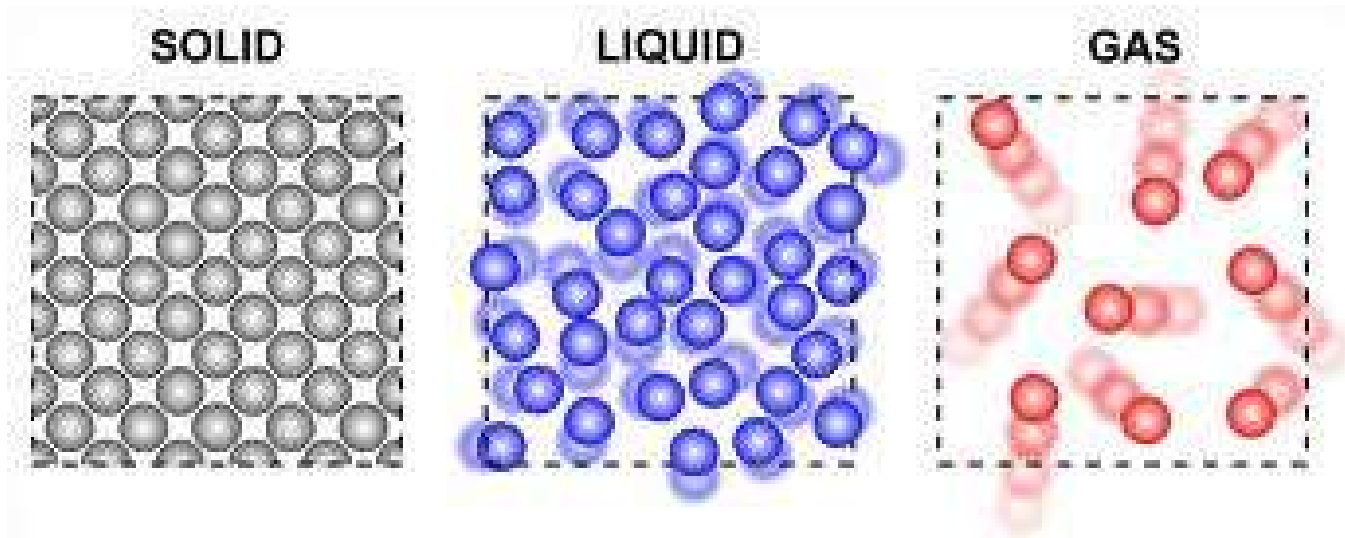


Phases of Matter

Mr. Skirbst

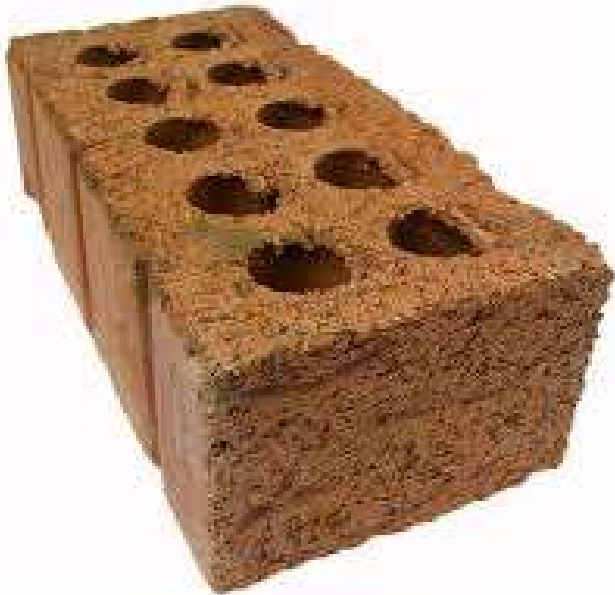
Phases of Matter

- determined by particle arrangement and speed



4 Phases of Matter

1. Solid



SOLID

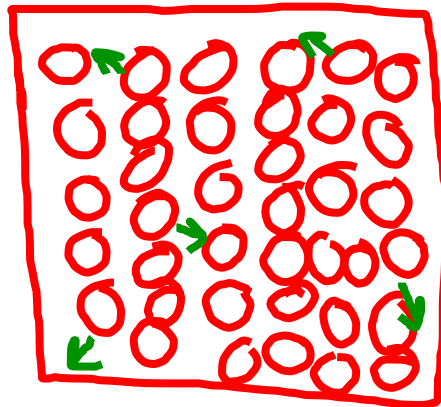


1. Solid

- have a definite shape and a definite volume

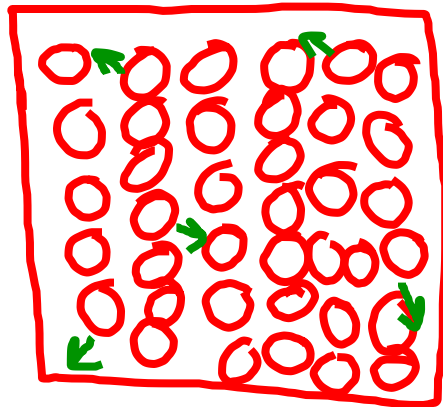
1. Solid

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



1. Solid

