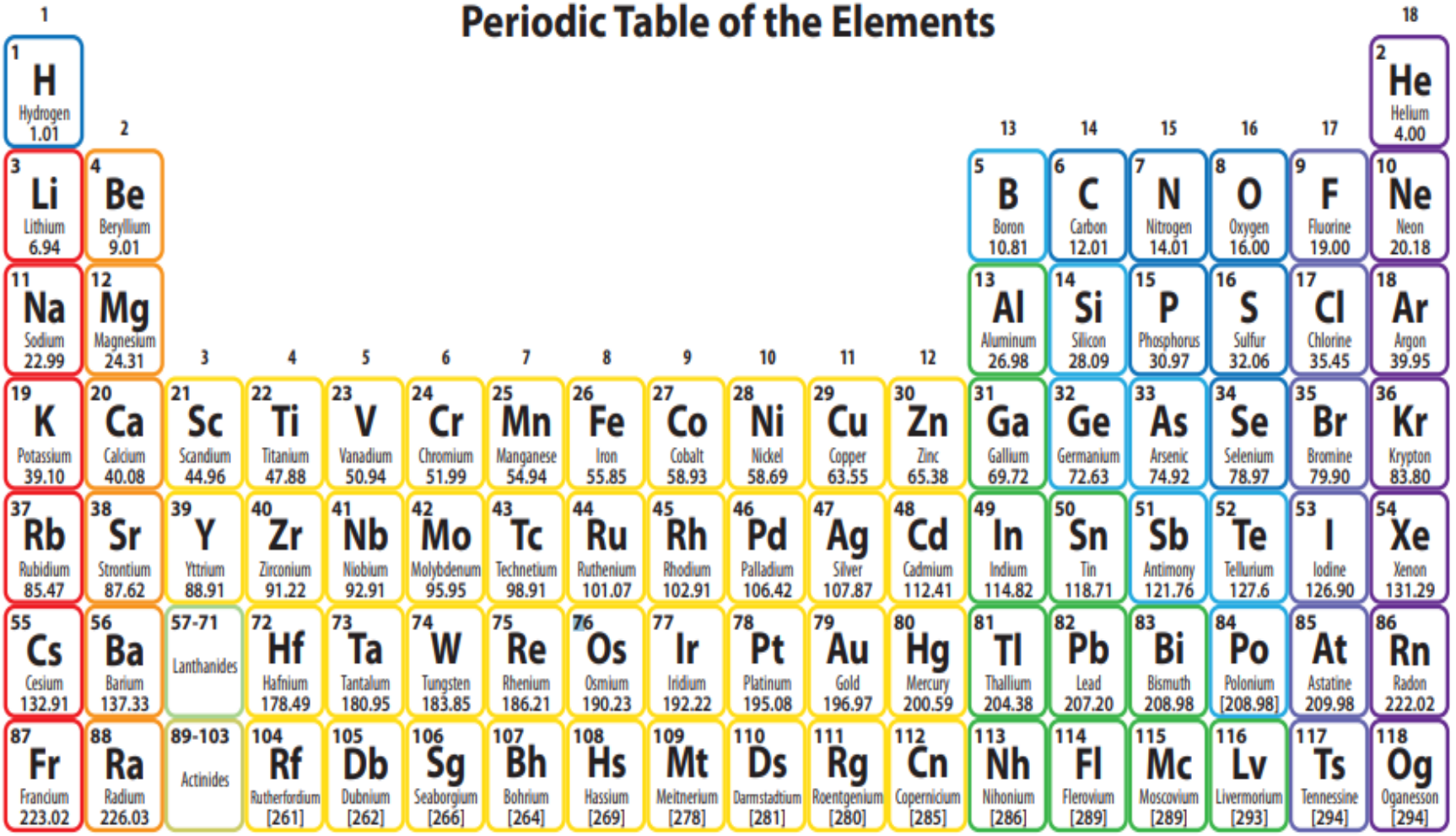
Name:

Due Date:

Part 5 Chemical RXN's

Periodic Table of the Elements



Part 5 Lesson 1 Types of Chemical Reactions

Chemical Change: The change of substances into other substances through a _____of the _____.

