

REDUCTION OF ALCOHOL FROM HUMAN BODY THROUGH ESTERIFICATION REACTION

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ABSTRACT

This report is pertaining to a method to remove alcohol from stomach before significant amount enters blood. The objective is to determine if organic acids can react efficiently with alcohol in an esterification reaction to possibly eliminate it from human body^[1]. The experiment are carried out with a view to create some sort of medication where the quantity of acetic acid would be consumable. Intention behind this project is not to motivate alcohol consumption but to provide an easy remedy for critical conditions.

Keywords: alcohol, esterification, medication, organic acids.

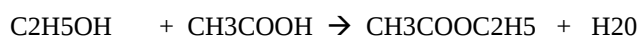
I. INTRODUCTION

All across the globe consumption of alcohol is increasing day by day or rather has become a trend. Youngsters have fallen for this and start consuming alcohol at an early age. Alcohol consumption gives rise to serious health disorders. It damages liver causing liver cirrhosis, shows a range short term and long term disorders on brain and central nervous system and also affects the reproductive organs. To tackle these problems and to contribute to a healthy living, we came up with this idea of reducing alcohol to ester using esterification reaction.

II. THEORY:

II.1 REACTIONS:

1. Actual esterification reaction



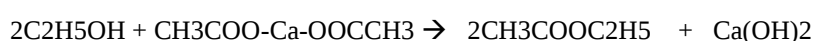
Ethyl alcohol Acetic acid Ethyl acetate Water

2. Pre- esterification reaction



Acetic Acid Calcium Calcium Acetate Water
 Hydroxide

3. Modified esterification reaction



Ethanol Calcium Acetate Ethyl Acetate Calcium Hydroxide

II.2 CALCULATIONS:

Some necessary calculations to obtain right pH of solution i.e. in the range of 3-4 are as follows

1. 100 ml of vinegar contains approximately 0.067-0.087 moles of acetic acid depending upon manufacturer.

2. According to FDA, recommended consumption of calcium for an adult is 1.3g per day.^[2]

3. Now, 100ml = 0.067 moles of acetic acid

1000 ml = 0.67 moles of acetic acid

4. Approximately the concentration of vinegar should be 0.03M

using,

$$M_1V_1 = M_2V_2$$

we obtain the quantity of vinegar as,

$$(1000 \times 0.03) / 0.67$$

$$= 44\text{ml}$$

5. Permissible value for $\text{Ca}(\text{OH})_2$ is $0.02^{[1]}$ moles, the amount of $\text{Ca}(\text{OH})_2$ required is,

0.02×74 , where molecular weight of $\text{Ca}(\text{OH})_2$ is 74

$$= 1.48\text{g}$$

III. PROCEDURE

III.1 Preparation of Solution:

1. Take 44ml of vinegar in a beaker.
2. Measure 1.48g of calcium hydroxide using digital weighing machine.
3. Add the measured calcium hydroxide to the beaker containing vinegar and stir well.
4. With the help of pH paper or pH indicator solution, measure the pH of solution (we had used pH meter for accuracy)
5. Obtained pH should be in the range of 3-4.

III.2 Titration against Potassium Permanganate:

1. Take 10 ml of this solution and add 10 ml alcohol to it.
2. Fill the burette with 2% KMnO_4 .
3. Perform the titration till brown color is obtained.

IV. OBSERVATIONS

1. Alcohol reacts with acetate ions present in the solution to form ester , ethyl acetate.
2. It is indicated by citric flavor aroma of ester instead of pungent smell of acetic acid.
3. Observations from titration suggest complete reduction of alcohol to ester because:
 - i. Potassium permanganate (KMnO_4) which is purple colored acts as indicator and end point achieved is purple-brown color.
 - ii. Formation of MnO_2 - ions gives the brown color and suggests reduction of alcohol.



V. CONCLUSION

1. Alcohol can be harmful to human body as it can cause heavy damage to liver like liver cirrhosis. Short term effects on brain include dizziness, drowsiness, loss of concentration, and mood swings. Long term effects include memory loss, strokes and concussions. Reproductive organs are also damaged due to consumption of alcohol. It can result in infertility or physical deformities and mental retardation in case of fetus.
2. Esters having negligible effect on our health proves to be a better alternative than alcohol in our body.
3. Using edible colors and artificial flavors it can be used in pharmaceutical and drug industry.
4. Usually our liver takes 10-12 hours to reduce alcohol but this might prove to be a faster solution.

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