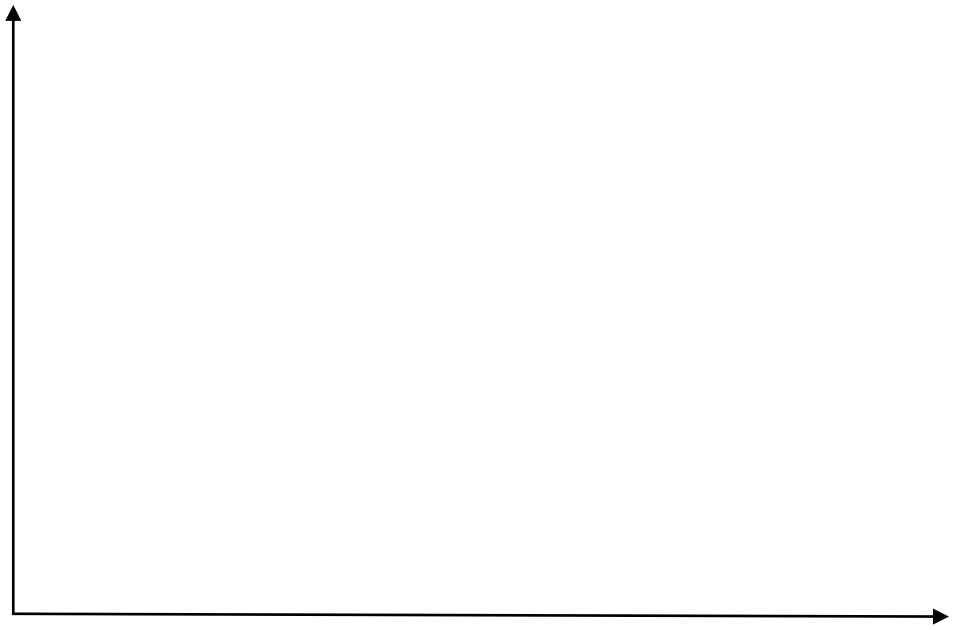
Distillation of Cherry Coke

Name: _____ Period: _____

Soda is a solution. All of the components of the mixture are evenly distributed because the particles are attracted to one another and they space themselves accordingly. Some of the components are solids, some are liquids and some are gases (at room temperature). Each component has a unique boiling point. We will separate these components using a separation technique called ***fractional distillation***. Each component will boil away at a different temperature. We refer to each of the components that boil away as "fractions". The word distill refers to a process of purification by boiling. As our solution is heated we will collect any liquid that turns to a gas using a distillation apparatus. When a liquid boils its temperature remains constant. When a plateau temperature occurs you know that one of your component liquids is boiling. As soon as the temperature "breaks" you know that the plateau is done and the liquid is now transitioning to the next boiling temperature. At this point you can move your distillation delivery tube to a new test tube so that you can collect the next liquid to boil away. Take a minute now and predict the shape of the heating curve you expect to get when the mixture is heated continuously for thirty minutes. Use the chart below to help you. First, number the fractions in the order they will boil away. Note that carbon dioxide is ALREADY a gas at room temperature so you don't need to include it on your heating curve. We will collect the gas separately at a later time.

Component	Boiling point	Fraction
Water	100 °C	
Flavoring (ester)	90 – 95 °C Depending on exact flavor	
High Fructose Corn Syrup	105 ° C	



Answer these questions before you begin the actual lab:

1. What type of mixture is Cherry Coke (homogeneous or heterogeneous)? How do you know (Hint: I gave it away in the intro.)

   _____

2. Is boiling point a characteristic property? Why or why not?

   _____

   _____

3. After all your fractions have been separated could you remix them and get back the original soda? Explain why or why not. Hint: Is this process causing a chemical or physical change?

   _____

   _____

   _____

   _____

   Draw and label the set up:

Read the procedures below. In the boxes to the right answer the related questions.

1. Set up the distillation apparatus as shown. **<u>Keep the test tube one inch above your alcohol burner</u>**.	1. Explain why you need a cold water bath around the collection test tubes. 2. Why are we putting an inch of distance between our burner and our test tube?
3. Make sure your thermometer is NOT touching anything but air when it is in place inside your test tube.	3. Why is this important?
4. Add 10 mL of soda to your test tube and then add 5-6 boiling chips. Begin heating your soda with an alcohol burner. Record the temperature every fifteen seconds in the data table. Use your iPad timer.	4. What are the boiling chips used for?
5. Carefully move your black collection tube to a new test tube when your first plateau breaks. You should see a temperature rise of at least 2 degrees before you assume your plateau has "broken". Do this for each fraction. You should have three fractions.	5. Why do we change test tubes after our plateau "breaks"?
6. If your thermometer rises to 105 degrees you should stop heating. FIRST remove the delivery tube from any and all liquids (hang it over the back of your pegboard and let it drip). THEN blow out your alcohol burner.	6. Why do you need to do these steps in this order?
7. While your fractions cool off you can prepare to make density measurements of your liquids. Get a balance and zero it. Then get a 10 mL graduated cylinder. Make sure it is clean and dry inside and out. Find the mass of the cylinder and record this in the data table labeled "fraction one data".	7. Why is it important to find the mass of the cylinder before you add any of your fraction?
8. When fraction one is cool to the touch you can pour some of it into your graduated cylinder. Use a funnel if necessary. If any spills you will have to start over. The amount you pour into your cylinder doesn't matter as long as you don't exceed the graduated cylinder's measuring capacity. Fill in the mass, volume and density data in the fraction one data table. Repeat step 7 for fractions two and three	8. Why doesn't the volume of fraction one need to be an exact number?
9. Record scent data and observe the color of the fractions.	9. Are odor and color characteristic properties?

Data:

Fraction	Boiling plateau °C	Density g/mL	Odor	Color	Likely identity of this fraction:
1					
2					
3					