

Friday Worksheet
Volumetric 7

Name:

A sample of oil was labelled without its concentration but was suspected of containing linolenic acid at a precise concentration. A volume of 5.00 mL of the original sample from the unlabelled bottle was dissolved using 95% ethanol/diethyl ether and placed in a 200mL volumetric flask and made to the mark with distilled water. A 0.101 M I₂ solution was prepared and placed in the burette.

Four 20.00mL aliquots of the diluted solution from the volumetric flask were placed in four 100 mL conical flasks and titrated against the iodine solution and the following titres were obtained.

15.55mL, 14.95mL, 15.02mL, 15.04mL

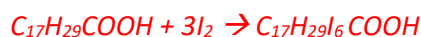
1) Calculate the average titre.

Select only the concordant results.

$$(14.95\text{mL} + 15.02\text{mL} + 15.04\text{mL}) / 3 = 15.00\text{ mL.}$$

2) Write a balanced chemical equation for the reaction between linolenic acid and iodine (I₂).

From the data sheet obtain the formula for linolenic acid.



For each double bond present in the organic molecule

3) What type of reaction is taking place in 2) above?

Addition

4) Calculate the amount, in mol, of I₂ in the average titre.

$$\text{Mol} = C \times V = 0.101 \times 0.01500$$

$$\Rightarrow 1.52 \times 10^{-3}$$

5) Calculate the amount in mol of linolenic acid in the conical flask that the iodine solution was titrated into.

$$\Rightarrow \Rightarrow 1.52 \times 10^{-3} / 3 = 0.000505 = 5.05 \times 10^{-4}$$

6) Calculate the concentration of linolenic acid in mol L⁻¹ in the original bottle.

Step 1 find the mol in the volumetric flask

$$\Rightarrow 5.05 \times 10^{-4} \times 10 = 5.05 \times 10^{-3}\text{ mol}$$

Find the concentration in the original sample bottle

$$5.05 \times 10^{-3} / 0.00500 = 1.01\text{ M}$$

7) Calculate the concentration of linolenic acid in %(w/v) found in the original bottle.

\Rightarrow Molar mass of linolenic acid is 278

$$\Rightarrow (1.01 \times 278 / 1000) \times 100 = 28.1\% \text{ (w/v)}$$

8) What technique would be used to purify linolenic acid from a sample of oils?

HPLC.