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 I_2 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.

2) Write a balanced chemical equation for the reaction between linolenic acid and iodine (I_2).

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

4) Calculate the amount, in mol, of I_2 in the average titre.

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

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

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

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