

Name: \_\_\_\_\_

# Unit 4 - Topic 1

## Particle Behavior in States of Matter

Concept: Changes in matter affect its properties.

- Which 5.0 mL sample of  $\text{NH}_3$  will take the shape of and completely fill a closed 100.0 mL container?
  - $\text{NH}_3(\text{s})$
  - $\text{NH}_3(\text{l})$
  - $\text{NH}_3(\text{g})$
  - $\text{NH}_3(\text{aq})$
- Which of the following has the strongest forces of attraction?
  - $\text{CO}_2(\text{s})$
  - $\text{CO}_2(\text{l})$
  - $\text{CO}_2(\text{g})$
  - $\text{CO}_2(\text{aq})$
- A 25.0 mL sample of water is poured from a 50.0 mL graduated cylinder to a 100.0 mL graduated cylinder. The volume of the water will
  - increase
  - decrease
  - remain the same
- As temperature increases, particle motion (increases / decreases) and the strength of particle attractions (increases / decreases).
- When a solid (melts / boils) the particle attractions are diminished, but not entirely overcome.
- When a liquid evaporates or boils, the particle attractions have been completely (formed / overcome).
- Which grouping of the three phases of bromine is listed in order from left to right for increasing distance between bromine molecules?
  - gas, liquid, solid
  - liquid, solid, gas
  - solid, gas, liquid
  - solid, liquid, gas
- Which statement best describes the shape and volume of an aluminum cylinder at STP?
  - It has a definite shape and a definite volume.
  - It has a definite shape and no definite volume.
  - It has no definite shape and a definite volume.
  - It has no definite shape and no definite volume.

Not all substances have the same phase of matter at the same temperature. We use STP to talk about substances under "normal" conditions. At STP Oxygen is a gas, while Cu is a solid. (Give the values and units for STP below)

STP =

In what state of matter are the following:

Phosphorus \_\_\_\_\_

Chlorine \_\_\_\_\_

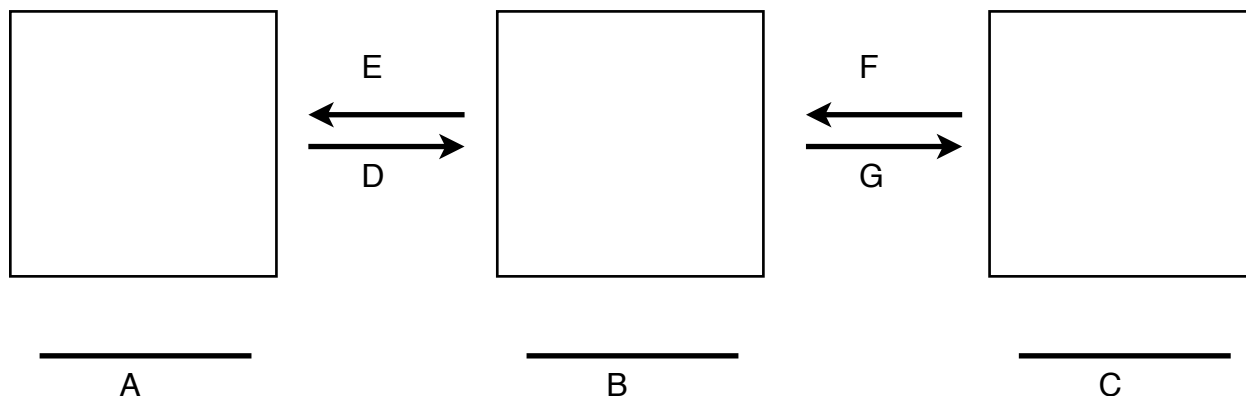
Bromine \_\_\_\_\_

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Phase	Type of Particle Motion (Vibrating, rotating, sliding)	Regular Geometric Arrangement of Particles (fixed or not fixed position)	Strength of Particle Attractions (weak, strong, nonexistent)
Solid (s)			
Liquid (l)			
Gas (g)			

Almost all substances can be made to change between the 3 phases simply by altering the **TEMPERATURE**.

Draw particle diagrams, labeling ALL LETTERS, using the space provided below:



### Heat vs. Temperature

REMEMBER!! **Heat** is the energy transferred between object while **Temperature** is a measure of the average *kinetic energy*.

**A change of 1 Kelvin = A change of 1 degree Celsius**  
*Look on Table T for the Celsius/Kelvin conversion equation.*

Practice the following conversions (Kelvin does NOT have the degree (°) symbol!)

- a. 273 K = 0°C
- b. 623 K = \_\_\_\_\_
- c. 373 K = \_\_\_\_\_
- d. 273°C = \_\_\_\_\_
- e. 80°C = \_\_\_\_\_
- f. 15°C = \_\_\_\_\_
- g. 0°C = 273 K