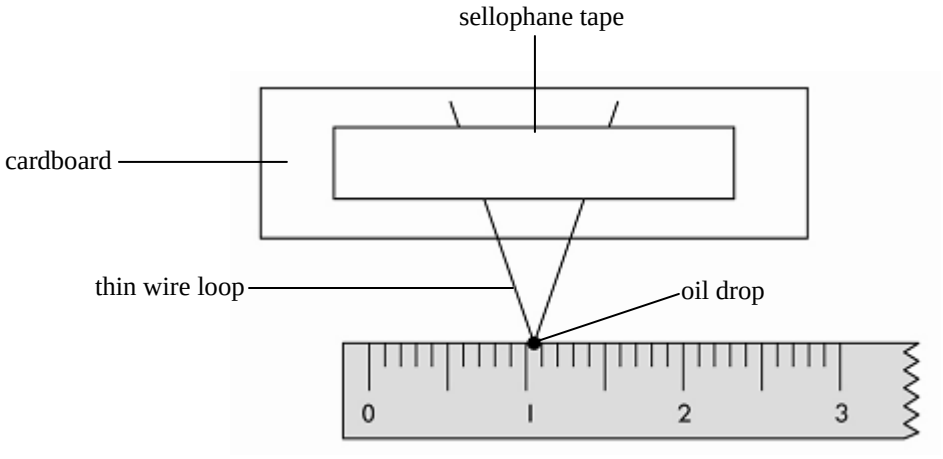
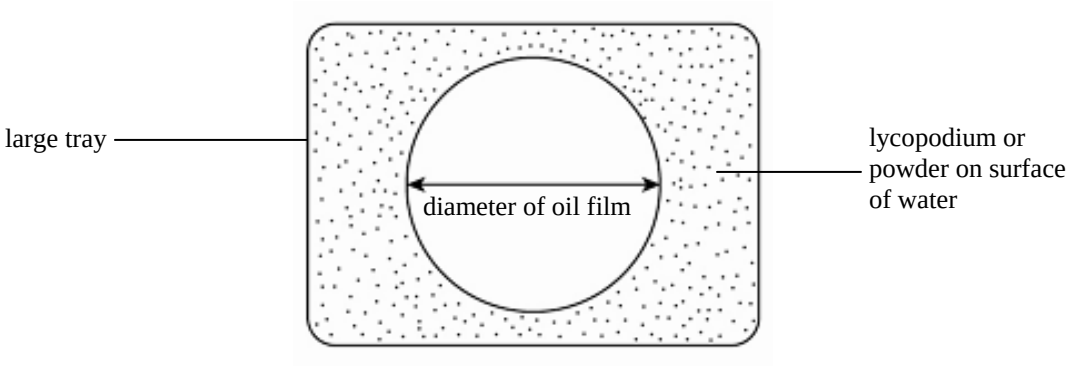
CHAPTER 4: MATTER AND SUBSTANCE

Aim of the experiment: To estimate the size of one particle of oil

Diagram:



Measuring oil drop



Measuring oil film

Procedure:

1. Lightly sprinkle lycopodium powder (or baby powder) on the surface of a tray of water.
2. Using a small loop of wire as shown in the diagram above, pick up a drop of oil and measure its diameter.
3. Touch the surface of the water in the tray with the drop of oil. (The oil forms a large circular oil film on the water.)
4. Measure the diameter of the oil film.

Results:

Diameter of oil drop: 0.2 cm

$\therefore$ Radius of oil drop (r) = 0.1 cm

Diameter of oil film = 40 cm

$\therefore$ Radius of oil film (R) = 20 cm

Calculation:

Volume of oil drop $\left(\frac{4}{3}\pi r^3\right)$ = volume of oil film ($\pi R^2 h$)

$$\frac{4}{3}\pi r^3 = \pi R^2 h$$

$$h = \frac{\frac{4}{3}\pi(0.1^3)}{\pi(20^2)}$$

$$h = 0.000\ 003\ 3 \text{ cm}$$

Conclusion:

The size of one particle of oil is about 0.000 003 3 cm.

Explanation:

This experiment assumes that the oil film is one particle thick. An oil particle has a diameter of 10^{-7}cm.