

Chapter 4 Test Review

Constants: $c = 3.00 \times 10^8 \text{ m/s}$ $h = 6.63 \times 10^{-34} \text{ J}\cdot\text{s}$ $1 \text{ m} = 1 \times 10^9 \text{ nm}$

You will not be given the equations on the test. Make sure they are memorized!

1) What is the energy of a photon whose frequency is $3.0 \times 10^{12} \text{ sec}^{-1}$?

2) Show your work and calculate the following.

a. Calculate ν for a $\lambda = 700.0 \text{ nm}$.

b. Calculate ν for a $\lambda = 400.0 \text{ nm}$.

c. Calculate the energy for each wavelength above.

a)

b)

d. Which wavelength has the greatest frequency?

e. Which wavelength has more energy?

f. How are energy, wavelength, and frequency related?

Honors Chemistry
Chapter 4 Test Review

Name:
Date:

- 3) A red light has a wavelength of 728 nm.
a. What is the frequency of the light?

b. What is the speed of the wave in m/s?

- 4) A purple light has a frequency of 7.42×10^{14} /sec.
a. What is its wavelength?

b. Find the energy for this wavelength.

- 5) You broke your big toe! The x-ray they take of your toe uses waves that have a length of 2.19×10^{10} m.

a. What is the speed of the wave in m/s?

b. What is the wavelength in nm?

c. What is the frequency of the x-ray?

- 6) Element Math Game: <http://education.jlab.org/elementmath/>

$$\begin{array}{c} M - A = n \\ \parallel \\ P - e = C \end{array}$$

- 7) Periodic Table of Isotopes : <http://ie.lbl.gov/education/isotopes.htm>

8) Balancing Nuclear Equations:

- a. $^{214}\text{Bi} \rightarrow ^{214}\text{Po} + \underline{\hspace{2cm}}$
- b. $^{90}\text{Rb} \rightarrow \underline{\hspace{2cm}} + {}^0_0\text{e}$
- c. $^{235}\text{U} \rightarrow \underline{\hspace{2cm}} + {}^4_2\text{He}$
- d. ^{230}Po emits an alpha particle.
- e. ^{14}C emits a beta particle.

9) Half-Life Problems:

- a. If one starts with 20 mg of a radioactive isotope with a half-life of 2.0 days, how much remains after eight days?

- b. The half-life of an isotope is 10 years. If we start with a 10 gram sample of the isotope, how much is left after 20 years?

- c. Start with 12.0 g of a given isotope. After 11 years only 3.0 grams is left. What is the half-life of the isotope?

10) Average Atomic Mass

Naturally occurring lead is composed of four isotopes: 1.40% ^{204}Pb (203.97 amu), 24.10% ^{206}Pb (205.97 amu), 22.10% ^{207}Pb (206.98 amu), and 52.40% ^{208}Pb (207.98 amu). What is the average atomic mass of lead?

Honors Chemistry Chapter 4 Answer Key

1) $2.0 \times 10^{-21} \text{ J}$

- 2) a. $4.29 \times 10^{14} \text{ s}^{-1}$
b. $7.5 \times 10^{14} \text{ s}^{-1}$
c. $2.84 \times 10^{-19} \text{ J}$; $4.97 \times 10^{-19} \text{ J}$
d. 400 nm
e. 400 nm

- 3) a. $4.12 \times 10^{14} \text{ s}^{-1}$
b. $3.0 \times 10^8 \text{ m/s}$

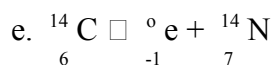
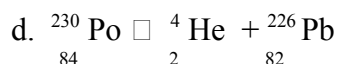
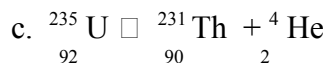
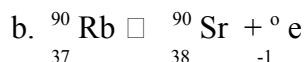
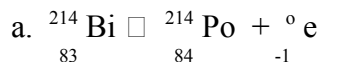
- 4) a. $4.04 \times 10^{-7} \text{ m}$
b. $4.92 \times 10^{-19} \text{ J}$

- 5) a. $3.0 \times 10^8 \text{ m/s}$
b. $2.19 \times 10^{19} \text{ nm}$
c. $1.37 \times 10^{-2} \text{ s}^{-1}$

6) **Element Math Game:** <http://education.jlab.org/elementmath/> $M - A = n$
(1st 36 elements) \parallel
 $P - e = C$

7) **Periodic Table of Isotopes :** <http://ie.lbl.gov/education/isotopes.htm>

8) Balancing Nuclear Equations:



9) Half-Life Problems:

- a. 1.25 mg
b. 2.5 g
c. 5.5 years

10) **Average Atomic Mass** = 207.22 amu