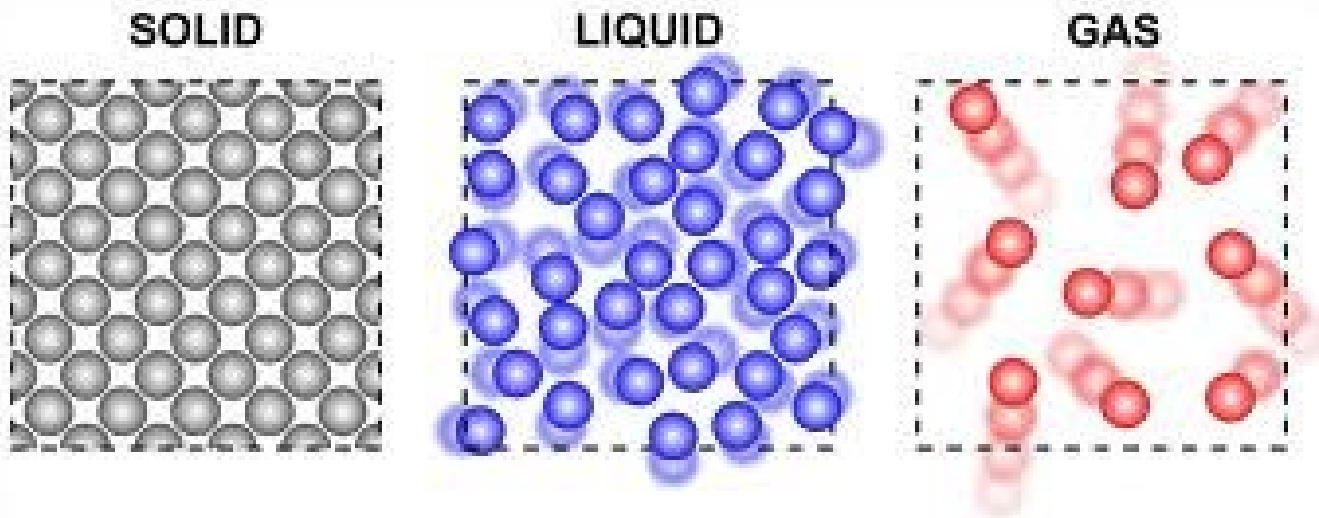


Phases of Matter

Mr. Skirbst

Phases of Matter

Determined by particle
arrangement and speed



4 Phases of Matter

1. Solid



SOLID



4 Phases of Matter

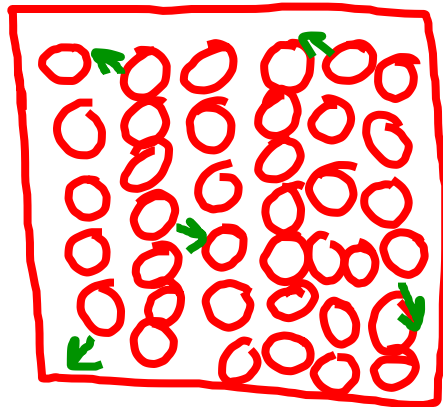
1. Solid

- have a definite *shape*
and a definite *volume*

4 Phases of Matter

1. Solid

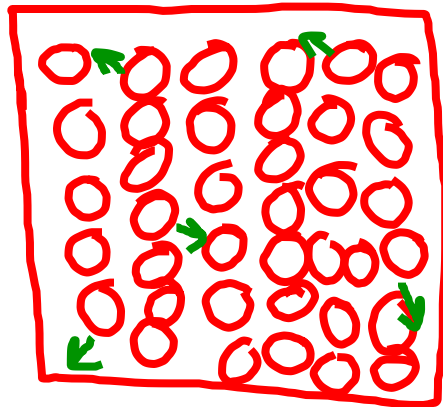
(particles are packed *tightly*
and move *slowly*)



4 Phases of Matter

1. Solid

(particles are packed *tightly*
and move *slowly*)



(higher
density)

