

+1 pt for grading

Name here Reef and on the back

Chem 121 Experimental Take Home Quiz 2 (Ch. 2, 7) → Due in class TOMORROW! (Fri, 9/18)
DO AND SHOW ALL THE WORK HERE OR NO CREDIT WILL BE GIVEN.

GRADER _____

Points lost _____

I. What is the wavelength of visible light with frequency of 5×10^{14} Hz?

Given: $\nu = 5 \times 10^{14}$ Hz

Equation: $\lambda = \frac{c}{\nu} = \frac{3 \times 10^8 \frac{m}{s}}{5 \times 10^{14} \frac{1}{s}} = 6 \times 10^{-7} m$

2 pts

- A. 0.6×10^6 B. 0.6×10^{-6} C. 15×10^{22}
 D. 3.13×10^{13} E. 6.02×10^{23}

express your answer in nanometers $6 \times 10^{-7} m \times \frac{1 nm}{10^{-9} m} = 600 nm$
 and check in Figure 7.5 of your textbook what color it corresponds to ~ orange

1 pt

II. What is the energy of light emitted when the hydrogen atom undergoes a transition from level $n_1 = 5$ to level $n_2 = 2$? ($R_H = 2.180 \times 10^{-18} J$)

Equation to use: $\Delta E = R_H \left(\frac{1}{n_2^2} - \frac{1}{n_1^2} \right)$ $R_H = 2.180 \times 10^{-18} J$

Calculations:

$\Delta E = 2.180 \times 10^{-18} J \left(\frac{1}{2^2} - \frac{1}{5^2} \right) = 2.180 \times 10^{-18} J \times 0.21 = 4.58 \times 10^{-19} J$

2 pt

Answer: $E = 4.58 \times 10^{-19} J$ (units!!)

EXTRA CREDIT: calculate the wavelength of the light emitted (do the work on the back of the page!) → see next page

- a. 663 nm b. 833 nm c. 546 nm d. 521 nm e. 434 nm

III. Fill in the blank with the letter from answers below:

- III-1 Milliken measured the charge of an electron in oil drop experiment
 III-2 Bohr postulates account for the line spectrum of an atom
 III-3 Rutherford discovered the nucleus of an atom in gold foil experiment
 III-4 Heisenberg brought forth uncertainty principle

1 pt

- a. Rutherford b. de Broglie c. Bohr d. Milliken e. Heisenberg

IV. Which of the following statements is (are) true?

- An excited atom can return to a higher energy level by emitting light energy.
- An atom can be excited to a higher energy level by absorption of light energy.
- The frequency and wavelength of light are inversely proportional.

1 pt

- a. 1 only b. 2 only c. 1 and 3 only d. 2 and 3 only e. 1, 2, and 3

V. Consider a compound formed between phosphorus and rubidium:

Would this be ionic or covalent compound? ionic (bc. metal + non-metal)

2 pt

Formula Rb⁺ P⁻³ Chemical Name Rubidium Phosphide

VI. The chemical name of SiF₄ is silicon tetrafluoride
(covalent!)

1 pt

Extra :

$$E = 4.58 \times 10^{-19} \text{ J}$$

$$\lambda = ? \text{ nm}$$

Equations

$$E = h\nu$$

$$\nu = \frac{c}{\lambda}$$

$$E = \frac{hc}{\lambda}$$

$$\lambda = \frac{hc}{E}$$

$$c = 3 \times 10^8 \frac{\text{m}}{\text{s}}$$

$$h = 6.63 \times 10^{-34} \text{ J}\cdot\text{s}$$

Calculation

$$\lambda = \frac{6.63 \times 10^{-34} \text{ J}\cdot\text{s} \times 3 \times 10^8 \text{ m/s}}{4.58 \times 10^{-19} \text{ J}}$$

$$4.58 \times 10^{-19} \text{ J}$$

$$= 434 \text{ nm.}$$