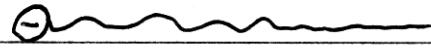
BOARD OF STUDIES
NEW SOUTH WALES

a) (i) Saponification is the production of soaps from fat and acids

(ii) soaps have a long saturated carbon chain tails with ionic heads (or non polar heads)



the non polar tail connects with the fat or grease and pulls it of the surface. The ionic heads then repel each other preventing the rejoining of the dirt and emulisfying the dirt through the ligvid.

BOARD OF STUDIES
NEW SOUTH WALES

$$aA + bB \rightarrow cC + dD$$

b) $$K = \frac{[C]^c [D]^d}{[A]^a [B]^b}$$

$$SO_{2(g)} + \tfrac{1}{2}O_{2(g)} \rightarrow SO_{3(g)}$$

$$\therefore K = \frac{[SO_3]}{[SO_2][O_2]^{\frac{1}{2}}} = \frac{0.04}{0.06 \times 0.05^{\frac{1}{2}}}$$

$$K = 3.03$$

c) part i)

$$H_2SO_4 + H_2O \rightarrow HSO_4^- + H_3O^+$$

$$HSO_4^- \rightarrow H^+ + SO_4^-$$

c) ii)

Oxidising agent

Sulfuric acid can be used as an oxidising agent in car lead/acid batteries

$Pb + H_2SO_4 \rightarrow$

Sulfuric acid can be used as a dehydrating agent e.g to dehydrate ethanol to ethene

$C_2H_5OH \xrightarrow{H_2SO_4 \text{ catalyst}} C_2H_4 + H_2O$

Sulfuric acid can be used to precipitate lead sulfates

$Pb(SO_4) + H_2SO_4$

BOARD OF STUDIES
NEW SOUTH WALES

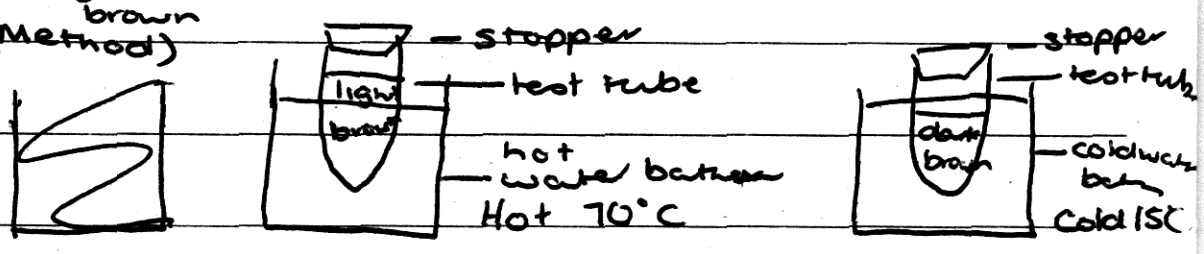
d.) i.) 1. To ~~large~~ medium measuring cylinder,

2. ~~full~~ one with water

3. pipette

d.) $2NO_{2(g)} \rightleftharpoons N_2O_{4(g)}$
light brown — brown

ii.) Set up (Method)



Aim:

~~Method: 1. To test~~

ii.) To analyse the equilibrium we just had to look for a colour change, distinguish between the light brown colour and dark brown. We noticed that this reaction was exothermic as the low temperature test tube changed to a dark brown

which signified the reaction moving to the right, ~~theirs~~ forming $N_2O_4(g)$.

(e) the first methode for producing Sodium hydroxide ~~was~~ (NaOH) was the Diaphragm cell. This consisted of a titanium anode, a iron mesh as a cathode and a ~~abrestos~~ ashtos to seperate the two compartments. Firstly the Brine which is concentrated Sodium chloride (NaCl) enters the cell the Chlorin ions are reduced at the iron mesh $Cl^- + e^- \longleftrightarrow Cl_{(g)}$

while water is oxidised at the anode

due to Sodium is to stable.

$\therefore \quad H_2O \longrightarrow H^+ + OH^-$

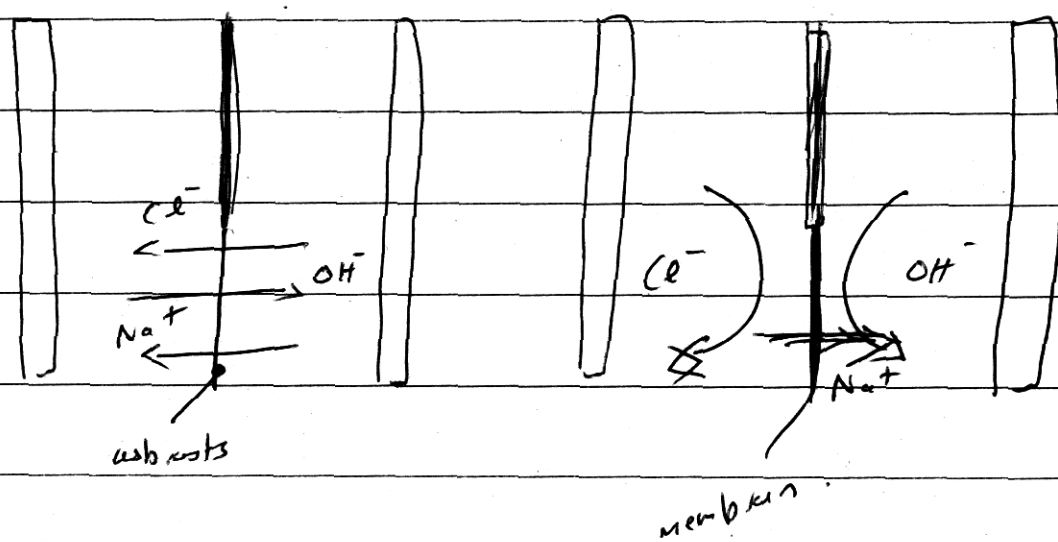
~~The hydroxide ions migrate to the cathode~~

So the hydroxide ions react with the Sodium to fors Sodium hydroxide but also hydro chloride is formed due to the asbrots allows hydrogen and chlorine to pass through. Then to prevent this by-product to occure they created a mercury-cell which uses liquid mercury as the cathode and titanium as the anode. the the Sodium ion is oxidised and simultaneous amalgumate with the liquid mercy.

$Na \longrightarrow e^- + Na^+$ (mercury).

this mercury then travels into a second tank which is filled with pure water, where there the amalgum of Sodium and mercury form Sodium hydroxide and mercury is reused. By many environmental problems occured due to the use of mercury. Mercury is a toxic and a heavy metal which stays at the bottom of the ocen with

which then accumulate in the body of animal then when we eat them mercury is in our body. So finaly the membrain cell was used to produce Sodium hydroxid. Its simular to the diaphragm cell by a membrain is used unlike the ashbests. the membrain (poly tetra fluroethelin) PTFE only allows Sodium ions to travel no hydroxid or chlorine ions so the final products is pure Sodium hydroxide.



the changes that occured from a diaphragm cell which produces a by-product to the mercury cell which was bad to the

environment to finely the least the membrane which produce pure NaOH.