

Kenai Peninsula Borough School District
Science; Chemistry
Unit 8: STATES OF MATTER AND GASES

Pacing:

NGSS Standards:

HS-PS1-6. Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.

HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

HS-PS2-2. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.

HS-PS2-5. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.

ELA/LITERACY:

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-PS1-6)

MATHEMATICS:

MP.2 Reason abstractly and quantitatively. (HS-PS1-7)

HSN-Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-7)

HSN-Q.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-7)

HSN-Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-7)

Essential Questions:

1. Explain the kinetic molecular theory in terms of the properties of ideal and real gases.
2. How does the mass of a gas particle affect its rate of effusion?
3. Explain how changes in atmospheric pressure affect the height of the column of mercury in a barometer.
4. Compare and contrast the different types of intermolecular forces.
5. Explain how hydrogen bonds affect the viscosity of a liquid. How do changes in temperature affect viscosity?

6. What effect does soap have on the surface tension of water?
7. Explain why most solids are denser than most liquids at the same temperature.
8. What information does a phase diagram supply?
9. What is the major difference between the processes of melting and freezing?
10. Draw and label the phase diagram for water explaining all areas and points.
11. State Boyle's, Charles', Gay-Lussac's, ideal and combined gas Laws using sentences and the equations.
12. Which of the three variables that apply to equal amounts of gasses are directly proportional?
13. Which are inversely proportional?
14. List common units for each variable in the ideal gas law.
15. How do mole ratios compare to volume ratios?

Big Ideas:

1. The kinetic molecular theory explains the properties of gasses.
2. The total pressure of a gas mixture is the sum of the partial pressures of each of the gasses in the mixture.
3. The different force of attraction – intramolecular, intermolecular, dispersion, dipole- dipole, and hydrogen.
4. Properties of solids and liquids based in the intermolecular forces.
5. Phase changes and phase diagrams.
6. The gas laws- Boyle's, Charles', Ideal, Gay-Lussac, combined
7. The combined gas law and Avogadro's principle.
8. Gas stoichiometry

Vocabulary: Amorphous solid, Boiling point, Condensation, Crystalline solid, Dalton's law of partial pressures, Deposition, Diffusion, Dipole-dipole forces, Dispersion forces, Evaporation, Freezing point, Graham's law of effusion, Hydrogen bond, Kinetic molecular theory, Melting point, Phase diagram, Pressure, Sublimation, Surface tension, Temperature, Triple point, Vaporization, Viscosity, Avogadro's principle, Boyle's law, Charles' law, Combined gas law, Gay-Lussac's law, Ideal gas constant, Ideal gas law, Molar volume