Semester 1 Review

Period 1

#1 team Sig figs, measurment, calculations, density

✓ All nonzero digits are significant

- "trapped" zeroes are significant

- zeroes to the left of the first nonzero digits are not significant.

- zeroes

density

$d = \frac{m}{V}$

- Rules for rounding
1. $x > 5$ increase by one
2. $x < 5$ decrease by one
3. 5 followed by nonzero digit increase by one

Sig Figs in Multiplication

Ex. 6 m: 3.00 m = 18 = 20 (number sig figs)

Measurement Notes

1. Find the smallest increment on the scale of the device
2. Read the measurement to that place
3. Now estimate one place to the right of that measurement (to the nearest 10th of the sm increment)

exp.: 1.13 − 1.1 = .03
with sig. = .0

Use the nu
with smallest
figs. to roun
that place.

Team #2

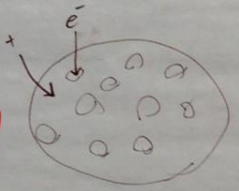
allelements are composed of atoms

Democritus called nature's basic particle an atom.

Thompson discovered electons.

Dalton's theroy:

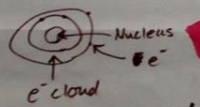
1. All matter is made of atoms
2. Atoms of one element are identical. Atoms of different elements differ in size shape ect...
3. Atoms cannot be split, created, or destroyed
4. Atoms of different elements combine in simple whole number ratios to form chemical compounds
5. In chemical reactions atoms are combined seperated or rearanged



Plum Pudding Model

Domocritus discovered atoms

- Gold Foil Experiment (Rutherford)
- Planetary Model

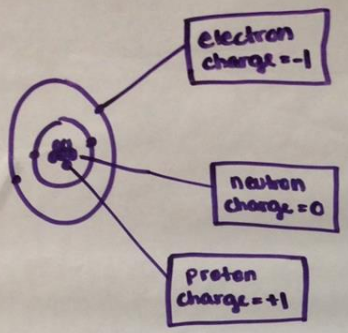


Bohr's model of the atom shows different levels of the atom + position of the nucleus

~~# elements is composed of atoms~~

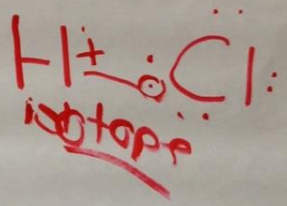
Atoms are mostly empty space

Team 3



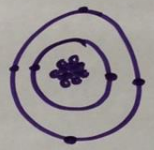
$n^0 + p^+ = 1 amu$

$e = 0 amu$



Carbon 12

carbon 13



electrons are located in the shells around the nucleus

Atomic mass = protons + neutrons

Electrons are in constant motion around the nucleus, protons + neutrons jiggle within the nucleus + atoms jiggle within the protons + neutrons.

Energy Levels

- The farther out the higher the energy.
- When an atom falls, it looses energy.
- Goes up, it gains energy

Team 4: electron configurations, exceptional electron configurations, energy levels, sublevels, and orbitals

The arrangement of electrons in an atom is known as the atoms electron configuration.

Al^{+3} - cofiguratico

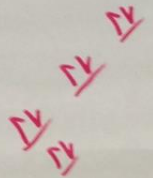
Iron has multiple cofigurations
Iron (II) Iron (III)
Iron (VI)

- written, they look like: $\frac{}{1s}\ \frac{}{2s}\ \frac{}{2p}$ .. with up and down arrows on each blank.
- Electrons fill the lowest energy levels first.

- Groups VIB 6 and IB 11 have exceptional electron configurations.