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



***(higher
density)***

2. Liquid

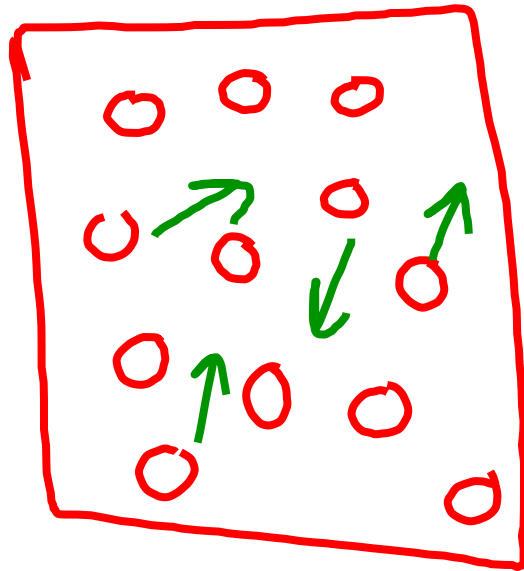


2. Liquid

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

2. Liquid

- (particles are free to move)



3. Gas

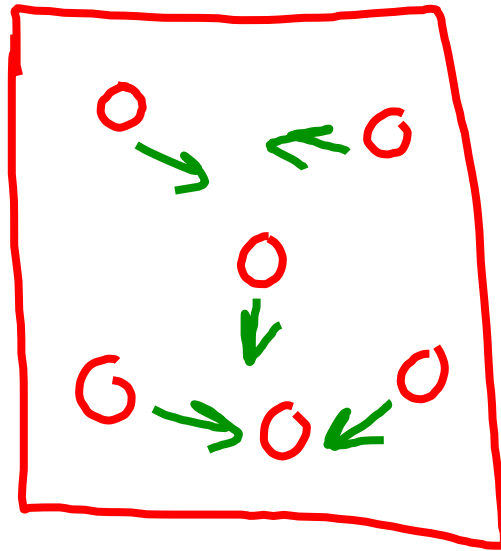


3. Gas

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

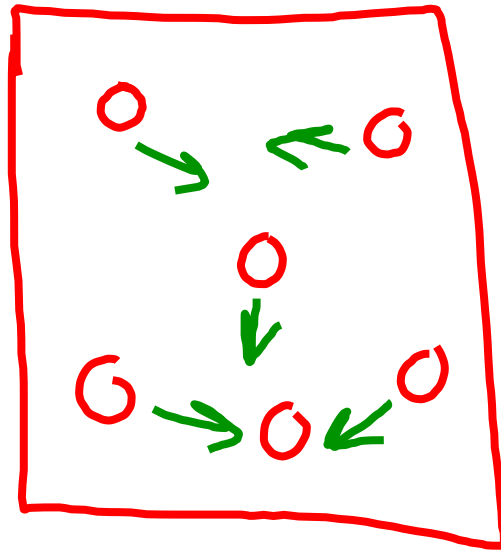
3. Gas

- (particles are in *constant* motion)



