

Chapter 4 Review

CH4 Review pg. 253 #1,2,4,5,6,7,9,10-12,15,16,18,19,24,26-28,33,34,36,45

1e 2d 4a 5d 6b 7c 9a 10c 11b 12c

- 15.** Metals and non-metals: Metals form positive ions and non-metals form negative ions. When metals donate electrons and non-metals accept electrons, both types can form a complete octet of electrons and, therefore, become stable.
- 16.** Non-metals: The valence shells of non-metals are more than half full but they do not lose electrons so they cannot accept electrons from each other to form a complete octet of electrons. They can, however, share electrons and form a complete octet and become stable.
- 18. a.** Delocalized means that the electrons that originate from one atom can move away from that atom and become a part of a larger group of shared electrons (the "sea" or "pool" of electrons surrounding a cluster of metal cations). In ionic bonds, the electrons are transferred specifically from one to another atom and held there to form discrete ions. In covalent bonds, an electron from one atom pairs up with an electron from another atom and is held in a location near those two nuclei.
- b.** Metallic bonds can be viewed as non-directional. The positive ions, layered in a very organized pattern, will slide over one another when stress (such as a pounding hammer) is applied, and not break the pattern. Throughout the impact, the pool of delocalized electrons helps to keep the metal together by continuing to exert a uniform attraction on the positive ions.
- 19.** Ionic solids are brittle because the oppositely charged ions are aligned in a regular pattern. When the crystals are stressed, the ions along a plane move in a way that causes like charges to be aligned beside each other. The repulsive electrostatic force then causes the crystal to break apart.
- 24.** In symmetrical molecules, any polar bonds are aligned so that the polarities of the bonds cancel, leaving the molecule non-polar. If an asymmetrical molecule has any polar bonds, the asymmetry will prevent them from cancelling each other.
- 26. a.** have a crystalline structure, generally have high melting and boiling points

b. metallic substances are not brittle but ionic substances are, metallic substances are malleable and ductile but ionic substances are not, metallic solids conduct electric current but solid ionic substances do not

27. a. often soluble in water, brittle

b. ionic solids have a high melting point and molecular solids do not, ionic solids are much harder than polar molecular solids

28. BF_3 is a trigonal planar molecule and the three polar bonds are positioned such that they cancel each other. Water is a V-shaped molecule and the two polar bonds are not along the same line and therefore cannot cancel each other.

33. a. ionic; $\Delta EN = 2.0$ b. covalent; $\Delta EN = 0.0$ c. polar covalent; $\Delta EN = 0.5$
d. ionic; $\Delta EN = 2.6$

34. a. lithium: $[\text{He}]2s^1$ b. argon: $[\text{Ne}]3s^23p^6$ c. chlorine: $[\text{Ne}]3s^23p^5$
d. phosphorus: $[\text{Ne}]3s^23p^3$

36. a. non-polar b. polar c. polar-covalent network does not exist on its own
 SiO_2 is a ratio of Si to O - as a single drawing looks like nonpolar d. polar

45. a.	b.	c.
3 BP; 1 LP	4 BP; 12 LP	2 BP; 2 LP
d.	e.	
5 BP, 0 LP	2 BP; 6 LP	