

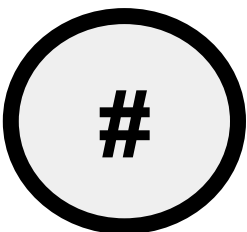
QUESTION TEMPLATE

answer

#

QUESTION TEMPLATE

answer



QUESTION TEMPLATE

answer

#

Bing-Bing-Toe !!!

Match #1:

**Chemistry Basics & Atomic Structure,
Nuclear**

Bing-bing-toe game rules

- **Clock Side = even #s – X Window side = odd #s – O**
- **2 players from each team go head to head
(standing by opposite team)**
- **Team may not help! Teams lose points for trying to distract the other team or help their team with answers.**
- **1st to hold up board with correct answer gets to play a square.**
- **Each BING-TOE = 1 point**

BING-BING-TOE GAME RULES

		FREE Space		

Bing-bing-toe game rules

Window side = odd #s – O

Clock Side = even #s – X

NO SITTING AT TABLE 1 or TABLE 8

ODD # - O team will send someone to Table 1

EVEN # - X team will send someone to Table 8

**How many atoms are in one
molecule of $\text{Al}(\text{OH})_3$?**

Seven (7)

**What particle did Thompson discover
and which experiment proved it?**

**Electron →
Cathode Ray Tube Experiment**

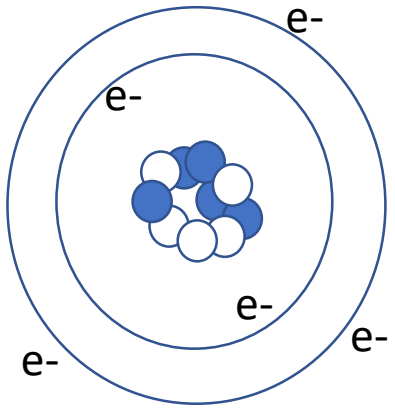
What parts of Dalton's theory remain true today?

- 1. All matter is composed of atoms**
- 2. Atoms of an element are identical in mass/properties, etc**
- 3. Different elements differ in mass/properties**
- 4. Atoms cannot be subdivided, created, or destroyed**
- 5. Atoms combine to form whole # chemical compounds**
- 6. In chemical rxns atoms combine, separate, or rearrange**

What parts of Dalton's theory remain true today?

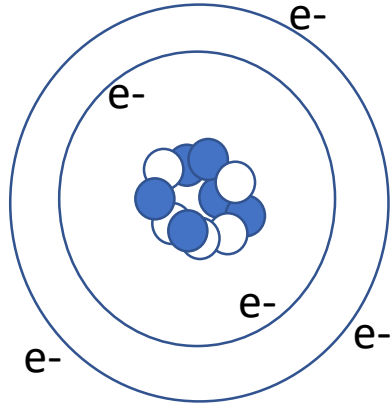
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Which TWO of these atoms are isotopes of each other? WHY?



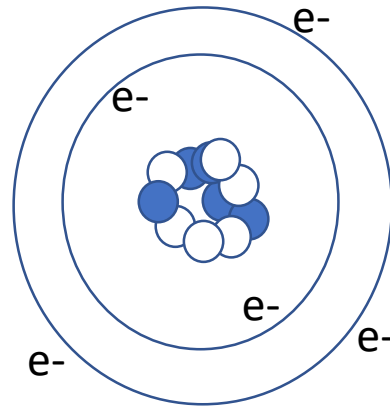
Atom A

5 protons
5 neutrons
5 electrons



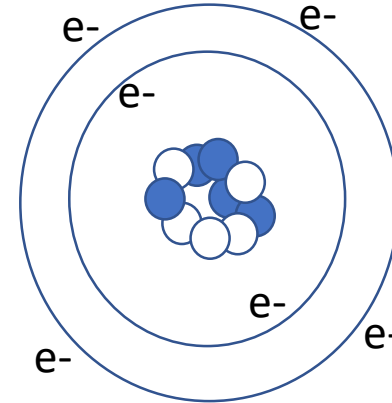
Atom B

6 protons
5 neutrons
5 electrons



Atom C

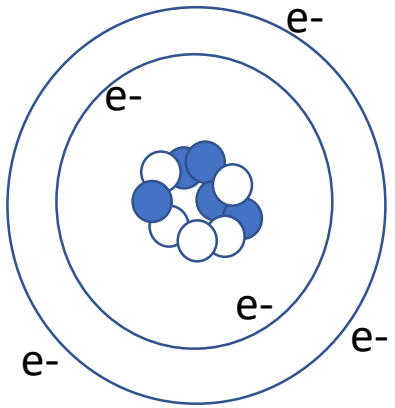
5 protons
6 neutrons
5 electrons



Atom D

5 protons
5 neutrons
6 electrons

Which TWO of these atoms are isotopes of each other? WHY?