4 Phases of Matter

2. Liquid



4 Phases of Matter

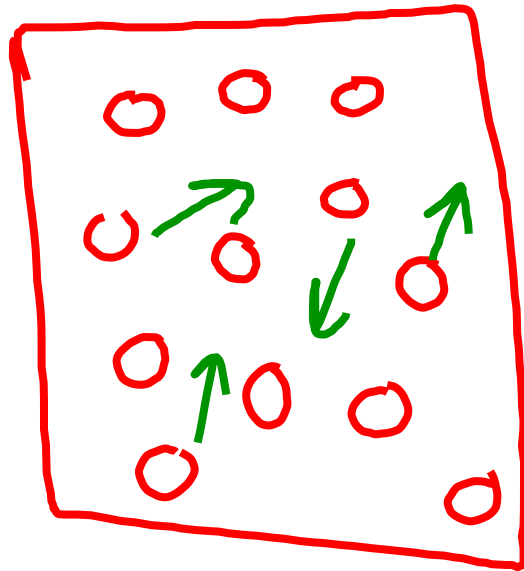
2. Liquid

- have no definite *shape*
and a definite *volume*

4 Phases of Matter

2. Liquid

(particles are free to move)



4 Phases of Matter

3. Gas



4 Phases of Matter

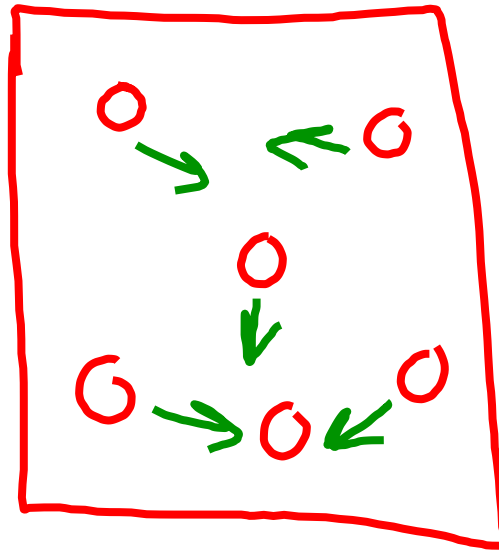
3. Gas

- have *no definite shape*
and *no definite volume*

4 Phases of Matter

3. Gas

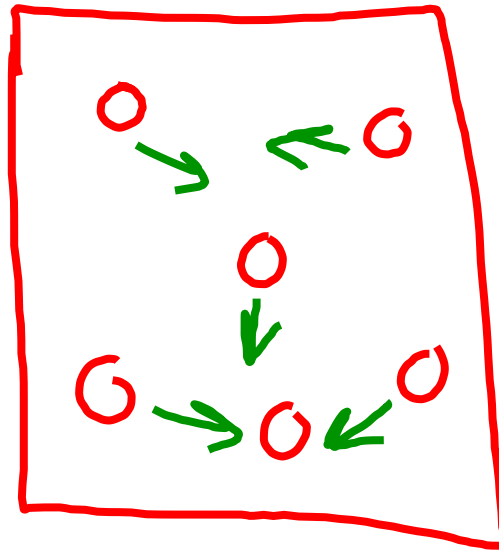
(particles are in *constant* motion)



