

Name:

Key

Date:

Pd:

Review: Unit 2: Atomic Structure and Nuclear Chem - Honors

Parts of an Atom

1. Complete the table below.

Subatomic Particle	Charge	Relative Mass (AMU)	Location in the Atom
Proton	+	1	Nucleus
Neutron	0	1	Nucleus
Electron	-	Very small	Energy Levels

2. What causes an atom to be electrically charged?

When $P \neq E$

3. Which subatomic particles are responsible for giving an atom its mass? Where are these particles located? Why is the other particle not included in the mass number?

P/N

↓
Too tiny!

Nucleus

4. Look at how the periodic table is arranged. What number is used to determine the order of the elements? (What is it CALLED, not where is it located)

Atomic # = # of Protons

Atoms, Ions, and Isotopes

5. How does an atom become an ion?

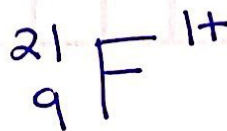
Gain/Lose e^-

6. Circle the correct choice to complete the sentences below.

- a. Sulfur must (gain/lose) electrons to become S^{2-} . S^{2-} is an example of a (cation/anion).
- b. Calcium must (gain/lose) electrons to become Ca^{2+} . Ca^{2+} is an example of a (cation/anion).
- c. If an two atoms of the same element have different masses, then they are called (isotopes/ions/atoms) and they have different numbers of (protons/neutrons/electrons).

7. Determine the mass number of an atom with 9 protons, 12 neutrons, and 8 electrons. Write the isotopic symbol for this atom.

$$9p + 12n = 21$$



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8. Atoms gain and lose electrons in order to attempt to achieve a valence shell configuration with 8 electrons. This is called the Octet Rule.

9. Explain the difference between mass number and average atomic mass.

That atom

All atoms of that element w/ abundance

10. Predict the charge (you will not have your colored periodic table on the test) of each ion and complete the table below.

Element	Symbol	# Protons	# Electrons (Neutral)	# Valence Electrons	Charge of Common Ion Formed	Cation/Anion?
Lithium	Li	3	3	1	1+	C
Chlorine	Cl	17	17	7	1-	A
Phosphorus	P	15	15	5	3-	A
Calcium	Ca	20	20	2	2+	C
Aluminum	Al	13	13	3	3+	C

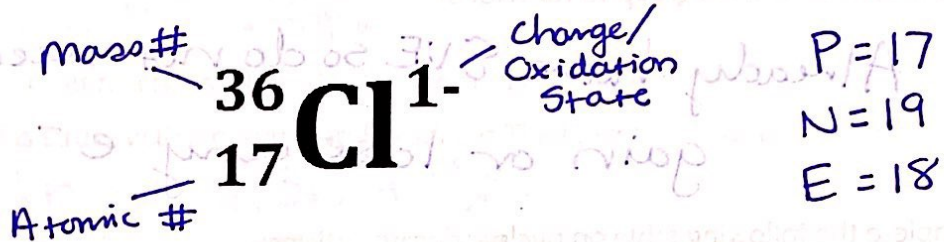
11. Label the groups, periods, valence electrons, and common ion formed on the table below:

	1																		8	
1	1+	2																		18
2																				
3			3	4	5	6	7	8	9	10	11	12								
4	1+	2+																		
5																				
6																				
7																				

6																				
7																				

Tip: 18 = 18 + 9 + 1

12. Identify each number in the isotope symbol below. How many protons, neutrons, and electrons are present?



13. Calculate average atomic mass for each of the following:

a. Rubidium is a soft, silvery-white metal that has two common isotopes, ^{85}Rb and ^{87}Rb . If the abundance of ^{85}Rb is 72.2% and the abundance of ^{87}Rb is 27.8% what is the average atomic mass of rubidium? Round to the correct number of sig figs (use the % abundance values).

$$\text{AAM} = (85 \times .722) + (87 \times .278)$$

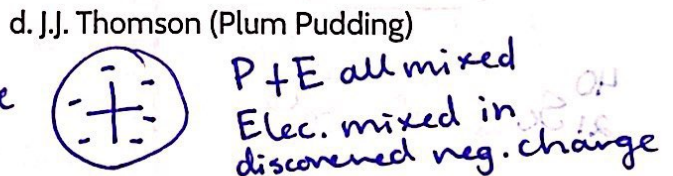
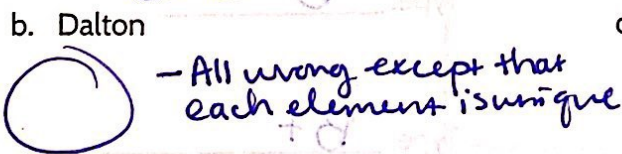
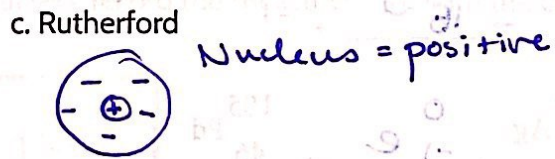
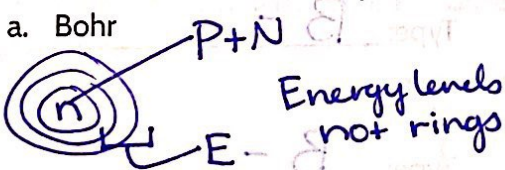
$$\text{AAM} = 85.6 \text{ amu}$$

b. An unknown element (X) contains 2 isotopes. The first isotopes has an abundance of 51.86% and a mass of 106.91 amu. The rest of the atoms have a mass of 108.91 amu. Determine the average atomic mass and the identity of the element. Round to the correct number of sig figs (use the % abundance and mass values) → 48.14%

$$107.87 \text{ amu}$$

Models of the Atom & Atomic Spectra:

