Checking a Shifted Chloride Detector

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

A model detector displays the mass number of isolated singly charged negative ions. An instrument offset shifts the reading by the same amount for every ion. The class tests a reference of bromine-79 as bromide ions and a chloride sample known to contain chlorine-35 and chlorine-37.

Record	First displayed number	Second displayed number
Bromide reference	80	—
Chloride sample	36	38

1 Which detector correction makes both records consistent with the known samples?

(1) Subtract 1 from every displayed number

(2) Add 1 to every displayed number

(3) Subtract 2 only from the chloride readings

(4) Leave every displayed number as shown

2 Explain why the separation between the two chloride readings alone cannot reveal this calibration shift. [1]

Answer and work

The detector software is corrected. A new test shows peaks at 35 and 37. It also reports 75 ions at the first peak and 25 at the second.

3 Use the periodic table to compare the numbers of protons, neutrons, and electrons in the two chloride ions. [1]

Answer and work

4 Explain which corrected record shows that the two isotopes occur in different amounts in this sample. [1]

Answer and work