- orbital notation follow rules of orbital notation - aufbau principle,

electron diagram



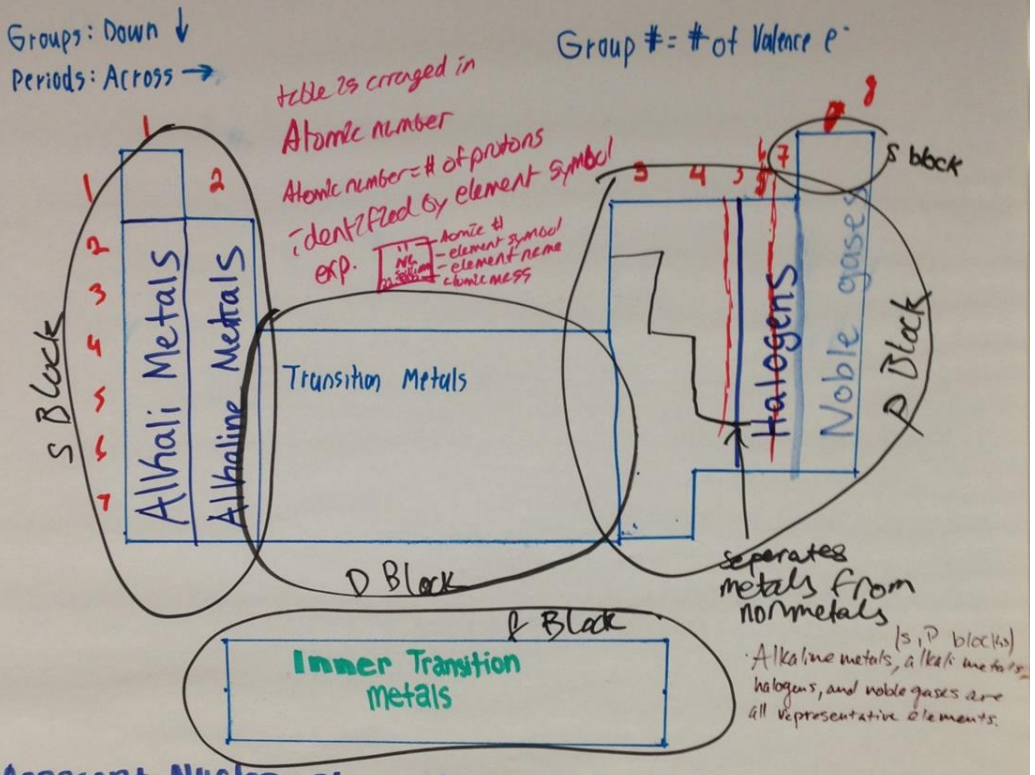
- Aufbau Diagram-

1s (2e⁻)				
2s	2p (6e⁻)			
3s	3p	3d (10e⁻)		
4s	4p	4d	4f (14e⁻)	
5s	5p	5d	5f	
6s	6p	6d		
7s	7p			

- When doubling, they have to be opposite spins

electron configuration is the distribution of electrons of an atom or molecule in atomic or molecular orbitals. exp: $1s^2, 2s^2, 2p^6$

Team 5: Periodic Table



- Apparent Nuclear strength increases across + decreases down
- Atomic Radii decreases across + increases down
- electronegativity increases across + decreases down
- ionization energy increases across and decreases down

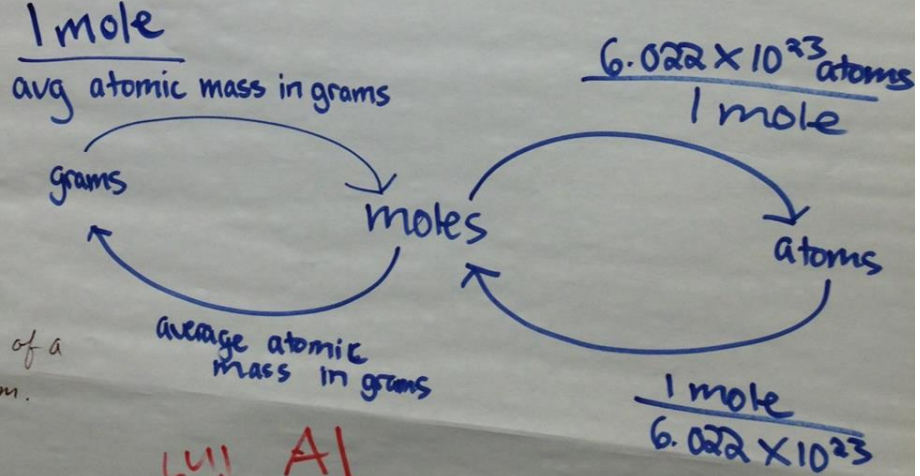
Team

Mole = 6.022×10^{23} atoms

Mole is like 1 dozen it equals 12 objects. But objects can be any size + weight exp. 12 elephants weigh more then 12 eggs

Moles to atoms = divide by 6.022×10^{23}
Atoms to moles = multiply by 6.022×10^{23}

Mole is a unit to express the amount of a chemical substance
12g of carbon is 1 mole equivalent



Amu = 1/12 of a carbon 12 atom.

64.1 Al

64.1 g × $\frac{1 \text{ mol}}{26.98 \text{ 1538 g Al}}$ = $\frac{64.1}{26.98 \text{ 1538}}$

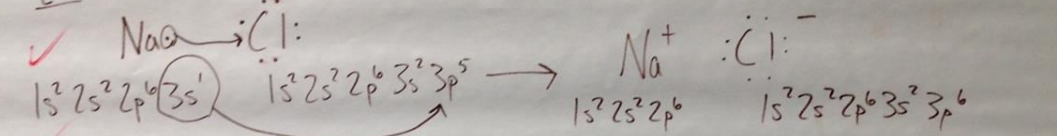
2.37 mol

2.375 6985 2

TEAM 7: Ionic bonding, formula writing and naming

- Compounds composed of cations and anions are called ionic compounds.
  - Cations = Metal (+) Anions = Nonmetal (-)

Ex:



- Ionic Bonds: The electrostatic forces that hold ions together in ionic compounds.

- Chemical bond that involves attraction between oppositely charged ions

- Formula writing steps
  1. Sodium nitride
  2. metal cation → Na^{+1}
  3. symbol of nonmetal anion → N^{-3}
  4. Combine → Na_3N

Formula Naming:

cation
- NH_4^{+1} → ammonium
- metal? → use PT (check for multiple oxidation states)

"Ide"

Ammonium chloride

Ne

$1s^2 2s^2 2p^6$
octet

- Elements/atoms want to have an electron configuration like the noble gases.

Period 2

Sig Figs. Calculation.