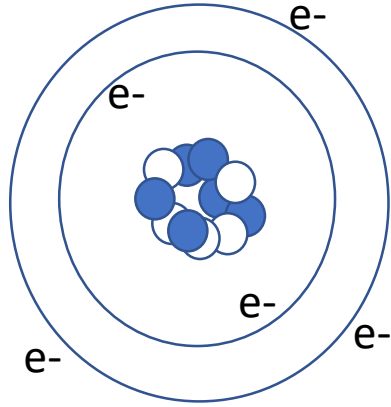


Atom A

5 protons

5 neutrons

5 electrons

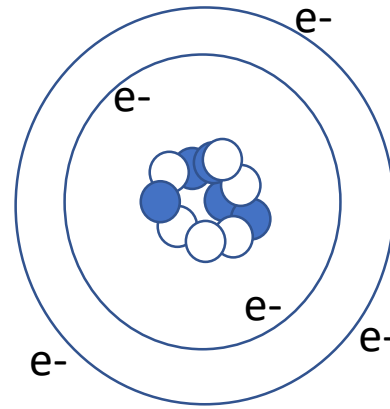


Atom B

6 protons

5 neutrons

5 electrons

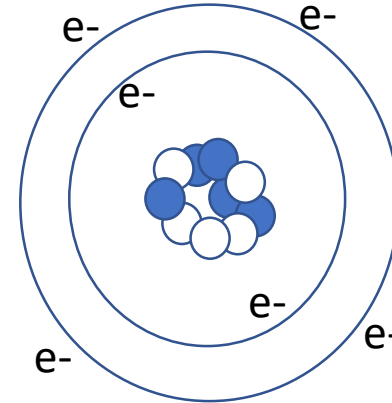


Atom C

5 protons

6 neutrons

5 electrons



Atom D

5 protons

5 neutrons

6 electrons

What Two parts of Daltons theory Have been proven false?

- 1. All matter is composed of atoms**
- 2. Atoms of an element are identical in mass/properties, etc**
- 3. Different elements differ in mass/properties**
- 4. Atoms cannot be subdivided, created, or destroyed**
- 5. Atoms combine to form whole # chemical compounds**
- 6. In chemical rxns atoms combine, separate,
or rearrange**

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**Name the phases of matter
(four answers, NOT aqueous...)**

Solid, liquid, gas, and plasma

Name the 6 phase changes and what phases the change is between

Melting – Solid to Liquid

Condensing – Gas to Liquid

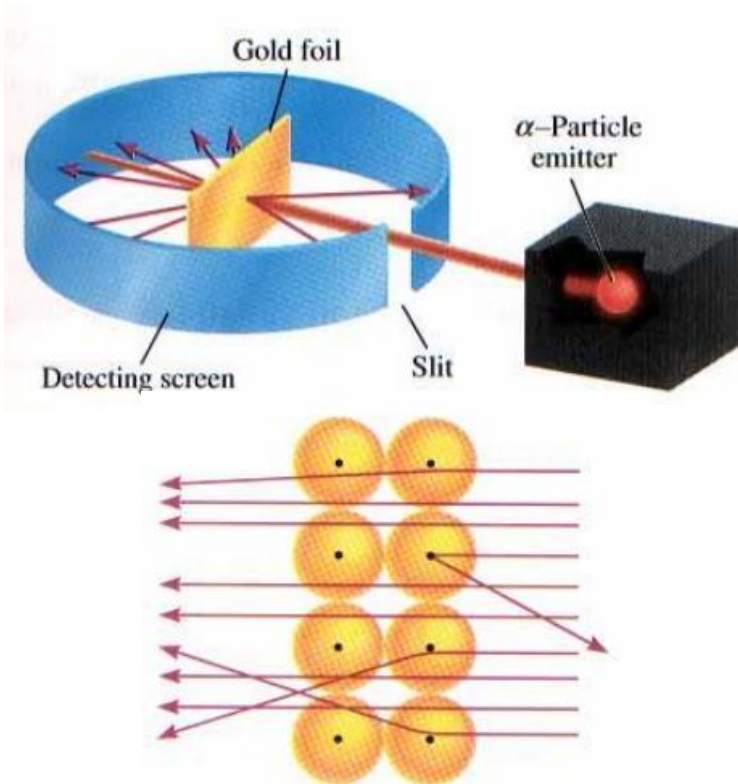
Sublimation – Solid to Gas

Freezing – Liquid to Solid

Vaporizing – Liquid to gas

Deposition – Gas to Solid

Draw a diagram for Rutherford's Experiment. Explain what FOUR things it proved about atomic structure



- Atom mostly empty space
- Nucleus in center
- Dense and small nucleus
- Positive nucleus

Name an element with similar properties to Iodine.