4 Phases of Matter

3. Gas

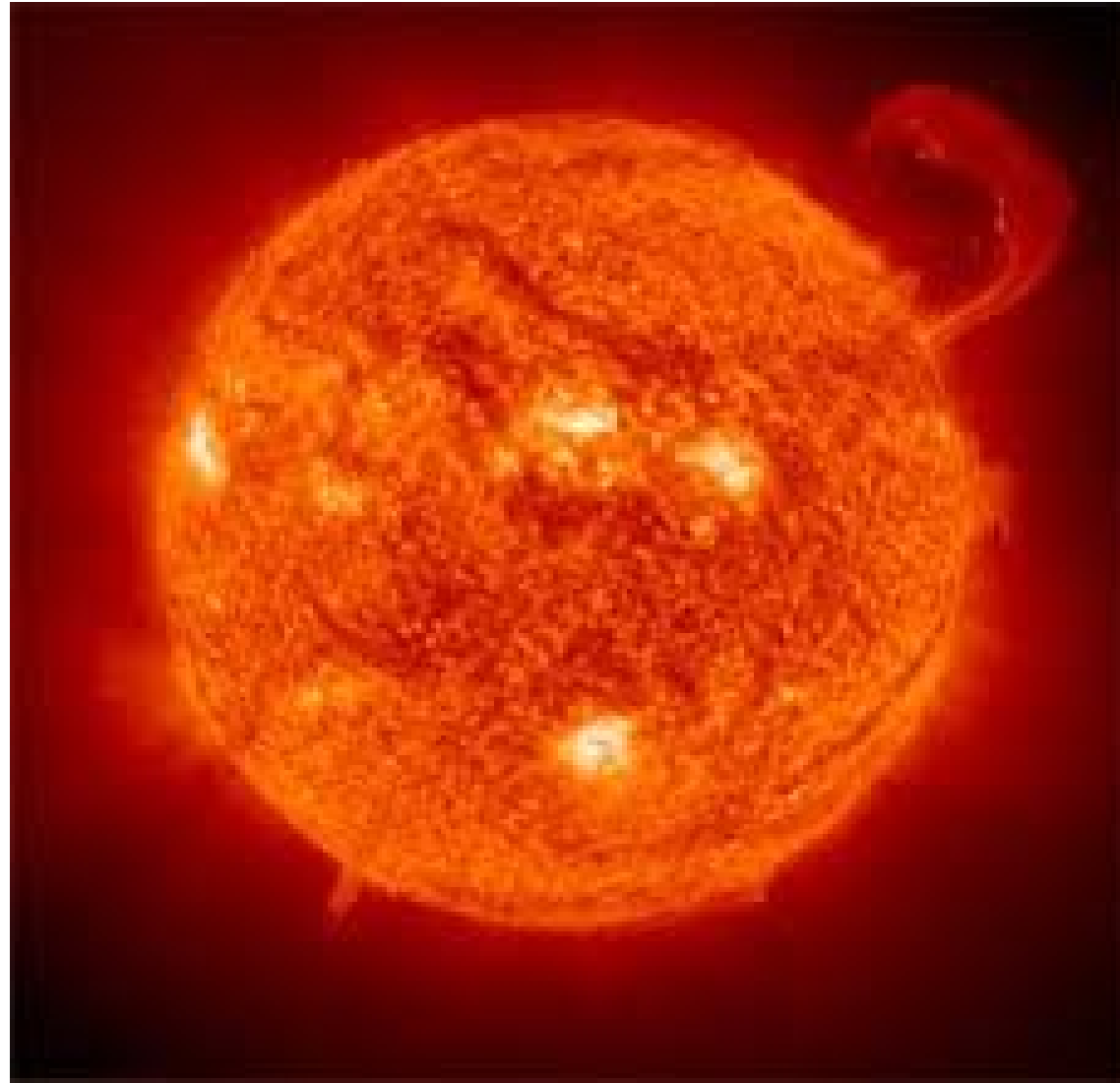
(particles are in *constant* motion)



(lower density)

4 Phases of Matter

4. Plasma



4 Phases of Matter

4. Plasma

(VERY HIGH energy)

ex. Sun, lightning)

4 Phases of Matter

4. Plasma

- cannot be *contained* by ordinary means

Phase Changes

The change from one phase of matter to another *due to changes in heat energy*

Phase Changes

SOLID – LIQUID:



Phase Changes

SOLID – LIQUID:

- **Melting** (solid to liquid)

Phase Changes

SOLID – LIQUID:

- Melting (solid to liquid)

due to an absorption of
heat energy

Phase Changes

SOLID – LIQUID:

- **Freezing** (liquid to solid)



Phase Changes

SOLID – LIQUID:

- **Freezing** (liquid to solid)

due to a release of heat
energy

Phase Changes

SOLID – LIQUID:

- **Heat of Fusion**

80 cal./g (water)

