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Pharmacy  
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COURSE: CHM 102

1.)

Alcohols can either be classified by:

- The number of hydrogen atoms attached to the carbon atom containing the hydroxyl group (OH). If they are three or two then it is a primary alcohol ( $1^\circ$ ), if they are one then it is a secondary alcohol ( $2^\circ$ ) and if there are none then it is a tertiary alcohol ( $3^\circ$ ). For example CH3CH(OH)CH3 Propan-2-ol( $2^\circ$ )
- The number of hydroxyl groups (OH) it possesses. One hydroxyl group is monohydric, two hydroxyl

groups is dihydric and three or more hydroxyl groups are trihydric and polyhydric respectively. For example  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$  Propanol (Monohydric alcohol)

2.

Solubility in water

Alcohols are soluble in water. This is due to the hydroxyl group in the alcohol which is able to form hydrogen bonds with water molecules. Alcohols with a smaller hydrocarbon chain are very soluble. As the length of the hydrocarbon chain increases, the solubility in water decreases. With four carbon in the hydrocarbon chain and higher, the decrease in solubility becomes visible as

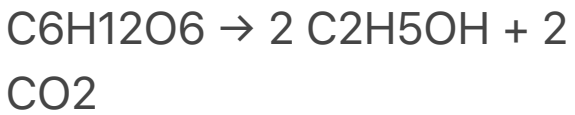
the mixture forms two immiscible layers of liquid. The reason why the solubility decreases as the length of hydrocarbon chain increases is because it requires more energy to overcome the hydrogen bonds between the alcohol molecules as the molecules are more tightly packed together as the size and mass increases.

3.

The chemical equations below summarize the fermentation of sucrose ( $C_{12}H_{22}O_{11}$ ) into ethanol ( $C_2H_5OH$ ). Alcoholic fermentation converts one mole of glucose into two moles of ethanol and two moles of carbon dioxide,

producing two moles of ATP in the process.

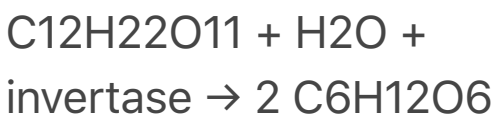
The overall chemical formula for alcoholic fermentation is:



Sucrose is a dimer of glucose and fructose molecules. In the first step of alcoholic fermentation, the

enzyme invertase cleaves the glycosidic

linkage between the glucose and fructose molecules.

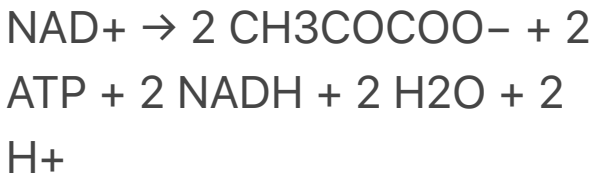


Next, each glucose molecule is broken down into

two pyruvate molecules in a process known as glycolysis.

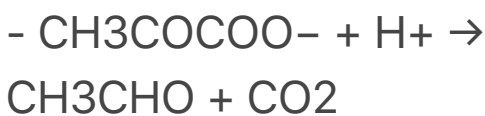
[2] Glycolysis is summarized by the equation:



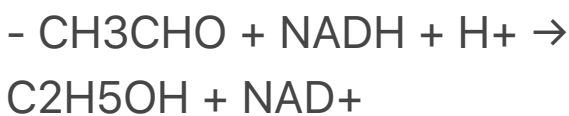


$\text{CH}_3\text{COCOO}^-$  is pyruvate, and  $\text{P}_i$  is

inorganic phosphate. Finally, pyruvate is converted to ethanol and  $\text{CO}_2$  in two steps, regenerating oxidized  $\text{NAD}^+$  needed for glycolysis:



catalyzed by pyruvate decarboxylase



This reaction is catalyzed by alcohol

dehydrogenase (ADH1 in baker's yeast).

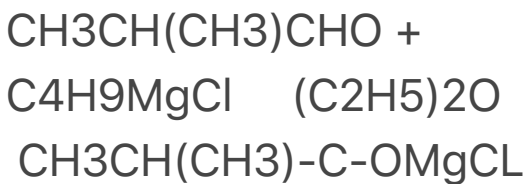
As shown by the reaction equation, glycolysis causes the reduction of two molecules

of NAD<sup>+</sup> to NADH.

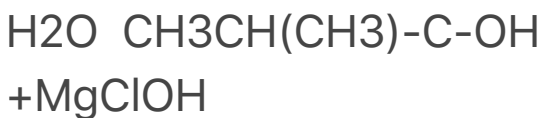
Two ADP molecules are also converted to two ATP and two water molecules via substrate-level phosphorylation.

C<sub>4</sub>H<sub>9</sub>

4.



C<sub>4</sub>H<sub>9</sub>



H

5. .

6. .



7.



8.



$\text{CH}_3\text{CH}=\text{CH}_2 + \text{H}_2\text{O}$

$\text{CH}_3\text{CHCH}_3$

$\text{OH}$