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1. Find the number of protons, electrons, and neutrons in a neutral atom of chlorine-37, atomic number 17.  
[1] \_\_\_\_\_
2. Find the atomic number and atomic mass of an atom containing 22 protons, 22 electrons, and 24 neutrons.  
[2] \_\_\_\_\_
3. Find the average atomic mass for a fictitious element, X, if 83.6% of its atoms have an atomic mass of 138.984 and 16.4% have an atomic mass of 137.954.  
[3] \_\_\_\_\_
4. Find the energy in a quantum of light that has a frequency of  $1.7 \times 10^{14}$  Hz.  
[4] \_\_\_\_\_
5. Find the wavelength of a photon of light with energy 2.04 eV. Express your answer in meters. ( $h = 6.63 \times 10^{-34}$  J·s;  $c = 3 \times 10^8$  m/s; 1 eV =  $1.6 \times 10^{-19}$  J)  
[5] \_\_\_\_\_
6. An electron in the  $n = 1$  state in an atom of hydrogen jumps to the  $n = 3$  state. What energy in eV is needed to make the transition?  
[6] \_\_\_\_\_
7. An electron in an excited hydrogen atom falls from the  $n = 5$  state to the  $n = 4$  state. Find the wavelength (in meters) of the light produced. ( $h = 6.63 \times 10^{-34}$  J·s;  $c = 3 \times 10^8$  m/s; 1 eV =  $1.6 \times 10^{-19}$  J)  
[7] \_\_\_\_\_

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Key Sheet

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[1] 17 protons, 17 electrons, 20 neutrons

atomic number = 22

[2] atomic mass = 46 u

[3] 139 u

[4]  $1.1 \times 10^{-19}$  J

[5]  $6.09 \times 10^{-7}$  m

[6] 12.1 eV

[7]  $4.03 \times 10^{-6}$  m