Chapter 15 – Ionic Bonding and Ionic Compounds

Watch the Tyler Dewitt video, *Ionic Bonding Introduction* at
https://www.youtube.com/watch?v=Qf07-8Jhhpc&t=8s

1. What is a chemical bond?

2. What are the three types of chemical bonds?
   a. b. c.

3. What kind of atoms are bonded together in ionic bonds?

4. What are examples of three ionic compounds as provided in the video?
   a. b. c.

Consider the bonding interaction of NaCl (sodium chloride) and answer the below:
5. What is the driving force behind the bonding of a sodium atom with a chlorine atom, to ultimately form sodium chloride?

6. Which atom "gives" the electron? _____ What kind of charge does this atom have once it gives the electron away? _____ Which atom "accepts" the electron? _____ What kind of charge does this atom have once it accepts the electron? _____

7. Atoms that have a net electrical charge are called _____.

8. What are the three steps in the formation of sodium chloride?
   a.

   b.

   c.

Refer to *Chapter 15 – Ionic Bonding and Ionic Compounds* to answer the below:
1. What are valence electrons (p. 413)?

2. What are electron dot structures (p. 414)?

3. What is the octet rule (p. 414)?

Watch the Tyler Dewitt video, *Ionic Bonding Part 2* at
https://www.youtube.com/watch?v=5EwmedLuRmw&t=20s

Don't be thrown off by the electron shell diagram he uses. It's simply another way to represent the electrons around atoms.

1. In looking at the electron shell diagram for sodium, how many valence electrons does it have? ____ How many valence electrons does chlorine have? ____

2. Draw an electron shell diagram for both sodium and chlorine.

Sodium atom	Chlorine atom

3. Why is atomic sodium not "happy" or unstable? Why is atomic chlorine unstable?

4. How do the two atoms resolve their instability issues?

5. Draw the electron shell diagram for sodium ion and chloride.

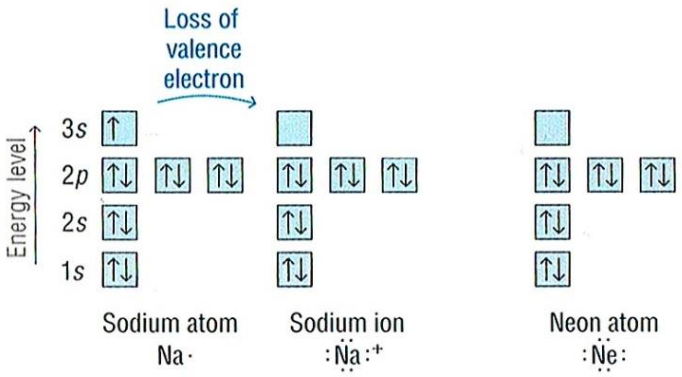
Sodium ion	Chloride

6. How many valence electrons does the chloride ion have? ____ How many valence electrons does the sodium ion have? _____

7. Characterize the net charges on sodium ion and chloride.

From text, pp. 415 – 417.

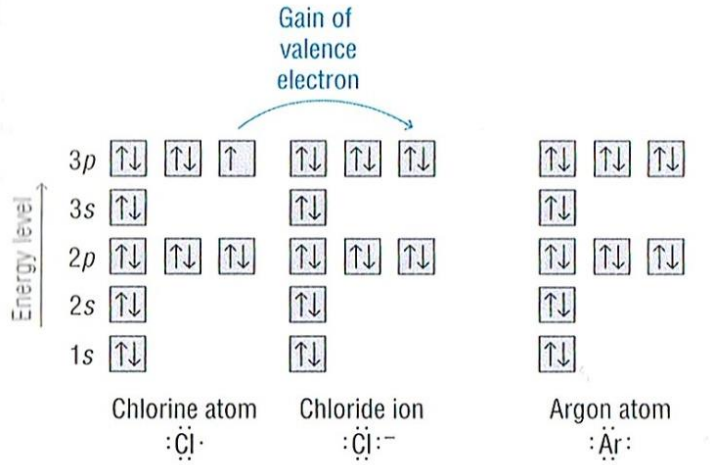
8. Take a look at the orbital energy diagram for sodium. Sodium loses its valence electron (↑), from which orbital? _____



What do you notice about the electron configuration of sodium ion and neon?

Write out this configuration.

9. Examine the orbital energy diagram for chlorine atom. Chlorine gains an electron (↓) in which orbital? ____



What do you notice about the electron configuration of chloride and argon?

Write out this configuration.

Watch the Tyler Dewitt video, *Ionic Bonding Part 3* at https://www.youtube.com/watch?v=RkZNYuSho0M

1. What keeps the seven electrons in the valence shell of chlorine from filling the valence shell of sodium? Why does the single sodium electron move to chlorine instead?

2. Electrons always move from the _____ to the _____.

Shape and Structure of Ionic Compounds

3. In nature, do you frequently come across just two atoms joined in an ionic bond? What is the name of the three-dimensional structure that ions typically form?