Comparing Metal Amounts in Two Oxide Models

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

An exhibit labels two pure model oxide samples. Sample M contains magnesium oxide, MgO. Sample A contains aluminum oxide, Al_2O_3. Each sample contains 0.060 mol of oxygen atoms. The samples contain only the elements in their formulas. Both samples are ionic solids with ions in an extended structure.

1 How many moles of Al_2O_3 formula units are in sample A?

(1) 0.020 mol

(2) 0.040 mol

(3) 0.060 mol

(4) 0.180 mol

2 Find the amount of metal atoms in each sample. Show how both formulas are used. [1]

Answer and work

The exhibit will also display a sample of MgO and a sample of Al_2O_3 that each contain 0.120 mol of metal atoms.

3 Predict the amount of oxygen atoms in each of the new samples. [1]

Answer and work

4 An unknown is one of the two oxides and contains 1.5 O atoms for every metal atom on average. Identify its formula. Explain whether this ratio describes a separate molecule in the solid. [1]

Answer and work