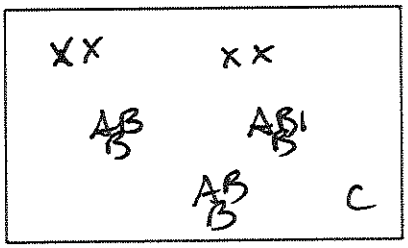
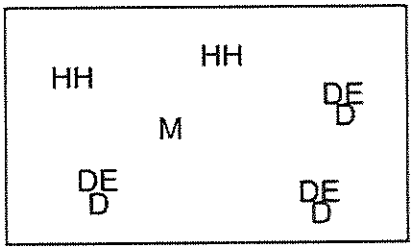
Semester 1 – General Chemistry Study Guide

Matter and Changes in Matter

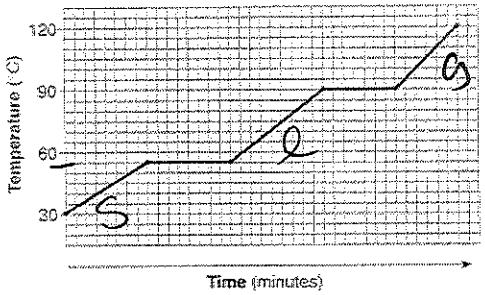
1. What is matter? anything that takes up space.

2. What is the difference between substance and mixture? List the two types of each.
   Substance – same throughout / Mixture – more than 1 substance.
3. Give an example of an element and compound. How are they different?
   ↳ Calcium → Ca ; CaO → more than 1 element
4. In the box below draw a mixture representing $2X_2 + 3AB_2 + C$





5. In the box above to the right draw out a formula that represents the box.
   $2H_2 + M + 3D_2E$
6. What are the indicators of a chemical reaction?
   → Energy
   → Color change
   → Precipitation
   → gas evolution
7. Underline the verb and label each process as chemical or physical change and explain why.
   ___a. perfume evaporating on your skin Physical
   ___b. butter melting physical
   ___c. wood rotting – Chemical – New substance
   ___d. charcoal heating a grill – New substance – Burn
   ___e. autumn leaves changing color – color change – Chemical
8. Label the heat curve with phase changes and phases

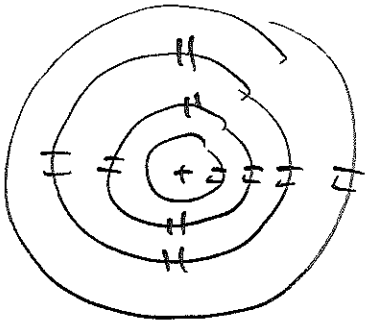


9. What is the melting point of this substance?
   55 °C

Atomic Structure

1. What substance determines the element? Protons
2. How many protons, neutrons, and electrons are in (assume neutral):
   C-12 p = 6 n = 6 e⁻ = 6
   I-128 p⁺ = 53 n = 75 e⁻ = 53
   128 − 53 = 75
   Nuclear symbol. $^{12}_{6}C$ $^{128}_{53}I$
3. How many electrons does each nuclear symbol have? $^{108}_{47}Ag^{+1}$ and $^{30}_{15}P^{-3}$?
   46 ↑ 18 ↑

4. Draw a Bohr diagram of a Calcium atom to the right?
   - How many energy levels? 4
   - How many total electrons? 20
   - How many valence electrons? 2



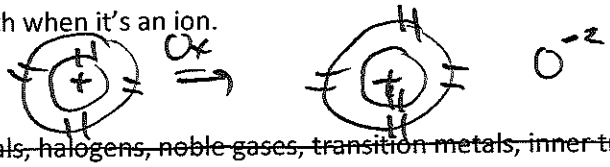
5. Give the number of valance electrons in
   Aluminum 3, Barium 2, Fluorine 7 and oxygen 6