Fluorine, Chlorine, any halogen

How do you calculate mass number?

Protons + neutrons = mass number

**How many valence Electrons do the
Halogen elements have?**

Seven

Define chemical change and physical change. Give an example of each.

Physical change is same substance before and after (boiling water).

Chemical change involves the making and breaking of chemical bonds to make a new substance (combustion, rusting, etc)

**Name the three subatomic particles
and give their relative masses.**

Proton – 1 amu

Neutron – 1 amu

Electron – almost no mass at all

Convert 15mi/day into in/sec

11 in/sec

**Classify Each Substance Below as:
Pure Substance (element or compound)
Mixture (homogeneous or heterogeneous).**

Calcium

Cookies and Cream Ice Cream

Carbon Dioxide

Tap Water

Neon

Kool Aid Punch

H₂O

Italian Salad dressing

Pure Substance		Mixture	
<u>Element</u>	<u>Pure Comp</u>	<u>Homogeneous</u>	<u>Heterogeneous</u>
CALCIUM	H2O	KOOL AID	SALAD
NEON	CARBON	TAP WATER	DRESSING
	DIOXIDE		COOKIES AND
			CREAM ICE
			CREAM

How many valence electrons do the alkali metals have and what is the charge of their ions?

1 valence electron

1+ charge

What radioactive emission changes a neutron into a proton?

Beta particle

Scientists discover some new elements. Using the data below, which is most likely to be radioactive?

$\begin{smallmatrix} 238 \\ 119 \end{smallmatrix} Xx$	$\begin{smallmatrix} 290 \\ 120 \end{smallmatrix} Yy$	$\begin{smallmatrix} 250 \\ 121 \end{smallmatrix} Zz$	$\begin{smallmatrix} 296 \\ 148 \end{smallmatrix} Xy$
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$\begin{smallmatrix} 290 \\ 120 \end{smallmatrix} Yy$

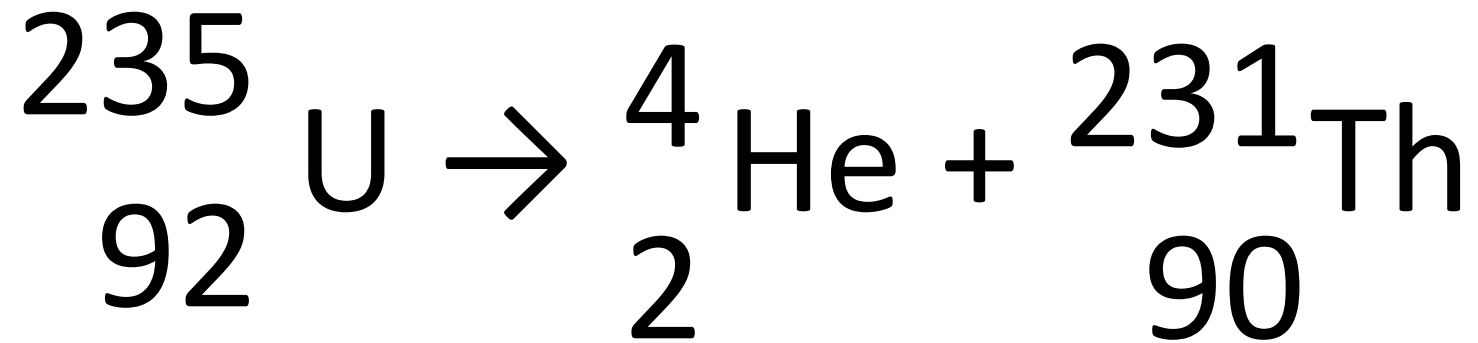
What radioactive emission changes a neutron into a proton?

Beta Emission

**How many protons and neutrons are
in the nuclei of Tl-204 atoms?**

81 protons and 123 neutrons

Uranium-235 undergoes alpha emission. What is the balanced eq.?



Neutron initiated fission of U-235 results in the release of 4 beta particles, the formation of Sr-90 and the release of another nucleus. What is the other nucleus?

Cerium - 146

Calculate the average atomic mass of Magnesium from these data. Magnesium occurs in nature in three isotopic forms:

Mg-24 (78.70% abundance)

