Tracking Two Vapors Over One Liquid

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

A sealed display holds a mixture of liquids P and Q with their vapor above it. At this temperature the model gives each substance a vapor-pressure contribution equal to its measured fraction among liquid particles multiplied by the vapor pressure it would have as a pure liquid. The total vapor pressure is the sum of the two contributions.

Substance	**Pure-liquid vapor pressure (kPa)**	**Measured fraction in the first liquid**
P	12	0.50
Q	4	0.50

1 Calculate the separate pressure contributions and the total vapor pressure above the starting mixture. [1]

Answer and work

In this model the fraction of vapor particles of a given substance equals its pressure contribution divided by the total vapor pressure.

2 What fraction of the vapor particles above the starting liquid are P particles?

(1) 1/4

(2) 1/2

(3) 2/3

(4) 3/4

3 Explain why the starting liquid and the vapor do not contain the same fraction of P particles. [1]

Answer and work

A second test uses a liquid that is one quarter P and three quarters Q at the same temperature.

4 A student says equal fractions in the vapor require equal fractions in the liquid. Use the second test to evaluate the claim. [1]

Answer and work