*Energy required to change
from solid to liquid*

Phase Changes

LIQUID - GAS:



Heat of Vaporization

Phase Changes

LIQUID - GAS:

- **Vaporization** (liquid to gas)

Phase Changes

LIQUID - GAS:

- **Vaporization** (liquid to gas)
due to an absorption of
heat energy

Phase Changes

LIQUID - GAS:

- **Condensation** (gas to liquid)



Phase Changes

LIQUID - GAS:

- **Condensation** (gas to liquid)
due to a release of heat
energy

Phase Changes

LIQUID - GAS:

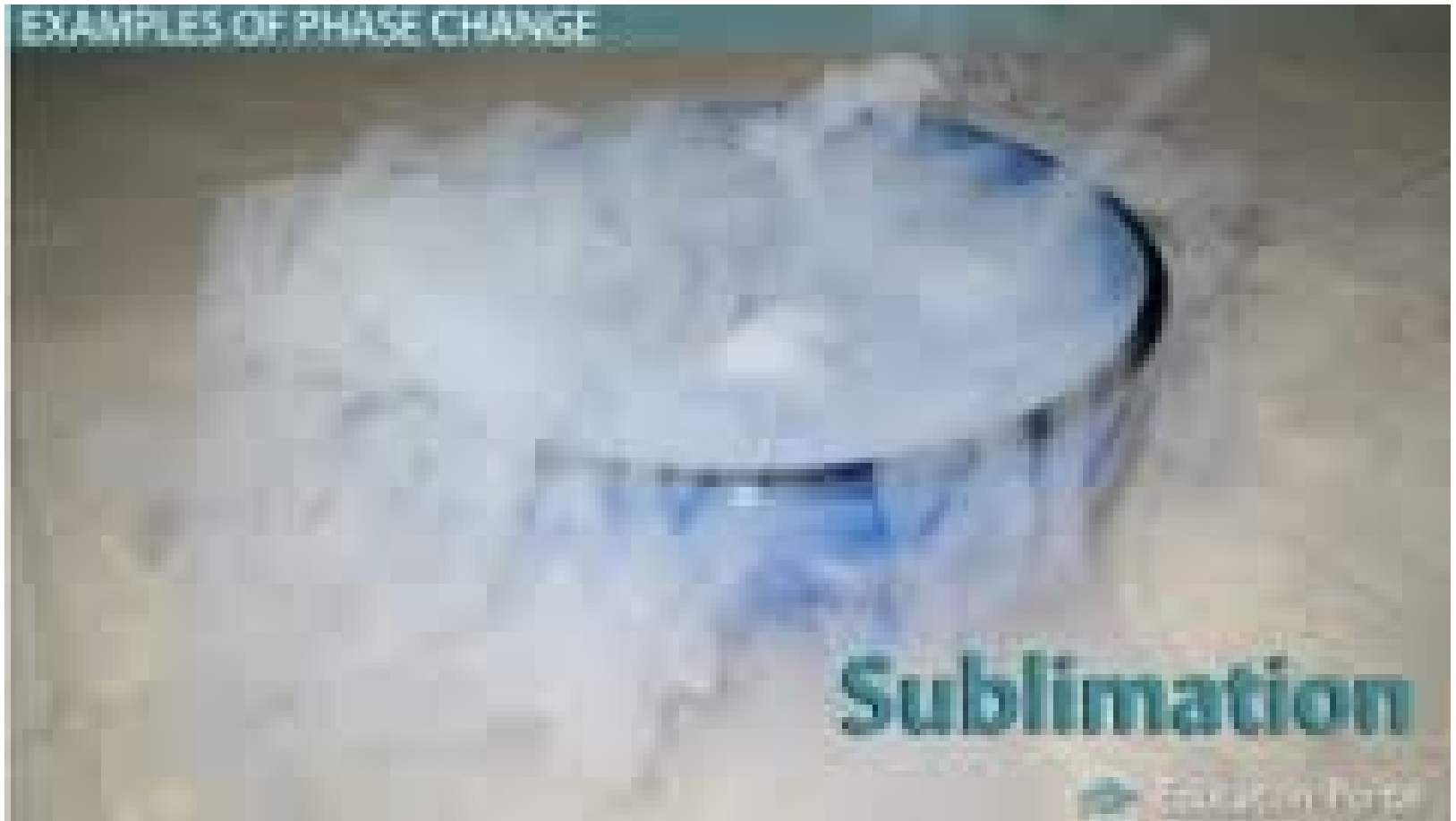
- **Heat of Vaporization**

540 cal./g (water)

