Reading a Gas Mass With Air Displacement

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

A model scale reports the apparent mass of a flexible bag in air. Surrounding air pushes upward. The model subtracts the mass of the air displaced by the bag from the true mass of the bag and its contents. The surrounding air has a density of 1.2 g/L.

Bag state	Volume of displaced air (L)	Scale reading (g)
Empty and flat	0.0	4.0
Filled with gas P	2.0	5.0

1 What mass of surrounding air does the filled bag displace?

(1) 1.0 g

(2) 1.2 g

(3) 2.0 g

(4) 2.4 g

2 Calculate the true mass and density of gas P in the bag. [1]

Answer and work

A second identical bag is filled with 2.0 L of gas Q. The pressure and temperature match the first filled bag. Gas Q has a density of 0.2 g/L.

3 Predict the new scale reading. Show how the actual gas mass and the displaced air both enter the calculation. [1]

Answer and work

4 A student says the decrease in the scale reading when the second bag was filled proves that adding gas decreased the bag’s true mass. Evaluate the claim. [1]

Answer and work