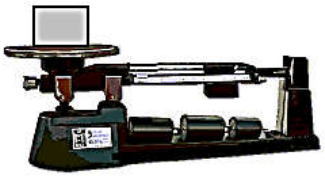
Chemistry
Ms. Ye

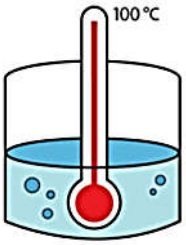
Name _____
Date _____Block_____

MODEL 1: Measuring **Physical Properties**

- Measuring **Mass**:

Before the property is measured	Measuring the property	After the property is measured
 block of aluminum		 block of aluminum $m = 307$ g

- Measuring **Boiling Point**:

Before the property is measured	Measuring the property	After the property is measured
 Water		 Water Boiling point=100°C

Questions:

1. According to the models above, which property (or properties) is a physical property?

2. In the example of measuring mass,
   a. what substance do you start out with before the mass is measured?
   b. what substance do you end up with after the mass is measured?

3. In the example of measuring boiling point,
   a. what substance do you start out with before the boiling point is measured?
   b. what substance do you end up with after the boiling point is measured?

4. For questions 3 and 4, did you end up with the same substance or a different substance from what you started with after you measured the mass or boiling point?

MODEL 2: Measuring **Chemical Properties**

- Measuring **flammability**:

Before the property is measured	Measuring the property	After the property is measured
 Wood		 Ash

5. According to the model above, which property (or properties) is a chemical property?

6. In the example of measuring flammability,
   a. what substance do you start out with before the flammability tested?
   b. what substance do you end up with after flammability is tested?
   c. Did you end up with the same substance or a different substance from what you started with after you tested flammability?

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Based on model 1 and your answer to the questions above, come up with a definition for physical properties & list some examples that were not included in this activity.

*Physical Property= ____

Ex: ____

Based on model 2 and your answer to the questions above, come up with a definition for chemical properties & list some examples that were not included in this activity.

*Chemical Property= ____

Ex: ____

Practice*: identify the following as either physical properties (P) or chemical properties (C)*

1. ____blue color
2. ____density
3. ____solubility
4. ____hardness
5. ____volume
6. ____melting point
7. ____reacts with water to form a gas
8. ____reacts with acid
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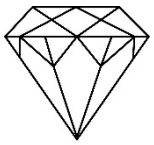
In addition to chemical and physical properties, they can also be classified as an extensive or intensive property.

Model 3:
The table below shows the physical properties of two pieces of diamonds

Substance	Amount	Mass	Density	Hardness	Melting point	Volume
	3.5 moles	42.04 g	3.5 g/mL	10	4600K (@ 10.8 kPa)	12.01 mL
	7.0 moles	84.08 g	3.5 g/mL	10	4600K (@ 10.8 kPa)	24.02 mL

Questions:

1. List the properties that stayed the <u>same</u> even though there were different amounts of the substance.

2. List the properties that <u>changed</u> with the different amounts of the substance.

Read the definitions below and then sort the properties (Mass, density, hardness, melting point, and volume) under either intensive or extensive property

Intensive Property – properties that DO NOT depend on the amount of substance present
Extensive Property – properties that DO depend on the amount of substance present

Intensive Properties	Extensive Properties

Application and Conclusion

1. What is the difference between a physical and a chemical property?

2. What is the difference between an intensive and an extensive property?

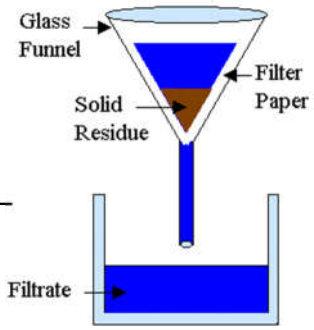
3. Identify the following properties as either chemical or physical. In addition, identify it as intensive or extensive.

Behavior or trait/characteristic	**Chemical or Physical**	**Intensive or Extensive**
Boiling point		
Density		
Color		
Flammability		
Texture		
Malleability		
Melting point		
Combustibility		
Volume		
Blue appearance		

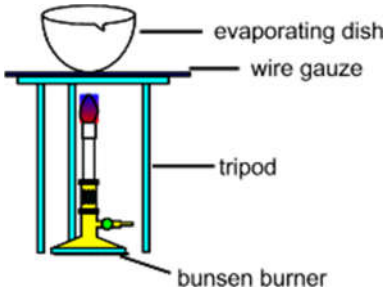
Separation Techniques

Recall, a **mixture** is a combination of _____ that you can _____ into their individual parts _____ what they are. Mixtures can be separated based on their _____ **properties**

1. **Filtration**
   - separation based on different_____ or _____
     allows you to separate a _____
     by catching the _____ on the _____

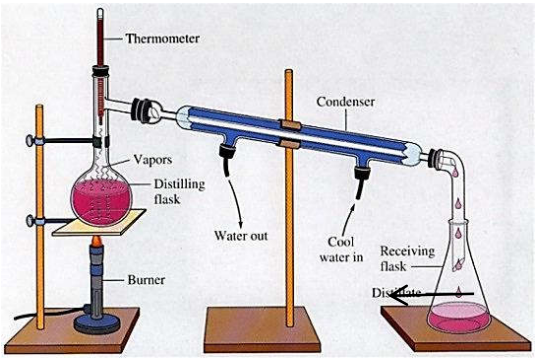


2. **Evaporation**
   - takes advantage of differences in _____
   - can be used to separate _____ mixtures
   - Downside: liquid components of mixture are lost to air through evaporation



3. **Distillation**
   - takes advantage of differences in _____
   - can be used to separate _____ mixtures
   - Superior method to evaporation because all components can be isolated and retained.

