An MIT crystallographer is collecting a data set to solve the structure of a protein. The data quality is too low using the lab's X-ray source, so she travels to California to use a synchrotron X-ray source (although the X-rays have same wavelength in each source.)

What must be true about this superior synchrotron X-ray source?

1. The California light beam has a higher frequency.
2. The California light beam has a lower frequency.
3. The California light beam has a higher intensity.
4. The California light beam has a lower intensity.
5. Both statements #1 and #3.
6. Both statements #2 and #4.

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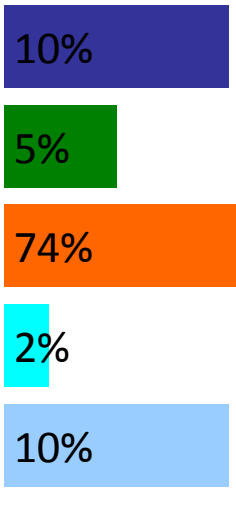

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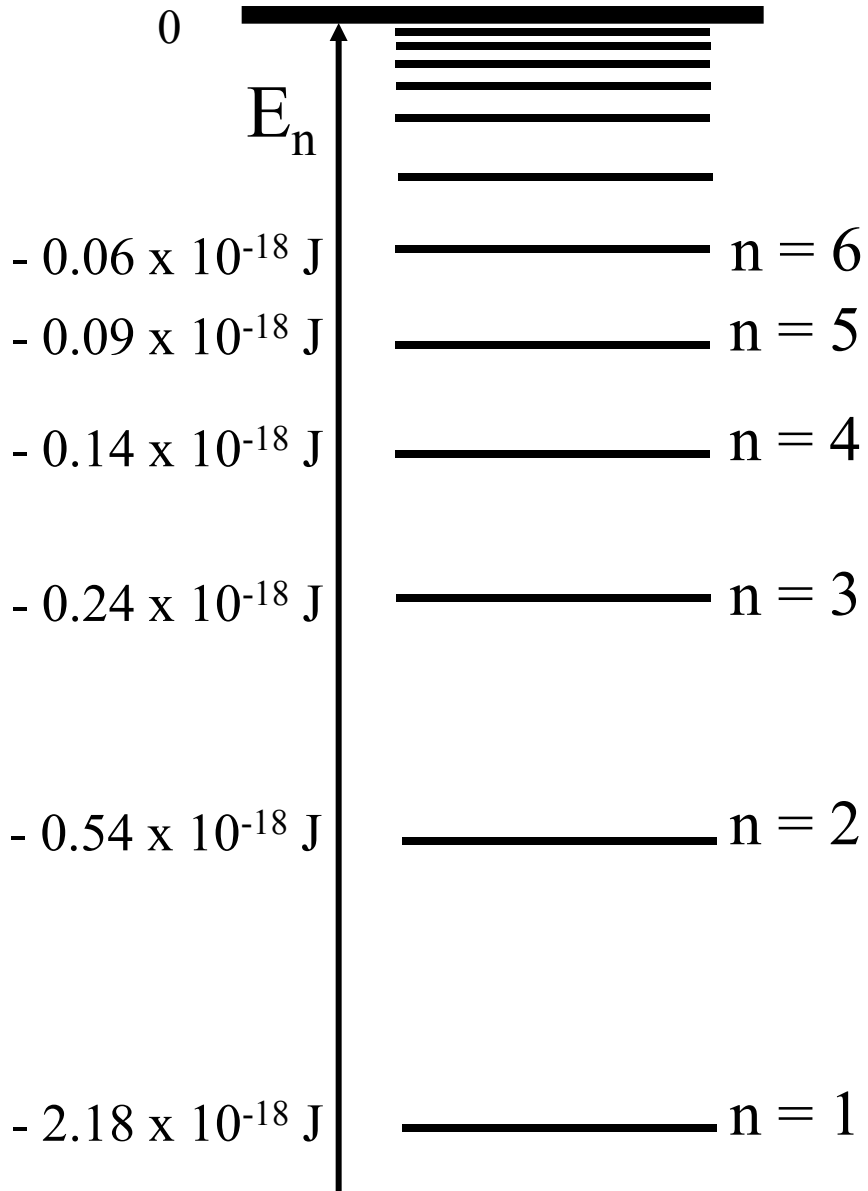
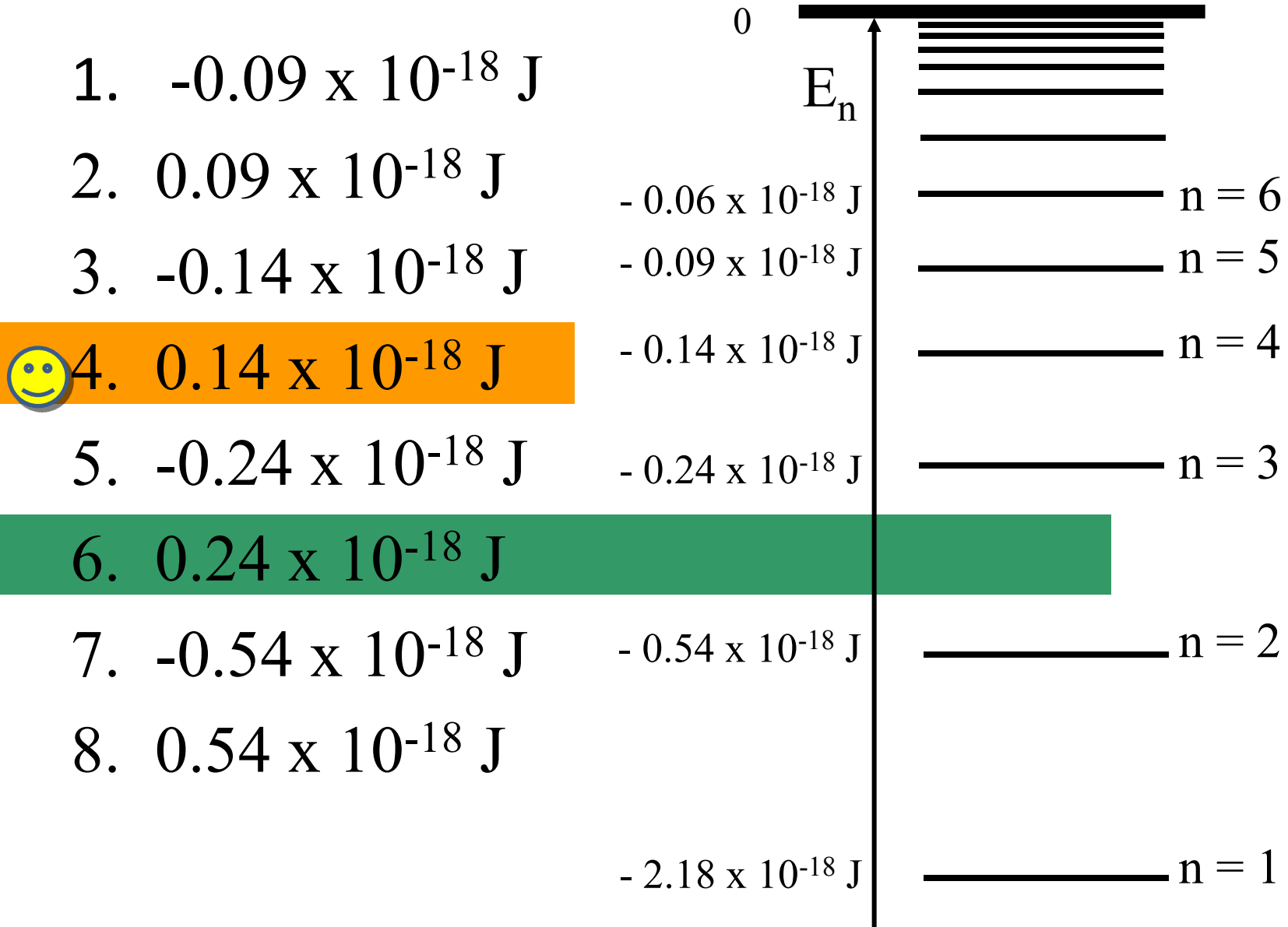
What is the IE of a H atom in the 3rd excited state?

