Chemistry 30S Unit 1 – States of matter

Complete the following review on a separate piece of paper. Be sure to include all heat arrows and diagrams to help with your explanation. Be sure to include the proper terminologies in your description. Bring the complete version of the test review to receive 2 bonus marks.

By using heat arrows, explain the following phase changes.

1. Liquid to solid

Endothermic or Exothermic

2. Solid to gas

Endothermic or Exothermic

3. Gas to liquid

Endothermic or exothermic

4. Solid to liquid

Endothermic or exothermic

1.Explain why melting is an endothermic process.

Solid is an endothermic process because heat must be put into the system for the intermolecular attraction between the particles be 'loosen up' in order for them to enter the liquid phase. Melting actually causes the surroundings to cool off.

2. Explain with diagrams how ice can boil water.

b. Why does it have to be in a closed system? Being in a closed system prevents additional particles to enter or leave the system. Otherwise, if it were open, other particles will enter the system which will affect and equalize the pressure.

3. What does it mean to reach a plateau during a heating/cooling curve? There is a dynamic equilibrium between the two states on the plateau. There is an increase in potential energy between the molecules while kinetic energy is low.

4. What is an elastic collision? An elastic collision is when gas particles do not gain or lose energy upon colliding with each other. This occurs during a constant temperature environment.

5. How does the kinetic energy of particles vary as a function of temperature? The higher the temperature, the more energy it has, the higher the kinetic energy, the more movement particles will have, the more pressure it exerts on its surroundings.

6. Explain why the baking instructions on a box of cake mix are different for high and low elevations. Would you expect to have a longer or shorter cooking time at a high elevation? High elevations means that there is a lower atmospheric pressure which affects the boiling temperature of water. If there is a lower atmospheric pressure, then the water boils a a lower temperature, meaning that it will require a longer cooking time. However, at low elevations, there is a higher atmospheric pressure meaning that there are more air particles "sitting" on the liquid. The liquid will require a higher temperature to boil (boils at a temperature of more than 100C). This will shorten the length of cooking.

7. Compare and contrast vaporization and evaporation
Vaporization is the general term of getting liquid into gas while evaporation is the process of liquid entering the gas phase below boiling temperature. It does not require added energy to enter the gas phase. It gains energy from its surroundings.

8. Explain the relationships amount vapor pressure, atmospheric pressure and boiling point.
Boiling point is when the vapor pressure of a liquid is the same as the atmospheric pressure. Vapor pressure is chemical property of the liquid while atmospheric pressure is the amount of air particles in the atmosphere. If there is a high atmospheric pressure, more energy is required to reach the boiling point (raising the boiling point). If the atmospheric pressure is low, the boiling point is lowered.

9. Use the kinetic-molecular theory to explain why gases are easier to compress than liquids or solids.
Gases are easier to compress because gas particles are more spaced out than liquids or solids, because of this reason, gas particles can be compressed to a smaller space while liquids and solids cannot. Gas particles also travel in random straight lines thus if the energy were to be lowered, they can be found to be 'compressed'.

10. What is a dynamic equilibrium? Give an example.

A dynamic equilibrium when there is a equal rate of 2 phase changes such as evaporation and condensation. When a liquid is in a closed system, the liquid will evaporate while the gas vapours will condense. If the evaporation and the condensation is occurring at the same rate, then it is in a dynamic equilibrium.

11. Be able to explain various phenomena such as boiling water with ice, evaporative cooling, and cooking in higher altitudes. Got it!

12.

Material	**Boiling (°C) - becomes a gas**	**Freezing (°C) - becomes a solid**
H_2O (water)	100° C	0° C
Fe (iron)	2750° C	1535° C
O (oxygen)	-183° C	-218° C
Hg (mercury)	357° C	-39° C
Ethyl Alcohol	78° C	-114° C

Find out the state for each of the temperatures

Material	-499C	-183C	-5C	53C	504C
Fe	Solid	Solid	Solid	Solid	Solid
O	Solid	Gas/Liquid	Gas	Gas	Gas
Hg	Solid	Solid	Liquid	Liquid	Gas
Ethyl Alcohol	Solid	Solid	Liquid	Liquid	Gas
Water	Solid	Solid	Solid	Liquid	Gas

13. Explain why ionic solids have a higher melting point than covalent solids.
    Ionic solids have a higher melting point because the structure of the ionic solid is tighter than covalent solids, which make them more difficult (requires more energy) for ionic solids to break a part, thus, a higher temperature to melt.
14. Describe the difference between the densities of the states of matter. Include examples to support your answer.

    Solids – dense

    Liquids – less dense Exception - water

    Gas – least dense

15. What does "kinetic" mean in terms of kinetic energy and the movement of molecules?

    Kinetic is the movement of molecules

    Higher the temperature, the more 'kinetic' energy a substance has.

16. Explain the relationship between intermolecular forces and vapour pressure.

    A substance with a high vapour pressure will tend to evaporate more readily as the molecules of the substance is *not* as strong in their intermolecular forces. Thus, the molecules can be broken more readily giving more gas vapour in a closed system. A substance with low vapour pressure, the particles within the substance will have a stronger bond which makes them more difficult to evaporate.