

Chemistry

Section I – Part B (continued)

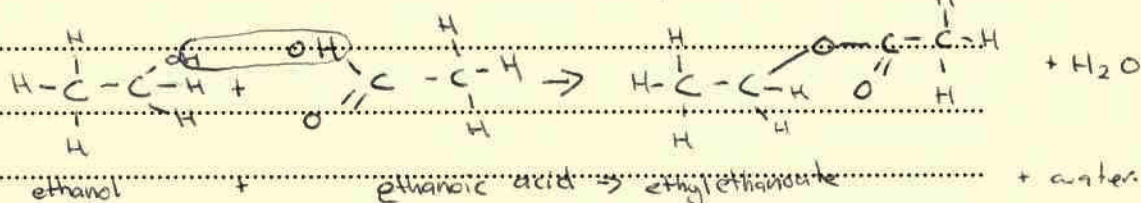
Marks

Question 22 (6 marks)

Justify the procedure you used to prepare an ester in a school laboratory. Include relevant chemical equations in your answer.

6

We used a process called esterification to produce an ester. We used mixed an acid, an alcohol and concentrated sulfuric acid (as a catalyst) in a pear-shaped flask. Heating this produced an ester and H_2O . An example of this is mixing ethanol with ethanoic acid.



Question 23 (4 marks)

A household cleaning agent contains a weak base of general formula NaX. 1.00 g of this compound was dissolved in 100.0 mL of water. A 20.0 mL sample of the solution was titrated with 0.1000 mol L⁻¹ hydrochloric acid and required 24.4 mL of the acid for neutralisation.

- (a) What is the Brønsted–Lowry definition of a base? 1

Brønsted–Lowry theory of a base states that
it is a proton acceptor.

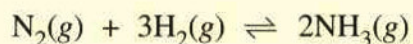
- (b) What is the molar mass of this base? 3

1.00 g → 100.0 ml of water
20 ml of sample titrated → 0.1000 mol/L
HCl → 24.4 ml.

$$\begin{aligned} \therefore &= 20.0 \text{ ml} \times 0.1000 \text{ mol/l} = 2 \\ &= 24.4 \div 2 \\ &= \underline{12.2 \text{ g/mol}} \end{aligned}$$

Question 24 (6 marks)

In the early twentieth century, Fritz Haber developed a method for producing ammonia, as shown by the equation:



- (a) Ammonia is used as a cleaning agent. State ONE other use of ammonia. 1

explosives

- (b) Explain the effect of liquefying the ammonia on the yield of the reaction. 2

By liquefying the yield reaction takes longer therefore yield increases so

- (c) Explain why it is essential to monitor the temperature and pressure inside the reaction vessel. 3

*if temperature increases reaction rate is faster
∴ yield is low*

*If pressure increased reaction is faster as well
∴ yield is low*

hence keeping temperature and pressure constant a compromise can be met