

Name: _____ Period: _____ Date: _____

PERIODIC TABLE NOTES HONORS CHEMISTRY

Directions: This packet will serve as your notes for this chapter. Follow along with the PowerPoint presentation and fill in the missing information. Important terms / ideas are in all capitals and bolded!

- Organizing the Elements

-Chemists needed a way to _____ all the elements and those yet to be _____

-DOBEREINER (1829) grouped elements into _____, three _____ with similar _____

-NEWLANDS (1865) arranged elements in order of increasing _____ (properties repeated every _____ elements... "LAW OF OCTAVES")

- The First Periodic Table

-_____ (1869) published the first Periodic Table

-Arranged elements in order of _____ and similar _____

-Left spaces for _____ elements AND _____ the _____ using his table

***THE DISCOVERY OF _____ AND _____ HELPED CONVINCING SCIENTISTS OF THE _____ OF HIS TABLE... _____ PROPERTIES MATCHED THE _____ PROPERTIES!!**

- Problems with the Table

-Mendeleev thought some of the atomic masses were _____ so he broke his rules (placed _____ before _____ due to _____)

-Atomic _____ were not wrong... he just did not know yet that each element had a _____ number of _____!

- PERIODIC LAW:**

-MOSELEY (1913) developed the _____ Periodic Table

-Arranged elements in order of increasing _____

- Reading the Table

-PERIOD:

-GROUP:

*Three _____ of elements on the Periodic Table...

- Metals / Nonmetals / Metalloids

Group AND Location	Characteristics / Examples
<p>METALS:</p>	<ul style="list-style-type: none"> • About _____ of elements are in this class • High _____ (shiny) • Good _____ of heat and electricity • Typically _____ at room temperature (except _____) • DUCTILE: • MALLEABLE: • High _____ and _____ • Form _____ (+) • Ex:
<p>NONMETALS:</p>	<ul style="list-style-type: none"> • No _____ • _____ of heat and electricity • Most (not all) are _____ at room temp • Low _____ and _____ • _____ malleable or ductile • _____ • Tend to form _____ (-) • Ex:
<p>METALLOIDS:</p>	<ul style="list-style-type: none"> • Have properties of both _____ and _____ • Ex: • Ion formation depends on their _____

- Classifying the Elements

-Elements can be _____ into one of _____ different classifications:

- 1) **REPRESENTATIVE ELEMENTS** → Groups ____ to ____ (s and p orbitals are highest _____ but not _____)... Wide range of _____
- 2) **TRANSITION METALS** → _____ of table (electrons in _____ orbital)
- 3) **INNER TRANSITION METALS** → Two rows " _____ " (electrons in the _____ orbital)... **RARE EARTH METALS**
- 4) **NOBLE GASES** → Group ____ (p orbital and highest energy level _____)

- Representative Elements (Main Group Elements)

-**ALKALI METALS:**

-**ALKALINE EARTH METALS:**

-**Boron Group**

-**Carbon Group**

-**Nitrogen Group**

-**Oxygen Group**

Nothing special to know about these groups. They are just named based on the element that is at the top of the group on the table.

-**HALOGENS:**

- Transition Metals

-Groups _____ / _____ sublevel

-Charges _____ (+)

- Inner Transition Metals

- _____ and _____ series / _____ sublevel

- " _____ "

- NOBLE GASES:**

- Why Are Families Similar?

Each family has the _____ number of **VALENCE ELECTRONS** (_____) which determines an element's _____... All want _____!!

- **IONS:**

-Atoms in their elemental state are _____ (protons and electrons are _____)

-Atoms can _____ or _____ electrons giving them a _____

-Ions have _____ number of protons and electrons

- **CATIONS:**

-Atoms that _____ electrons become cations (loss of _____ charged particles)

-Formed from _____

- _____ of electrons _____ determines the _____ (1+, 2+, etc.)

-Ex:

- **ANIONS:**

-Atoms that _____ electrons become anions (more _____ charged particles)

-Formed from _____

- _____ of electrons _____ determines the _____ (1-, 2-, etc.)

-Ex:

- **Charge Formation**

-Think of it like _____...

LOSING electrons is _____!

GAINING electrons is _____!

- **What Determines the Charge?**

- _____ on the Periodic Table and _____!!

