CHEMISTRY 11

UNIT #3 - ELEMENTS, COMPOUNDS & MIXTURES

SECTION #1: THE CLASSIFICATION OF MATTER (continued)

Phase Changes

In a phase change the molecules do not change. They simply loosen, or tighten up, their relationships with neighbouring molecules.

Pure ice contains nothing but H_2O molecules. In ice these molecules are strongly attracted to their neighbours. This attraction is so strong that all of the molecules are frozen into their positions. They cannot move.

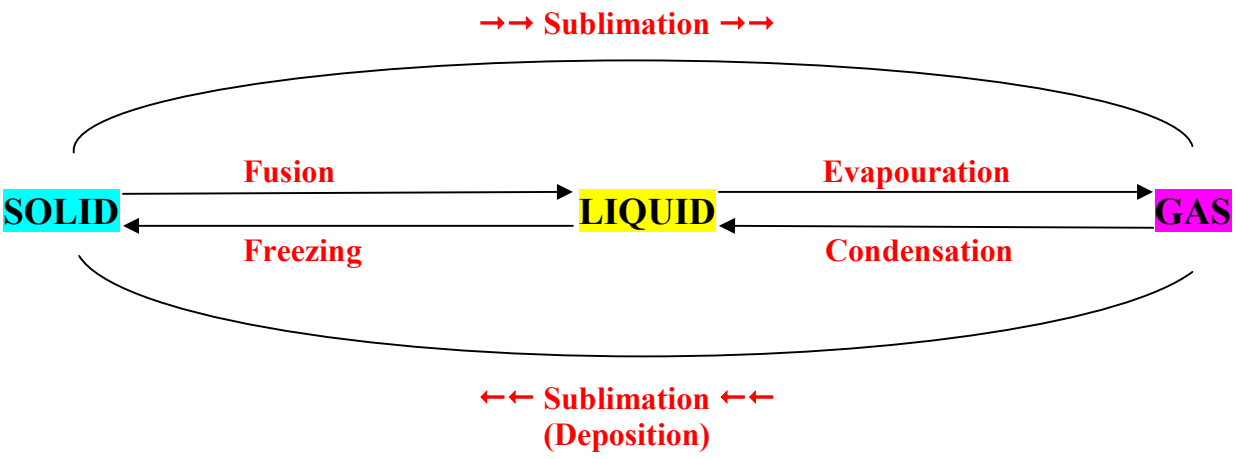
When heat is added, the H_2O molecules gain energy. If they gain enough energy, then they will break loose. They can escape from their rigid positions and freely flow past each other.

The crystal of ice has now become liquid water.

With further heating, the H_2O molecules gain even more energy. At 100 °C they reach the boiling point. Here they have enough energy to completely escape from their neighbours. The molecules stop touching each other. They fly apart in all directions.

Liquid water has now become steam.

Phase Change Names

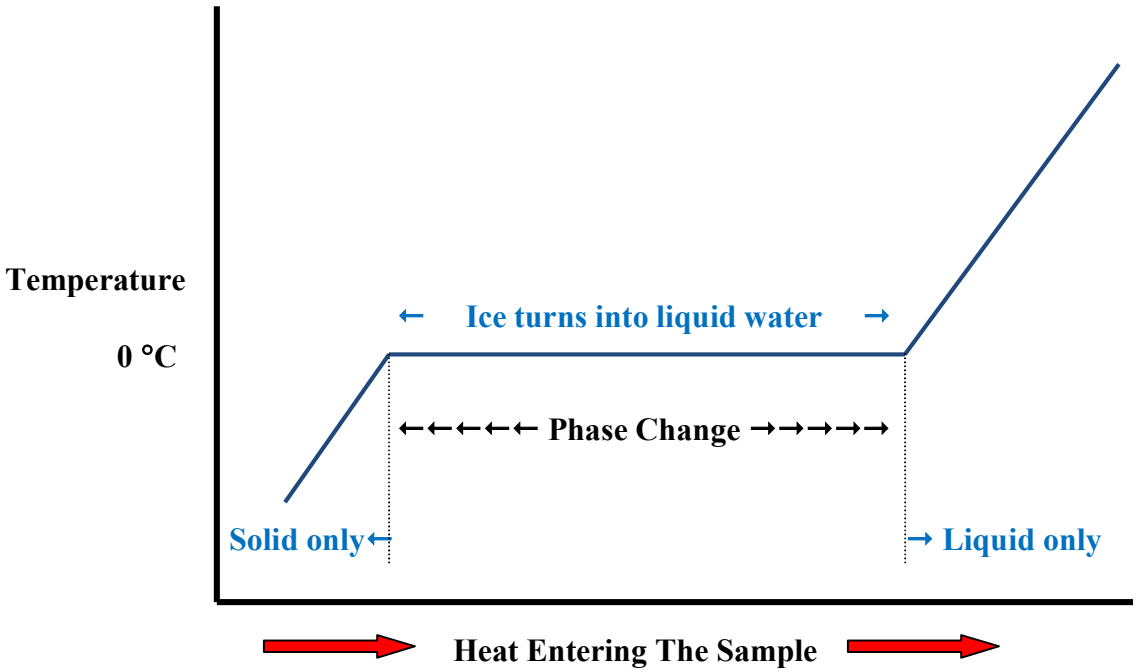


Temperature

*** During a phase change a substance's temperature **does not** change. ***

For example, while a piece of ice is melting, its temperature remains constant at 0 °C. All of the absorbed heat is used to convert this solid into a higher energy form - liquid water. The temperature remains at 0 °C until ALL of the ice has melted.

The following graph illustrates the relationship between temperature and phase changes.



According to the graph, the temperature stays at 0 °C until all of the ice has melted.

If one graphed the boiling of water, you would also see a plateau. The temperature would stay at 100 °C until ALL of the liquid had turned into steam. Only AFTER all of the molecules had become gaseous, could energy then be used to raise the temperature.

Energy Changes

In general, phase changes require a lot less energy than chemical changes.