Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Root Beer

**Purpose**

The purpose of this exercise is to produce a root beer by controlling the fermentation of sugar.[[1]](#endnote-1)

**Procedure:**

**Materials**

1. 500 ml bottle of spring water 5. Sugar
2. 1 weigh boat (coffee filter) 6. Plastic Spoon
3. Drinking cup, marked with two lines 7. Baker’s yeast

Measure: 8. Raisin

30 ml mark = \_\_\_\_\_\_\_\_\_\_\_\_cm

3-4 ml mark = \_\_\_\_\_\_\_\_\_\_\_\_cm

4. Root beer extract

**Sequence of Steps**

1. Read history and background information.
2. Obtain a 500 ml bottle and label it with your name.
3. Weigh 75 grams of sugar in your weigh boat.
4. Discard 75 ml of water from the plastic bottle.
5. Obtain 3-4 ml of root beer extract and pour into the 500 ml bottle. Swirl gently until mixed.
6. Rinse cup with tap water.
7. Measure 30 ml of lukewarm water (97-112 F) into your cup from equipment station.
8. Transfer a ½ tsp of sugar from your weigh boat to the 30 ml of warm water.
9. Using a funnel, pour the remaining portion of your sugar into your bottle.
10. Weigh .07g of yeast into your weigh boat and pour into the 30ml mixture in your cup. Stir gently until mixed and let set for 5 minutes. This will activate (bring alive) the yeast.
11. Swirl gently the sugar extract and water mix in your bottle until sugar is completely mixed.
12. After 5 minutes, pour yeast solution into your bottle.
13. Use cup to obtain warm water as needed and fill bottle until there is a 5cm space left at the top of the bottle.
14. Optional step: If you would like more “fizz” in your root beer, place 1 raisin in your bottle.
15. Be sure to twist cap on your bottle securely.
16. Place bottle in dark space, undisturbed for 2 days.
17. After day two, refrigerate for 1-2 days before testing.
18. C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmfWhen pouring the root beer, tilt bottle slowly so as not to disturb the yeast that has settled on the bottom.
19. Clean up your work area and complete questions.

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**History**

Root beer was made by our forefathers by soaking Sassafras (a type of tree root) in water, and adding sugar and yeast (yeast for carbonation). In the early 1900’s however, scientists discovered that safrole, a chemical found in Sassafras root, was a carcinogen. Now, a mixture of other herbs and spices makes up “root beer extract” which is what we now use to make homemade root beer.

**Background Information**

There are 2 types of respiration, which is the breakdown of sugar to form ATP: Aerobic & Anaerobic

Yeast cells, which are a type of fungus, obtain energy from glucose (sugar) by a specific anaerobic process called fermentation.

There are two types of fermentation: Lactic Acid & Alcoholic Fermentation.

Alcoholic fermentation is involved in the making of food products such as bread, cheese, soy sauce, tofu, vinegar, wine, and yogurt. In order to make these foods, bacteria or fungi break down complex sugars into simpler substances like carbon dioxide and alcohol. Alcoholic fermentation begins after glucose diffuses into the yeast cell. The glucose is broken down into two, three carbon molecules called pyruvic acid. The pyruvic acid is then converted to CO2, ethanol, and energy for the yeast cell.

It is the carbon dioxide produced through fermentation by the thriving yeast cells that give root beer its “fizz”. This fizz is produced in store bought root beer by a carbonation machine that forces carbon dioxide into the root beer mixture, without the aid of yeast. When you make root beer, you are creating a very friendly environment for yeast to grow and multiply – by adding sugar (food) and cutting off the oxygen supply. Yeast, like many microbes, is anaerobic. This means they grow best without oxygen.

**Observations**

1. Describe the appearance of the root beer during the bottling process.

2. Describe the appearance of the root beer after fermentation. How is it different from what you saw during the bottling process in question #1?

3. Why were the yeast cells necessary in this experiment?

4. Why was the sugar necessary in this experiment?

5. Explain how the root beer came to be carbonated.

6. Explain how commercial (store bought) root beer is carbonated.

7. What is safrole? Why do we not use it anymore?

8. List the needed ingredients to make root beer.

9. Why did we put the yeast in the warm water for 5 minutes?

10. What is fermentation?

1. Goehring, JessaLee (2008). Root Beer, Lab. *Lodi High School Agriculture Department*. [↑](#endnote-ref-1)