

Alkenes: double bonds and addition reactions

Chemistry grades 11-12 (A Level · IB · Class 11-12) · Lab answers

The model answers use the sample table. Keep three significant figures, show the blank correction and remember that 0.100 g of oil is scaled by a factor of 1 000 to reach 100 g.

Level: Chemistry grades 11-12 (A Level · IB · Class 11-12) · **Curriculum:** A Level 3.3.4

Question 1 Corrected titres

Palm: $9.6 - 0.3 = 9.3 \text{ cm}^3$. Coconut: $1.9 - 0.3 = 1.6 \text{ cm}^3$.

Question 2 Moles of bromine

Corrected titre $24.1 - 0.3 = 23.8 \text{ cm}^3$. $n = 0.020 \times 23.8 / 1000 = 4.76 \times 10^{-4} \text{ mol}$.

Question 3 Per 100 g of oil

Scale by $100 / 0.100 = 1\,000$: $4.76 \times 10^{-4} \times 1\,000 = 0.476 \text{ mol per } 100 \text{ g}$. Mass = $0.476 \times 159.8 = 76.1 \text{ g per } 100 \text{ g}$.

Question 4 Coconut oil value

$n = 0.020 \times 1.6 / 1000 = 3.2 \times 10^{-5} \text{ mol}$; $\times 1\,000 = 0.032 \text{ mol per } 100 \text{ g}$.

Question 5 Ranking and meaning

Order: **sunflower, then rapeseed, olive, palm and coconut**. Highly unsaturated oils are liquid and go rancid faster; coconut oil is nearly saturated, solid in cool weather and more stable when heated.

Question 6 Number of C=C per molecule

Triglyceride: $100 / 880 = 0.1136 \text{ mol per } 100 \text{ g}$. C=C per molecule = $0.298 / 0.1136 = 2.6$.

Question 7 Errors and improvements

Bromine is volatile and also reacts slowly with propanone, and the end point is judged by eye. **Improve** by using a colorimeter, running a blank (as here), covering the flasks and repeating until titres agree to 0.2 cm^3 .