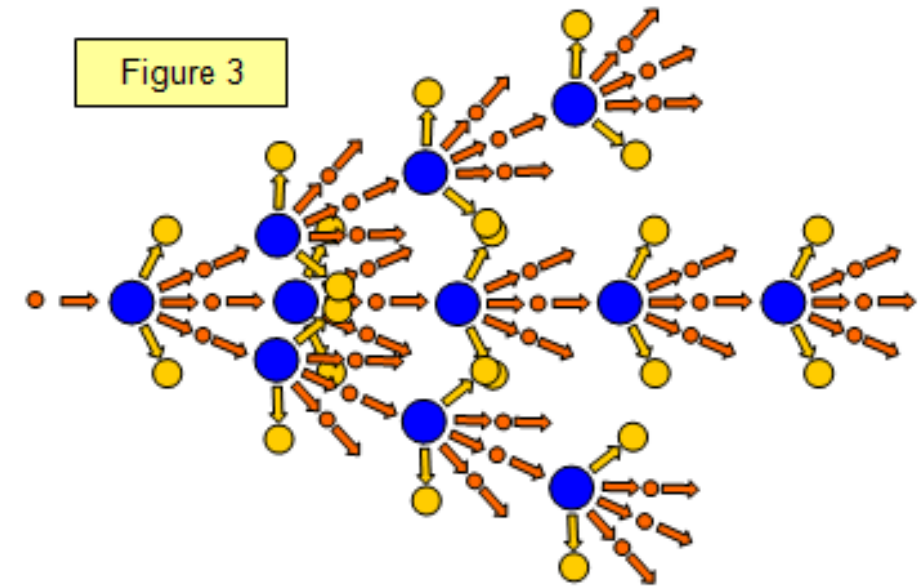
Mg-26 (11.17% abundance)

Mg-25 (10.13% abundance)

24.31 amu

What is nuclear fission?

A large, unstable nucleus breaking apart into smaller more stable nuclei. Sometimes the result is a chain reaction.



A substance has a density of 1.39g/ml. You have 10g of the substance. What volume (in L) do you have?

$$7.2 \times 10^{-3} \text{ L}$$

**How many decigrams are in 437 kg?
Write in scientific notation!**

$$4.37 \times 10^6 \text{ dg}$$

**How many sig. figs are in the
following values?**

612 kg

0.00067 ml

309.4 g

612 kg \rightarrow 3 s.f.

0.00067 ml \rightarrow 2 s.f.

309.4 g \rightarrow 4 s.f.

**Perform the calculation using
accurate sig figs**

$$1.31 \text{ cm} \times 2.3 \text{ cm} =$$

$$3.0 \text{ cm}$$

**Perform the calculation using
accurate sig figs**

$$8.264 \text{ g} - 7.8 \text{ g} =$$

$$0.5 \text{ g}$$

What holds the nucleus together so the repulsion between protons doesn't make the atom fly apart?

Strong Force

Grudge Ball !!!

Match #2:
Electrons
Periodic Table

GRUDGE BALL RULES

Each team gets 10Xs

- Teams will take a turn answering a review Q
- Correct answer
= 2Xs to take from any team (splitting is ok)
and a shot at the hoop.

Successful shot from the:

1 point line = +1X (3 total)

2 point line = +2X (4 total)

3 point line = +3X (5 total)

GRUDGE BALL RULES

No More Xs?

Gain back 2Xs by answering the Q correctly.

Incorrect Answer?

If team gets incorrect answer, random choice gets to steal the Q, so BE READY!

Winning

Most Xs at the end of game wins!

Which element is this?

$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$

Manganese

Give name and write out noble gas notation:

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

Zirconium
 $[\text{Kr}] 5s^2 4d^2$

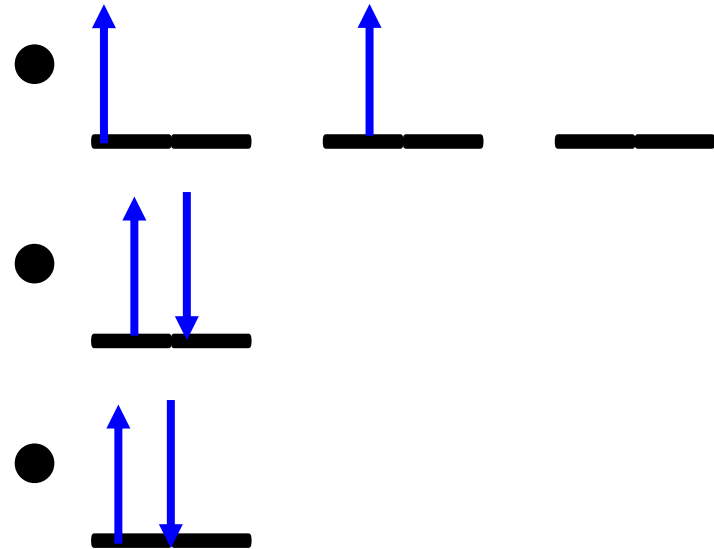
What does the Pauli Exclusion Principle say?

No two electrons can have the same set of quantum numbers – they can't occupy the "same space" - they can't have the same "address."

What does the Aufbau Principle say?

**Electrons are lazy!
They want to occupy the lowest
energy orbitals first.**

Draw the orbital diagram for carbon. How many unpaired e- does it have?



What is the noble gas configuration for calcium?

