Checking Vapor Readings for Two Molecule Shapes

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

A classroom display compares two model liquids made of nonpolar molecules. The molecules have the same formula and mass. Model P is long and less compact. Model Q is compact. The display predicts stronger attractions when more of the surfaces of two molecules can approach closely.

Sample	**Equilibrium vapor pressure at 30 °C (kPa)**	**Equilibrium vapor pressure at 40 °C (kPa)**
P	12	20
Q	22	34

1 Which property has the same value for both liquids and therefore cannot by itself account for their different vapor pressures?

(1) Equilibrium vapor pressure at 30 °C

(2) Equilibrium vapor pressure at 40 °C

(3) Molecular mass

(4) Compactness

2 Use the fixed-temperature readings and the contact model to explain why the lower vapor pressure of P is consistent with stronger attractions. [1]

Answer and work

The class places Q alone in two vessels at 40 °C. The vessels have equal vapor-space volumes but different exposed liquid areas. After one minute the pressure due to vapor is 20 kPa in the smaller-area vessel and 30 kPa in the larger-area vessel. Liquid remains in both.

3 A student says the different one-minute readings prove the two vessels will have different equilibrium vapor pressures. Evaluate the claim using the Q reference data. [1]

Answer and work

4 Describe how the class could check whether area changes the time to reach equilibrium without changing the final vapor pressure. [1]

Answer and work