AP WORKSHEET 01E: Quantitative aspects of electrons

1. This question is about breaking covalent bonds.

    (a) The bond energies of the single bonds between two chlorine atoms within a chlorine molecule and two fluorine atoms within a fluorine molecule are calculated to be 4.02×10^{-19} J and 2.64×10^{-19} J respectively. For each bond, calculate the following;

        (i)   The frequency of a photon that could be used to break the bond. (2)
        (ii) The wavelength of each photon in (i). (2)

    (b) When an excited electron falls back to its ground state, what can be said of the energy change that occurs when compared to the energy change of the original, promotion process? Explain. (2)

2. Lithium ions give a distinctive red flame test. In one such experiment the energy of this red light is found to have an energy of 3.06×10^{-19} J. Calculate the wavelength of the light from the lithium ions in nm. (2)

3. Which of the following process will *release* the greatest amount of energy? Explain your answer. (2)

    Promoting an electron from n = 1 to n = 6
    Promoting an electron from n = 1 to n = 4
    An electron falling from n = 2 to n = 1
    An electron falling from n = 6 to n = 5

4. When an electron falls from n = 5 to its lowest possible state in the Lyman series, the energy that is released is greater than the energy that is released when an electron falls from n = 5 to its lowest possible state in the Balmer series. Explain. (2)

5. Electron transitions are expected to absorb or emit greater magnitudes of energy in the He^+ ion than in the hydrogen atom. Why? (2)