Chapter Outline 10.0

**States Of matter**

Please follow the Chapter outline format that Tagami posted on the Chem page

**Section 1: The Kinetic-Molecular Theory of Matter**

1. The kinetic-molecular theory of gases (pg. 329-330)
2. State the kinetic-molecular theory of matter and describe how it explains certain properties of matter.
3. Ideal gas- a hypothetical gas that perfectly fits all the assumptions of the kinetic-molecular theory.
4. Elastic collision- one in which there is no net loss of total kinetic energy.
5. Figure- 1: Shows how gas particles travel in a straight line until they collide with other gas particles.
6. The kinetic –molecular theory and the nature of gases (pg. 330- 331)
7. List the five assumptions of the kinetic –molecular theory of gases.
8. Diffusion- Such spontaneous mixing of the particles of two substances caused by their random motion
9. Effusion- a process by which gas particles pass through a tiny opening
10. Figure 2: this shows that gases readily diffuse into each other.
11. Use the kinetic-molecular theory to explain each of the following properties of gases: expansion, fluidity, low density, compressibility, and diffusion.

-Expansion: The molecules are moving in continuous straight lines. So they will continue in one direction until colliding with something, meaning they will fill whatever container they are in.
-Fluidity: Fluidity is the ability to flow, or move from one place to another. Since gases are in constant motion, and the molecules are independent of each other, the gas is able to flow.
-Low Density: The molecules are much further apart than with a solid or liquid.

-Compression ability: Is this even a word? Gases can be compressed because there is so much space between molecules.

1. Describe the conditions under which a real gas is most likely to behave ideally.
* The molecules in ideal gas do not have a finite volume and exert no attractive forces.
1. Which of the following gases would you expect to deviate significantly from ideal behavior: He, O2, H2, H2O, N2, HCl, or NH3?
* HCl is the most polar of these, so it won't behave ideally.
1. How does the kinetic-molecular theory explain the pressure exerted by gases?
* The greater the number of molecules, the greater the number of collisions with the walls off the container at a constant temperature, and the greater the pressure of the gas, and vice-versa

**Section 2- Liquids (pg 333- 336)**

1. Properties of solids and the kinetic- molecular theory.
2. Describe the motion of particles in liquids and the properties of liquids according to the kinetic-molecular theory.
3. Fluid- a substance that can flow and therefore take the shape of its container
4. Surface tension- a force that tends to pull adjacent parts of a liquid’s surface together, thereby decreasing surface area to the smallest possible size.
5. Capillary action- the attraction of the surface of a liquid to the surface of a solid is a property closely related to surface tension.
6. Vaporization- The process by which a liquid or solid changes to a gas.
7. Evaporation- the process by which particles escape from the surface of nonboiling liquid and enter the gas state.
8. Figure- 3: shows the different densities of different types of liquids.
9. Figure- 4: Shows how gases and liquids diffuse together and also talks about uniform of the solution.
10. Describe the liquid state according to the kinetic-molecular theory.
* Liquids have the medium energy level of the three states. They have enough energy for the molecules to break free from their solid lattice but not enough to separate from being in groups of molecules, they move around slowly and randomly in groups, with a moderate level of kinetic energy to power them.
1. List the properties of liquids.
* 1. Take the shape of its container
2. Some space between particles
3. Particles move at a medium speed sometimes bouncing off each other
4. has a fixed volume
1. Explain why liquids in a test tube form a meniscus.
* Formation of a meniscus is a surface tension effect. Depending on the chemical properties of the various components, there may be a stronger affinity between the liquid and the solid than there is between the air and the solid. In this case, a concave meniscus is formed. If the affinity between the air and the solid is greater, then a convex meniscus is formed.

Surface tensions is caused by cohesive forces.

1. Compare vaporization and evaporation.
* Vaporization is when a liquid turns into vapor, evaporation is when the surface of a liquid turns into gas and rises.

**Section 3- Solids (pg 337- 341)**

1. Properties of Solids and the Kinetic-Molecular Theory.
2. Describe the motion of particles in solids and the properties of solids according to the kinetic-molecular theory.
3. Crystalline solids- they consist of crystals.
4. Crystal- a substance in which the particles are arranged in an orderly, geometric, repeating pattern.
5. Amorphous solid- one in which the particles are arranged randomly.
6. Melting- the physical change of a solid to a liquid by the addition of energy as heat.
7. melting point- The temperature at which a solid becomes a liquid
8. Figure 5: This figure shows how the particles are arranged in a solid and shows an elements structure as an example.
9. Figure 6: This figure shows a lot of the types of crystal and their structural shape.
10. Describe the solid state according to the kinetic-molecular theory.
* The kinetic molecular theory states that all matter is made up tiny constantly moving particles. In a gas they are spread out very far from each other, a liquid is closer together and a solid is packed tightly. When these materials are heated the particles begin to move faster making more friction which causes changes in state, such is call the heat if fusion and vaporization.
1. What is the difference between an amorphous solid and a crystalline solid?
* Amorphous solid, any noncrystalline solid in which the atoms and molecules are not organized in a definite lattice pattern. Such solids include glass, plastic, and gel.
1. Compare and contrast the four types of crystals.
* Covalent, Metallic, and Ionic crystals have high melting points and densities, but molecular crystals tend to be soft and have a lower melting point.

Should provide more qualities of the different types of crystals.