Qualitative Analysis and Chemical Bonding Lab

Alignment to AP Chemistry Curriculum Framework

**Enduring Understandings and Essential Knowledge**

Forces of attraction between articles (including the noble gases and also different parts of some large molecules) are important in determining many macroscopic properties of a substance, including how the observable physical state changes with temperature.

2B1: London dispersion forces are attractive forces present between all atoms and molecules. London dispersion forces are often the strongest net intermolecular forces between large molecules.

2B3: Intermolecular forces play a key role in determining the properties of substance, including biological structures and interactions.

The strongest electrostatic forces of attraction holding atoms together in a unit are called chemical bonds.

2C1: In covalent bonding, electrons are shared between the nuclei of two atoms to form a molecule or polyatomic ion. Electronegativity differences between the two atoms account for the distribution of the shared electrons and the polarity of the bond.

2C2: Ionic bonding results from the net attraction between oppositely charged ion, closely packed together in a crystal lattice.

2C3: Metallic bonding describes an array of positively charged metal cores surrounded by a sea of mobile valence electrons.

The type of bonding in the solid state can be deduced from the properties in the solid state.

2D1: Ionic solids have high melting points, are brittle, and conduct electricity only when molten or in solution.

2D2: Metallic solids are good conductors of heat and electricity, have a wide range of melting points, and are shiny, malleable, ductile, and readily alloyed.

2D3: Covalent network solids generally have extremely high melting points, are hard, and thermal insulators. Some conduct electricity.

2D4: Molecular solids with low molecular weight usually have low melting points and are not expected to conduct electricity as solids, in solution, or when molten.

**Learning Objectives**

2.11 The Ss is able to explain the trends in properties and/or predict properties of samples consisting of particels with no permanent dipole on the basis of London dispersion forces.

2.13 The Ss is able to describe the relationship between the structural features of polar molecules and the forces of the attraction between the particles.

2.15 The Ss is able to explain observations regarding the solubility of ionic solids and molecules in water and other solvents on the basis of particle views that include intermolecular interactions and entropic effects.

2.16 The Ss is able to explain the properties (phase, vapor pressure, viscosity, ect.) of small and large molecular compounds in terms of the strengths and types of intermolecular forces.

2.19 The Ss can create visual representations of ionic substances that connect the microscopic structure to macroscopic properties, and/or use representations to connect the microscopic structures to macroscopic properties (e.g. boiling point, solubility, hardness, brittleness, low volatility, lack of malleability, ductility, or conductivity.)

2.20 The Ss is able to explain how a bonding model involving delocalized electrons is consistent with macroscopic properties of metals (e.g. conductivity, malleability, ductility, and low volatility) and the shell model of the atom.

2.22 The Ss is able to design or evaluate a plan to collect and/or interpret data needed to deduce the type of bonding in a sample of a solid.