

1. An average star has a peak wavelength of $2.50\mu\text{m}$. What is the temperature of the surface of the star?
2. Calculate the energy in eV of a photon having a wavelength of $2.50\mu\text{m}$.
3. When a certain metal is illuminated with light of $3.0 \times 10^{15}\text{Hz}$, a stopping potential of 2.50V is required to stop the most energetic electrons. What is the work function of the metal?
4. An X-rays with a wavelength of $2.50 \times 10^{-10}\text{m}$ is needed for a particular procedure. Find the minimum accelerating voltages required to produce this wavelength.
5. A particular salt has an interplanar spacing of $d=0.250\text{nm}$. A monochromatic x-ray beam shows a first order diffraction maximum when the grazing angle is 10.5° . What is the wavelength?
6. X-rays are scattered from electrons striking a Cu target. The measured wavelength shift is $2.50 \times 10^{-3}\text{nm}$. Calculate scattering angle.

7. Calculate the energy and momentum of a photon of 250.0nm wavelength.

8. Fans, researchers, historians and even the players argue all the time about who was the fastest pitcher of all-time. The most widely quoted response is Nolan Ryan, whose fastball was "officially" clocked by the *Guinness Book of World Records* at 100.9 miles per hour in a game played on August 20, 1974 versus the Chicago White Sox. A record that's still included in the book.

a. Find the de Broglie wavelength of the ball(145g).

b. If its speed is measured to an accuracy of .10%, what is the minimum uncertainty in position as it crosses the plate?(The umpire could be wrong.)