

- (c) Rank the following spectra from having the least to the most number of absorption lines<sup>2</sup>; clearly indicate ties, if any. Then briefly explain the reasoning for your ranking.
- (A) The sun, observed from a spacecraft in orbit around Earth.  
 (B) The sun, observed from a telescope at sea level.  
 (C) Light from an incandescent light bulb, across the room.

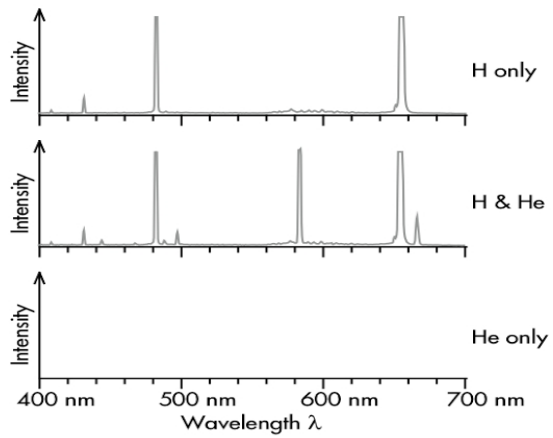
(least lines)

(most lines)

Explanation:

**Emission Spectra**

3. The (simplified) intensity versus wavelength graph of a sample that contains only hydrogen (H) atoms is shown with the graph of a sample that contains both hydrogen and helium (He) atoms. Carefully note the wavelength values of the peaks in these graphs.



- (a) Sketch in the peaks of a sample that contains *only* He atoms.
- (b) (Clearly circle your answer.) According to Kirchhoff's laws, these spectra are produced by  

 a hot, dense object  
 hot, diffuse gas atoms  
 blackbody radiation passing through cool, diffuse gas atoms
- (c) Briefly explain your answer to (b).

Explanation:

<sup>2</sup>Adapted from Adams, Prather, and Slater, *Lecture-Tutorials for Introductory Astronomy*, 1/e, Addison-Wesley, 2005, pp. 43-44.