Measurements, Density

2 sig figs
11

* All non-zero digits = significant
* Trapped zeroes are significant
3 sig figs
101

* Zeroes to the RIGHT of decimal point, and a non-zero # are significant.
1.01 ← 3 sig figs

* Density = $\frac{mass}{volume}$

* measurements = find smallest increment on the scale of the device, read measurement to that place.
* volume = milliliters or liters
* mass = kilograms or grams

$V = \frac{D}{m}$

$m = D \times V$

* in a multiplication problem the amount of sig figs in the smallest number is the same amount that will be in the answer

- When multiplying, add exponents
  When dividing, subtract exponents
- When adding or subtracting, exponents must be the same
  * if they are not, move the decimal to change the exponent

"Rule of thumb" for measurements
Read measurements 1 place to the right of the smallest increment on the scale - the last digit is estimated.
10th 1th

Time is a quantity

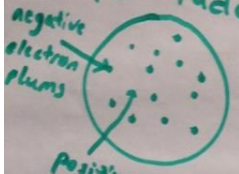
Examples: $3.752 \times 6.328 =$

23.7193936
TO SIG FIGS
23.72

History of Atomic Theory

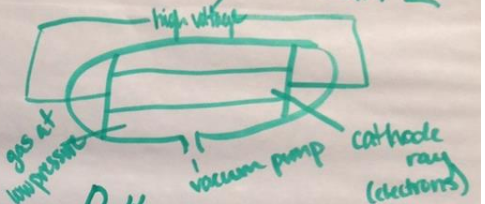
Team 2

Plum Pudding Model



Democritus

First theorized about atom



Dalton

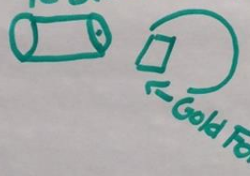
First atomic Theory

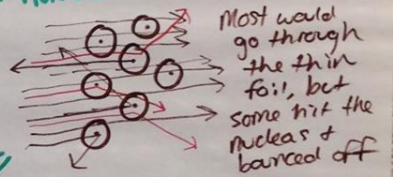
Thomson

used a cathode ray to discover electrons

Rutherford

Gold Foil Experiment to discover the nucleus





Bohr

Discovered energy levels by looking at the electromagnetic spectrum of a hydrogen atom. Created planetary model

modern atomic theory

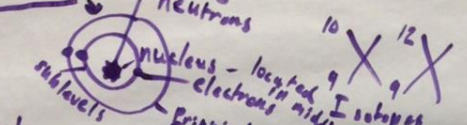
4. Chemical reactions occur w/ atoms

- Schroedinger's equation helped lead to the quantum model involving electron clouds

- All elements are composed of atoms, Indivisable and Indestructible Particles.
- All ~~same~~ Atoms of the same element are exactly alike.
- In any compound, the atoms of the different elements in the compound are joined in a definate whole-number ratio such as 1 to 1, 2 to 1, 3 to 2 ect.

Team 3

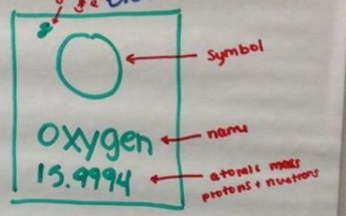
Atomic number = # of protons or electrons.



protons: + positive 1 AMU
neutrons: 0 neutral 1 AMU
electrons: − 0 amu

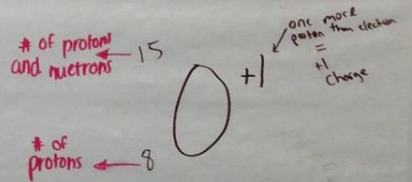
Valence are the outermost electrons in the outer ring of the atom ← # of electrons in the outer energy level of an atom

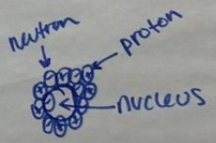
Isotopes have the same # of protons but different # of neutrons



# of Protons - identifies the element

nucleus always positively charged





electrons = negative or − -not included in atomic mass

isotopes - hydrogen 1, 2, 3

hydrogen 1 = 1 proton
H 2 = 1p+ 1n
H3 = 1p+ 2n

0 neutrons
P = Proton
n = neutron

hydrogen-1	$^{1}_{1}H$	0 neutrons, 1 proton, 1 electron
hydrogen-2	$^{2}_{1}H$	1 proton/electron, 1 neutron
hydrogen-3	$^{3}_{1}H$	1 proton/electron, 2 neutrons

Team 4

Aufbau Diagram

1s
2s
3s — 2p
4s — 3p
5s — 4p — 3d
6s — 5p — 4d
7s — 6p — 5d — 4f
7p — 6d — 5f

to occupy the same orbital, electrons must be of opposite spin.

fill in all boxes with an up arrow first.

If electrons remain, fill in the boxes with down arrows from left to right.

1s 2s 2p

Cd

$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^1$

$1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 \cancel{5s^2} 4d^1$

1s 2s 3p 2p

Put all the orbitals in numerical order.

first

Exceptional ones

Cu Cr

electrons fill an atom from low to high energy

S P D

atoms are most stable with full or half-full sublevels

exceptional electron configuration

Rules of electron configuration

1. Aufbau - fill lowest energy 1st
2. Pauli exclusion - orbital may describe at most 2 electrons
3. Hund's rule - One electron per orbital till orbital is filled

Abreviated notation

Put last noble gas in brackets, finish configuration

Ca = [Ar] $4s^2$

Periodic Table

27 synthetic (man made) elements
91 natural

The PT has multiple trends in groups/periods

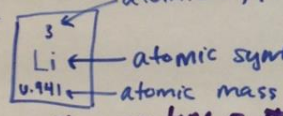
Elements in a group have the same amount of valence electrons (excluding He)

