487. Calculate the frequency of infrared (IR) light with a photon energy of 1.78 eV.

488. Calculate the wavelength of a radio wave that has a photon energy of 3.1×10^{-6} eV.

489. Light of frequency 6.5×10^{14} Hz illuminates a lithium surface. The ejected photoelectrons are found to have a maximum kinetic energy of 0.20 eV. Find the threshold frequency of this metal.

490. Light of wavelength 519 nm shines on a rubidium surface. Rubidium has a work function of 2.16 eV. What is the maximum kinetic energy of the photoelectrons?

491. The smallest known virus moves across a Petri dish at 5.6×10^{-6} m/s. If the de Broglie wavelength of the virus is 2.96×10^{-8} m, what is the virus's mass?

492. The threshold frequency of platinum is 1.36×10^{15} Hz. What is the work function of platinum?

493. The ship *Queen Elizabeth II* has a mass of 7.6×10^{7} kg. Calculate the de Broglie wavelength if this ship sails at 35 m/s.

494. Cobalt has a work function of 5.0 eV. What is the wavelength of the photon that will just have the threshold energy for cobalt?

495. Light of frequency 9.89×10^{14} Hz illuminates a calcium surface. The ejected photoelectrons are found to have a maximum kinetic energy of 0.90 eV. Find the threshold frequency of this metal.

496. What is the speed of a neutron with a de Broglie wavelength of 5.6×10^{-14} m?

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497. Calculate the binding energy of ${}^{39}_{19}\text{K}$.

498. Determine the difference in the binding energy of ${}^{107}_{47}\text{Ag}$ and ${}^{63}_{29}\text{Cu}$.

499. Find the mass defect of ${}^{58}_{28}\text{Ni}$.

500. Complete this radioactive-decay formula: ${}^{212}_{84}\text{Po} \longrightarrow ? + {}^{4}_{2}\text{He}$.

501. Complete this radioactive-decay formula: ${}^{16}_{7}\text{N} \longrightarrow ? + {}^{0}_{-1}e + \overline{\nu}$.

502. Complete this radioactive-decay formula: ${}^{147}_{62}\text{Sm} \longrightarrow {}^{143}_{60}\text{Nd} + ?$.

503. A 3.29×10^{-3} g sample of a pure radioactive substance is found after 30.0 s to have only 8.22×10^{-4} g left undecayed. What is the half-life of the substance?

504. The half-life of ${}^{48}_{24}\text{Cr}$ is 21.6 h. A chromium-48 sample contains 6.5×10^{6} nuclei. Calculate the activity of the sample in mCi.

505. How long will it take a sample of lead-212 (which has a half-life of 10.64 h) to decay to one-eighth its original strength?

506. Compute the binding energy of ${}^{120}_{50}\text{Sn}$.

507. Calculate the difference in the binding energy of ${}^{12}_{6}\text{C}$ and ${}^{16}_{8}\text{O}$.

508. What is the mass defect of ${}^{64}_{30}\text{Zn}$?

509. Complete this radioactive-decay formula: $? \longrightarrow {}^{131}_{54}\text{Xe} + {}^{0}_{-1}e + \overline{\nu}$.

510. Complete this radioactive-decay formula: ${}^{160}_{74}\text{W} \longrightarrow {}^{156}_{72}\text{Hf} + ?$.

511. Complete this radioactive-decay formula: $? \longrightarrow {}^{107}_{52}\text{Te} + {}^{4}_{2}\text{He}$.

512. A 4.14×10^{-4} g sample of a pure radioactive substance is found after 1.25 days to have only 2.07×10^{-4} g left undecayed. What is the substance's half-life?

513. How long will it take a sample of cadmium-109 with a half-life of 462 days to decay to one-fourth its original strength?

514. The half-life of ${}^{55}_{26}\text{Fe}$ is 2.7 years. What is the decay constant for the isotope?