

Unit 1B: Extra Practice Sheet

States of Matter:

When you change from ____ to ____, what is happening:	Gas to Liquid	Solid to Liquid	Solid to Gas
To the energy of the particles:	↓	↑	↑
To the speed the particles are moving:	slow ↓	speed ↑	speed ↑
To the spacing between the particles:	closer together	spread out	spread out
To the temperature of the whole substance:	drops	increase	increase
And what do we call that phase change from ____ to ____:	condense	melt	sublimation
Real life example of this phase change:	Dew on grass	Ice cube melt	Dry ice

List the 3 steps of the Kinetic Theory of Matter / Atomic Theory:

1. All matter made up of tiny particles (atoms)
2. Tiny particles are in constant random motion
3. Moving particles collide w/ each other + sides of container

Matter:

Material	Pure Substance or Mixture	Element, Compound, Homogeneous, Heterogeneous	Separated Chemically or Physically?
The AIR you breathe	Mix	Homogen	Phys
Pure Helium Gas (He)	PS	Elem	Chem
Sugar (C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> )	PS	Comp	Chem
Chex Mix	Mix	Heterogen	Phy
Carbon Dioxide (CO <sub>2</sub> )	PS	Comp	Chem

Chemical vs Physical Changes and Properties

In the table below, write YES in the box that matches with the corresponding scenario. The first 2 are done as an example:

	Physical Property	Physical Change	Chemical Property	Chemical Change
Ice Melting		YES		
Bonds are broken, molecules are rearranged, new bonds form				YES
Color / Texture / Shape	X			
Frying an Egg				X
Reactivity with Water or Acid			X	
Gasoline burning				X
Chewing Food		X		
Malleability / Ductility	X			
Car Rusting				X
Flammability			X	
Alka Seltzer put in water gives off a gas				X
Butter Melting		X		
When you mix an acid and a base, a solid salt will appear as a product				X
Chopping a board in half at karate class		X		



**Density:**

- What are the two different units for density?  $g/cm^3 + g/mL$
- I mix two different liquids together into a beaker, and observe. One liquid floats to the top, so that it is "sitting" on top of the other. What can you tell me about the densities of these two liquids?  
*The one on top is less dense*
- Using the table to the right, if we were to place all 6 of these substances into a graduated cylinder to form a "density column", which substance would end up on top? Which would be on the bottom? Place all 6 of these substance in order from top to bottom of your imaginary graduated cylinder, based on the densities listed in the table.

TOP

- Yes Oil
- Corn Oil
- Water
- Glycerine
- Corn Syrup
- Mercury

BOTTOM

Substance	Density (g/ml)
Corn Syrup	1.38
Vegetable Oil	.85
Mercury	13.6
Corn Oil	.925
Glycerine	1.26
Water	1.0

- Mercury has a density of 13.6 g/ml. Assuming that I have 3.8ml of it inside of an old school thermometer, what is the mass of that sample of mercury?

$$D = 13.6 \text{ g/ml}$$

$$V = 3.8 \text{ mL}$$

$$M = ?$$

$$D = \frac{M}{V}$$

$$13.6 \text{ g/ml} = \frac{M}{3.8 \text{ mL}}$$

$$M = 51.68 \text{ g}$$

- A brick that has a height of 0.1m, a width of 0.25m, and a depth of 0.2m. It also has a mass of 575 grams. What is the density of this block?

$$D = \frac{M}{V}$$

$$D = \frac{575 \text{ g}}{5000 \text{ cm}^3}$$

$$D = 0.115 \text{ g/cm}^3$$

- A rock with a mass of 875 grams is dropped into a tank of water that has 500ml of water in it. When the rock enters the water, the water level rises to 670ml. What is the density of that rock?

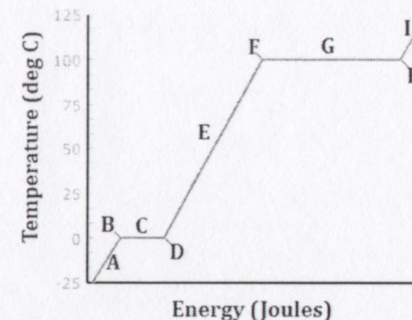
$$D = \frac{M}{V}$$

$$D = \frac{875 \text{ g}}{170 \text{ mL}}$$

$$D = 5.15 \text{ g/mL}$$

**HONORS ONLY for the rest of the study guide:**

Phase Graph: Answer the following questions on the phase graph to the right: (Note: B, D, F, and H are all the corners of the graph. A, C, E, G, and I are all the straight lines)



- Where is the substance ONLY a solid? **A**
- Where is the substance ONLY a liquid? **E**
- Where is the substance ONLY a gas? **I**
- Where is the substance in transition between solid and liquid? **Btw B + D**
- Where is the substance in transition between liquid and gas? **Btw F + H**
- List every place on the graph where the substance is, either partially or completely, a liquid? **B, C, D, E, F, G, H**
- Could this be the phase graph for water (H<sub>2</sub>O)? Give evidence of your reasoning.  
**Yes Melting = 0°C, Evap = 100°C**

**Gas Laws:**

- Helium gas in a balloon at 293 K occupies a volume of 1.2 L. What will be the volume of the balloon if the temperature of the balloon drops from 293 K to 275 K?

Law being used: **Charles**

Quick Guess: Is volume going to increase or decrease? **Decrease**

	FORMULA	WORK	ANSWER
Given 1:	$293 \text{ K} = T_1$	$\frac{V_1}{T_1} = \frac{V_2}{T_2}$	$\frac{1.2 \text{ L}}{293 \text{ K}} = \frac{V_2}{275 \text{ K}}$ $V_2 = 1.13 \text{ L}$
Given 2:	$1.2 \text{ L} = V_1$		
Given 3:	$275 \text{ K} = T_2$		

- A sample of oxygen gas at 1.78 atm occupies 1.3 L. What will be its volume if the pressure drops to 0.68 atm?

Law being used: **Boyles**

Quick Guess: Is volume going to increase or decrease? **Increase**

	FORMULA	WORK	ANSWER
Given 1:	$1.78 \text{ atm} = P_1$	$\frac{P_1 V_1}{n} = \frac{P_2 V_2}{n}$	$1.78 \text{ atm} \times 1.3 \text{ L} = 0.68 \text{ atm} \times V_2$ $3.40 \text{ L} = V_2$
Given 2:	$1.3 \text{ L} = V_1$		
Given 3:	$0.68 \text{ atm} = P_2$		