- Metals on the left, non-metals on the right
  * except for H (which is special). acts as an alkali metal and a halogen

- Noble gases are furthest to the right, they have 8 valence electrons and do not form compounds perfect set meaning they don't react except for Xenon (you can force it)

- ~~Elliot~~ Alkali metals and Halogens react
  - 4 unconfirmed elements
  1 valence e^- — 7 valence e^-

- Periods are horizontal, groups are vertical

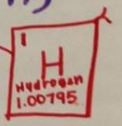
- 

same

protons + neutrons = atomic mass

mass of p^+ = 1 amu mass of e^- = 0 amu

mass of n^0 = 1 amu



mass # - protons = # neutrons

Atomic size decrease across a period and increases down a group

☺ - Mercury (Hg) is the only liquid metal @ room temp
Bromine (Br) is the only liquid non-metal

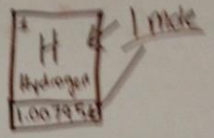
- Hydrogen acts as both an alkali metal and a Halogen

- The alkali metals get more reactive as you go down the group

- Protons have a positive charge, electrons have a negative charge, neutrons are neutral

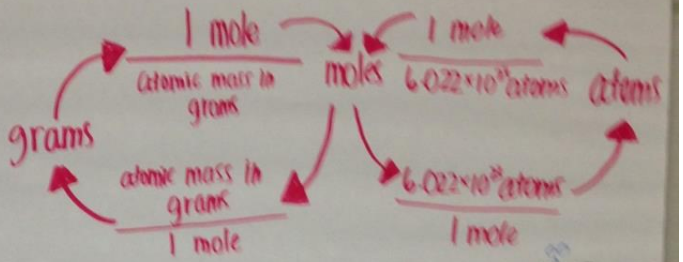
- Some elements have multiple oxidation states (mostly transition metals)
  they make the transition from metals to nonmetals

Team 6



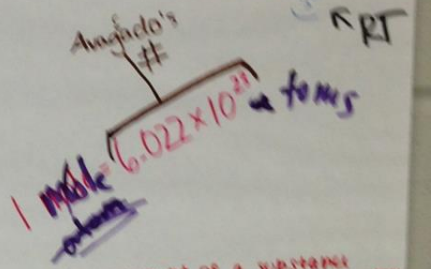
1 mole = contains as many particles as there are atoms in exactly 12 g of Carbon-12

When solving mole problems you get the atomic mass from the PT.



Moles are a quantity, not a quality.

* use significant figures in your answer.



PT

* a mole is the amount of a substance that contains as many particles as there are atoms

1) All non-zero digits are significant :)
2) "Trapped" zero's are significant
3) Zeroes to the left of the first non-zero digits are not significant, such zeroes merely indicate the position of the decimal point.
4)

4 sig figs: 1.000
3 sig figs: 1010
2 sig figs: 00001

example:

* How much does 0.050 moles of phosphorus mass?

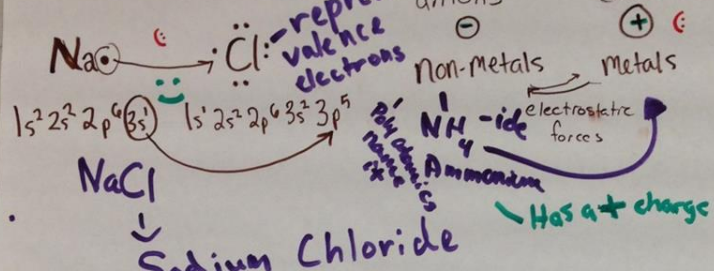
$$\frac{0.050 \text{ moles}}{1} \times \frac{30.9738 \text{ g}}{1 \text{ mole}} = \boxed{1.5 \text{ grams}}$$

USe DA To help Solve

:)

Team 7

Ionic Bonding



Naming Ionic Compounds

Step 1 - Name the metal

- If more than 1 charge is possible write in Roman Numerals
- + add "ide" to non-metal name
- Most polyatomic ions end in -ate, -ite

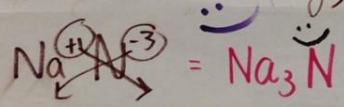
Polyatomic ions (a lot more!!)

Ammonium	NH_4^{1+}
Acetate	$C_2H_3O_2^{1-}$
Hypochlorite	ClO^{1-}
Chlorite	ClO_2^{1-}
Chlorate	ClO_3^{1-}
Hydroxide	OH^{1-}
Nitrate	NO_3^{1-}
Nitrite	NO_2^{1-}
Carbonate	CO_3^{2-}
Sulfite	SO_3^{2-}
Sulfate	SO_4^{2-}
Phosphate	PO_4^{3-}

Formula Writing

- Write symbol for metal cation
- Write symbol for non-metal anion
- Add subscript numbers to balance charges (the criss-cross thing)

- Put polyatomic ions in parentheses if more than one is needed $(NH_4)_3N$



Period 3

Sigfigs, calculations, measurement, densit

whole #s all significant

0's inbetween #s are significant

4.00 3 sig figs .004 1 sig fig

Counting #s have [redacted] unli
sig figs

4,000 1 sig fig
4,000.4 sig fig

Measurement round to # of sig figs

× mutiplication - round to least # sig figs
÷ division
+ adding
− subtraction
> rounded to last decimal place

When in Scientific Notation, Numbers in ↓ is your sig fig
1.32×10^{15}

density = mass / volume
D = m/v

Use scientific notation to represent very large or very small numbers

Ex: 9215337×10^{6}
7 sig figs
does not count as sigfigs

Accuracy ≠ Precision = NOT the same thing

Density is a Physical Property

Quanity is something that has magnitude, size, or amount scientists agreed on measurement system SI.

