**Emission Spectra and Electron Transitions**

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

An excited atom can emit a photon when an electron moves to a lower energy level. The photon energy equals the difference between the levels.

**1** Which electron change can produce a photon in the emission model?

(1) A move from a higher level to a lower level

(2) A move from a lower level to a higher level by absorbing a photon

(3) A change in the number of protons

(4) No change in energy level

**2** An electron moves from a 6.0 eV level to a 2.0 eV level. Calculate the emitted photon’s energy. [1]

Answer and work

_____

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**3** Explain why two elements can show different sets of emission lines even under the same observing conditions. [1]

Answer and work

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**4** Which line represents the lower photon energy in a spectrum measured in vacuum?

(1) 450 nm

(2) 650 nm

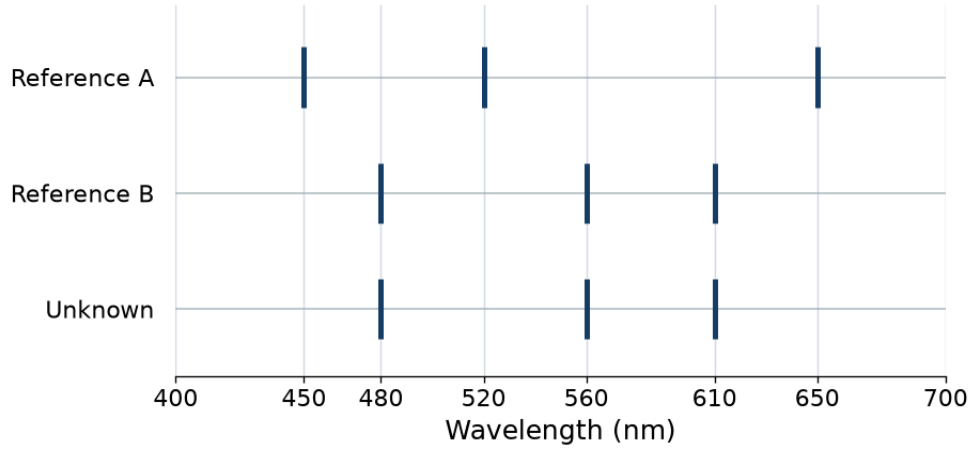
(3) Both have the same photon energy.

(4) A longer wavelength always has a higher photon energy.

**Matching a Model Line Spectrum**

Use the information below to answer the questions.

The figure compares two reference spectra with an unknown sample. Each mark is one detected wavelength. The model uses the same wavelength scale for all samples, and longer wavelength means lower photon energy.




Reference and unknown line spectra on the same wavelength scale.

**5** Which reference matches all the unknown’s line positions?

(1) A only

(2) B only

(3) Both references

(4) Neither reference

**6** Calculate the difference in wavelength between the longest and shortest lines of reference B. [1]

Answer and work

**7** Which line in the unknown has the lowest energy per photon?

(1) 480 nm

(2) 560 nm

(3) 610 nm

(4) All have the same photon energy.

**8** Why is matching several line positions stronger evidence of identity than matching only one position? [1]

Answer and work