7 A student uses a solution of solvent and oil to estimate the length of an oil molecule.

(a) (i) Name an instrument that the student could use to accurately measure 10 cm^3 of the solution.

(1)

.....

(ii) The student uses a dropper to produce drops of the solution.

There are 2000 drops in 10 cm^3 of the solution.

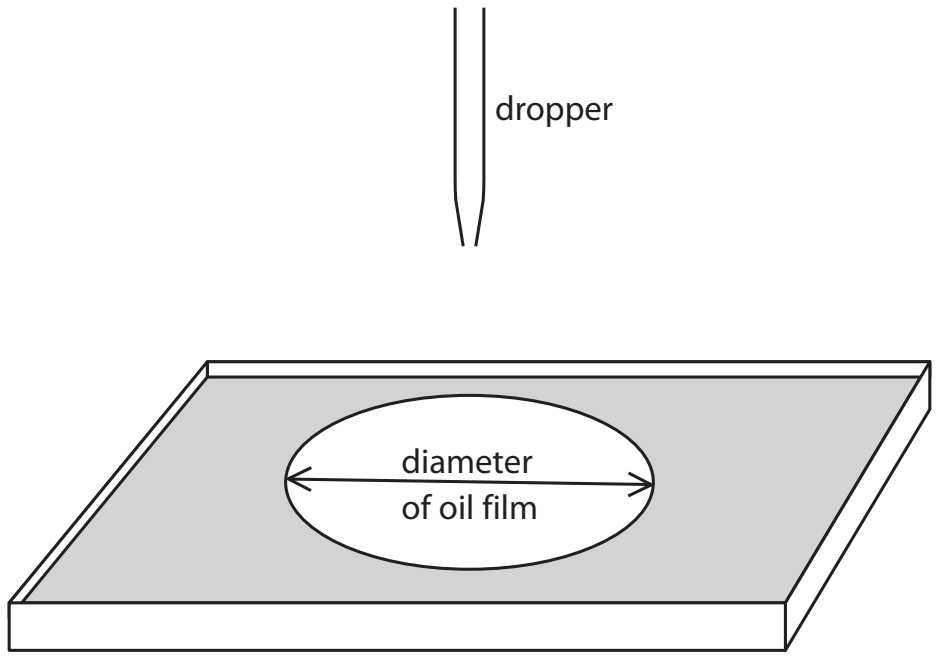
Calculate the volume of 1 drop.

(1)

volume of 1 drop = ... cm^3

(b) The student adds a drop of the solution to a tray of water.

She measures the diameter of the oil film that forms.



The student measures the diameter of the oil film several times.

The table shows her results.

Diameter in mm	305	301	297	298	303

(i) Calculate the average (mean) diameter of the oil film.

Give your answer to three significant figures.

(2)

average diameter = ... mm

(ii) When the drop touches the water, the solvent evaporates and an oil film forms with thickness equal to the length of one oil molecule.

The volume of the oil film is 1.0 mm^3.

The thickness of the oil film can be found using the formula

$$\text{volume} = \pi r^2 t$$

[r = radius of film, t = thickness of film]

Calculate the length of one oil molecule.

(3)

length = ... mm

(Total for Question 7 = 7 marks)

TOTAL FOR PAPER = 60 MARKS

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