General Chemistry
Mr. MacGillivray
Quiz #10:
Quantum Theory and Light

Possibly useful equations and constants:

$E=h\nu$ $\qquad\qquad$ $c=\lambda\nu$ $\qquad$ ☺ x ☹ = 😐 $\qquad$ cafeteria food = H_2SO_4

$c=3.00 \times 10^8$ m/s $\qquad$ $h=6.626 \times 10^{-34}$ Js

Arrange the following types of electromagnetic radiation in order of INCREASING ENERGY.

UV radiation	X-rays	Visible light
Gamma rays	Microwave radiation	Infrared radiation

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Arrange the following types of electromagnetic radiation in order of INCREASING WAVELENGTH.

Green	Yellow	Orange	Violet
Blue	Red	Indigo	

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

8. Sketch an *s* orbital below. $\qquad\qquad\qquad\qquad\qquad$ 9. Sketch a *p* orbital below.

10. Calculate the energy of a photon with a frequency of 5.45×10^{14} Hz.

11. Calculate the energy of a photon with a wavelength of 325 nm.

lowest E

microwaves
infrared radiation
visible light
UV radiation
X-rays

highest E gamma rays

shortest wavelength

violet
indigo
blue
green
yellow
orange
red

longest wavelength

⑧ ○ ← s orbital   ⑨ ∞ ← p orbital

⑩ $E = h\nu = (6.626 \times 10^{-34} J_s)(5.45 \times 10^{14} \frac{1}{s}) = 3.61 \times 10^{-19} J$

⑪ $C = \lambda \gamma$

$\gamma = \frac{C}{\lambda} = \frac{3 \times 10^{8} \frac{m}{s}}{325 \times 10^{-9} m} = 9.23 \times 10^{14} \frac{1}{s}$

$E = h\nu = (6.626 \times 10^{-34} J_s)(9.23 \times 10^{14} \frac{1}{s})$

$= 6.12 \times 10^{-19} J$