1. -0.09×10^{-18} J
2. 0.09×10^{-18} J
3. -0.14×10^{-18} J
4. 0.14×10^{-18} J
5. -0.24×10^{-18} J
6. 0.24×10^{-18} J
7. -0.54×10^{-18} J
8. 0.54×10^{-18} J



What is the IE of a H atom in the 3rd excited state?

0%	1. -0.09×10^{-18} J
1%	2. 0.09×10^{-18} J
2%	3. -0.14×10^{-18} J
34%	4. 0.14×10^{-18} J
3%	5. -0.24×10^{-18} J
60%	6. 0.24×10^{-18} J
0%	7. -0.54×10^{-18} J
0%	8. 0.54×10^{-18} J



The Lyman series of H atom electron transitions (with $n_{final} = 1$) produces light in the…

1. IR range
2. Near IR range
3. Visible range
4. UV range

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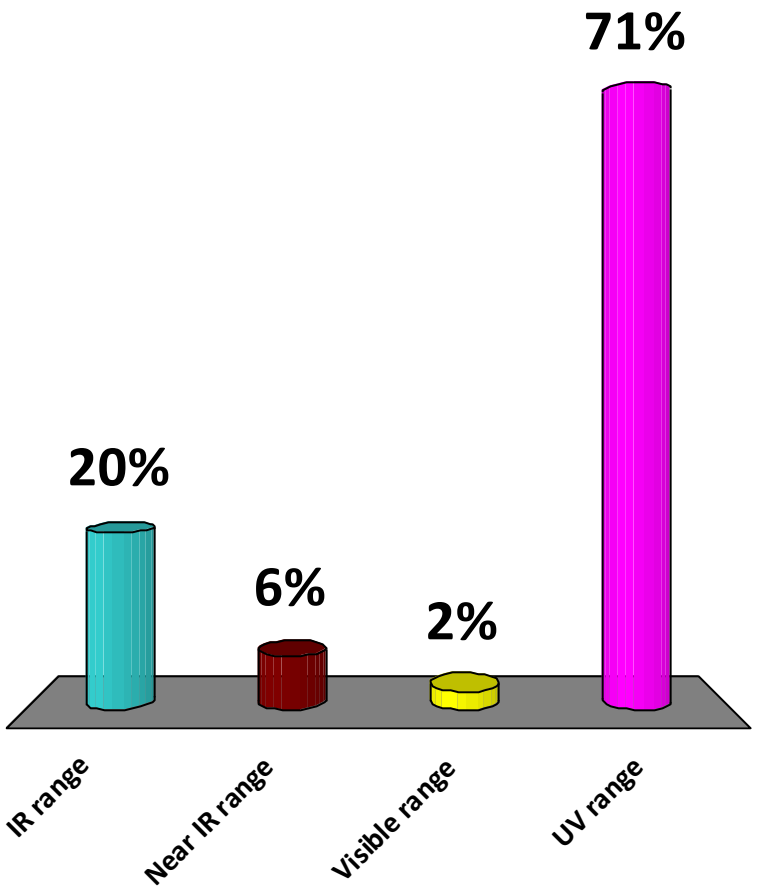
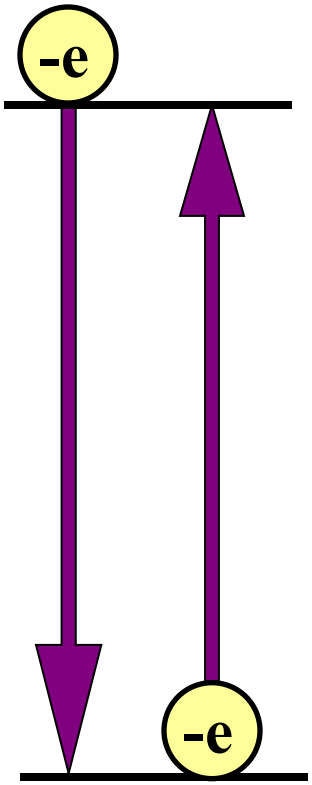


Select the most accurate statement about photon absorption by an atom.



1. $n_{inital} > n_{final}$ (energy gained by e-)
2. $n_{final} > n_{inital}$ (energy gained by e-)
3. $n_{inital} > n_{final}$ (energy lost by e-)
4. $n_{final} > n_{initial}$ (energy lost by e-)

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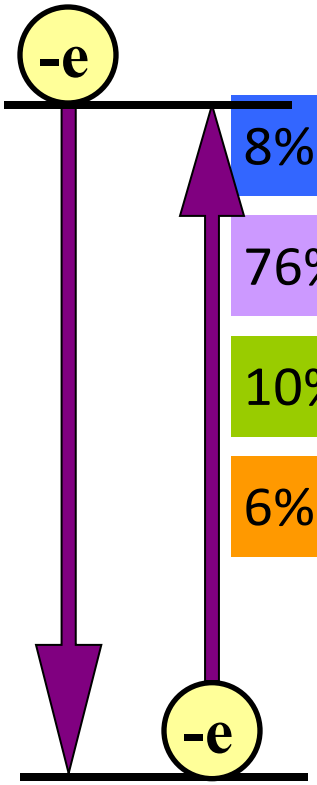

8%

76%

10%

6%

1. $n_{inital} > n_{final}$ (energy gained by e-)
2. $n_{final} > n_{inital}$ (energy gained by e-)
3. $n_{inital} > n_{final}$ (energy lost by e-)
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When a beam of light strikes a gold surface (workfunction = 5.1 eV), electrons are ejected with a maximum kinetic energy of 6.3 eV. What is the energy of the incident light?

1. -1.2 eV
2. 11.4 eV
3. 1.2 eV
4. 5.1 eV

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0%	1. -1.2 eV
90%	 2. 11.4 eV
10%	3. 1.2 eV
0%	4. 5.1 eV

5.111 Principles of Chemical Science
Fall 2014