

Unit 1-2: Matter and Measurement

- 1) Classify each of the following substances as; an element (E), a compound (C), a homogeneous mixture (hom), or a heterogeneous mixture (het).

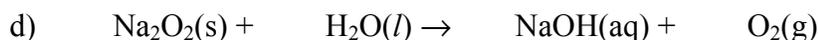
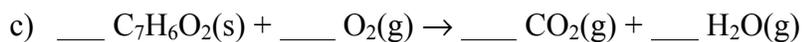
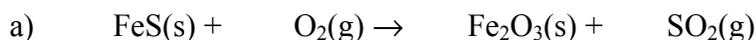
a) gold	b) aqueous potassium chromate
c) Gorp (trail mix)	d) stainless steel
e) phosphorous tribromide	f) yttrium
g) chocolate chip cookie	h) phosphoric acid

- 2) Determine the identity of an unknown metal (in g/cm^3) if a sample with mass 53.2 g increases the volume of water in a graduated cylinder from 23.13 mL to 30.59 mL.
- 3) What will be the **volume** of a 45.8 g sample of 1-butanol if the density of this liquid is 0.81 g/ml?

Unit 3: Moles and Stoichiometry (and a Specific Heat question)

- 4) What is the density (g/L) of SF_6 gas at STP. (*Hint: Assume you have 1 mole of SF_6 gas*)

- 5) Balance the following equations:



- 6) A 146 g piece of an unknown metal was heated to 100.0 °C in a boiling water bath, and then it was dropped into a beaker containing 55 g of water at 11.5 °C. The temperature of the water rises to 22.8 °C. What is the specific heat of this unknown metal? (*Use units of $\text{J}/\text{g}\cdot^\circ\text{C}$*)

Units 4-5: Basics of Atoms, History of atoms and Nuclear Chemistry

7) Fill in all missing information for each question: All symbols must have atomic # & mass #

Isotope	Symbol	Number of Protons	Number of Neutrons	Mass Number
a. boron-11				
b.	${}^{71}_{31}\text{Ga}$			
c.		84		210

8) a) Who discovered the electron? _____ by what experiment? _____

b) Who discovered the electron charge & mass? _____ by what experiment? _____

9) Determine the average atomic mass of chromium (Cr) on the distant planet D'Qar if it has the following distribution of Cr isotopes: 55.0% ${}^{50}\text{Cr}$ (49.946 amu), 35.0% ${}^{52}\text{Cr}$ (51.941 amu), and 10.0% ${}^{54}\text{Cr}$ (53.939 amu).

10) How is C-14 used in the dating of archeological relics? What is the maximum age for which this isotope is useful?

Unit 6-7: Modern Atomic Structure, Periodic Table and Trends, types of substances, Lewis Dots

11) What does the Heisenberg uncertainty principle state? How does it lead to the concept of orbitals instead of Bohr's planetary model?

12) Complete this table below given the electron configurations shown.

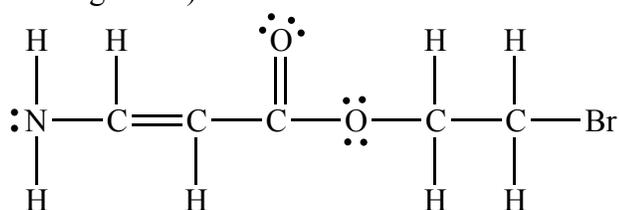
Electron Configuration	Symbol	Group #	Period #	Metal, NM, Metalloid	# of valence electrons	Charge of common ion
a) $1s^2 2s^2 2p^6 3s^2$						
b) $[\text{Ar}]4s^2 3d^{10} 4p^1$						
c) $[\text{Kr}]5s^2 4d^{10}$						
d) $[\text{Rn}]7s^2 5f^{14} 6d^{10} 7p^5$						

Unit 8: Bonding, Shapes, Reactivity

13) Complete the formulas or names of the following (mixed) compounds

Name to Formula	Formula to Name
a. hypobromous acid	f. CrO_3
b. dinitrogen pentoxide	g. ZnSO_3
c. sodium oxalate (don't reduce the anion!)	h. HCN
d. cadmium sulfide	i. $(\text{NH}_4)_3\text{P}$
e. nickel(II) dichromate	j. HClO_3

14) Draw a 3D model of this molecule. All bond angles should be correct. (Do not show an orbital diagram!!!)



1) Fill in this chart.

<u>Cmpd</u>	<u>Lewis Dot</u> (Show all lone pairs.)	<u>3D diagram</u> Put in δ^+ , δ^- charges or arrows.	<u>Electron & Molecular</u>	<u>hybridization</u>
			<u>Geometries</u> (of central atom)	<u>& ~bond angle</u> (109.5° , 120° , 180°)
a) SO_3^{2-}				
b) N_2H_2				
c) ClO_2^-				
d) SCN^- (C central)				
e) N_2O (NNO)				