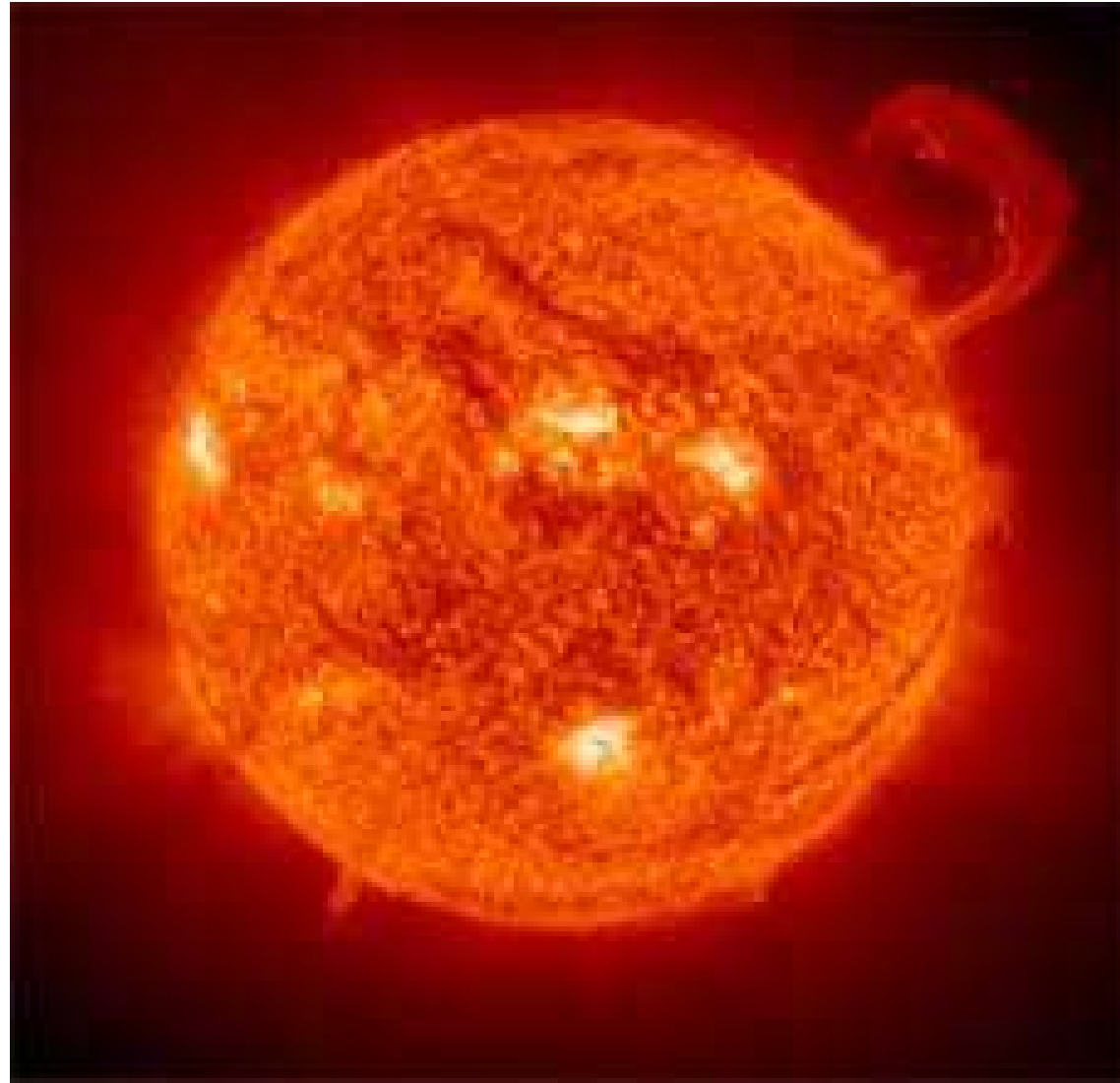
3. Gas

- (particles are in *constant* motion)



**(lower
density)**

4. Plasma



4. Plasma

- *VERY HIGH energy* (ex. Sun, lightning)

4. Plasma

- cannot be *contained* by ordinary means

5. Other Proposed Phases

5. Other Proposed Phases

- *super solid* (no friction)

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- super solid (no friction)

- *string-liquid* (strange atoms)

5. Other Proposed Phases

- super solid (no friction)
- string-liquid (strange atoms)
- *dark matter* (?????????)