*Energy required to change
from liquid to gas*

Phase Changes

SOLID - GAS:



Phase Changes

SOLID - GAS:

Sublimation (solid to gas)

Phase Changes

SOLID - GAS:

Sublimation (solid to gas)

-due to absorbing heat
energy

Gas Laws

Laws that describe the behavior of gasses under certain conditions

Gas Laws

BOYLE'S LAW:

Pressure and volume are inversely related (as one goes up, the other goes down)

Gas Laws

CHARLES' LAW:

Temperature and volume are directly related (as one goes up, the other goes up)

Gas Law Equations

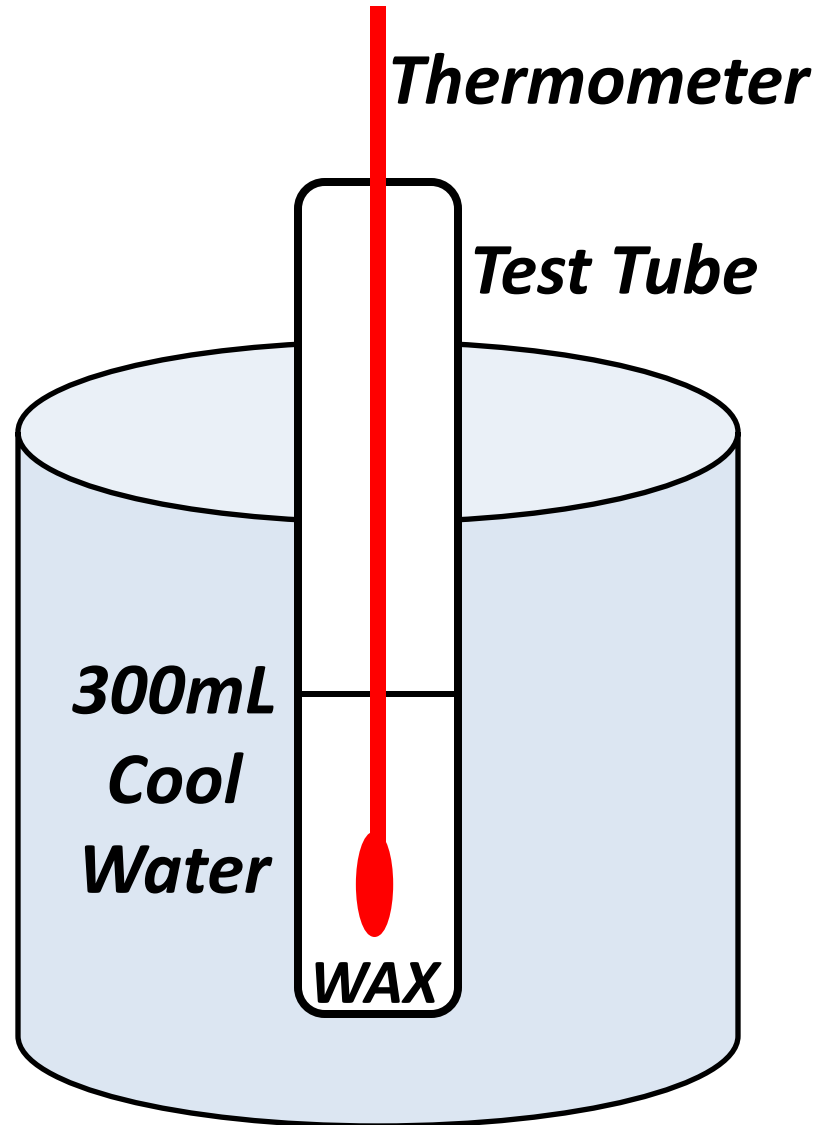
$$P \rightarrow \frac{1}{V}$$

$$T \rightarrow V$$

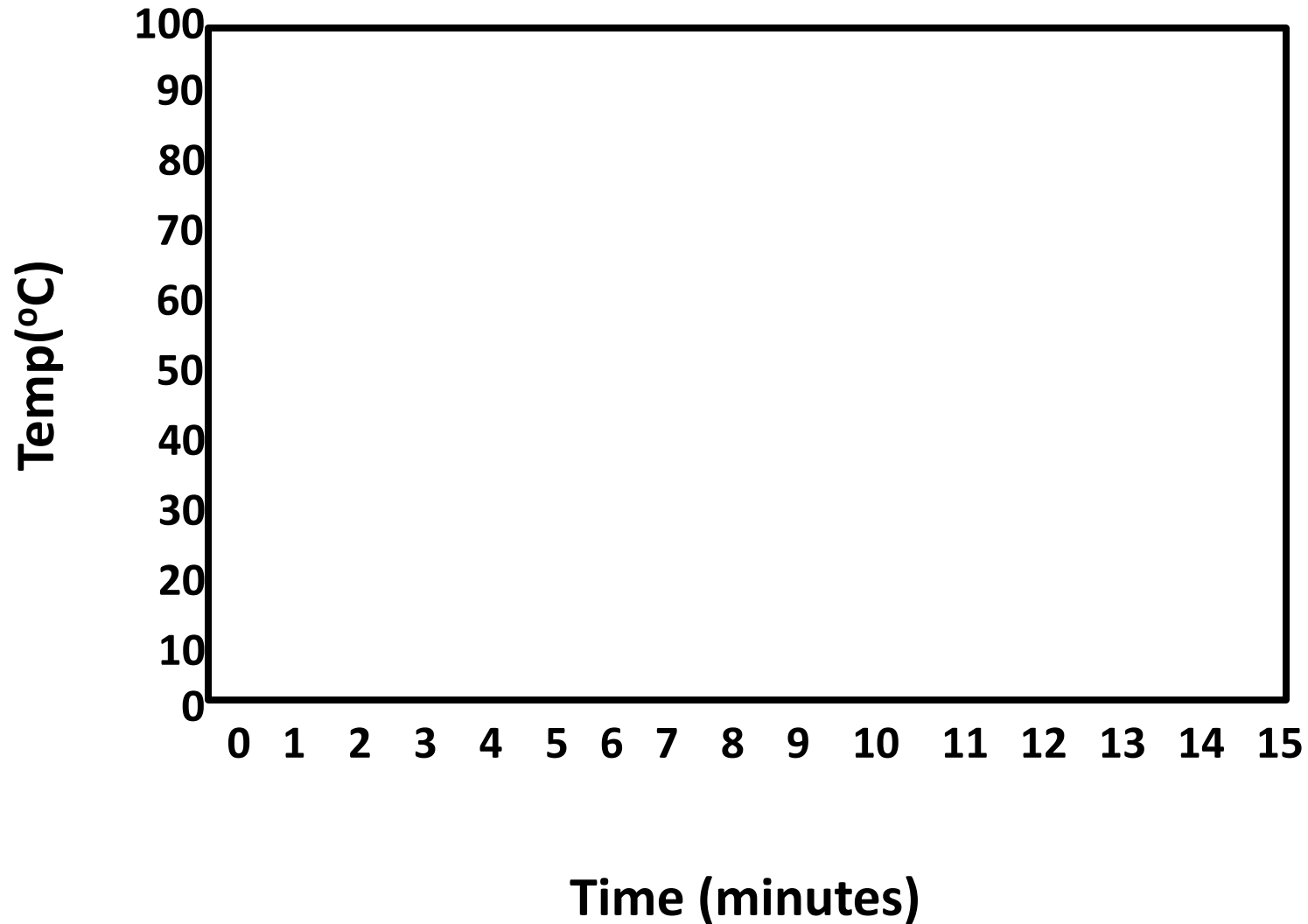
$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$PV = nRT$$

