# Chapter 11 – Lesson 3 Notes – Physical Changes

***Physical change*** - is a change in the size, shape, form or state of matter in which the matter’s identity stays the same.

Ex: When ice melts some of its properties change – state of matter, the shape, and temperature, but it is still water.

**Changes in Shape and Size**

Changes in shape and size are physical changes. – The identity of the matter has not changed.

Ex: Cut paper into a square – the shape has changed but it is still paper.

**Changes in State of Matter**

In order to change the state of matter of a substance we need to add or remove thermal energy to speed up/slow down the particles of matter.

**Adding Thermal Energy**

When we add thermal energy to a solid – the particles begin to move faster and faster, and the temperature increases. When the particles move fast enough to overcome the forces that are holding them together, the solid reaches it melting point. ***Melting point*** is the temperature at which a solid changes to a liquid.

When we add thermal energy to a liquid – the particles begin to move faster and faster, and the temperature increases. When the particles move fast enough to overcome the forces that are holding them together, the solid reaches it boiling point. ***Boiling point*** is the temperature at which a liquid changes to a gas.



Some solids change directly to a gas without first becoming a liquid. This process is called ***sublimation***.

**Removing Thermal Energy**

When we remove thermal energy from a gas – the particles begin to move more slowly and temperature decreases. Condensation occurs when the particles are moving slowly enough for the attractive forces to pull the particles closer together. ***Condensation*** is the process when a gas becomes a liquid.

When we remove thermal energy from a liquid – the particles begin to move more slowly and temperature decreases. Freezing occurs when the particles are moving slowly the particles only vibrate in place. ***Freezing*** is the process when a liquid becomes a solid.

Freezing and Melting are reverse processes – so they occur at the same temperature. The same is true for Boiling and Condensation.

Another change in state is deposition – it is the change from a gas directly to a solid. (It is the state opposite of sublimation)

**Dissolving**

Dissolving is a physical change because the identities of the substances are not changed.

Ex: Salt dissolving in water for a salt water aquarium.

You can reverse the process by boiling the salt water causing the liquid to change to a gas (water vapor) and leaving the salt behind.

**Conservation of Mass**

During a physical change the particles of matter that are there before he change are the same as those present after the change, so the total mass before and after the change remains the same.