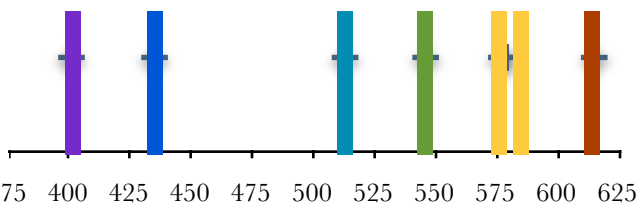


Quiz 03: Spectroscopy

Questions 1-7: Identify each of the lamps from their spectra.

1. Tube 1
 A) argon. **B) krypton.** C) helium. D) sodium. E) neon.
2. Tube 2
A) argon. B) nitrogen. C) hydrogen. D) sodium. E) neon.
3. Tube 3
 A) krypton. B) sodium. C) hydrogen. **D) mercury.** E) neon.
4. Tube 4
 A) mercury. B) hydrogen. C) helium. D) sodium. **E) neon.**
5. Tube 5
 A) hydrogen. **B) helium.** C) nitrogen. D) mercury. E) sodium.
6. Tube 6
 A) argon. B) krypton. **C) hydrogen.** D) sodium. E) neon.
7. Tube 7
 A) hydrogen. B) nitrogen. C) helium. D) mercury. **E) sodium.**



8. This is the emission spectrum of which element?
 A) Hydrogen.
 B) Helium.
C) Mercury.
 D) Krypton.
 E) None of these.

9. How do you know this is *not* the spectrum of **argon**?
 A) It might be. The argon spectrum is so faint, it's hard to tell what lines are present.
 B) It is argon. None of the previous choices match the spectrum shown.
C) It can't be. This spectrum shows green and yellow lines which are not present in the argon spectrum.

Identify the color for each of the emission lines shown on the **cadmium** (Cd) spectrum on the wall chart. The scale on the spectrum shows the wavelength λ in angstroms (Å). Since $1\text{Å} = 10\text{ nm}$, then $4500\text{Å} = 450\text{ nm}$.

10. Wavelength = $4650\text{Å} = 465\text{nm}$
 A) red. B) yellow. C) green. **D) blue.** E) none.
11. Wavelength = $6090\text{Å} = 609\text{nm}$
 A) red. **B) yellow.** C) green. D) blue. E) none.
12. Wavelength = $6430\text{Å} = 643\text{nm}$
A) red. B) yellow. C) green. D) blue. E) none.
13. Calculate the temperature of a yellow star having a peak wavelength $\lambda_{\text{max}} = 590\text{ nm}$.
 A) 300 K
 B) 2316 K
C) 5085 K
 D) 7420 K
 E) 15,860 K

$$T = \frac{3 \times 10^6 \text{K}}{\lambda} = \frac{3 \times 10^6 \text{K}}{590 \text{nm}}$$

$$T = 5085 \text{K}$$

14. (4 points) Calculate the **radial velocity** of a star observed to have an H-alpha line ($\lambda_0 = 656.30\text{nm}$) at a wavelength $\lambda = 656.52\text{nm}$. Answer numerically with an integer value (no decimal places). Show your work below.

$$v_r = \frac{(\lambda - \lambda_0)}{\lambda_0} \left(3 \times 10^5 \frac{\text{km}}{\text{s}} \right)$$

$$v_r = \frac{(656.52 - 656.30)}{656.30} \left(3 \times 10^5 \frac{\text{km}}{\text{s}} \right)$$

$$v_r = 101 \frac{\text{km}}{\text{s}}$$