

Chemistry 100
Homework Problem Set # 6
Due Wednesday, October 22

1. *Waldron, Question 5.13* For each object, indicate which color(s) of visible light the object absorbs:
 - (a) a red book
 - (b) a green leaf
 - (c) a white dress
 - (d) a black rug
 - (e) a blueberry
2. Which photons have more energy in each pair (circle)?
 - (a) red or blue
 - (b) violet or yellow
 - (c) infrared or green
 - (d) ultraviolet or x-ray
 - (e) ultraviolet or green
 - (f) radio or infrared
3. *From Waldron, Question 5.28* Copy the line structures of the molecules given (see page 205). What is the largest number of conjugated (alternating) double bonds for each? (Count only the longest conjugated series, not all the double bonds). Rank the hydrocarbons according to the wavelength of the ultraviolet light they absorb - label with "shortest wavelength" and "longest wavelength". Also indicate which one absorbed the lowest energy photons.
4. *Waldron, Question 5.10* Identify each atom from its electron configuration:
 - (a) $1s^2 2s^2 2p^4$
 - (b) $1s^2 2s^2 2p^6 3s^2 3p^2$
 - (c) $1s^2 2s^2 2p^6 3s^2 3d^1$
5. *Waldron, Question 5.23* Write the electron configuration for:
 - (a) O^{2-}
 - (b) S^{2-}
 - (c) Na^+
 - (d) Be^{2+}

6. Currently, a sunscreen that protect against both UVA and UVB is recommended. What is the difference between UVA and UVB in terms of wavelength and energy per photon? Why is protection against both UVA and UVB recommended?

7. *Waldron, Question 5.1* Identify each half reaction as either reduction or oxidation:

- | | |
|--|-------------------------------|
| (a) $\text{Fe}^{2+} + 1 \text{e}^- \longrightarrow \text{Fe}^+$ | Oxidation or Reduction? _____ |
| (b) $\text{Ag} \longrightarrow 1 \text{e}^- + \text{Ag}^+$ | Oxidation or Reduction? _____ |
| (c) $\text{Mo}^{6+} + 3 \text{e}^- \longrightarrow \text{Mo}^{3+}$ | Oxidation or Reduction? _____ |
| (d) $\text{Cl}^- \longrightarrow 1 \text{e}^- + \text{Cl}$ | Oxidation or Reduction? _____ |

8. *Waldron, Question 5.8* Describe the difference between silver salt and metallic silver. Why is this difference crucial for the reactions of photography? (Hint: see text page 175)

9. What is a free radical? What problems can free radicals cause for food? For people?

10. What is an antioxidant? Name any two antioxidants commonly found in food.

11. Identify the full nuclear symbol for the following isotopes or particles:

- | | |
|-----------------|-------------------|
| (a) cobalt-60 | (f) an electron |
| (b) helium-4 | (g) a neutron |
| (c) uranium-238 | (h) plutonium-239 |
| (d) uranium-235 | (i) strontium-90 |
| (e) hydrogen-1 | (j) iodine-131 |