6. What is the most likely (common) charge of
   Aluminum +3, Barium +2, Fluorine -1 and oxygen -2

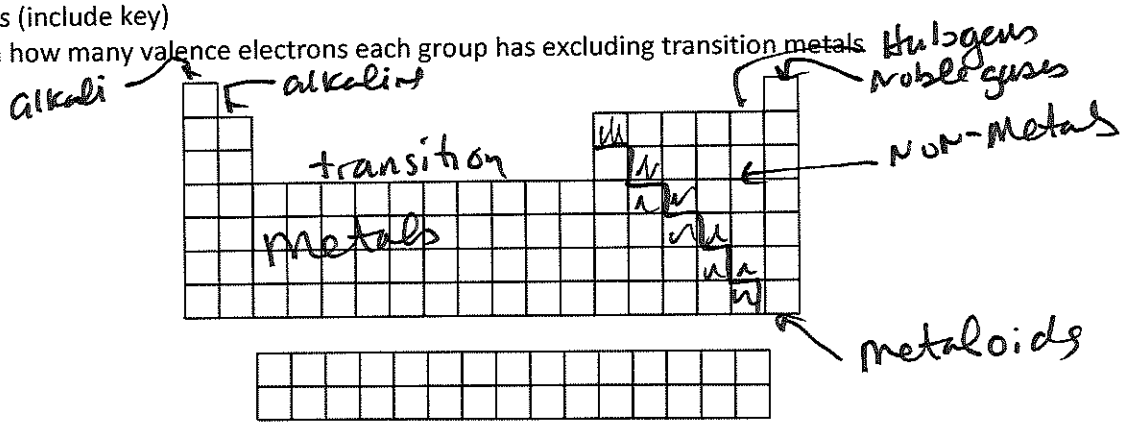
7. Alkaline earth metals, such as Barium, tend to _____ electrons (gain / lose and how many). What type of ion? 2e- cation +2
8. Halogens, such as Bromine, tend to _____ electrons (gain / lose and how many) What type of ion? 1e- anion -1

9. Why do noble gases not bond?
   - Stable due to a full valence shell.

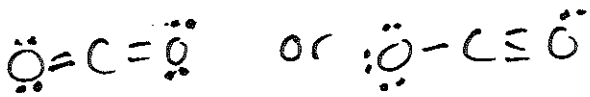
10. Draw a Bohr model for O-18 and then draw both when it's an ion.

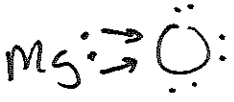


11. On the Periodic Table (on the next page):
    a. Label – ~~alkali metals, alkaline earth metals, halogens, noble gases, transition metals, inner transition~~ metals
    b. Draw in the zig-zag line/step. Then shade in metals, nonmetals, and metalloids with three different colors (include key)
    c. Label how many valence electrons each group has excluding transition metals



Bonding

1. Draw a Lewis dot diagrams of CO_2 

2. Draw a Lewis sketch of a MgO showing how the substance is formed. 

3. Write a dissolving equation for the following substances.
   a. MgO $MgO \rightarrow Mg^{+2} + O^{-2}$

   b. $NaNO_3$ $NaNO_3 \rightarrow Na^{+} + NO_3^{-1}$

Nomenclature – naming and writing formulas

1. $Ca(ClO_3)_2$ Calcium Chlorate
2. CO Carbon Monoxide
3. $KMnO_4$ Potassium Permanganate
4. CrO Cromium (II) oxide
5. N_2S_6 diNitrogen hexa Sulfide
6. $Fe(ClO_2)_3$ Iron (III) chlorite
7. $(NH_4)SO_4$ ammonium Sulfate

6. barium hydroxide $Ba(OH)_2$
7. iron (III) sulfate $Fe_2(SO_4)_3$
8. carbon tetrachloride CCl_4
9. lead (IV) chromate $Pb(CrO_4)_2$
10. aluminum nitrite $Al(NO_3)_3$
11. copper (II) acetate $Cu(C_2H_3O_2)_2$
12. barium phosphate $Ba_3(PO_4)_2$