15. Draw and describe each of the following models of the atom. Label the subatomic particles and parts of the atom. Also, identify what was incorrect about this model.



16. Which model was the first to contain/discover each of the following:

a. Energy Levels: Bohr

b. A Nucleus: Rutherford

c. Electrons: Thomson

d. Protons/Positive Charge: Thomson

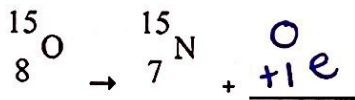
17. Why don't elements in group 18 form ions?

Already have 8 VE so do not need to gain or lose any e^-

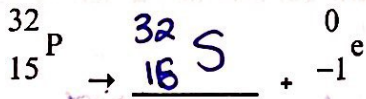
29. Complete the following table on nuclear decay particles:

Type of Decay	Decay Particle (draw symbol)	What does it do to the isotope?
Alpha	${}^4_2\text{He}$	-2 from Atomic # -4 from Mass #
Beta Negative	${}^0_{-1}e$	N releases $-1e \rightarrow$ turns into proton
Beta Positive	${}^0_{+1}e$	P releases $+1e \rightarrow$ turns into neutron
Gamma	${}^0_0\gamma$	Nothing

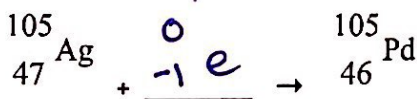
30. Complete the following nuclear decay reactions:



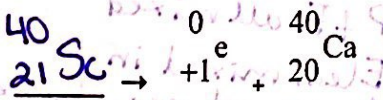
Type: B+



Type: B-



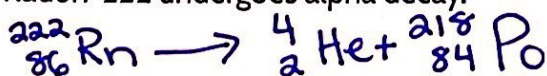
Type: B-



Type: B+

31. Write the following nuclear decay reactions:

a. Radon-222 undergoes alpha decay.



b. Polonium-210 releases a negatively charged particle with no mass during beta decay.

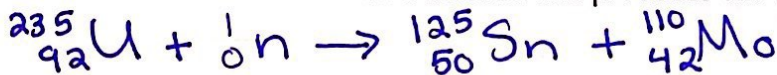


c. During a gamma decay process, Francium-221 releases energy.

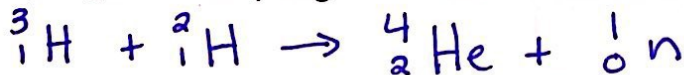


32. Write the following nuclear reactions. Then identify them as Fission or Fusion:

a. Uranium-235 is struck with a neutron and produces Tin-125 and Molybdenum-110



b. Hydrogen-3 and Hydrogen-2 combine to form Helium-4



33. Chromium-48 decays. After 6 half-lives, what fraction of the original nuclei would remain?

$$\frac{1}{64}$$

34. The half life of iodine-125 is 60 days. If you have 200 grams of I-125, how much would be left after 360 days?

6 HL

3 g

35. Palladium-100 has a half-life of 3.6 days. If one had exactly 6,000,000 atoms at the start, how many atoms would be present after 22.4 days?

6.222 HL

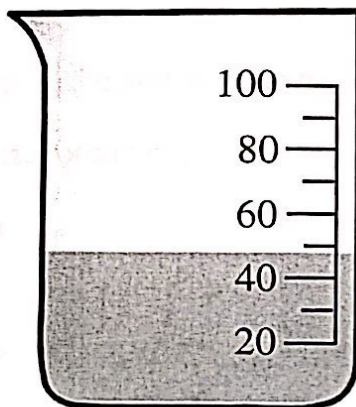
80,000 atoms

Workback Questions:

1. The frequency of a microwave is 1.98×10^{-4} MHz. What is this measurement in Hz. Round to the correct number of sig figs.

$$\frac{1.98 \times 10^{-4} \text{ MHz} \times 10^9 \text{ Hz}}{1 \text{ MHz}} = 198,000 \text{ Hz}$$

2. Assuming the following beaker is measured in milliliters, record the measurement with the correct uncertainty.



48 mL ± 5 mL

How many days would pass if a person traveled to Mars and it took 2.3 years to arrive. Round to the correct number of sig figs.

$$\frac{2.3 \text{ yr} \times 365 \text{ d}}{1 \text{ yr}} = 840 \text{ days}$$