Reconstructing Two Paths in a Model Lamp

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

A classroom lamp model gives an electron three allowed levels at 0, 2, and 5 eV. In a downward transition the electron emits one photon with energy equal to the difference between the two levels. Each trial begins with the electron at 5 eV and ends with it at 0 eV.

Path	**Electron movement**
D	From 5 eV directly to 0 eV
S	From 5 eV to 2 eV, then from 2 eV to 0 eV

1 Which pair of photon energies comes from path S?

(1) 1 eV and 4 eV

(2) 2 eV and 3 eV

(3) 2 eV and 5 eV

(4) 3 eV and 5 eV

2 Explain why a detector that records only total emitted energy per trial would give the same result for D and S. [1]

Answer and work

A second instrument reports individual photon energies but records only photons with energy greater than 2.5 eV.

3 State what this instrument records in each path and explain whether its output distinguishes the paths. [1]

Answer and work

4 A third trial begins with the electron at 2 eV and ends at 0 eV. The second instrument records nothing. Explain whether the instrument’s result shows that no energy was emitted. [1]

Answer and work