

PHASES (STATES) OF MATTER NOTES

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Phases are a physical property of matter. The phase of a substance depends upon the amount of heat energy it contains. When a substance absorbs heat, the particles that make it up move faster and farther.

SOLIDS - contain the least amount of heat energy of all the phases.

1. Many solids have particles arranged in a crystalline lattice - a repeating fixed pattern made up of **unit cells** - that are constantly vibrating in place.
2. Solids have a definite shape and volume.
3. Solids are usually the most dense state of a substance. Water is one important exception.
4. The temperature at which a substance freezes is known as its **freezing point** (f.p.).

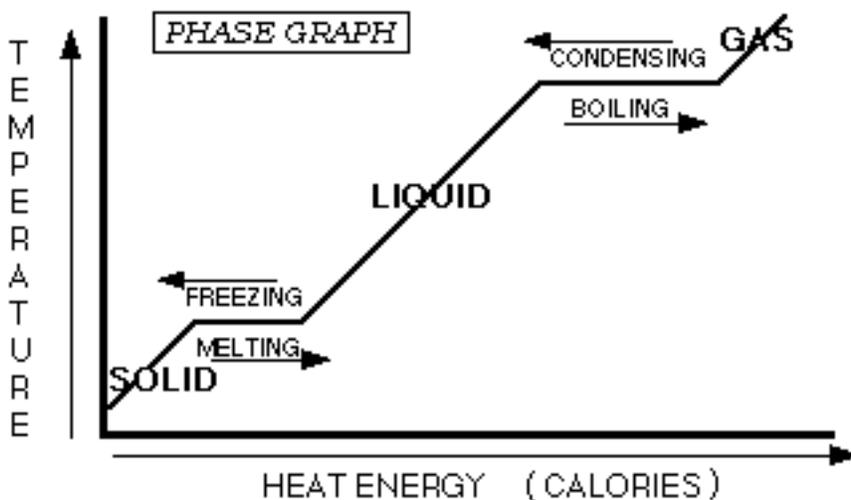
LIQUIDS - contain more heat energy than solids, less than gases or plasma.

1. The particles have broken away from their crystalline lattice and are free to move.
2. Liquids have a definite volume but no definite shape.
3. Liquids are usually less dense than solids and more dense than gases or plasma
4. The temperature at which a solid changes to a liquid is known as its **melting point** (m.p.) which is the same temperature as the freezing point of the substance.

GASES - contain more heat energy than solids or liquids, but less than plasma.

1. The particles have great amounts of kinetic energy and are separated by great distances. This explains why gases, unlike liquids and solids, can be easily compressed.
2. Gases have no definite volume or shape and are less dense than solids or liquids
3. The temperature at which a liquid forms a gas is known as its **boiling point** (b.p.) . The **pressure** above a liquid determines the boiling point of that liquid (the lower the pressure, the lower the b.p.). Water on top of Mt. Everest boils at 75°C.
4. When a gas turns into a liquid, **condensation** is taking place. The temperature at which condensation takes place is the same temperature as the boiling point.

PLASMA - Matter at temperatures in millions of °C (not found naturally on earth).



Different substances have different melting and boiling points:

<u>substance</u>	<u>melting point</u>	<u>boiling point</u> (at 1 atm.)
oxygen	-218 °C	-183 °C
water	0 °C	100 °C
salt	801 °C	1413 °C
sand (silicon dioxide)	1610 °C	2230 °C