If you're unsu
how many sig figs
Put it in scientific
notation

Find the smallest incorment on the scale of the device

Dalton

Atomic Theory

1. All matter is composed of atoms
2. All atoms of an element are identical in their properties. Others differ in these properties.
3. Atoms cannot be subdivided, divided, destroyed, or created.
4. Atoms combine in simple whole-number ratios to form chemical compounds.
5. In chemical reactions, atoms are combined, separated, or rearranged.

Democritus

first developed idea of atom (↑ "indivisible" in Greek)

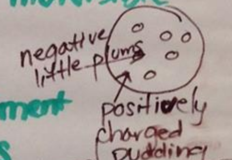
↖ he was gre[...]

Thompson

Charge of electrons – Cathode ray

Plum Pudding Model

Disproved that atoms are indivisible



Rutherford

Alpha particles – Gold foil experiment

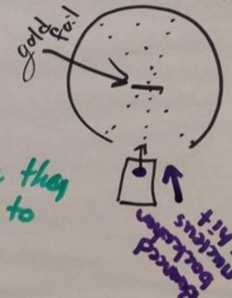
Discovered nucleus

when electrons were deflected? he figured there must have been a ball of mass

Evidence for Atomic Theory

Law of Conservation of Mass

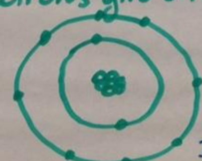
Rutherford's Model



Bohr

Created Planetary Model

Electrons give off bands of light when they drop from high to low energy



It's called the Planetary Model because it shows the electrons "orbiting" the nucleus like how planets orbit the Sun.

Law of Conservation of Mass
- Mass is not created or destroyed in reactions

Law of Definite Proportions
- Compounds have a fixed composition that does not change.

Law of Multiple Proportions
- In compounds, the masses of elements form simple, whole number ratios.

Atoms :)

- **Protons** (P+)
  - Positive charge
  - In the Nucleus
  - Mass of 1

Strong nuclear force keeps them from repelling in the nucleus

- **Neutrons** (n°)
  - No Charge
  - Located in the Nucleus
  - Mass of 1

- **Electrons** (e-)
  - negative charge
  - no apparent mass
  - in electron cloud

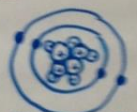
mass number
- # of p+ + # of n°

atomic number
- # of p+ & # of e- in an atom

mass # - atomic #
- # of n°

Basic building blocks of matter is atoms

Isotopes have different # of neutrons but same # of protons



Beryllium Example

Ions have a different # of e-

Average atomic mass (to 1 mole of that element in grams)

Planetary Model
- The atomic Model proposed by Bohr
- e- orbit around nucleus like planets around the sun.

You need the same # of p+ and N to have a stable atom.

Mass number and Average Atomic Mass NOT the same!!

* The most recent model of the atom, shows shells which when closer to the nucleus has a higher likelyhood of finding electrons!

Electrön Cönfiguratiöns

Aufbau - electrons fill from low → high energy levels

Pauli's Exclusion - 2 electrons per orbital. Electrons spin in opposite directions

Hund's Rule - one electron per orbital before you begin to double up

Fluorine (9)

↑↓	↑↓	↑↓	↑↓	↑
1s	2s	2p	2p	2p

principal energy level → 1s^2 ← # e^- in orbital

s ← shape of the orbital

Abbreviated Electron Configurations

[Noble gas in period above]

Aufbau Diagram :)

1s
2s 2p [redacted]
3s 3p 3[redacted]d
4s 4p 4d 4f
5s 5p 5d 5f

s^{2-} p^{6-} d^{10-} f^{14-}

Calcium = [Ar]$4s^2$
or
$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

Exceptional Configurations

Cu [Ar] $3d^{10} 4s^1$
Ag [Kr] $4d^{10} 5s^1$
Au [Xe] $4f^{14} 5d^{10} 6s^1$

empty s sublevel with a full d level ($s^1 d^{10}$) requires less energy

Periodic Table

→ Periods (PT)

↓ Groups ...

Metals, nonmetals, metalloids

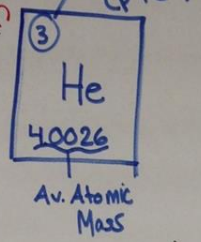
Shiny — conduct — solid (exc. Hg)

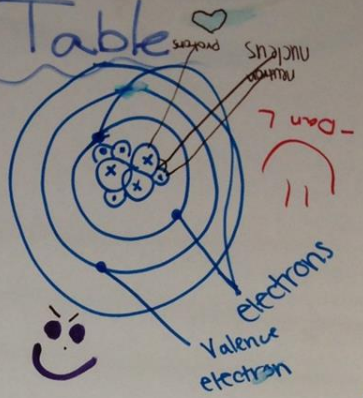
Don't conduct — Dull, Brittle — solids, liquids, gas.