Phase Changes

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

SOLID – LIQUID Changes:



SOLID – LIQUID Changes:

Melting (solid to liquid)

SOLID – LIQUID:

Melting (solid to liquid)

- due to an absorption of
heat energy

SOLID – LIQUID:

Freezing (liquid to solid)



SOLID – LIQUID:

Freezing (liquid to solid)

- due to a release of heat
energy

SOLID – LIQUID:

Heat of Fusion

80 cal./g (water)

*-Energy required to
change from solid to liquid*

LIQUID - GAS:



Heat of Vaporization

LIQUID - GAS:

Vaporization (liquid to gas)

LIQUID - GAS:

Vaporization (liquid to gas)

- due to an *absorption* of
heat energy

LIQUID - GAS:

Condensation (gas to liquid)



LIQUID - GAS:

Condensation (gas to liquid)

- due to a release of heat
energy

LIQUID - GAS:

Heat of Vaporization

540 cal./g (water)

*- Energy required to
change from liquid to gas*

SOLID - GAS:



SOLID - GAS:

Sublimation (solid to gas)

SOLID - GAS:

Sublimation (solid to gas)

-due to absorbing heat
energy

Gas Laws

Laws that describe the behavior of gasses under certain conditions

BOYLE'S LAW:

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

CHARLES' LAW:

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

Gas Law Equations

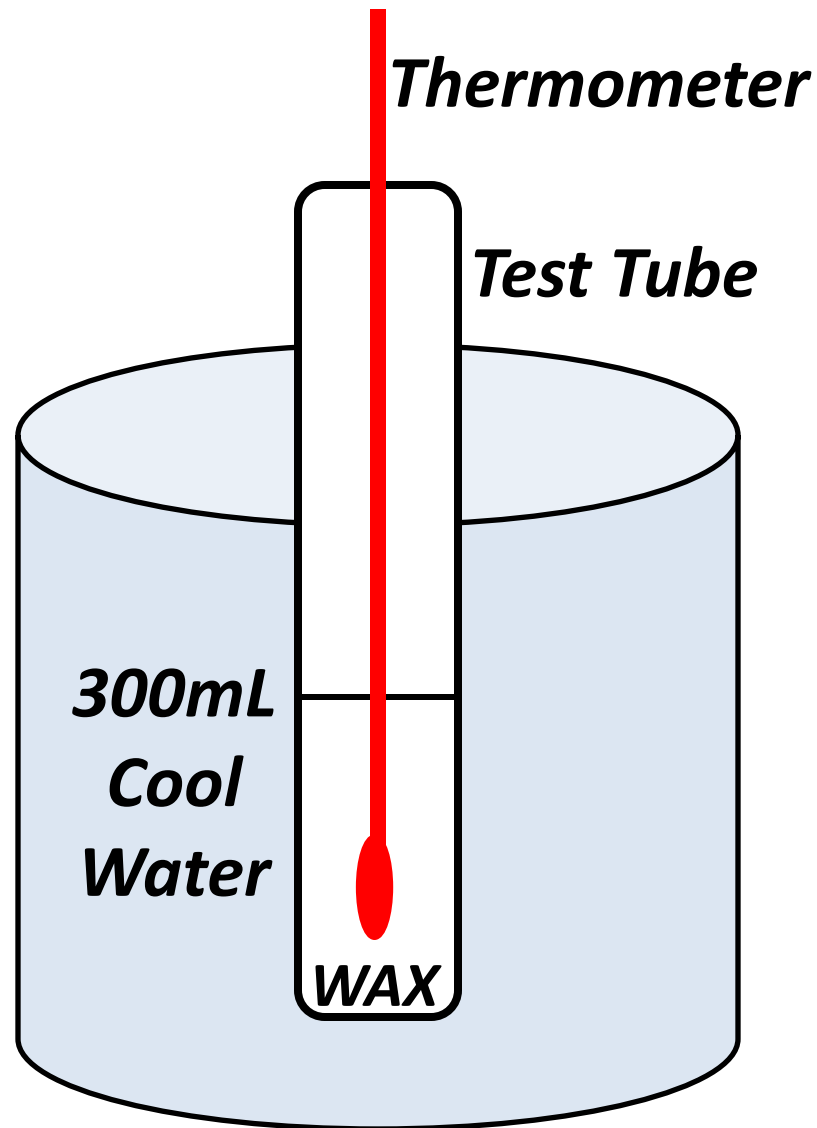
$$P \rightarrow \frac{1}{V}$$

$$T \rightarrow V$$

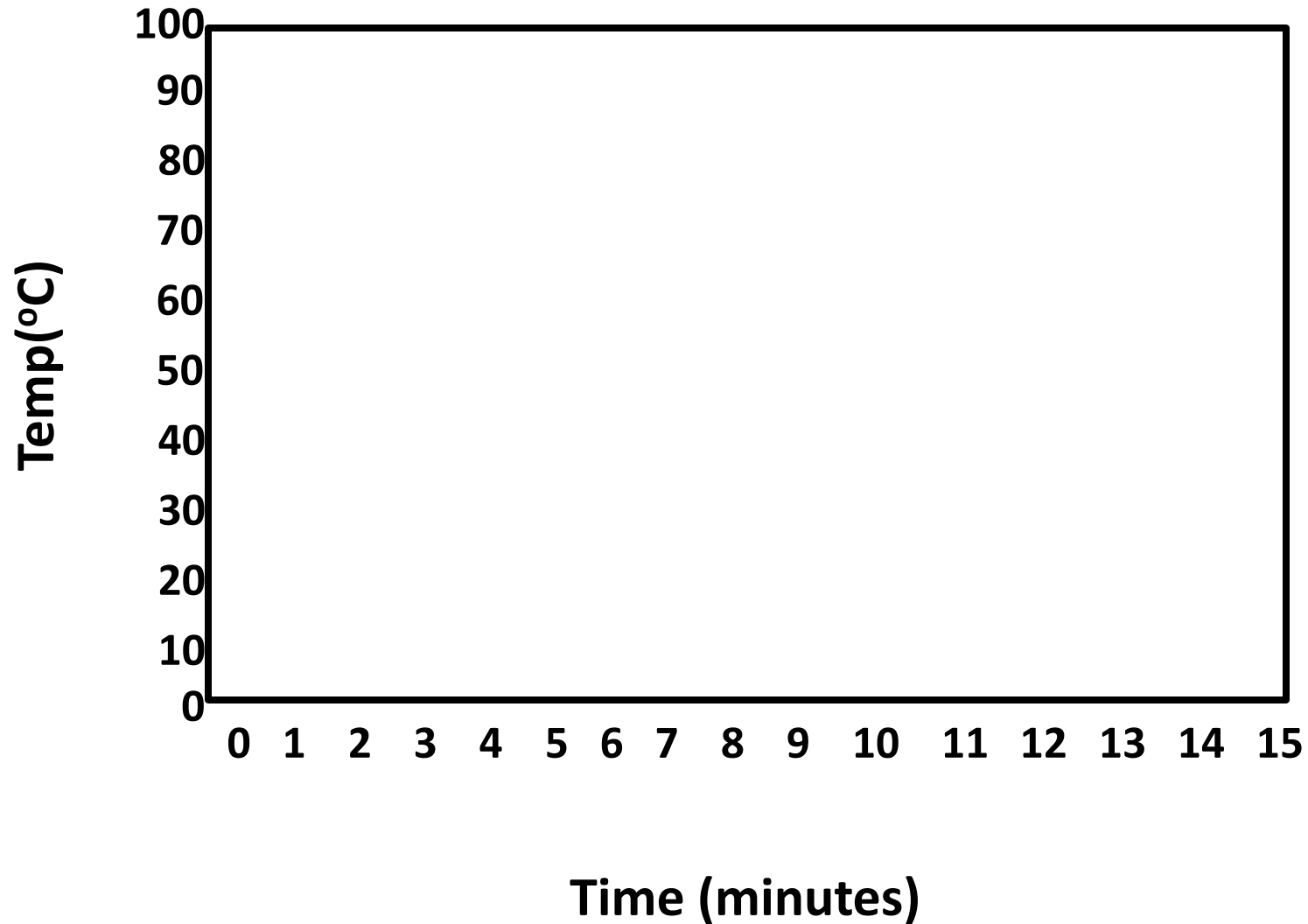
$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$PV = nRT$$

