nucleus that it doesn't feel as much attraction to sodium's nucleus as the inner electrons do.
- D) All three statements are true.**

The correct answer is D. Sodium's single valence electron has little reason to stay in sodium's orbit because it is pretty far from sodium's nucleus, it's shielded from sodium's nucleus by the ten electrons in the inner rings, and it has no other electron in ring 3 to pair up with.

3. Which is the biggest obstacle that sodium has to overcome in order to give its valence electron to chlorine?

- A) Sodium has to get close to chlorine, but chlorine's electrons and sodium's electrons are repelling each other.
- B) Both sodium and chlorine are electrically neutral, so they have no attraction for each other.
- C) It takes a significant amount of energy to remove sodium's valence electron and give it to chlorine.
- D) Almost all the sodium and chlorine atoms are moving so fast that there's not enough time for sodium to give its valence electron to chlorine.

The correct answer is A. Sodium and chlorine's mutual electrical repulsion requires sodium to slam into chlorine at high speed to overcome their mutual electrical repulsion. The electrical repulsion around atoms is so strong that when one object is placed on another, the atoms in two objects never really touch. Instead, the object on top rests on a tiny gap of empty space.

4. A negative ion _____.

- A) can only be formed by adding or removing an electron from an atom's outer ring
- B) is no longer considered an atom
- C) can be formed by moving an electron from an atom's inner ring to its outer ring
- D) is missing a positive charge in its nucleus

The correct answer is A. An ion can only be formed by adding or removing electrons, and only by moving electrons into or out of the outer ring. Despite having an extra electron or losing an electron, an ion is still an atom because it has a nucleus being circled by electrons.

5. What happens when sodium gives its single valence electron to chlorine?

- A) Sodium becomes a negative ion and chlorine becomes a negative ion.
- B) Sodium becomes a positive ion and chlorine becomes a negative ion.
- C) Sodium becomes a negative ion and chlorine becomes a positive ion.
- D) Sodium becomes a positive ion and chlorine becomes a positive ion.

The correct answer is B. When sodium gives away an electron, it becomes positive, and when chlorine accepts sodium's electron, chlorine becomes negative.

6. The reason sodium and chlorine bond together after sodium gives chlorine its single valence electron is _____.

- A) sodium's ring 3 and chlorine's ring 4 are now overlapping
- B) sodium's magnetic spin is opposite that of chlorine's magnetic spin
- C) sodium wants to take back its valence electron from chlorine
- D) sodium became positive and chlorine negative**

The correct answer is D. By giving away its valence electron, sodium becomes a positive ion. Chlorine, by accepting sodium's electron, becomes a negative ion. Positive attracts negative and the two atoms form an ionic bond.

7. True or false: The properties of each atom help predict the properties of the molecule formed when the two atoms bond to each other.

- A) True
- B) False**

The correct answer is B. The properties of a molecule are usually much different than the properties of the individual atoms making up that molecule.

8. Which statement is true?

- A) Valence electrons in the outer ring of an atom can be removed and brought to another location.
- B) Only valence electrons can be removed and brought to another location, not electrons from the inner rings.
- C) Electrons spin as they circle the nucleus and create a magnetic field around themselves.
- D) All three statements are true.**

The answer is D: all three statements about electrons are true.

9. Which statement is true?

- A) Two electrons circling a nucleus pair up because they spin in opposite directions and create opposite magnetic fields that pull the electrons together.
- B) Every pair of electrons in a ring tries to keep as far away as possible from every other pair of electrons.
- C) Electrons can be induced by a group of approaching electrons to back away and in doing so, leave behind an electrically positive space.
- D) All three statements are true.**

The answer is D: all three statements about electrons are true.