Mixture of 2 liquids is placed in a flask over a heat source. The liquid with the _____ boiling point stays in this flask →



The liquid with the _____ boiling point collects in this flask

4. Centrifuge

- Separates a mixture based on differences in _____
- Amount of separation depends on speed of centrifuge
- Must be followed by filtration or decanting
- Separates _____ only!

Figure 4: Isopycnic separation with a self-generating gradient

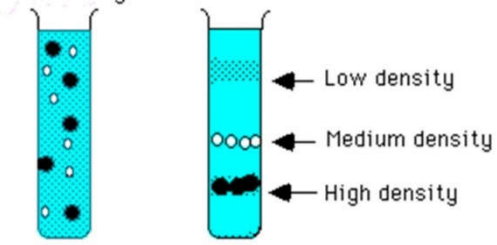
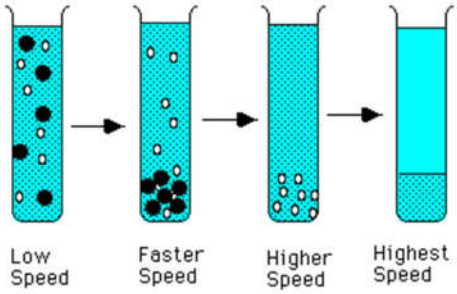
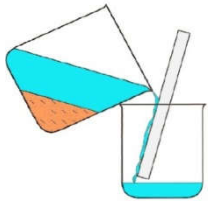


Figure 2: Differential Centrifugation.



5. Decanting



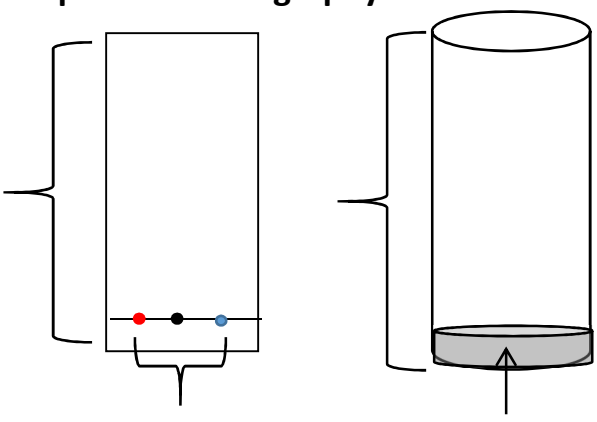
- Takes advantage of differences in_____ and/or _____
- A crude separation technique for _____ mixtures.

6. <u>Chromatography</u>=a technique that allows you to separate a _____ based on _____ and/or _____

***polarity=**_____

3 Types of Chromatography:

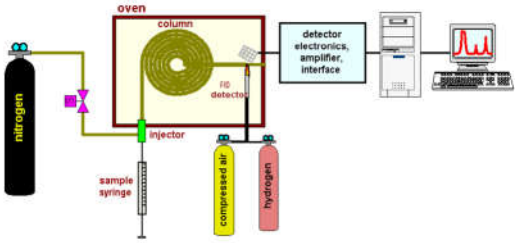
i. Paper Chromatography

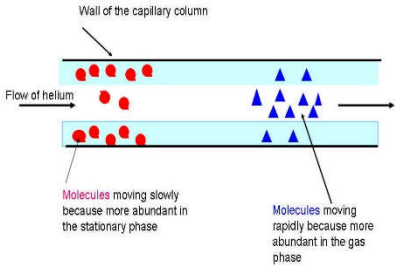


How the components separate depend on how attracted the individual components are to the _____ versus the _____

ii. Gas Chromatography

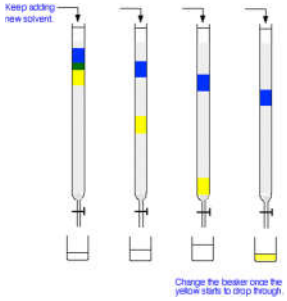
- Relies on the fact that different compounds dissolve to different extents in a particular liquid
- Also can be used to separate based on _____





iii. Column Chromatography

- Separates the components of a mixture based on the differences in _____
  - The _____ molecules exit the column first
  - The _____ molecules exit the column last
- Separation can also be based on <u>polarity (attraction)</u> to the material in the column



7. Others include **sifting, magnetism, etc.**

Separation Techniques Practice

Mixture	**Type of Mixture**	**Differing Physical Properties**	**Possible Separation Techniques**
Ex: Sugar dissolved in water	Homogeneous	*boiling point	*evaporation *distillation
Coffee grounds and water			
Crude Oil (mixture of different hydrocarbons)	Homogeneous	*boiling point	
Water + Barium Sulfate (Barium Sulfate is insoluble in water)			
Mixture of pigments found in a plant leaf: (chlorophyll a/b, xanthophylls, carotene)	Homogeneous	*size *polarity	
Milk (skim milk--plasma phase—and cream)		*density	
Oil and water			

Separation Challenge: Preparation Sheet **Name**_____
Chemistry

- The following table contains some physical properties regarding iron, salt, and sand.

Material	State	Magnetic	Water Soluble
Iron	Solid	Yes	No
Salt	Solid	No	Yes
Sand	Solid	No	No

- Write a procedure for how you would separate a mixture of sand, salt, and iron into 3 separate containers.
- **Indicate what materials you need!**
- You will carry out this procedure next class period