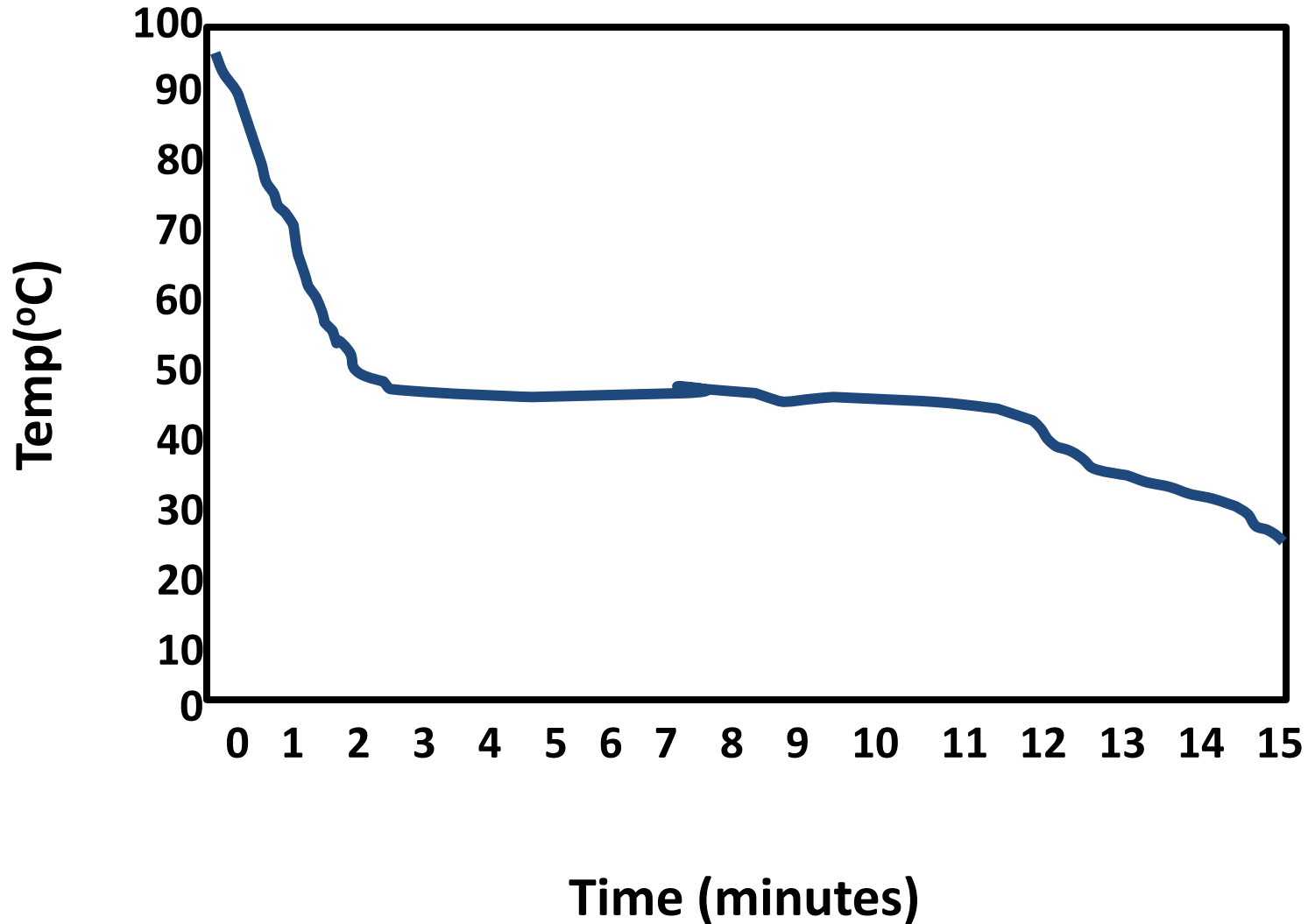
Phase Change Graph (Lab)