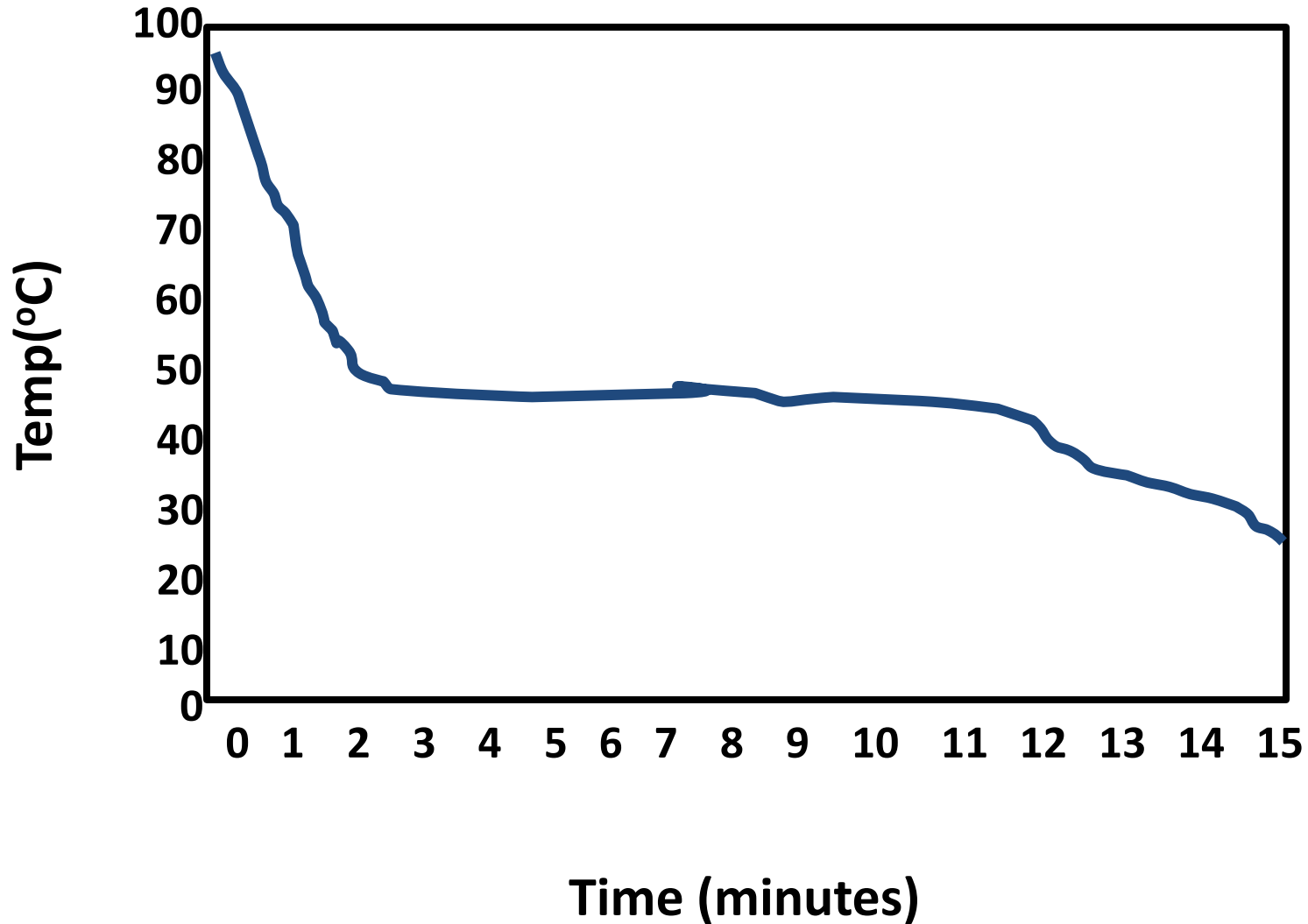
Phase Change Graph (Lab)