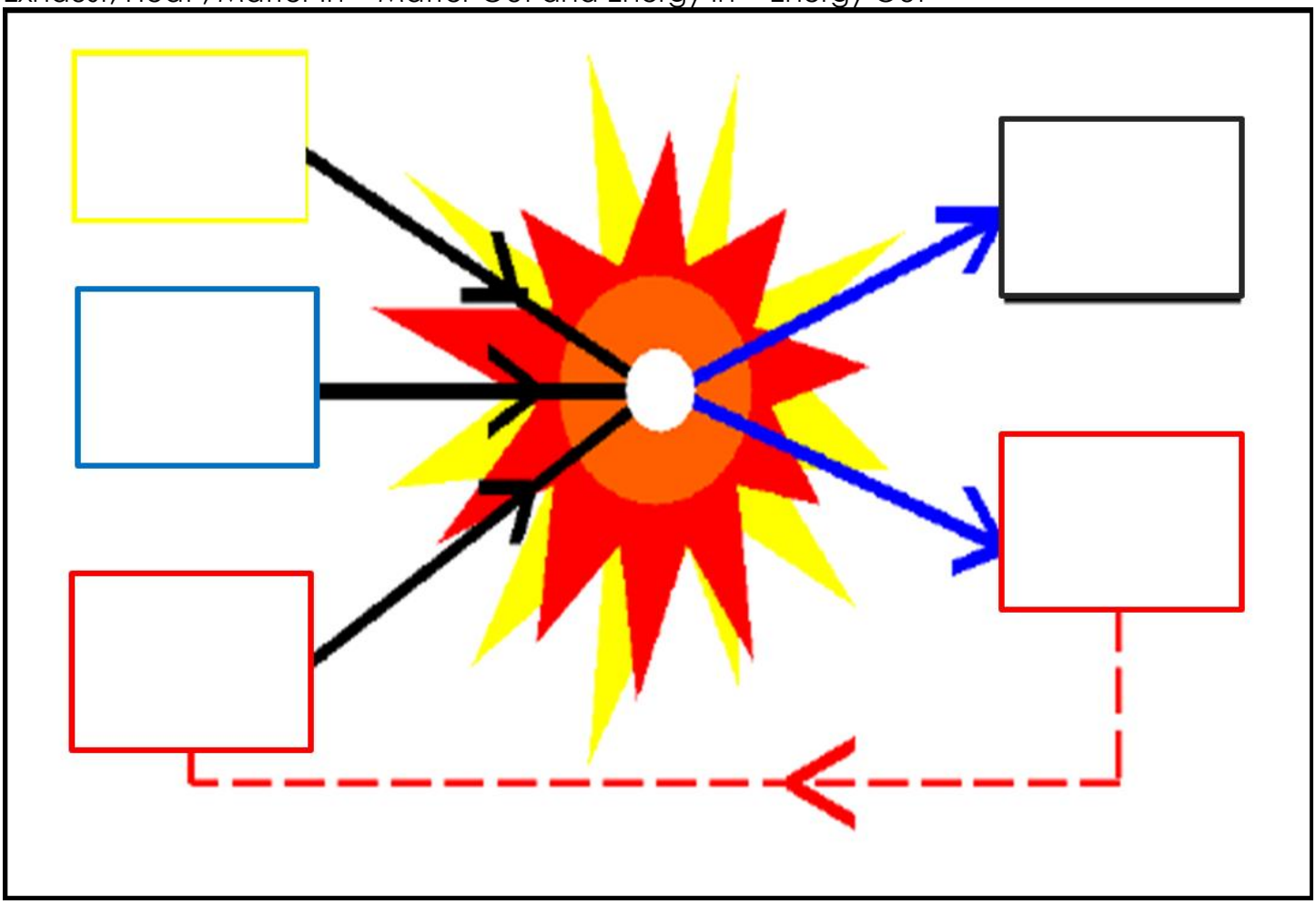
The 6 Types of Chemical Reactions

Combustion: When _____combines with another compound to form _____ and carbon dioxide.

$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2\,H_2O(g)$

_____ _____ _____ _____

Describe what goes in and out of combustion below. Word bank: Fuel, Oxygen, Heat, Exhaust, Heat , Matter In = Matter Out and Energy In = Energy Out



Synthesis Reaction: When _____ or more _____ compounds combine to form a more _____one. A + B = AB

___Zn + ___ HCl → _$ZnCl_2$ + _H_2 (g)

- Steel Wool is Iron (Fe).
- The battery sends an electric current through the thin wire (700°C)
- Iron reacts with Oxygen in air and creates Iron Oxide.

Iron + Oxygen Iron Oxide

___Fe + ___O_2 ____Fe_2O3

Decomposition Reaction: A complex molecule _____down to make _____ ones.

Opposite of Synthesis Reaction. AB → A + B

___ H_2O ---> ____H_2 + ___O_2 (Electrolysis of Water)

Demonstration – Electrolysis.

What is happening in the beaker? Can you guess the chemical change?

