QUESTION TEMPLATE

answer

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Bing-Bing-Toe !!!

Match #1:

Chemistry Basics & Atomic Structure Nuclear

BING-BING-TOE GAME RULES

		FREE Space		

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

How many atoms are in one molecule of $Al(OH)_3$?

Seven (7)

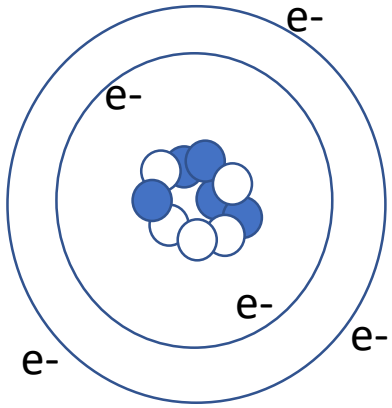
What particle did Thompson discover and which experiment proved it?

Electron →
Cathode Ray Tube Experiment

What Three parts of Dalton's theory remain true today?

1. All matter is composed of atoms
2. Atoms combined to form simple whole number chemical compounds
3. In chemical reactions atoms are combined, separated, or rearranged

Do any of these atoms represent isotopes? If so, which ones and why?

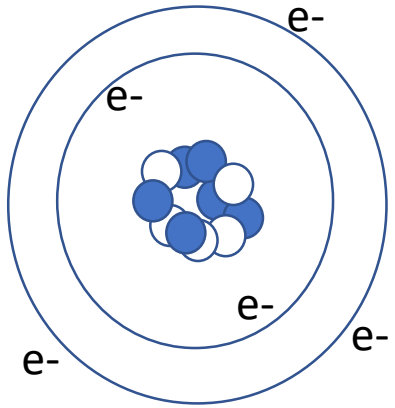


Atom A

5 protons

5 neutrons

5 electrons

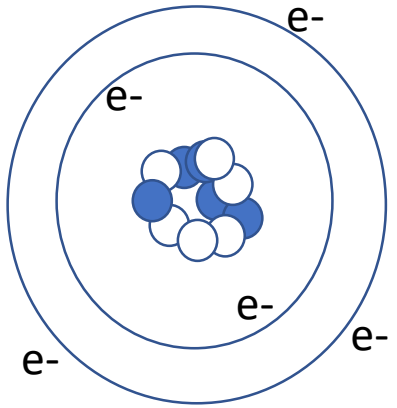


Atom B

6 protons

5 neutrons

5 electrons

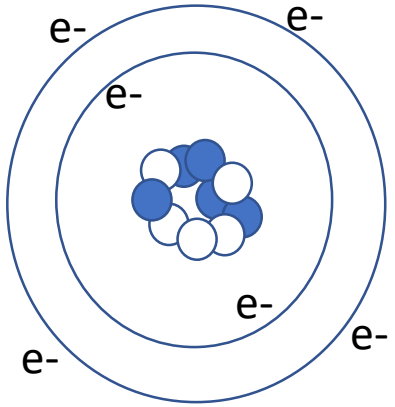


Atom C

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. Atoms of a given element are identical in mass and size
2. Atoms cannot be subdivided, created, or destroyed

