Homework #3 (Wave Model of Light)
## CHEM 11 (S 2016, LAC)
(Due Wednesday, February 24)

Note: You must show your work where appropriate; correct answers by themselves do not get credit. Also remember to apply significant digits to round your answers appropriately.

1. In my research on the structure of molecules, I have obtained the circular dichroism spectrum of L-fenchone from 145 nm to 325 nm. What is this range in Hz? In what region of the E-M spectrum is this range of wavelengths located? [Just for your information, I have included the spectrum here. It is not used in the problem.]

Fenchone Circular Dichroism Spectrum
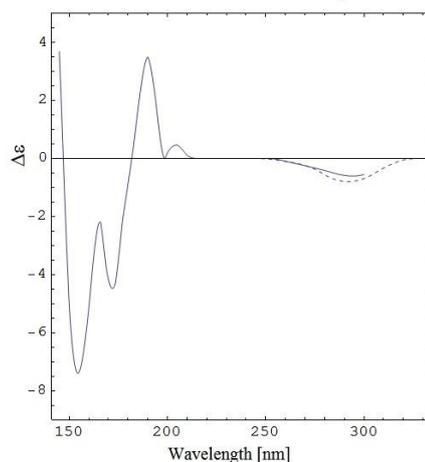
2. A microwave oven operates at a frequency of 2.45 GHz ±10 MHz. So convert each of these values with scientific notation (powers of ten) to simple Hz. Then add and subtract the 10 MHz equivalent to the 2.45 GHz to arrive at the end points of the allowed frequencies. Then convert these frequencies into wavelengths and find their middle wavelength and the allowed tolerances in wavelength.

3. The molecular weight of glucose (usually called dextrose by doctors and nurses) is 180.156 g/mol. A commonly used IV fluid in the hospital is D5W (a 5% dextrose solution in water). D5W has 278 mmol/L of glucose in water. If the specific rotation [α] of glucose is 52.7 degrees, what is the rotation of a 200. mm path length sample of D5W? Remember that α = [α] c l . See your notes to remember what each of these variables stand for.

4. If the index of refraction of a regular type of glass is 1.52, what is the velocity of light in that glass?

5. Since the strong bright lines of helium gas under low pressure appear at 447.148, 501.567, and 587.562 nm, use the hand-out from class and estimate what color each of these lines would appear to be. Also name the type of spectrum this is. Lastly calculate the frequency of the longest wavelength line.