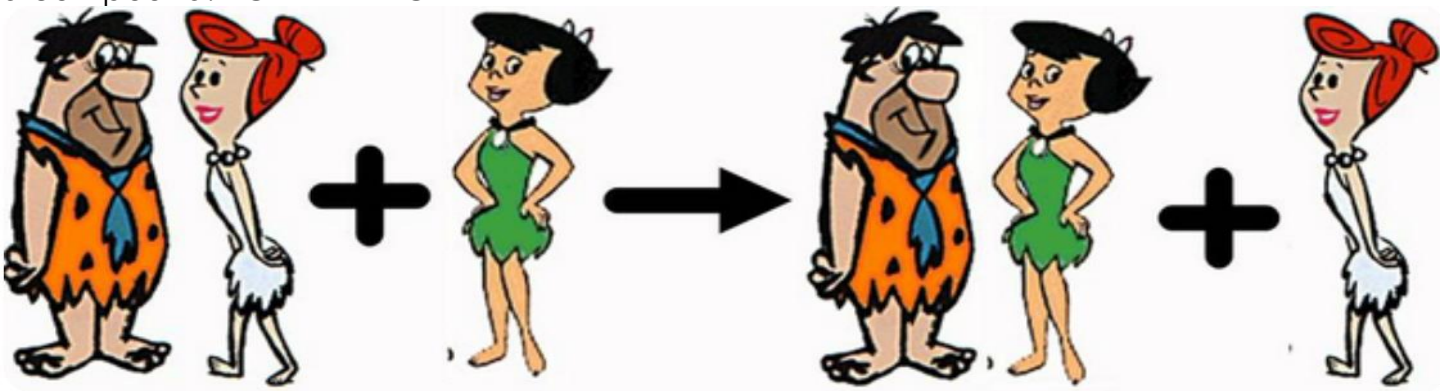
Black Snake Experiment

Sodium bicarbonate breaks down into sodium carbonate, water vapor, and carbon dioxide gas. The burning sugar in oxygen produces water vapor and carbon dioxide gas. The snake is carbonate with black carbon particles:

$2\ NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$

____C_2H_5OH + ____ $O_2 \rightarrow$ ____ CO_2 + ____H_2O

Single Displacement: When one element _____ _____ with another element in a compound. BC + A → AC + B



Which was the single displacement reaction and which was the combustion reaction?

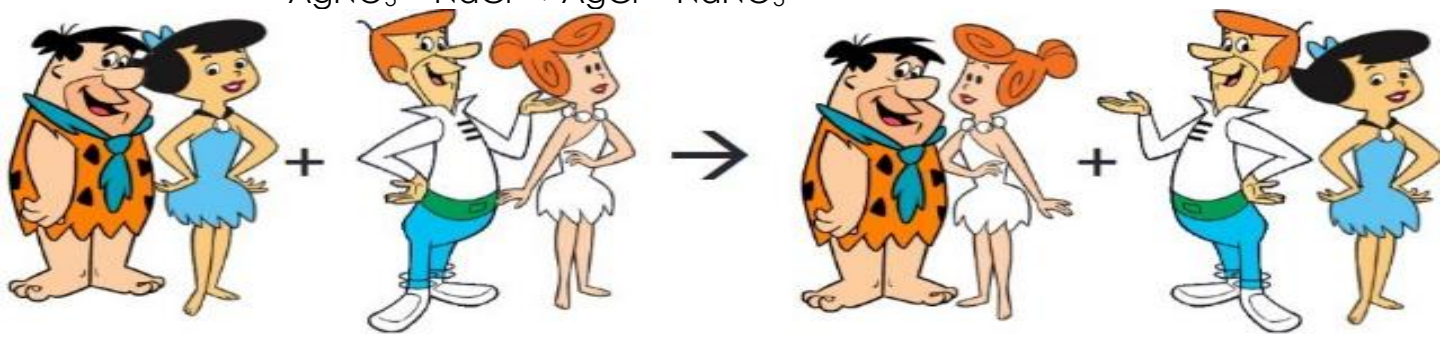
Hydrogen gas reacts with Oxygen. $2H_2 + O_2 \rightarrow 2H_2O$ Answer= Synthesis Reaction	Reaction between zinc and hydrochloric acid is $Zn + HCl \rightarrow H_2 + ZnCl_2$. Answer= Single Displacement Reaction

Part 5 Lesson 2 Continued Types of Chemical reactions

Double Displacement: When _____ different molecules _____ places, forming two entirely different compounds.

$AB + CD \rightarrow AD + CB$

$AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$



Demonstration – Chemical Change with baking soda and vinegar.

