Chemistry D- States of Matter & Gas Laws

PS-6 Kinetic molecular theory, states of matter & Gas Laws- Particles within the specific states of matter differ by internal energies and particle attractions. Understanding how particles interact based on environmental conditions provides the framework for predicting changes in matter.

TS 6.1 States of matter- The state of a substance is based on the molecular structure, kinetic energy and intermolecular attractions. The state of a substance can affect chemical reactivity.

6.1.1 Describe particle arrangement & motion in the different states using the kinetic molecular theory of matter

Key Ideas: States of matter, kinetic energy, IMAs (IMFs)

6.1.2 Distinguish exothermic and endothermic processes based on movement of energy

6.1.3 Explain how heat changes (enthalpy) are associated with different states of matter

TS 6.2 Phase Changes- A change in the state requires a change in the energy of the particles.

6.2.1 Describe the relationship between temperature and states of matter as outlined by warming (cooling) curves

Key Ideas: warming curve, cooling curve, states changes (e.g. freezing, melting, vaporization, condensation, etc.)

6.2.2 Calculate heat changes (enthalpy) for changes in temperature and states of matter using enthalpy equations

Key Ideas: specific heat, latent heats (fusion & vaporization)

TS 6.3 Gas Laws- The properties of gases behave in predictable ways which can be described through defined laws

6.3.1 Describe the properties of gases using volume, temperature, pressure & number of particles (moles)

Key Ideas: atmospheres, bars, Pascals, temperature scales (Celsius & Kelvin)

6.3.2 Identify and use the appropriate gas law when quantitatively describing changes in gas properties.

Key Ideas: Boyles', Charles' & Gay-Lussac's – (Avogadros' & Combined)

6.3.3 Describe how ideal gases adhere to predicted changes in temperature, volume, pressure and moles.

6.3.4 Use the ideal gas law equation in stoichiometric problems that include gases at non-STP conditions

Key Ideas: STP, ideal gas law, ideal gas law constant (R = 0.0821 L atm/ mol K, 8.31 L kPa/mol K)

6.3.5 Describe conditions where ideal gases fail

6.3.6 Calculate partial pressures of gases in a mixture using Dalton's Law of Partial Pressure

6.3.7 Describe how molecular mass affects effusion rates of gases.

Key Ideas: Graham's Law