Reading Outer Electrons From Two Bands

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

An exhibit uses a model scanner that reports electrons in two bands. The inner band counts electrons in the first two occupied shells. The outer band counts electrons in the third shell. Each electron contributes one count. Neutral sodium atoms have shell counts 2, 8, 1. Neutral magnesium atoms have shell counts 2, 8, 2.

Sample	Inner-band count	Outer-band count
P	10	1
Q	10	2

1 Which band distinguishes one neutral sodium atom from one neutral magnesium atom in this model?

(1) Inner band only

(2) Outer band only

(3) Both bands

(4) Neither band

2 Identify the atoms in P and Q. Explain why the matching inner counts do not identify the elements by themselves. [1]

Answer and work

A neutral-atom mixture contains only sodium and magnesium. Its scanner reports 40 in the inner band and six in the outer band.

3 Complete the table with the total number of atoms and the number of each element. Explain how you used both bands. [1]

Category	Number of atoms
Total	
Sodium	
Magnesium	

How you used both bands

4 A student says the six outer counts prove there are six sodium atoms. Use the inner band to test the suggestion. [1]

Answer and work