Checking Which Photons Change an Atom

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

A classroom detector model gives an atom three allowed energies: 0, 3, and 7 eV. Each trial uses one photon at a time. A bound electron moves up only when the photon energy matches the difference between its current level and a higher allowed level. None of the photons shown can remove an electron in this model.

Photon energy (eV)	**Electron energy after a trial starting at 0 eV**
3	3 eV
4	0 eV
6	0 eV
7	7 eV

1 Which photon moves an electron from 0 eV to 7 eV in one step?

(1) 3 eV

(2) 4 eV

(3) 6 eV

(4) 7 eV

2 Use the energy levels to explain why a 6 eV photon fails to raise an electron from 0 eV even though a 3 eV photon succeeds. [1]

Answer and work

In a new test, some atoms start at 3 eV and the rest start at 0 eV. The detector observes that some 4 eV photons are absorbed.

3 Use the levels to identify which starting atoms can absorb the 4 eV photons. [1]

Answer and work

4 A student says the 4 eV absorption proves that every atom started at 3 eV. Evaluate the claim using the stated model. [1]

Answer and work