Two Ions With the Same Mass Number

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

A classroom detector simulates isolated ions. It shows two possible identities for a particle. Both models have mass number 40. Both are singly charged in this simulation. The detector can also count electrons.

Possible particle	Atomic number	Mass number	Charge
Potassium ion	19	40	+1
Calcium ion	20	40	+1

1 Calculate the neutron count for each possible ion. Use both numbers from the table. [1]

Answer and work

2 What does the shared mass number establish for the two models?

(1) They have the same proton count.

(2) They have the same neutron count.

(3) They have the same total count of protons and neutrons.

(4) They are the same element.

The detector reports that the particle has 19 electrons. A student matches this count to the atomic number 19 and chooses potassium.

3 Use the stated charge and electron count to identify the particle. Explain what the student overlooked. [1]

Answer and work

4 Another detector reports that the neutron count equals the proton count. Use both counts to decide which candidate fits this observation. [1]

Answer and work