[Ar] 4s²

**How many unpaired electrons
are in chromium?**

Four

How many orbitals in a set of each type/shape orbital?

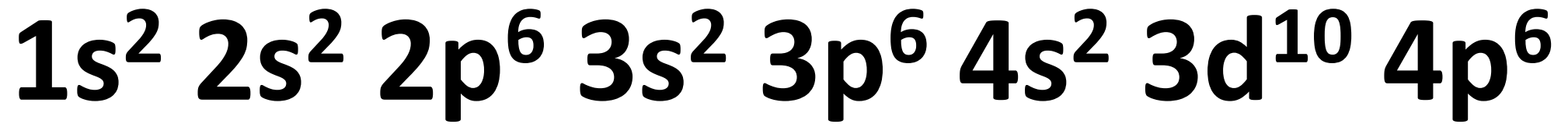
s - 1

p - 3

d - 5

f - 7

What is the highest energy level in the element below:



Fourth energy level

**Which element might form a ion by
losing electrons from the s and d
orbitals F, S, Li, Ti**

Ti

What is the atomic radius?

Measure of the distance from the center nucleus to the valence electron.

Atomic radius increases as you go (left or right?) and (up or down?)

**Left
Down**

Atomic radius decreases going right because _____ and increases going down because _____

Greater effective nuclear charge = more protons pulling electrons in closer

More energy levels and increased shielding cause nucleus to not pull electrons in as hard

**Order these elements
from smallest to largest?**

Se, S, Cl Na

Cl, S, Se, Na

Of the elements in the alkaline earth metals which has the highest electronegativity

Beryllium

Why does it take less energy to remove e- as you go down a group?

More energy levels, so electron is further from the nucleus, and more shielding which means the nucleus isn't able to attract as well.

Describe the trend for reactivity of halogens.

Reactivity increases as you move UP the periodic table.

**What is the sum of the charges from the atoms below when they are ions?
Calcium, nitrogen, and strontium**

1

$$2 + (-3) + 2 = 1$$

**How many electrons are in a
set of p orbitals?**

6 electrons

What is the term for the ability of metals to be pounded and shaped into sheets?

malleability

What is the definition of ionization energy?

The amount of energy needed to remove one electron from a neutral atom.

**Predict the ions of the following atoms and
then rank the ions
from smallest to largest radius
S , P , Cl , Ca , K**



**Electronegativity increases
going (left or right?) and increases
going (up or down?)**

**Right
Up**

**Which element is in period 4
group 3B**

Scandium

Draw a diagram for absorption and emission.



What is the e- configuration for copper (II)?

$1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$

**How many electrons can fit
in a d orbital?**

2

**Electronegativity
(increases or decreases?) as you
move down a group.
WHY?**

DECREASES

**More energy levels → more shielding
→ further from nucleus harder to
attract electrons**

**Does Metallic Character
(reactivity) increase or decrease
going down a group?**

Increases

Define “effective nuclear charge.”

**The attractive positive charge of
nuclear protons acting on
valence electrons.**

Give an example of two ions that each have a larger atomic radius than their neutral parent atom.

Anions are larger than neutral parent atom.

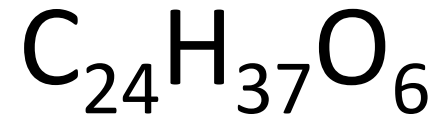
Board Game Review !!!

Match #3:
Bonding
Reactions
Stoichiometry

What is the name of the compound SrO ?

Strontium oxide

What is the molar mass for the hydrocarbon



421.61 g/mol

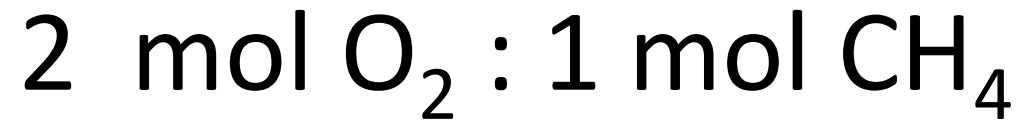
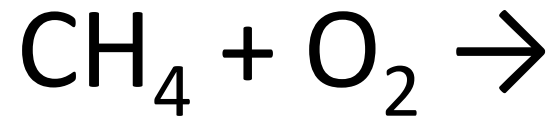
What happens to the electrons during a metallic bond?

Sea of electrons, delocalized electrons etc.

What type of bond forms between two nonmetals share electrons?

Covalent bond

Balance the following reaction and identify the mole ratio between the two reactants.



What are the dominant intermolecular forces present in water?

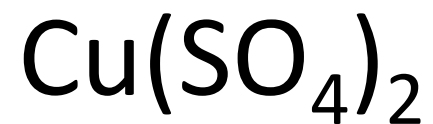
Hydrogen bonding

Remember H-NOF!