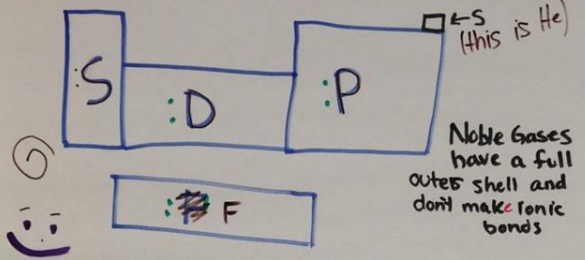
Around the metal/non-metal mark

1-8 Valence Electrons

S and P blocks







Noble Gases have a full outer shell and don't make ionic bonds

* hydrogen & its Periodic issues !!

- related to 1+ families
- weird properties
- acts like alkali metal & halogen but is neither

Atomic radius (NG✓) ↓ Increases, Dec. →

Ionization energy (NG✓) Apparent nuclear strength (NG✓) ↓ Dec. Inc. → Electronegativity (NGX)

(F is the most electronegative element)

Group	1	2	3	4	5	6	7	8
Valence e⁻	1	2	3	4	5	6	7	8
Type	Alkali	Alkaline						

Halogens -> gain e⁻ to be like Noble Gases

Transition Metals can sometimes form multiple ionic bonds

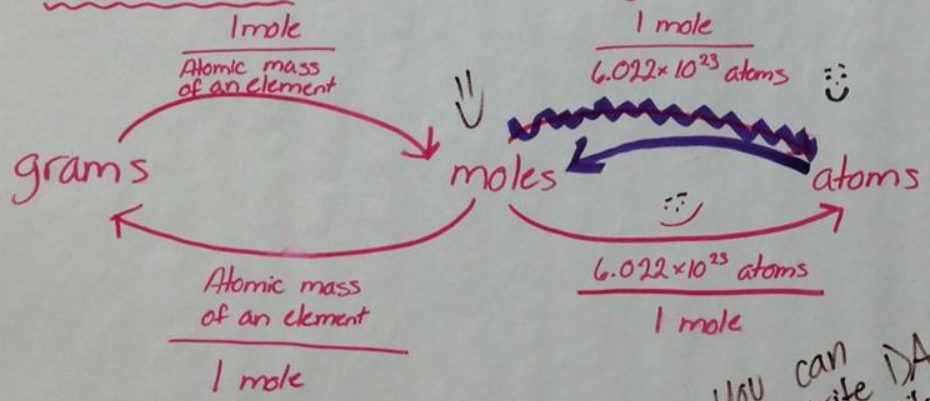
Xe can be forced to make an ionic bond

Mole Concept :)

- When you're solving a problem you use dimensional Analysis.
- A mole is the amount of a substance that contains as many particles as there are atoms in exactly 12 g of Carbon-12.
- It's like a dozen because there's 6.022×10^{23} atoms in a mole just like there's 12 things in a dozen.
- To convert from atoms to moles divide by 6.022×10^{23}.
- To convert from moles to atoms multiply by 6.022×10^{23}.
- Molar Mass is the mass in grams of one mole of a substance.

-Dan L

remember to include units in your work



6.022×10^{23} is known as Avogadro's Number.