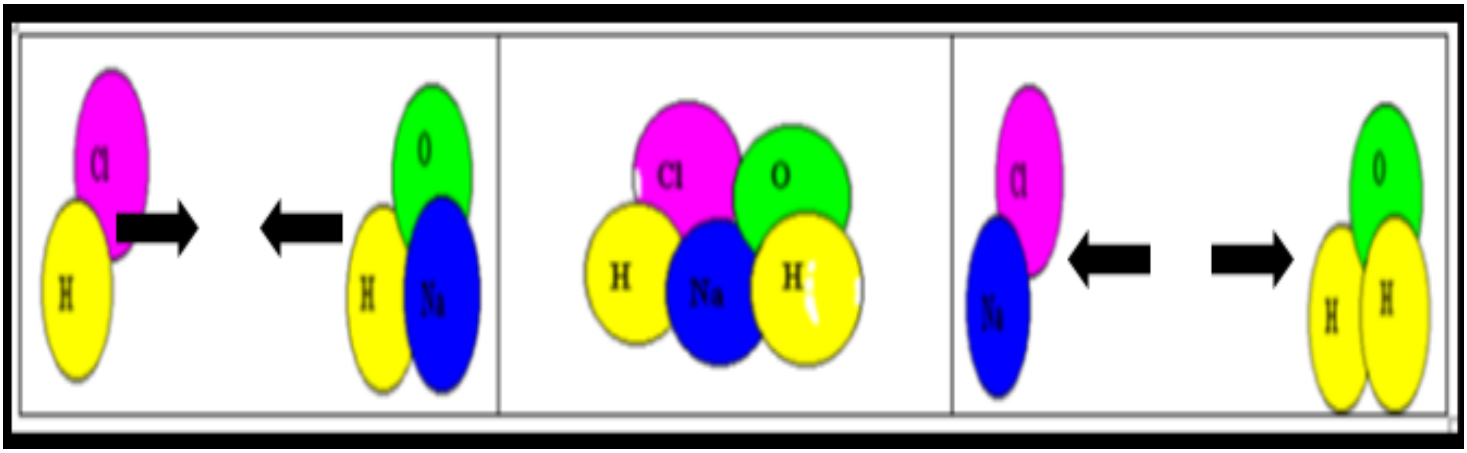
- The chemical reaction occurs in two steps.
- The **double displacement** reaction occurs first. _____ in vinegar reacts with sodium_____ to form _____ and carbonic _____:
- $NaHCO_3 + HC_2H_3O_2 \rightarrow NaC_2H_3O_2 + H_2CO_3$
- Carbonic acid is unstable and goes through a **decomposition** reaction to produce carbon dioxide gas:
- $H_2CO_3 \rightarrow H_2O + CO_{2(g)}$

Cleopatra's Needle (Chalk and Vinegar)

$2\ HC_2H_3O_2 + CaCO_3 \rightarrow Ca(C_2H_3O_2)_2 + CO_2 + H_2O$

_____ _____ _____ _____ _____

Acid / Base: When an acid and base _____ with _____.



Acid-Base RXN: The acid and base neutralize each other producing a _____.

The H(+) cation of the acid combines with the OH(-) anion of the base to form _____.

The compound formed by the cation of the base and the anion of the acid is called a salt.

HCL + NaOH → H2O + NaCl

_____ + _____ -> _____ + _____

Which is the acid and which is the base?
Which is the salt, and which is the water?

$$KOH + HCl \rightarrow KCL + H_2O$$

Which is the acid and which is the base?
Which is the salt, and which is the water?

$$2H_3PO_4 + 3Ca(OH)_2 \rightarrow 6H_2O + Ca_3(PO)_4$$

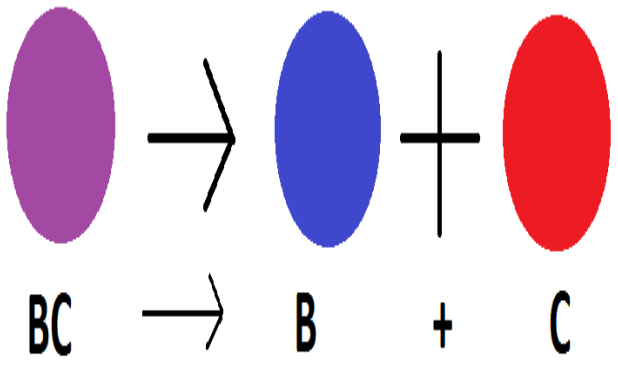
_____ +_____ -> _____ + _____

Quiz Wiz, Name the type of Chemical Reaction.

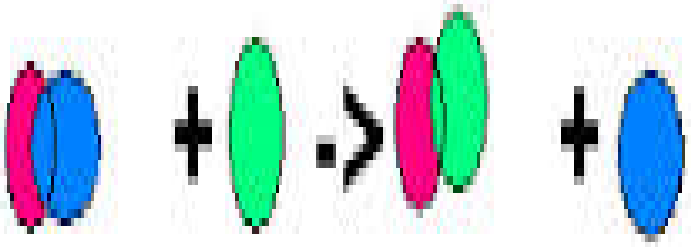
Word Bank is the 6 types of chemical reactions.

1)	2)	3)
4)	5)	6)
7)	8)	9)
10)	*11)	

Name the six types of chemical reactions below?

