Checking Two Solids With the Same Atom Ratio

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

An exhibit compares two model solids that each contain 20 atoms of X and 20 atoms of Y. In P, X and Y occupy sites in one metal lattice. In Q, the atoms occur in separate XY molecules. Electrons can move through P. In Q, the shared electrons remain within their own molecules in this model.

Model	**Smallest separate groups in the particle record**	**Conducts as a solid**
P	One continuous lattice	Yes
Q	Twenty XY molecules	No

1 Which observation shows that Q is organized as discrete molecules in this model?

(1) It contains 20 atoms of each element.

(2) It contains separate XY groups.

(3) It has the same atom ratio as P.

(4) It does not conduct as a solid.

2 Use the electron descriptions to explain why P conducts as a solid while Q does not in the model. [1]

Answer and work

A second sample of the metal lattice has 30 X atoms and 10 Y atoms. It still forms one lattice of the same type. A second sample of Q has 10 XY molecules.

3 Compare the X-to-Y ratios of the new samples. Explain why reducing the number of Q molecules keeps its ratio fixed. [1]

Answer and work

4 Evaluate the claim that the first two samples must have the same type of bonding because their atom ratios match. [1]

Answer and work