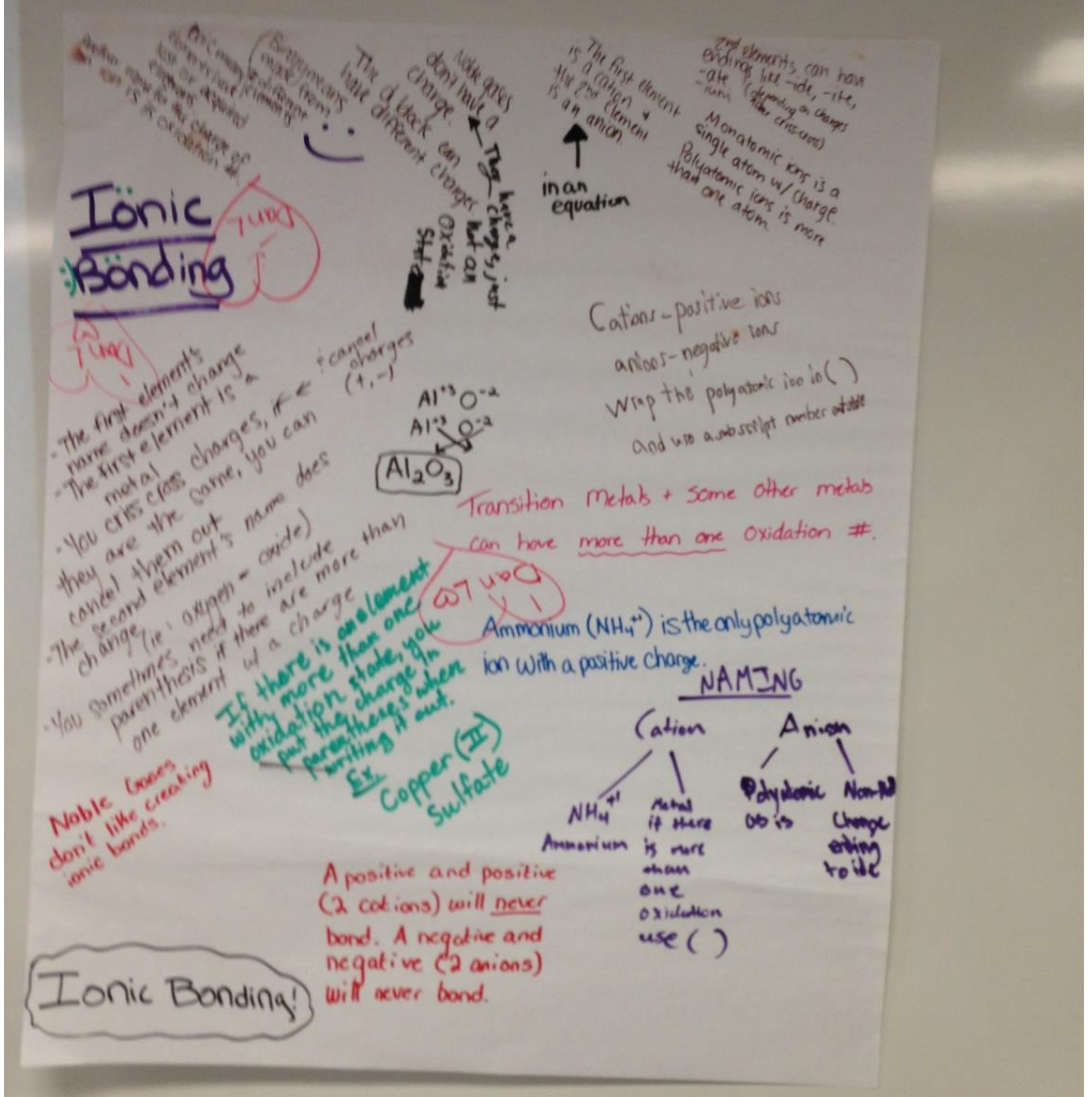
avocados

The Atomic Mass on the periodic table is one mole of that specific atom

Karli R.

- year - month - day - hours - seconds :)

You can also write DA work like


Ionic Bonding
The first element's name doesn't change
The first element is a metal
You cris cross charges, if ∈ cancel charges (+,-)
they are the same, you can cancel them out
The second element's name does change
Sometimes, need to include parenthesis if there are more than one element of a charge
Noble gases don't like creating ionic bonds.
Al+3 O-2
Al2O3
Transition Metals + some other metals can have more than one oxidation #.
If there is an element with more than one oxidation state, you put the charge in parentheses when writing it out.
Ex. Copper (II) Sulfate
Ammonium (NH4+) is the only polyatomic ion with a positive charge.
NAMING
Cation
Anion
NH4+ Ammonium
Metal if there is more than one oxidation use ( )
Polyatomic ide/ite
Monatomic Change ending to ide
A positive and positive (2 cations) will never bond. A negative and negative (2 anions) will never bond.
Ionic Bonding!
Cations - positive ions
anions - negative ions
Wrap the polyatomic ion in ( ) and use a subscript number outside
in an equation
Monatomic ions is a single atom w/ charge.
Polyatomic ions is more than one atom.

Period 5

Team 1

Quantity- something that has magnitude, size, or amount.

2 sig figs
1 sig fig
9.0 + 9 = 18 (20) 2 sig fig

Density = mass / volume

9.01 + 8.0 = 17 (8.2) 2 sig figs

19 x 8 = 152 (.17)

add decimal at the end of a number with 0's to show sig figs 100.-1 sig fig 100.-3 sig figs

28.6 → 3 sig figs

910 → 2 sig figs

+/-

* round answer to smallest # of places past decimal

X/÷

# of sig figs round answer to fewest # of sig figs

100 = 1 sig fig
100.0 = 3 sig figs

Placeholder zeroes aren't significant

Significant Figures are measured

# of sig figs-
45.6 cm = 3
.00040 g = 2
10000 = 1
110.00 = 5
3.36 mL + 7.1 mL = 10.5 mL

The math is easier using scientific notation, and you are less likely to make a mistake.

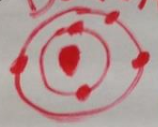
$10^0 = 1$

Team 2

5th Century B.C.E. - Democritus (Greek Philosopher) hypothesized that all matter was made of smaller particles called "atoms"

18th Century C.E. - Chemists prove with three laws that atoms exist

Bohr's Model

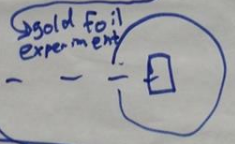


Modern Model

Rutherford found the nucleus with his gold foil experiment

Rutherford found that the nucleus was the source of the positive charge of an atom

J.J. Thomson
- Plum Pudding
- Cathode Ray Tube
- He discovered that electrons were negatively charged particles.



Dalton's atomic theory
- all matter composed of atoms
- atoms of same element identical
- atoms can't be destroyed
- different elements combine
- chem reactions rearranged

Modern Model of the Atom

- Protons and neutrons are in the nucleus.
- There are electrons orbiting the nucleus
- Mass of protons and neutrons are about 1 amu
- electron mass is 0. ← almost 0 amu
- Electrons have a negative charge
- Protons - positive charge
- neutrons - neutral charge
- electrons are located in the electron cloud (around nucleus)

Dot Structure

H· nucleus electron shell

- also known as Bohr's model

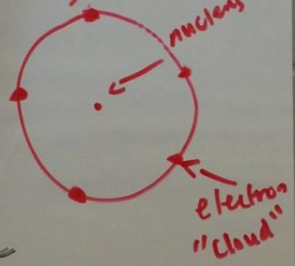
Takes energy for electrons to fall back toward the nucleus

~~electrons~~ electrons are in Constant Motion.

atom's diameter greater than the length of 30 football fields

nucleus is a lot smaller than the electron cloud

electrons would be less than the diameter of human hair.