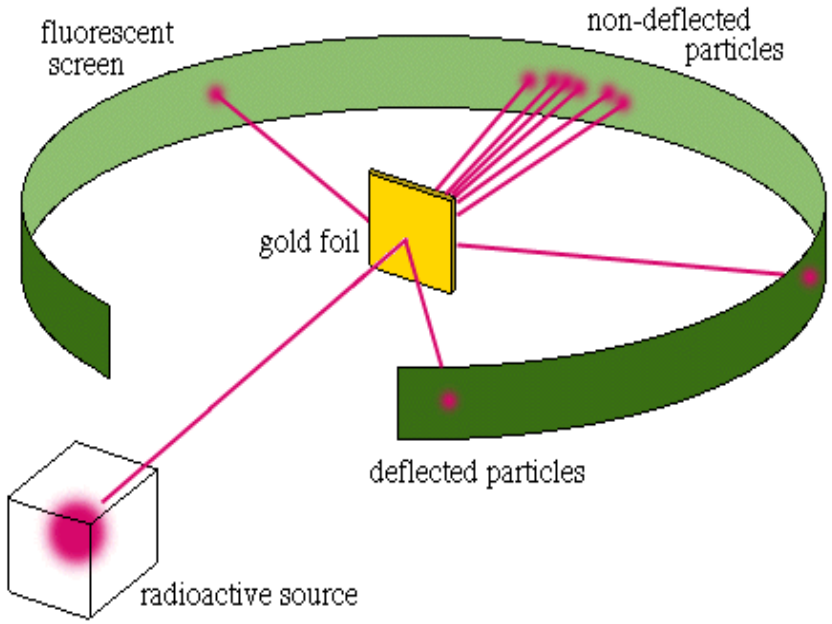
Name the phases of matter

Solid, liquid, gas, and plasma

Name all phase changes and what phases the change is between

Melting – Solid to Liquid
Freezing – Liquid to Solid
Condensing – Gas to Liquid
Vaporizing – Liquid to gas
Sublimation – Solid to Gas
Deposition – Gas to Solid

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



Atom mostly empty space
Dense, central core - 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	
Element	Pure Comp	Homogeneous	Heterogeneous
CALCIUM	H2O	KOOL AID	SALAD DRESSING
NEON	CARBON DIOXIDE	TAP WATER	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

The half-life of thorium-227 is 18.72 days How many days are required for three-fourths of a given amount to decay?

37.44 days

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.?

$$^{235}_{92}U \rightarrow {}^{4}_{2}He + {}^{231}_{90}Th$$

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?

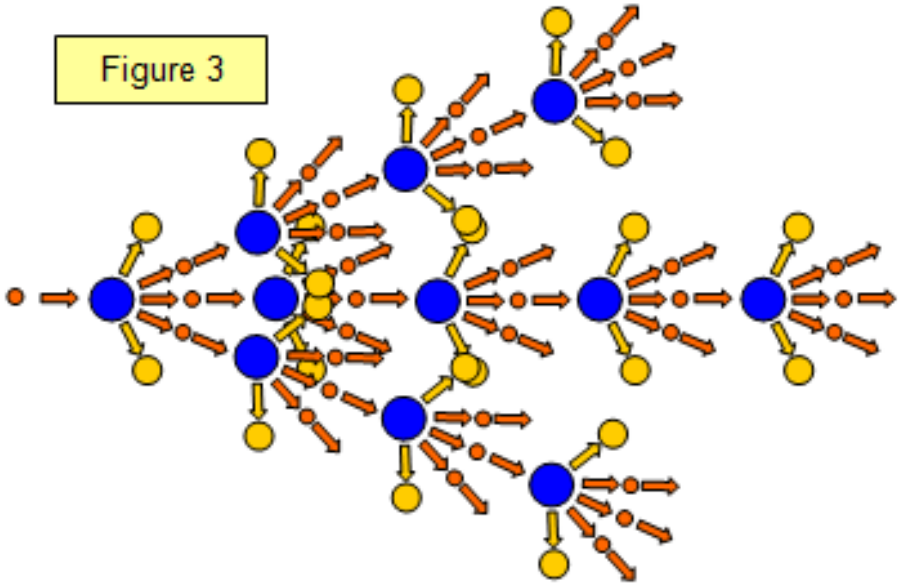
Cerium - 146

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?

7.2×10^{-3} L

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

4.37×10^{6} dg

How many sig. figs are in the following values?

612 kg **0.00067 ml** **309.4 g**

612 kg → 3 s.f.

0.00067 ml → 2 s.f.

309.4 g → 4 s.f.

Perform the calculation using accurate sig figs

1.31 cm x 2.3 cm =

3.0 cm

Perform the calculation using accurate sig figs

8.264 g - 7.8 g =

0.5 g

A radioactive substance has a half life of 125 days. What percent is left after 1.45 years?

5.31%

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:

2 point line = +2X (4 total)

3 point line = +3X (5 total)

GRUDGE BALL RULES

No More Xs?
Gain back Xs 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

1

Give name and write out noble gas notation:

$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s2\ 4d^2$

Zirconium

[Kr] $5s^2\ 4d^2$

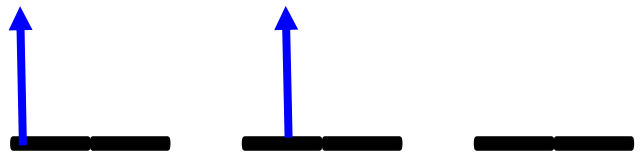
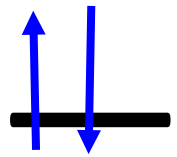
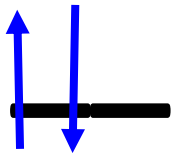
What does the Pauli Exclusion Principle say?