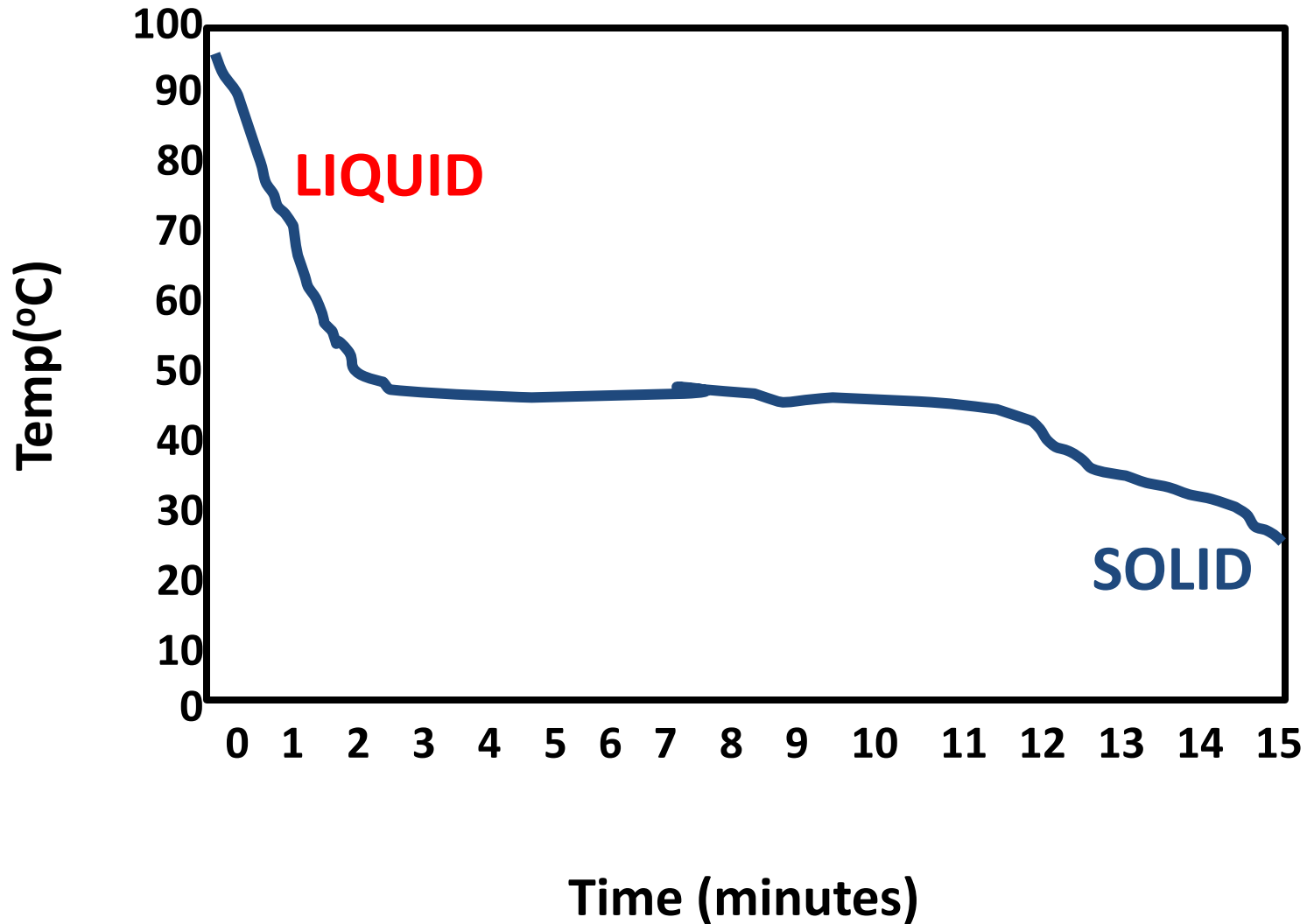
Phase Change Graph (Lab)



Phase Change Graph (Lab)



Phase Change Graph (Lab)



Phase Change Graph (Lab)

