Checking Metal Ratios at Different Spots

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

A display compares two metal models containing X and Y. Both have the same overall ratio of X atoms to Y atoms. The uniform model mixes X and Y throughout one lattice. The grain model has some regions containing X only and other regions containing Y only. A probe can count atoms in small regions.

Sample	**X and Y in region 1**	**X and Y in region 2**	**X and Y in the whole sample**
P	5 X, 5 Y	5 X, 5 Y	100 X, 100 Y
Q	10 X, 0 Y	0 X, 10 Y	100 X, 100 Y

1 Which local result fits the grain model?

(1) The two regions of P each contain both elements.

(2) The two regions of Q contain different individual elements.

(3) P and Q both contain 100 X atoms overall.

(4) Both whole samples have the same ratio.

2 A student says the same whole-sample atom ratio establishes the same arrangement. Evaluate the claim using the local records. [1]

Answer and work

A new probe reading on Q covers both measured regions at once, combining the counts from region 1 and region 2.

3 Predict the combined X and Y counts. Explain why this larger reading can hide the local difference. [1]

Answer and work

4 Describe a follow-up using small-region readings to test whether the first two readings from P are representative. [1]

Answer and work