Rank the bulk forces in order of strength from weakest to strongest.

Metallic < Ionic Lattice < Network Covalent

What is the formula for copper (IV) sulfate?



What kind of a reaction is this?



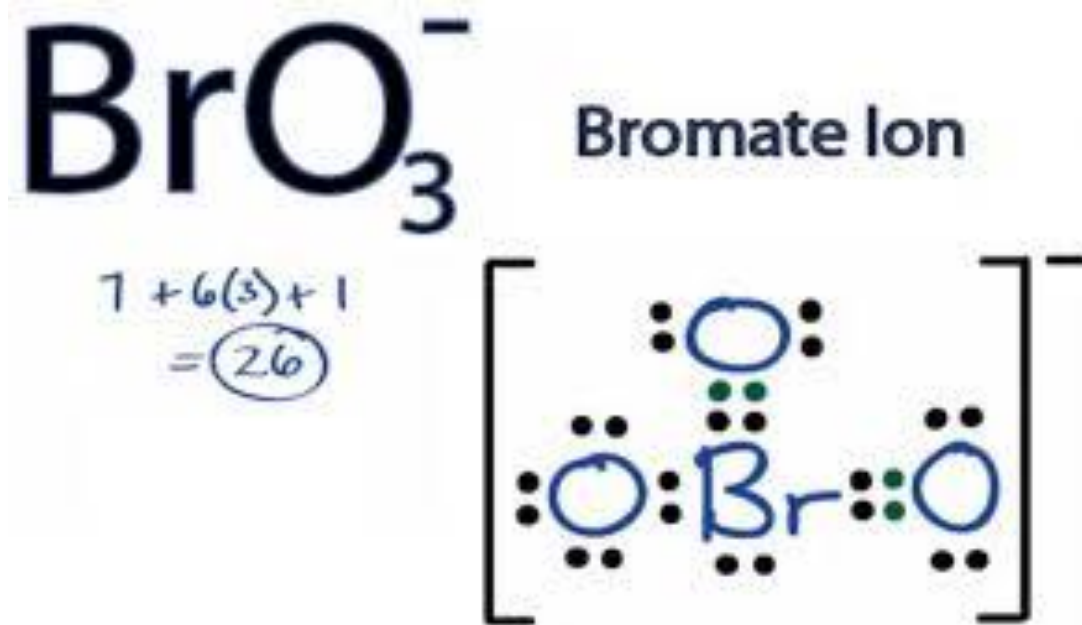
Single replacement/single displacement

Which molecule has covalent bonding and does not require a double or triple bond?

CO_2 , CO , N_2 , Cl_2

Cl_2

Draw the Lewis dot structure for BrO_3^-



What is the VSEPR geometry for carbon tetrachloride?

tetrahedral

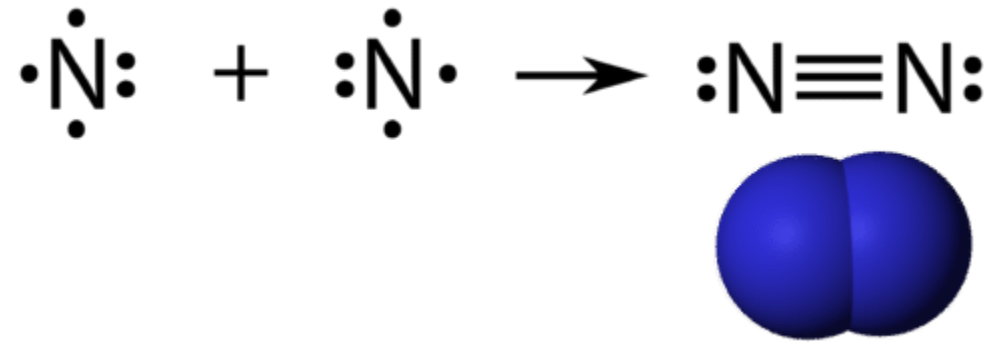
What is the molar mass of $(\text{NH}_4)_2\text{S}$?

68.15 g/mol

What is the VSEPR geometry for ammonia?

trigonal pyramidal

Draw the Lewis Dot structure for nitrogen gas.

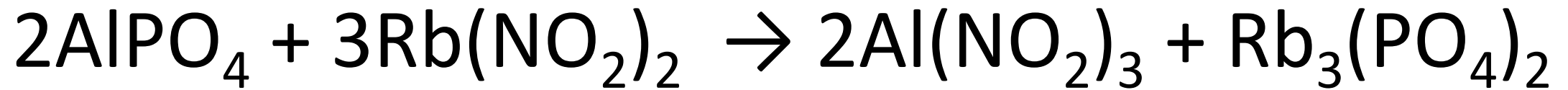


What kind of a reaction requires O_2 as a reactant?

Combustion!