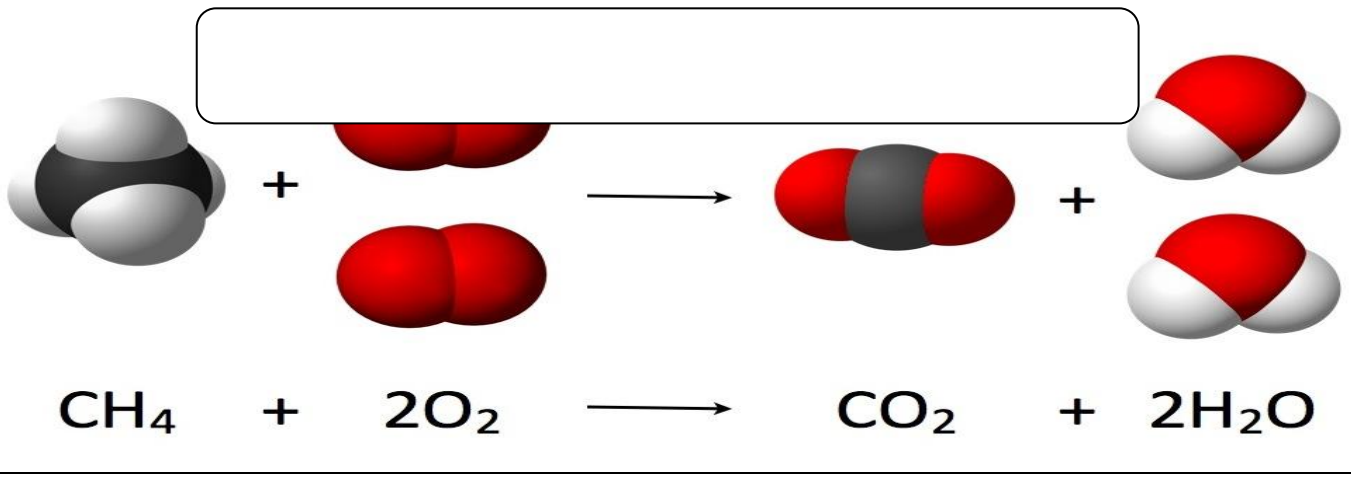
$HCl + NaOH \rightarrow H_2O + NaCl$	

AB + C -> AC + B



$Fe + O_2 \rightarrow FeO_2$

NaCl KBr NaBr KCl



$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$

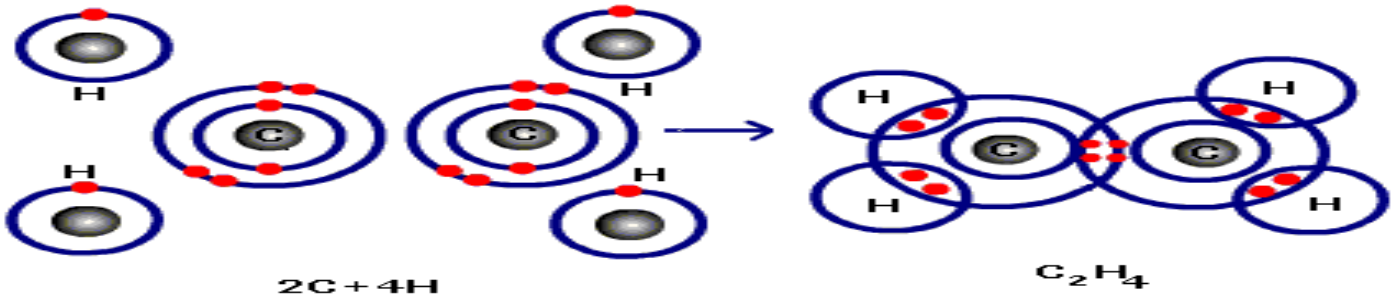
Part 5 Lesson 3 Atomic Bonding

Chemical Bonding: The attraction that _____ atoms close to each other.

Ionic, Covalent, Metallic

Covalent – _____ electrons
Ionic – _____ or _____ electrons (transfer)
Metallic- Many _____ electrons

Covalent bonding occurs by a _____ of _____ electrons (Strongest) (SPONCH).



Which choice best describes a covalent bond?

A.) This bond is formed from the attraction between mobile electrons and fixed positively charged metallic atoms.

B.) The electrostatic bond between two ions formed through the transfer of one or more electrons.

C.) An electrostatic bond between a hydrogen atom in a covalent bond and an electronegative atom such as oxygen.

D.) The bond formed by the sharing of a pair of electrons by two atoms.

Ionic bonding (+/-) Bonds created by the attraction of opposite _____.

