

Unit 6A Quest Review:
Atomic History & Structure, Nuclear Chem

Name _____
Date _____ **Block** _____

Atoms History

1. Fill in the missing information regarding the evolution of the model of the atom

Name of Scientist	Experiment	Sketch of Model	Major Idea/Discovery
	n/a		Atoms are a hard sphere. All atoms of a given element are identical in mass and properties.
JJ Thomson			
Ernest Rutherford			
	n/a		Electrons travel around the nucleus in well-defined paths (like planets in a solar system)
	n/a		Electrons have distinct amounts of energy and are found in orbitals—an area where an electron is most likely to be found

Atomic Structure, Isotope Notation

1. Complete the following chart.

Element	Atomic Number	Mass Number	# protons	# neutrons	#electrons
Sodium-24					
${}_{15}^{30}\text{P}^{-3}$					
Cobalt-60					
		25	12		10
${}_{80}^{200}\text{Hg}^{+2}$					
	34			44	36

2. What is the difference between an ion and an isotope?

Average Atomic Mass

Calculate the average atomic mass for each of the following isotopes. Show all work!

	Element	Mass	Percent Abundance
1.	Copper-63	62.9396 amu	69.17 %
	Copper-65	64.9278 amu	30.83 %

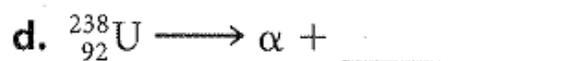
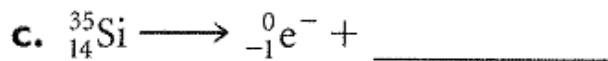
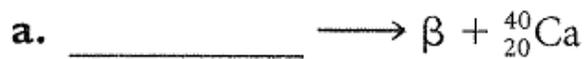
	Element	Mass	Percent Abundance
2.	Element Q-8	8 amu	10.0%
	Element Q-9	9 amu	20.0%
	Element Q-10	10 amu	70.0%

3. Look at the average atomic masses you calculated in 1&2 and compare it to the mass of the individual isotopes. Is the average mass closer to the mass of the
- Most abundant isotope, or
 - Least abundant isotope
- ***Why?

Challenge Problem: Chlorine has two naturally occurring isotopes, Cl-35 (mass 34.9689 amu) and Cl-37 (mass 36.9659 amu). If chlorine has an average atomic mass of 35.4527, what is the percent abundance of each isotope?

Nuclear Decay Equations, Half-Life

1. Fill in the missing parts of these nuclear reactions



2. Americium—241 is an alpha emitter used in smoke detectors. Write an equation for the decay of Am-241:

3. Write a nuclear equation to represent the beta decay of Kr—85

Half-Life

1. The fossilized remains of a plant found at a construction site contain $1/8$ the amount of carbon-14 that is present in a living plant. If the half-life of Carbon-14 is approximately 5715 years, determine the approximate age of these fossilized remains.

2. How much of an original 20.00-gram sample of nitrogen-16 remains unchanged after 36.0 seconds? The half-life of N-16 is 7.2 seconds.

3. The half-life of Co-60 is 5.26 years. A 10-gram sample of Co-60 is 21.04 years old. What was the original mass of Co-60?

4. What is the half-life of a radioisotope if 25 grams of an original 200-gram sample of the isotope remains unchanged after 11.46 days?