Predict the products and balance the following reaction:

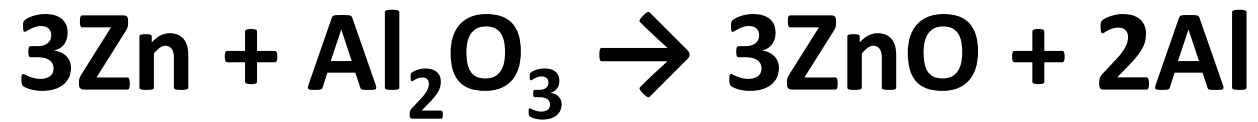
aluminum phosphate plus rubidium nitrite



In a 'polar' bond, the elements involved are sharing the electron(s)...

Unequally!

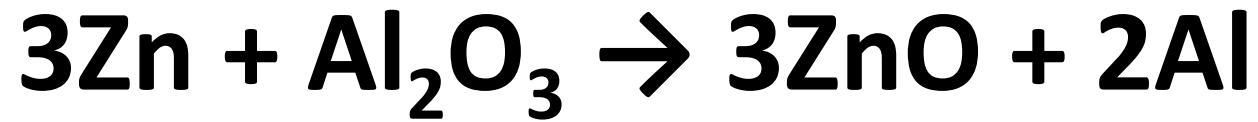
If you have 10 mol of Zn, how many mols of ZnO can be produced?



10 mol ZnO!

Same molar ratio!

If you have 25g of Zn, how many g of ZnO can be produced?



31.1g ZnO

Name the seven diatomic elements.

H₂

F₂

Cl₂

Br₂

I₂

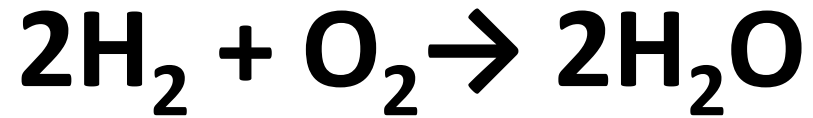
O₂

N₂

What is the molar mass of $\text{Al}(\text{OH})_3$?

77.98 g/mol

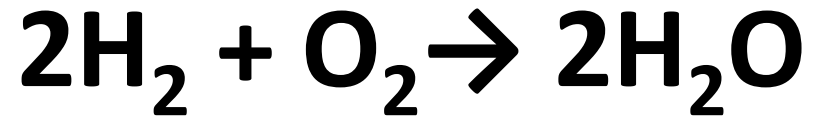
If you have 38L of O₂ at STP, how many L of H₂O can you produce, assuming your water is gaseous.



L of A → mols A → mols B → L of B

76L H₂O

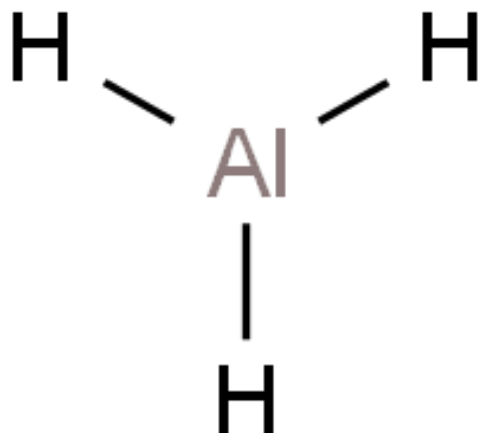
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Draw the Lewis dot structure for AlH_3

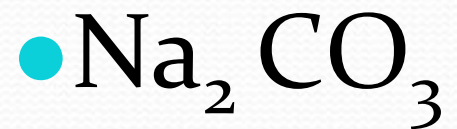


What is the mole ratio of TNT to carbon monoxide in the following equation?



- 2 mole TNT : 7 mole CO

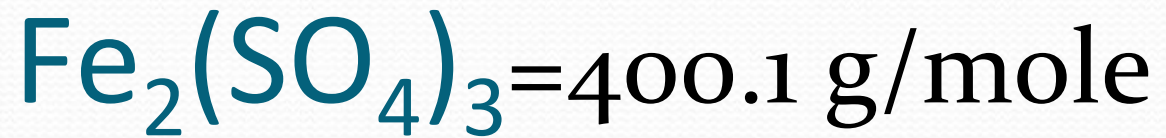
What is the formula of sodium carbonate?



What is the molar mass of sodium carbonate?

- 106g/mol

What is the molar mass of iron (III)
sulfate



How many moles of iron (III) sulfate in 44.5g iron (III) sulfate? The molar mass is 400.1 g/mol.

0.111 moles $\text{Fe}_2(\text{SO}_4)_3$

How many grams potassium chloride are
in 14.6 moles potassium chloride?

$$1 \text{ mole} = 74.5 \text{ g}$$

1087.7g KCl

How many grams of iron (III) carbonate
are found in 5.46 moles iron (III)
carbonate?