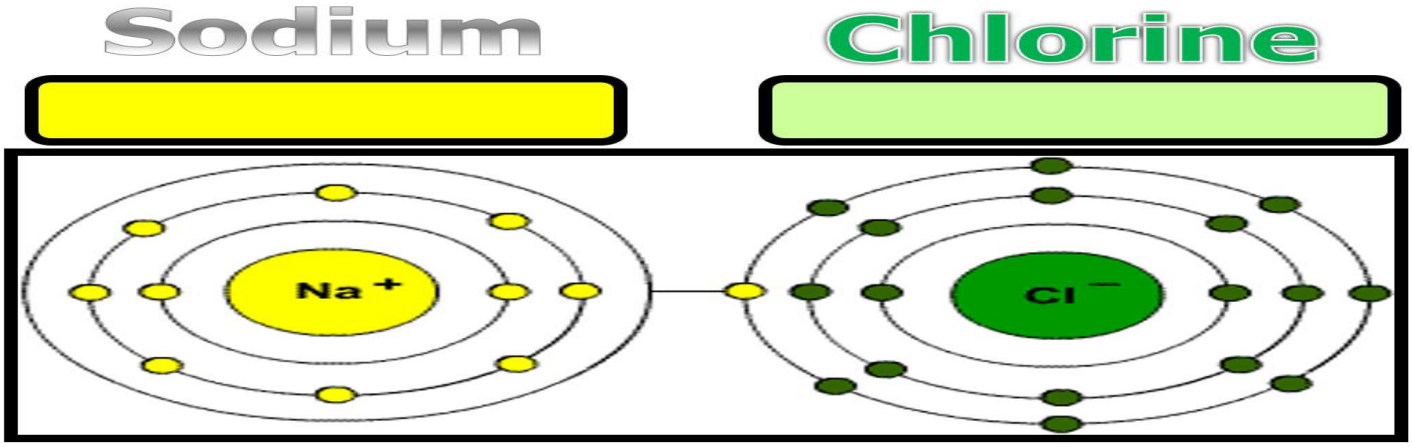
Transfer of an electron

Ionization: The process of _____ electrons from an atom to form ions.

Ionic - One atom strips electron from the other so both are now stable. Held then by ____ /_____charge

Ionic Bonding: Forms crystal _____.
Metal bonding to a _____-metal will always be an ionic bond.

Which is a metal and which is a non-metal? What type of bond is this?



Which choice best describes a Ionic bond?

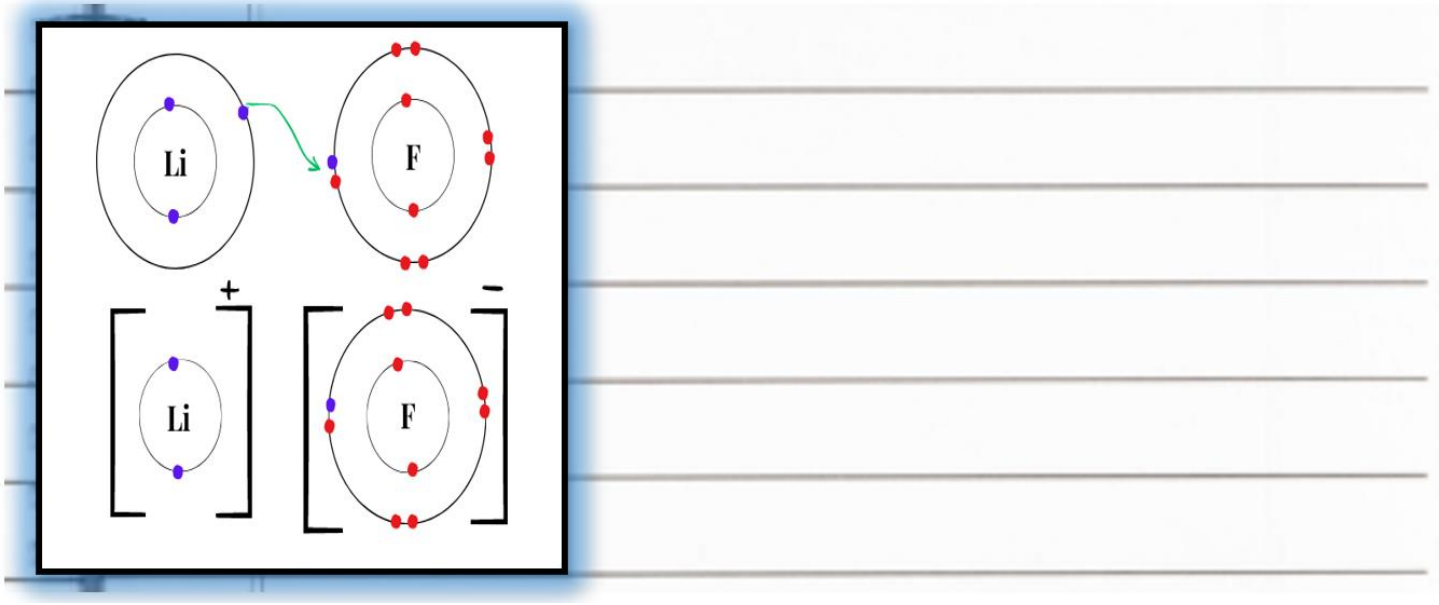
A.) This bond is formed from the attraction between mobile electrons and fixed positively charged metallic atoms.

B.) The electrostatic bond between two ions formed through the transfer of one or more electrons.

C.) An electrostatic bond between a hydrogen atom in a covalent bond and an electronegative atom such as oxygen.

D.) The bond formed by the sharing of a pair of electrons by two atoms.

