Checking Two Sources of an Emitted Electron

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

A model starts with a neutral atom containing six protons, eight neutrons, and six bound electrons. In trial P it removes one bound electron. In trial Q a neutron changes into a proton and emits a beta-minus electron. No bound electron leaves in Q. The detector records one negative particle leaving the atom in each trial.

After the event	Protons	Neutrons	Bound electrons
P	6	8	5
Q	7	7	6

1 Which record shows that a nuclear change occurred?

(1) P only

(2) Q only

(3) Both

(4) Neither

2 Calculate the mass number and the net charge of the remaining atom or ion in each trial. [1]

Answer and work

3 A student says matching remaining mass numbers and charges prove both electrons came from the same part of the atom. Evaluate the claim with the counts. [1]

Answer and work

The display now gives each remaining ion one electron to make it neutral.

4 Explain whether the two neutral atoms now have the same identity. Use their proton counts. [1]

Answer and work