***Chemistry***

**7: Chemical** **Bonding and Molecular Structure**

**7.1: Ionic Bonding**

1. Does a cation gain protons to form a positive charge or does it lose electrons?

Solution

The protons in the nucleus do not change during normal chemical reactions. Only the outer electrons move. Positive charges form when electrons are lost.

3. Which of the following atoms would be expected to form negative ions in binary ionic compounds and which would be expected to form positive ions: P, I, Mg, Cl, In, Cs, O, Pb, Co?

Solution

P, I, Cl, and O would form anions because they are nonmetals. Mg, In, Cs, Pb, and Co would form cations because they are metals.

5. Predict the charge on the monatomic ions formed from the following atoms in binary ionic compounds:

(a) P

(b) Mg

(c) Al

(d) O

(e) Cl

(f) Cs

Solution

(a) P3–; (b) Mg2+; (c) Al3+; (d) O2–; (e) Cl–; (f) Cs+

7. Write the electron configuration for each of the following ions:

(a) As3–

(b) I–

(c) Be2+

(d) Cd2+

(e) O2–

(f) Ga3+

(g) Li+

(h) N3–

(i) Sn2+

(j) Co2+

(k) Fe2+

(l) As3+

Solution

(a) [Ar]3*d*104*p*6; (b) [Kr]4*d*105*s*25*p*6; (c) 1*s*2; (d) [Kr]4*d*8; (e) [He]2*s*22*p*6; (f) [Ar]3*d*10; (g) 1*s*2; (h) [He]2*s*22*p*6; (i) [Kr]*d*105*s*2; (j) [Ar]3*d*7; (k) [Ar]3*d*6; (l) [Ar]3*d*104s2

9. Write out the full electron configuration for each of the following atoms and for the monatomic ion found in binary ionic compounds containing the element:

(a) Al

(b) Br

(c) Sr

(d) Li

(e) As

(f) S

Solution

(a) 1*s*22*s*22*p*63*s*23*p*1; Al3+: 1*s*22*s*22*p*6; (b) 1*s*22*s*22*p*63*s*23*p*63*d*104*s*24*p*5; 1*s*22*s*22*p*63*s*23*p*63*d*104*s*24*p*6; (c) 1*s*22*s*22*p*63*s*23*p*63*d*104*s*24*p*65*s*2; Sr2+:1*s*22*s*22*p*63*s*23*p*63*d*104*s*24*p*6; (d) 1*s*22*s*1; Li+ 1*s*2; (e) 1*s*22*s*22*p*63*s*23*p*63*d*104*s*24*p*3; 1*s*22*s*22*p*63*s*23*p*63*d*104*s*24*p*6; (f) 1*s*22*s*22*p*63*s*23*p*4; 1*s*22*s*22*p*63*s*23*p*6

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