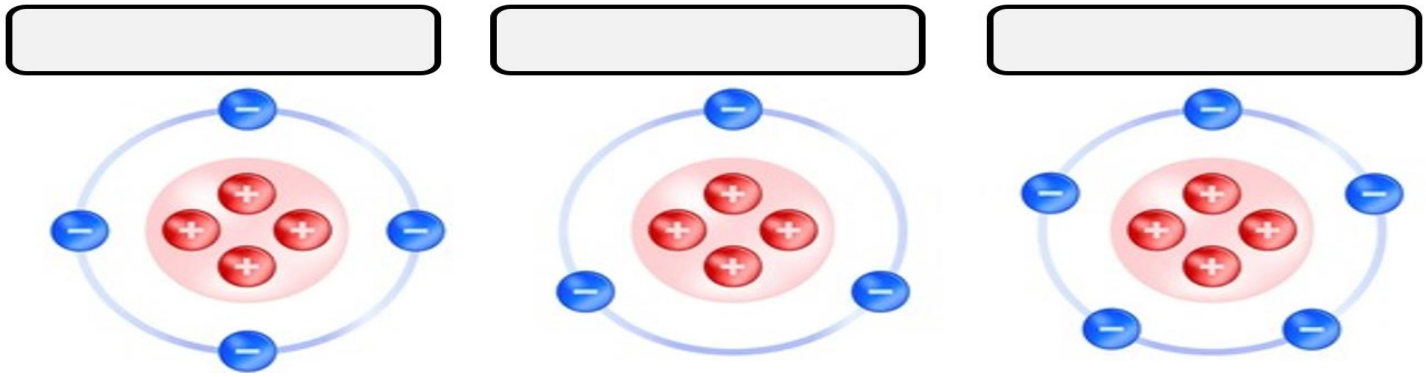
Describe the ionic bond between Lithium and Fluorine below.



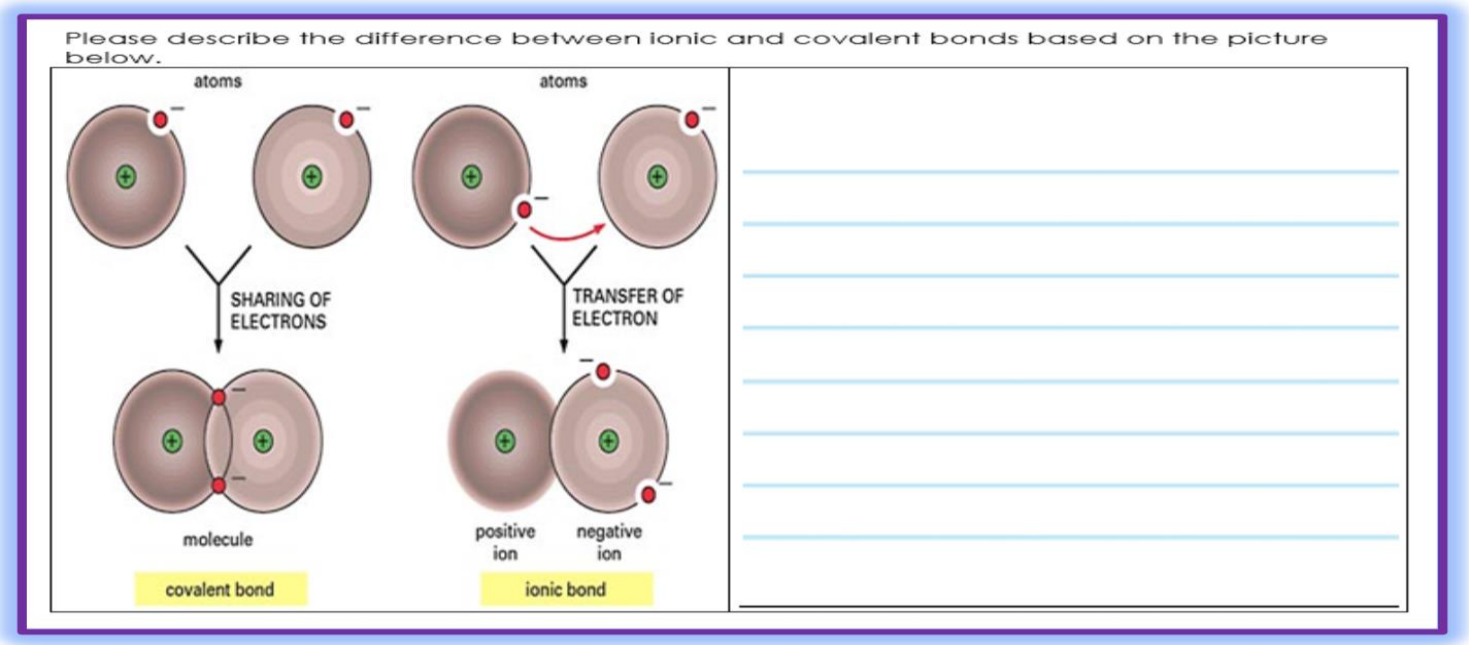
Ion: A _____ atom.

- When an atom _____ an electron, now one atom has 1+ (_____), and the other has -1 (_____)

Which is a Cation, Anion, and Neutral Atom?