-Atoms want _____ electrons in their outer or highest energy level to be stable... They want to be like a _____! So they **GAIN** or **LOSE** electrons to accomplish this... Whichever is _____!!!!

1 H																	2 He
3 Li	4 Be	<ul style="list-style-type: none"> ■ hydrogen ■ alkali metals ■ alkali earth metals ■ transition metals ■ poor metals ■ nonmetals ■ noble gases ■ rare earth metals 										5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Unq	105 Unp	106 Unh	107 Uns	108 Uno	109 Une	110 Unn								

- Practice

-Determine if each of the following is a **cation** or **anion** and give the charge it forms:

a) _____:

b) _____:

c) _____:

d) _____:

- Periodic Trends

-Since the Periodic Table groups elements by similar _____, certain _____ can also be seen when the table is analyzed

-These trends can have similarities as you go across a _____ or down a _____...

- Factors Influencing Trends

1) **Electron Energy Level:**

2) **Nuclear Charge:**

3) **SHIELDING EFFECT:**

- **ATOMIC RADIUS:**

-Trend: _____ down a column and _____ going across a row

-WHY DOES IT FOLLOW THIS TREND?

- Group: As you go down a column, the number of _____ and _____ increase... so the radius _____! (**Factor #1**)
- Row: As you go across a row, all e- are in the same _____ and the nuclear charge gets _____, causing the outer e- to be held _____... so it _____! (**Factor #2**)

- **IONIC RADIUS:**

-Trend: _____ down a column and _____ going across a row for cations and anions, but cations are _____ and anions are _____

- Group: As you go down a column, the number of _____ and _____ increase... so the radius _____! (**Factor #1**)

- Row: Cations are _____ because as e- are _____ nuclear charge increases and holds tighter, while anions are _____ because as e- are _____ nuclear charge decreases and does not hold as tight... but each type still _____ as go across! **(Factor #2)**

- **IONIZATION ENERGY:**

-Trend: _____ down a column and _____ going across a row

-WHY DOES IT FOLLOW THIS TREND?

- Group: As you go down a column, _____ energy levels are added and the valence e- are more " _____ " from the pull of the nucleus, making it _____ to remove an e-... so it _____! **(Factor #3)**
- Row: As you go across a row, the nuclear charge gets _____ (holds e- tighter) and the orbital gets closer to being _____ which adds _____, making it _____ to remove an e-... so it _____! **(Factor #2)**

-Watch for EXCEPTIONS like _____, _____, etc.... WHY do they occur?: (answer)

-To remove a second e-, even _____ energy is required (gets _____ to steal) so Ionization Energy _____ with each electron removed!

- **ELECTRONEGATIVITY:**

-Trend: _____ down a column and _____ going across a row

-WHY DOES IT FOLLOW THIS TREND?

- Group: As you go down a column, more _____ are added, making the valence e- _____ from the nucleus and not held as " _____ " due to shielding... so it _____! **(Factor #3)**
- Row: As you go across a row, the nuclear charge _____, making it easier to attract e- to the atom... so it _____! **(Factor #2)**

- **ELECTRON AFFINITY:**

-Trend: _____ down a column and _____ going across a row

-WHY DOES IT FOLLOW THIS TREND?

- Think in terms of _____... the _____ the attraction to an e-, the more _____ is released! **(Same factors for the Group and Row as E- Neg)**

- Metallic / Reactivity

-As you go down a group of METALS, the metallic character and reactivity of the metals

-As you go down the HALOGENS, the reactivity _____! Therefore, the most reactive element in the halogen family is _____!!

- Practice

-Which has the **GREATER atomic size**?

-Which has a **LOWER ionization energy**?

-Which has a **HIGHER electronegativity**?

-Which has **LESS shielding**?

-Which is **MORE reactive**?

***NOTE: We will do this together!!**

Summary of Periodic Trends

	Atomic Radius (Size)	Ionic Radius (Size)	Ionization Energy	Electro-negativity	Electron Affinity	Metallic Character	Reactivity	Nuclear Charge	Shielding
Definition									
Trend ACROSS (left to right)							X		
WHY does it follow this trend going ACROSS?									
Trend DOWN (top to bottom)								X	
WHY does it follow this trend going DOWN?									