Name: _____ Period: ____ Date: _____

PERIODIC TABLE NOTES
ADVANCED 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 CONVINCE 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**:

  -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:

- **NONMETALS**:

  -No _____

  -_____ of heat and electricity

  -Most (not all) are _____ at room temp

  -Low _____ and _____

  -_____ malleable or ductile

  -_____

  -Tend to form _____ (-)

  -Ex:

- **METALLOIDS**:

  -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**:

  -**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 _____…

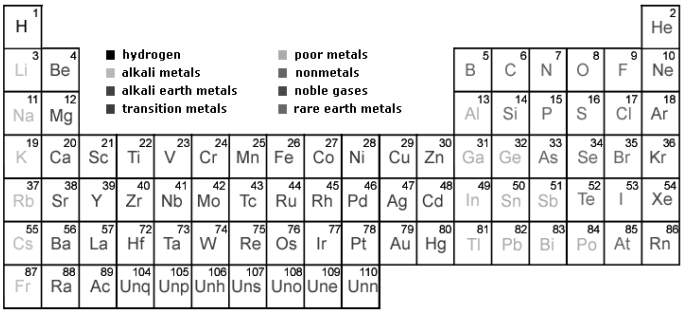
  LOSING electrons is _____!

  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 _____!!!!



- 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 _____!

  - Row: As you go across a row, all e- are in the same _____ and the nuclear charge is _____, causing the outer e- to be held _____… so it _____!

- **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 pull off an e-… so it _____!

- 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 pull off an e-… so it _____!

-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 energy levels are added, making the valence e- farther from the nucleus and not held as "_____" due to shielding… so it _____!

- Row: As you go across a row, metals are more likely to _____ e- to form cations, while nonmetals want _____ e- to be stable, forming anions … so it _____!

- **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!

- Metallic / Reactivity

-As you go down a group, the metallic character _____ as well as the reactivity

-Exception: _____… As you go down the family 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?**

SUMMARY OF PERIODIC TRENDS