NAME _____ PREF ____ SECTION SC_____ DATE _____

EXPERIMENT 39: FERMENTATION OF GLUCOSE

Equipment: 2- 250mL distilling flask, 1 hole rubber stopper, thermometer, one 50mL graduated cylinder, crucible cover, 3 6oz bottles
Materials: 5-10g molasses, yeast, 10-20mL lime water, 10-15g $CaO_{(s)}$, splints.

In this experiment, you will learn how ethyl alcohol, C_2H_5OH is made.

A. Make a solution of 30 mL. of molasses and 150 mL. of warm water at 35° to 40° in a wide mouth 6 ounce bottle.

B. Make a thin paste of 1/4 of a yeast cake (or 1/2 pkg baker's yeast) with 10 mL. of lukewarm water. Add this to the solution of the molasses.

C. Connect this bottle with two other bottles arranged to have the gas formed to pass first through the limewater and then through tap water. Allow to stand for 4 or 5 days.

1. What change do you notice in the limewater (saturated $Ca(OH)_2$)? _____

_____

2. What must be one of the products of the fermentation of the glucose in the molasses?

_____

D. Pour the fermented mixture into a 250 mL distilling flask, close the flask with a one hole rubber stopper. Introduce a thermometer through the stopper and distill the fermented mixture.

3. At what temperature does the liquid begin to boil? _____

4. Complete the equation: $Ca(OH)_2$ + _____ → $CaCO_3 + H_2O$

E. Distill the mixture into a graduated cylinder until 25 mL of distillate have been collected.

5. Describe the odor distillate. _____

F. Pour 1 mL. of distillate into a crucible cover and apply a lighted splint to the liquid.

6. Describe what happens. _____

G. Pour the remaining distillate into a clean, dry distilling flask, and add fresh CaO until the liquid is completely absorbed. Carefully re-distill and collect a few milliliters of distillate. Repeat Part F.

7. Describe what happens. _____

_____

_____

SUMMARY QUESTIONS

8. What type of bonding is used to explain the fact that ethyl alcohol cannot be separated completely from water by ordinary distillation? _____

9. Write an equation to show the function of the calcium oxide in separating ethyl alcohol from the water. _____

10. Was this separation a physical or a chemical process? Explain. _____

_____

_____

11. What was the reason for adding yeast? (Consult your textbook). _____

_____

_____

12. Why was it necessary to have water in the last bottle of the fermentation apparatus? ___

_____

_____

13. What is the origin of the term "proof" in connection with alcoholic beverages? _____

_____

_____

14. Describe how alcohol can be made form glucose ($C_6H_{12}O_6$). _____

_____

_____

_____

15. Complete the following equation: $C_6H_{12}O_6 \rightarrow$ _____ + _____

DIAGRAM