Checking Mass When Water Vapor Replaces Air

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

Two rigid cells have the same volume and temperature. Each holds ten gas particles in a classroom model. A dry-air particle has a model mass of 29 units, and a water molecule has a mass of 18 units. At this volume and temperature, pressure depends on the total particle count.

Cell	Dry-air particles	Water molecules
P	10	0
Q	6	4

1 Which comparison of pressures fits the model?

(1) P has greater pressure.

(2) Q has greater pressure.

(3) The pressures are equal.

(4) Pressure cannot be compared without the particle masses.

2 Calculate and compare the gas masses in the cells. [1]

Answer and work

3 A student says equal pressures at equal volume and temperature establish equal gas mass. Evaluate the claim with the two cells. [1]

Answer and work

The model replaces one more dry-air particle in Q with one water molecule while keeping the same volume and temperature. All ten particles remain in the gas phase.

4 Predict how the pressure and gas mass change after the replacement. [1]

Answer and work