1592.68 gFe(CO₃)₃

Aqueous copper(II) bromide reacts with aqueous aluminum chloride. What type of reaction is this?

Double displacement.

Aqueous copper(II) bromide reacts with aqueous aluminum chloride. Balance this equation and predict the products.



How many moles of sodium carbonate
are in 10.9 g sodium carbonate?

Molar mass sodium carbonate 106 g

0.103 moles

What is the molar ratio of iron(III) sulfate to sodium sulfate when iron(III) sulfate reacts with sodium carbonate?



If 10 moles iron (III) sulfate reacts, how many moles sodium carbonate will form?



If 15 g oxygen is reacted with hydrogen, then how many moles water will be produced?

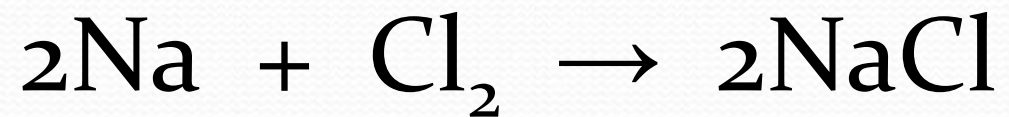


0.94 moles water

What are three of the four indications that a chemical reaction has occurred?

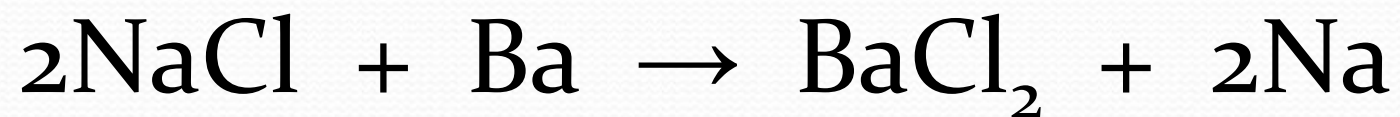
1. Production of heat and light
2. Production of a gas
3. Formation of a precipitate
4. Change in color

If 46 g sodium metal reacts completely,
then how many moles chlorine gas will be
required to make sodium chloride?



1 mole Cl_2

If 100 g sodium chloride reacts completely with barium, then how many grams sodium metal will be obtained?



39.32 g Na

How many liters fluorine gas in .87 moles of fluorine gas?

- *1 mole gas at STP (standard temperature and pressure, 0 degrees C and 1 atm pressure) = 22.4 L gas*

19.52L F₂

How many grams of oxygen gas are in
.69L of oxygen gas? (22.4 L/1 mole)

.99g

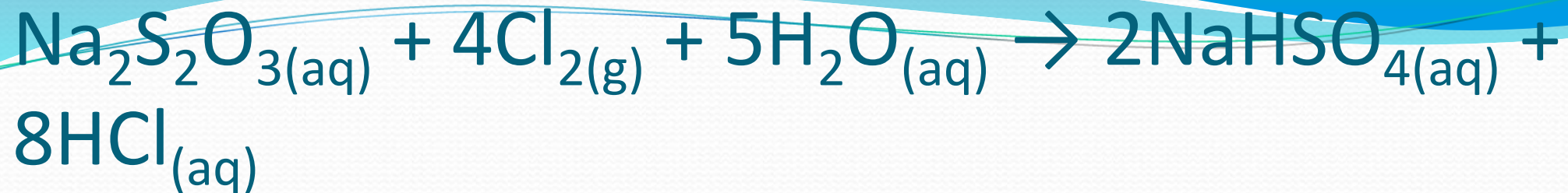


How many moles of H_2S are required to form 8.20 moles of SO_2 ?

8.2 mol

$2 \text{ NaClO}_3 \rightarrow 2 \text{ NaCl} + 3 \text{ O}_2$ How many molecules of oxygen are produced when 80.0 grams of sodium chloride are produced?

1.23×10^{24} molecules



How many moles of H_2O react if 5.24×10^{19} molecules of HCl are formed?

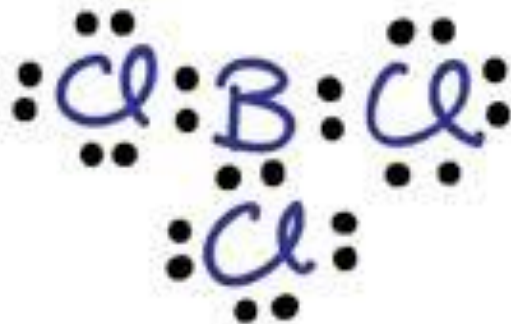
$5.44 \times 10^{-5} \text{ mol B}$

Draw the Lewis structure and identify the VSEPR geometry for BCl_3 .



$$3 + 7(3) = 24$$

Boron Trichloride



Trigonal Planar