Ajibola Taofeek Oluwatoba
Pharmacy
19/MHS11/022
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°), if they are one then it is a secondary alcohol (2°) and if there are none then it is a tertiary alcohol (3°). For example CH3CH(OH)CH3 Propan-2-ol(2°)
- 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 CH3CH2CH2OH 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 bons 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 is 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:
$C_6H_{12}O_6 \rightarrow 2\ C_2H_5OH + 2\ CO_2$
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.
$C_{12}H_{22}O_{11} + H_2O +$
invertase $\rightarrow 2\ C_6H_{12}O_6$
Next, each glucose molecule
is broken down into
two pyruvate molecules in a
process known as glycolysis.
[2] Glycolysis is summarized
by the equation:
$C_6H_{12}O_6 + 2\ ADP + 2\ Pi + 2$

NAD+ → 2 CH_3COCOO^- + 2 ATP + 2 NADH + 2 H_2O + 2 H^+

CH_3COCOO^- is pyruvate, and Pi is inorganic phosphate. Finally, pyruvate is converted to ethanol and CO_2 in two steps, regenerating oxidized NAD+ needed for glycolysis:

- $CH_3COCOO^- + H^+ \rightarrow CH_3CHO + CO_2$ catalyzed by pyruvate decarboxylase
- $CH_3CHO + NADH + H^+ \rightarrow C_2H_5OH + NAD^+$ 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+ to NADH.
Two ADP molecules are also converted to two ATP and two water molecules via substrate-level phosphorylation.

C4H9
4.

CH3CH(CH3)CHO + C4H9MgCl (C2H5)2O
CH3CH(CH3)-C-OMgCL

C4H9

H2O CH3CH(CH3)-C-OH +MgClOH

H

5. .
6. .

LiAlH4(C2H5)2O
7.

CH3CH(CH3)
CH3OH(CH3)CH2OH
8.

CH3CH2OH+H2S04
CH5CH2CH2OH2OSO3H

-H2O

CH3CH2CH4OSO3H

CH3CH2CH2OSO3H
CH3CH=CH2 +H2SO4

CH3CH=CH2 + H2O

CH3CHCH3

OH