Absorption and Emission

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

In this model an electron can occupy only certain energy levels. When it moves between levels, the photon energy equals the magnitude of the energy difference.

1 Which process can move an electron from a lower level to a higher level?

(1) Absorbing a photon with matching energy

(2) Emitting a photon with matching energy

(3) Losing a proton from the nucleus

(4) Adding a neutron to the nucleus

2 An electron goes from a level of 5.0 eV to one of 2.0 eV. Calculate the energy of the photon involved and state whether it is emitted or absorbed. [1]

Answer and work

3 Which transition produces the photon of higher frequency, one that emits 2.0 eV or one that emits 4.0 eV?

(1) The 2.0 eV transition

(2) The 4.0 eV transition

(3) Both have the same frequency.

(4) The energies give no frequency information.

4 Explain why this model gives separate emission lines instead of a continuous range of emitted photon energies. [1]

Answer and work

Reading a Model Energy Diagram

Use the information below to answer the questions.

A display shows three energy levels for a model atom. Each letter identifies one level. The scale gives its energy in electron volts.



Allowed energies for the model atom.

5 Which drop emits the photon with the greatest energy?

(1) B to A

(2) C to B

(3) C to A

(4) All drops emit the same energy.

6 Calculate the photon energy needed to move an electron from B to C. State whether the photon is absorbed or emitted. [1]

Answer and work

7 Which transition can absorb a 2 eV photon in the model?

(1) A to B

(2) B to A

(3) B to C

(4) C to B

8 An electron returns from C to A in two steps through B. Show how the energies of the two emitted photons compare with one photon from a direct C-to-A drop. [1]

Answer and work