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?

$[Ar]\ 4s^2$

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:

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

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 outer 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

20

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

$$K^{+} > Ca^{2+} > Cl^{-} > S^{2-} > P^{3-}$$

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

Left

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

QUESTION TEMPLATE

answer

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answer

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answer

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answer

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 $C_{24}H_{37}O_6$

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.

$CH_4 + O_2 \rightarrow$

2 mol O_2 : 1 mol CH_4

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?

$Cu(SO_4)_2$

What kind of a reaction is this?

$Na + CaSO_4 \rightarrow$

Single replacement/single displacement

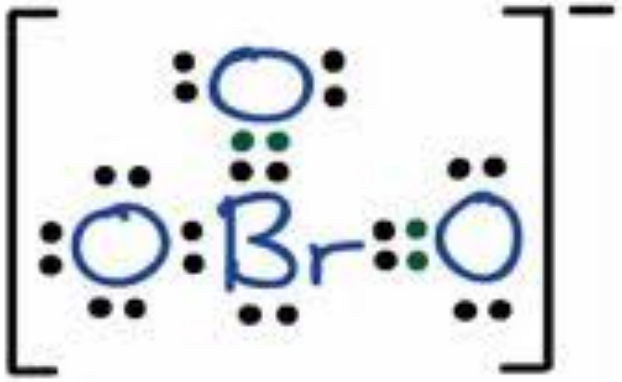
Which molecule has covalent bonding and does not require a double or triple bond?
CO_2, CO, N_2, Cl_2

Cl_2

Draw the Lewis dot structure for BrO_3^-

BrO_3^- Bromate Ion

$7 + 6(3) + 1 = 26$



What is the VSEPR geometry for carbon tetrachloride?

tetrahedral

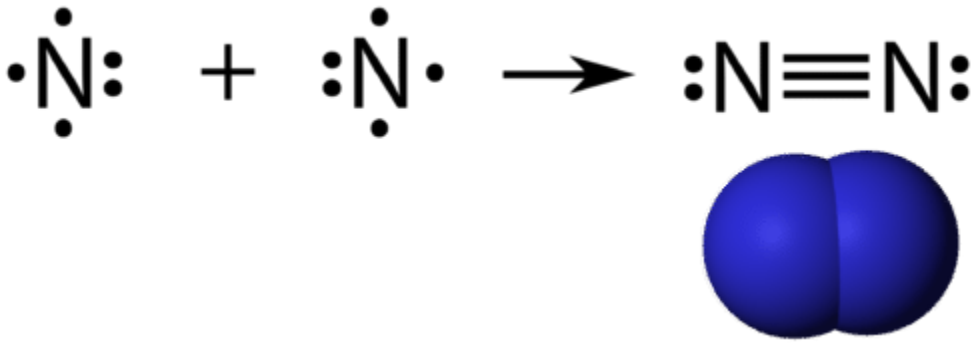
What is the molar mass of $(NH_4)_2S$?

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

$$2AlPO_4 + 3Rb(NO_2)_2 \rightarrow 2Al(NO_2)_3 + Rb_3(PO_4)_2$$

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?

$3Zn + Al_2O_3 \rightarrow 3ZnO + 2Al$

10 mol ZnO!

Same molar ratio!

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

$3Zn + Al_2O_3 \rightarrow 3ZnO + 2Al$

31.1g ZnO

Name the seven diatomic elements.

H_2 F_2 Cl_2

Br_2 I_2 O_2

N_2

What is the molar mass of Al(OH)3?

77.98 g/mol

If you have 38L of O_2 at STP, how many L of H_2O can you produce, assuming your water is gaseous.

$2H_2 + O_2 \rightarrow 2H_2O$

L of A → mols A → mols B → L of B

76L H_2O

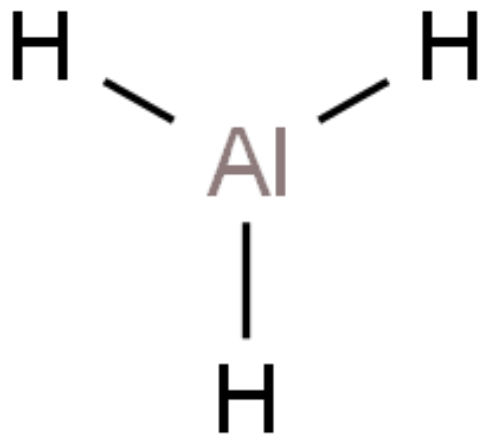
If you have 38L of O_2 at STP, how many L of H_2O can you produce, assuming your water is gaseous.

