Finding a Dissolved Marker in Two Liquids

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A class models a dissolved marker that can be present in both water and oil. The liquids form separate layers. The marker does not react in the model. The class measures the marker concentration and volume of each layer after the liquids have settled.

Layer	**Volume (L)**	**Marker concentration (mg/L)**
Water	0.20	5.0
Oil	0.050	12.0

1 Calculate the marker mass in each layer. Show how concentration and volume enter the calculation. [1]

Answer and work

2 Which statement matches the measurements?

(1) Oil has both higher concentration and more total marker.

(2) Water has both higher concentration and more total marker.

(3) Oil has higher concentration, while water has more total marker.

(4) The two layers have equal marker concentrations.

The class models a repeat in which both liquid volumes double. It adds enough marker to give the same measured concentration in each layer as before.

3 How does the total marker mass compare with the original run? Explain using both layers. [1]

Answer and work

4 A student samples only the oil and claims that the concentration reading gives the total mass of marker in the container. Explain what information is missing. [1]

Answer and work