Reading Two Atom Masses in One Peak

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

A classroom detector reports the rounded mass of each particle. The model has two nitrogen isotopes of mass 14 u and 15 u. A nitrogen molecule has two N atoms, and its mass is the sum of their masses. The model also allows a one-atom silicon particle of mass 29 u.

Record	**Mass peaks detected (u)**
Original sample	28, 29, 30
After all two-atom nitrogen molecules separate	14, 15, 29

1 Which nitrogen atom pair gives a molecule with mass 29 u?

(1) 14 u with 14 u

(2) 14 u with 15 u

(3) 15 u with 15 u

(4) No nitrogen pair can have that mass.

2 A student says the original 29 u peak alone establishes that silicon is present. Explain why that peak cannot establish the particle identity by itself. [1]

Answer and work

3 Use the second record to explain which evidence shows that at least some of the original particles were single silicon atoms. [1]

Answer and work

4 Predict the second record for a sample containing the same nitrogen molecules but no silicon. Explain what changes and what stays. [1]

Answer and work