$2H_2 + O_2 \rightarrow 2H_2O$

L of A → mols A → mols B → L of B

76L H_2O

Draw the Lewis dot structure for AlH_3



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

$$C_7H_5N_3O_6 \rightarrow CO + C + H_2O + N_2$$

- 2 mole TNT : 7 mole CO

What is the formula of sodium carbonate?

- Na_2CO_3

What is the molar mass of sodium carbonate?

- 106g/mol

What is the molar mass of iron (III) sulfate

$Fe_2(SO_4)_3$=400.1 g/mole

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

0.111 moles $Fe_2(SO_4)_3$

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

1 mole = 74.5 g

1087.7g KCl

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

1592.68 g$Fe(CO_3)_3$

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.

$$3CuBr_2 + 2AlCl_3 \rightarrow 3CuCl_2 + 2AlBr_3$$

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?

$$Fe_2(SO_4)_3 + 3Na_2CO_3 \rightarrow Fe_2(CO_3)_3 + 3Na_2SO_4$$

1 mole $Fe_2(SO_4)_3$ = 3 moles Na_2SO_4

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

$$Fe_2(SO_4)_3 + 3Na_2CO_3 \rightarrow Fe_2(CO_3)_3 + 3Na_2SO_4$$

1 mole $Fe_2(SO_4)_3$ = 3 moles Na_2SO_4

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

- $2H_2 + O_2 \rightarrow 2H_2O$

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?

$$2Na + Cl_2 \rightarrow 2NaCl$$

1 mole Cl_2

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

$2NaCl + Ba \rightarrow BaCl_2 + 2Na$

$2NaCl + Ba \rightarrow BaCl_2 + 2Na$

39.32 g Na

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

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

19.52L F_2

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

.99g

$2\ H_2S + 3\ O_2 \rightarrow 2\ SO_2 + 2\ H_2O$

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

8.2 mol

$2\ NaClO_3 \rightarrow 2\ NaCl + 3\ O_2$ How many molecules of oxygen are produced when 80.0 grams of sodium chloride are produced?

1.23×10^{24} molecules

$Na_2S_2O_{3(aq)} + 4Cl_{2(g)} + 5H_2O_{(aq)} \rightarrow 2NaHSO_{4(aq)} + 8HCl_{(aq)}$

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

5.44×10^{-5} mol B

Water in Space

In the space shuttle, the CO_2 that the crew exhales is removed from the air by a reaction within canisters of lithium hydroxide. On average, each astronaut exhales about 20.0 mol of CO_2 daily. What volume of water will be produced when this amount of CO_2 reacts with an excess of LiOH?

(Hint: The density of water is about 1.00 g/mL.)

$$\mathbf{CO_2(g) + 2\ LiOH(s) \rightarrow Li_2CO_3(aq) + H_2O(l)}$$

20.0 mol *excess* x g

Water is NOT at STP!

$$x\ \text{mL}\ H_2O = 20.0\ \text{mol}\ CO_2 \left(\frac{1\ \text{mol}\ H_2O}{1\ \text{mol}\ CO_2}\right)\left(\frac{18\ \text{g}\ H_2O}{1\ \text{mol}\ H_2O}\right)\left(\frac{1\ \text{mL}\ H_2O}{1\ \text{g}\ H_2O}\right)$$

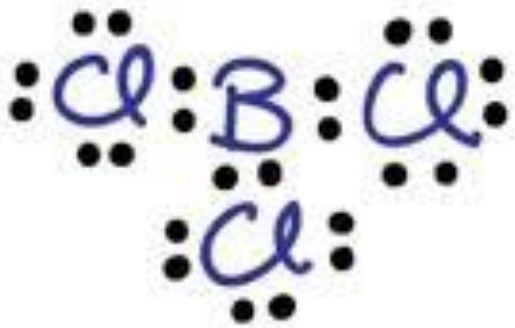
$$X = 360\ \text{mL}\ H_2O$$

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

BCl_3

Boron Trichloride

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



Trigonal Planar