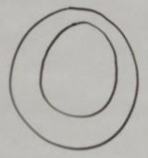


An atom is now defined as the smallest particle of an element that retains the chemical properties of the element.

Team 4: Electron Configuration

- Aufbau Diagram - electrons enter orbitals of lowest energy first
- Different Sublevels (S, P, D, f)
- Hund's rule - electrons occupy orbitals of equal energy
- Pauli exclusion Principle - An atomic orbital may Describe at most 2 electrons.
- Example: Li | ↑↓ 1s | ↑ 2s | — 2p | — 3s | — 3p | — | $1s^2 2s^1$

• the arrangement of electrons in an atom is known as the atom's electron configuration.



7 energy levels

• exceptional electron configurations.

↑↓ 1s — Always starts with an up arrow.

• electrons fill orbitals in an energy sublevel once before "doubling up"

example: ↑↓ 1s ↑↓ 2s ↑↓ ↑ ↑ 2p ← not correct

↑↓ 1s ↑↓ 2s ↑ ↑ ↑ 2p ← correct

Valence electrons are the electrons in the outer shell of the atoms. Electrons in the same orbital have opposite spins

S = $2e^-$

P = $6e^-$

d = $10e^-$

f = $14e^-$

Aufbau

1s
2s 2p
3s 3p 3d
4s 4p 4d 4f
5s 5p 5d 5f
6s 6p 6d
7s 7p

* Valence electrons are the # of electrons in the atoms outermost shell

* 1st ionization energy increases across and decreases down the Periodic table.

* Dividing line between metals and non-metals
* Electronegativity increases across (left) decreases down. (right)

* Atomic radii decreases across a group and increases down a period

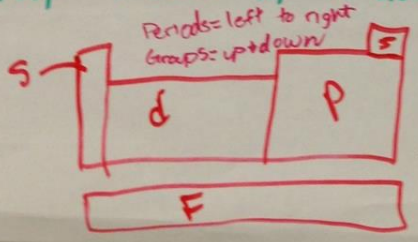
* Metals are good conductors, ductile, shiny.

* Noble gases are in the 8th Columnand have ~~8~~ valence electrons.
8 or 2 (Helium)

inter transitions
↳ runs @ the bottom

- Nonmetals like to gain electrons metals like to lose electrons
- Electronegativity doesn't inc. noble gases
- Perodic trends - left to right
  Group trends - up to down

alkali alkaline
↓ ↓



Alkali metals are highly reactive

1st group

2nd group

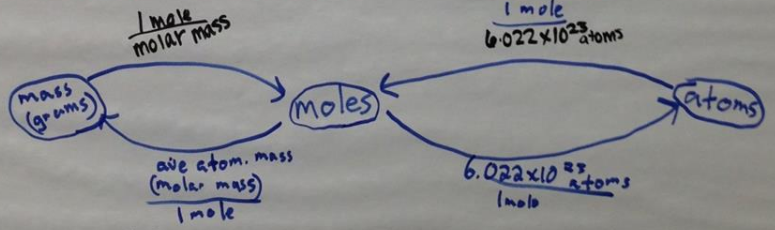
- Noble gases have no commonly formed ions

Mole Concept

- a mole is a quantity, not a unit (like a dozen)

* Avogadro's number: 6.022×10^{23}

- A mole is the amount of substance that contains exactly as many particles as there are atoms in 12g of Carbon-12
- To convert from atoms to moles: divide by 6.022×10^{23}
- To convert from moles to atoms: Multiply by 6.022×10^{23}
- Molar Mass is the mass in grams of one mole of a substance



** DA to solve

• To convert from g. to atoms
- convert g. to moles
- then moles to atoms

- atoms back to moles
- moles back to g.

Some Polyatomic Ions:

- Acetate - $C_2H_3O_2^{-1}$
- Bromate - BrO_3^{-1}
- Bromite - BrO_2^{-1}
- Chlorate - ClO_3^{-1}
- Chlorite - ClO_2^{-1}
- Cyanide - CN^{-1}
- Dihydrogen Phosphate - $H_2PO_4^{-1}$
- Dihydrogen Phosphite - $H_2PO_3^{-1}$
- Fluorate - FO_3^{-1}
- Fluorite - FO_2^{-1}

-don't change the endings on ionic compounds with polyatomic anions

Naming

- Step 1- Name the metal element
- If more than 1 charge possible write the ~~charge~~ ion in Roman Numerals
- Step 2- Add -ide to the non metal name

Writing

- Write the symbol of the metal cation
- Write the symbol of the non metal anion
- Add subscript numbers to balance charges (Criss-Cross)

-cations first and then anion

- Cations: positive ions
- anions: negative ions
- Anions and cations attract each other through electrostatic forces

example- Ammonium NH_4^{1+}
Acetate $C_2H_3O_2^{1-}$
Hydroxide OH^-

*only use parentheses if there is more than one of the same poly atomic ion.

- If the subscript is "1", leave it out.

ex..

LiF_3 — LiF_3