


a)(i) Saponification is the process by which ~~sodium stearate~~ <sup>stearic acid</sup> reacts with glycerol to form sodium stearate (soap)

(ii) A soap molecule has a ball and tail:

$\oplus$    
The positive end buries itself in the dirt/grime, and the negative is pulled by the water. The dirt is taken with the soap molecule, and hence, washed off.

~~(b)  $SO_2 = 0.06 \text{ mol/L}^{-1}$~~

~~$O = 0.05 \text{ mol/L}^{-1}$~~

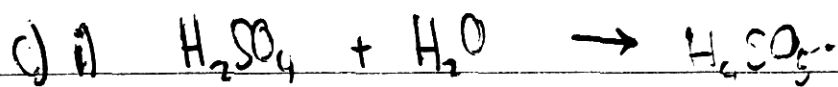
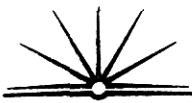
At equilibrium  $SO_3 = 0.04 \text{ mol/L}^{-1}$

64.07 32 80.07

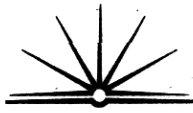


$$K = \frac{(\text{Products})}{(\text{Reactants})} = \frac{(80.07)^2}{((64.07)^2 + (32)^1)}$$

$K = 0.049$  (3 dec places)

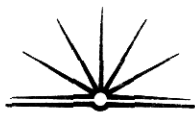


(ii) In esterification  $H_2SO_4$  is used to dehydrate any excess water



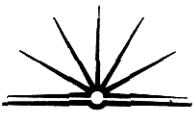
~~at~~ d) (i) The reaction will take place in a closed environment. The conditions are monitored. Then change the conditions to observe the change.

(ii) Observe the reaction if there are any sign changes when the equilibrium is ~~is~~ disturbed (temperature change, pressure change). Record the results of which direction the reaction goes (left to right or right to left) when the conditions change.



e) Sodium hydroxide was produced by a mercury ~~method~~ <sup>membrane filters</sup>. ~~This was formerly the method of~~

Sodium hydroxide is produced from sodium chloride although the asbestos caused problems to humans as it was found to cause problems to the lungs & respiratory system. In the long term it caused lung cancer. For this reason it was changed & there was the next development. All 3 methods of production of sodium hydroxide were efficient until there was a new development. The membrane filter method is now used widely & as they are most efficient which are available. The starting costs of this technology are quite high which is why some companies haven't changed their old method of industrial production of NaOH. There is a large demand for sodium hydroxide. It is produced on a very large scale by industries. The most efficient method needs to be



adapted for this reason.