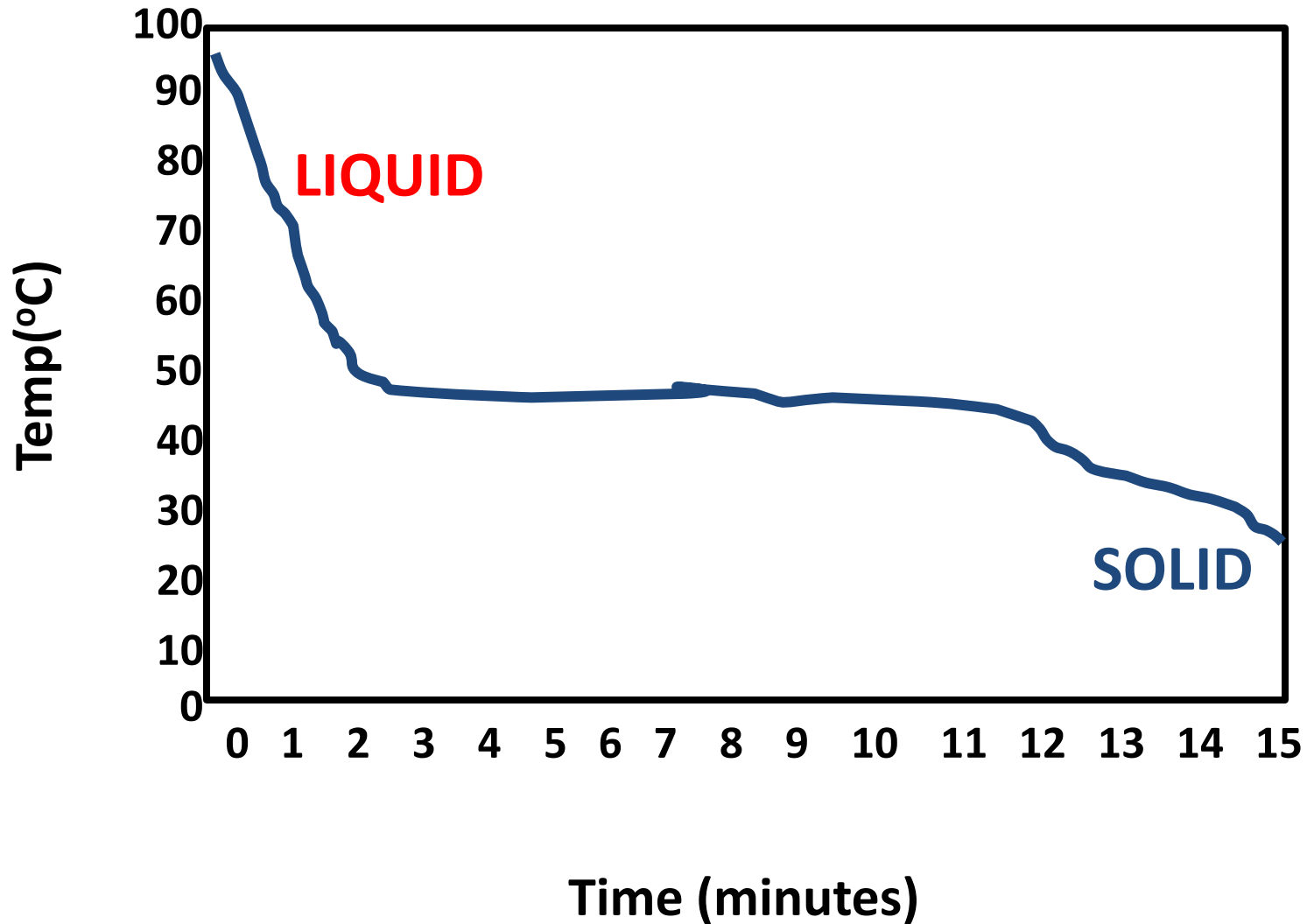
Phase Change Graph (Lab)



Phase Change Graph (Lab)



Phase Change Graph (Lab)



Phase Change Graph (Lab)

