Comparing Mass and Volume in a Liquid Mix

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

A class models a mixture of water and glycerol in a closed container at constant temperature. No material is added or removed when the liquids mix. The liquid molecules can change how they pack together as they move into the mixture.

Measurement	**Mass (g)**	**Volume (mL)**
Water before mixing	20.0	20.0
Glycerol before mixing	25.2	20.0
Mixture	45.2	39.0

1 Which conclusion follows from the measurements?

(1) Both the masses and volumes add exactly.

(2) The masses add, but the mixture volume is below the sum of the initial volumes.

(3) The mixture loses 1.0 g during mixing.

(4) The mixture gains 1.0 mL during mixing.

2 Calculate the mixture’s measured density using the final mass and volume. [1]

Answer and work

A student attributes the lower volume to a loss of molecules. The class instead considers whether attractions between the mixed molecules change their spacing.

3 Use the mass result and the model to explain how the volume can drop without material leaving the container. [1]

Answer and work

4 Would using 40.0 mL in the density calculation give a result higher or lower than the measured density? Explain. [1]

Answer and work