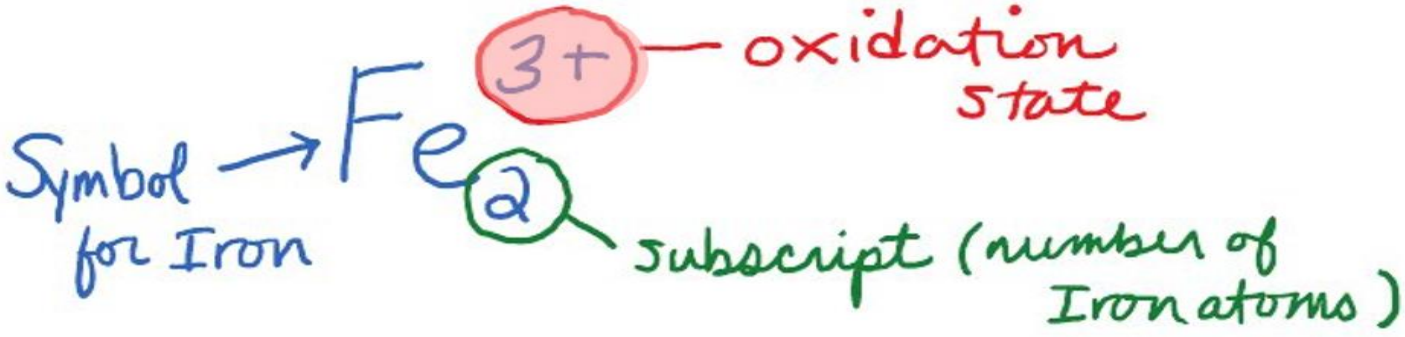


Please describe the difference between ionic and covalent bonds based on the picture below.



Superscript can be used in connection with atomic charge or ionization. Some atoms lose an electron or electrons and bear a positive charge.

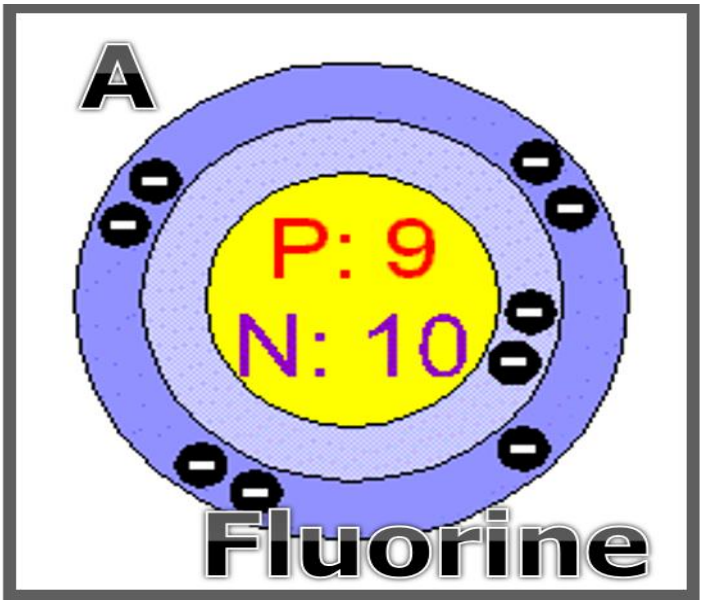
Example 3+ (lost electrons)

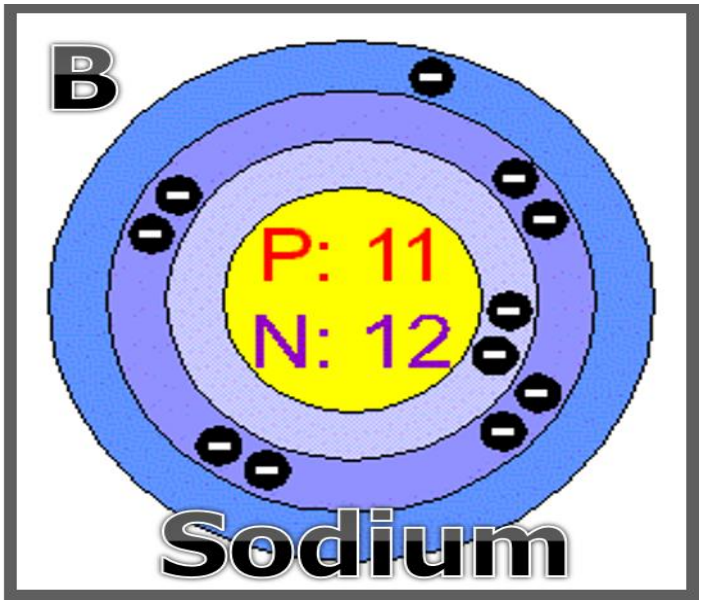


Which atom below formed a cation, and which formed an anion?

Electron Affinity: The amount of energy required to _____ an electron from a singly charged negative ion.

Which atom below has a high electron affinity, and which has a low electron affinity?





Precipitation Reactions: Occur when _____ and _____ of aqueous solutions combine to form an insoluble ionic solid, called a precipitate.

First - $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$

Second- $AgNO_3(aq) + NaI(aq) \rightarrow AgI(s) + NaNO_3(aq)$

Metallic bonding: The bonding between atoms within _____. The sharing of _____ free electrons. Sharing of free electrons between a lattice of metal atoms.

Which choice best describes a metallic bond?

A.) This bond is formed from the attraction between mobile electrons and fixed positively charged metallic atoms.

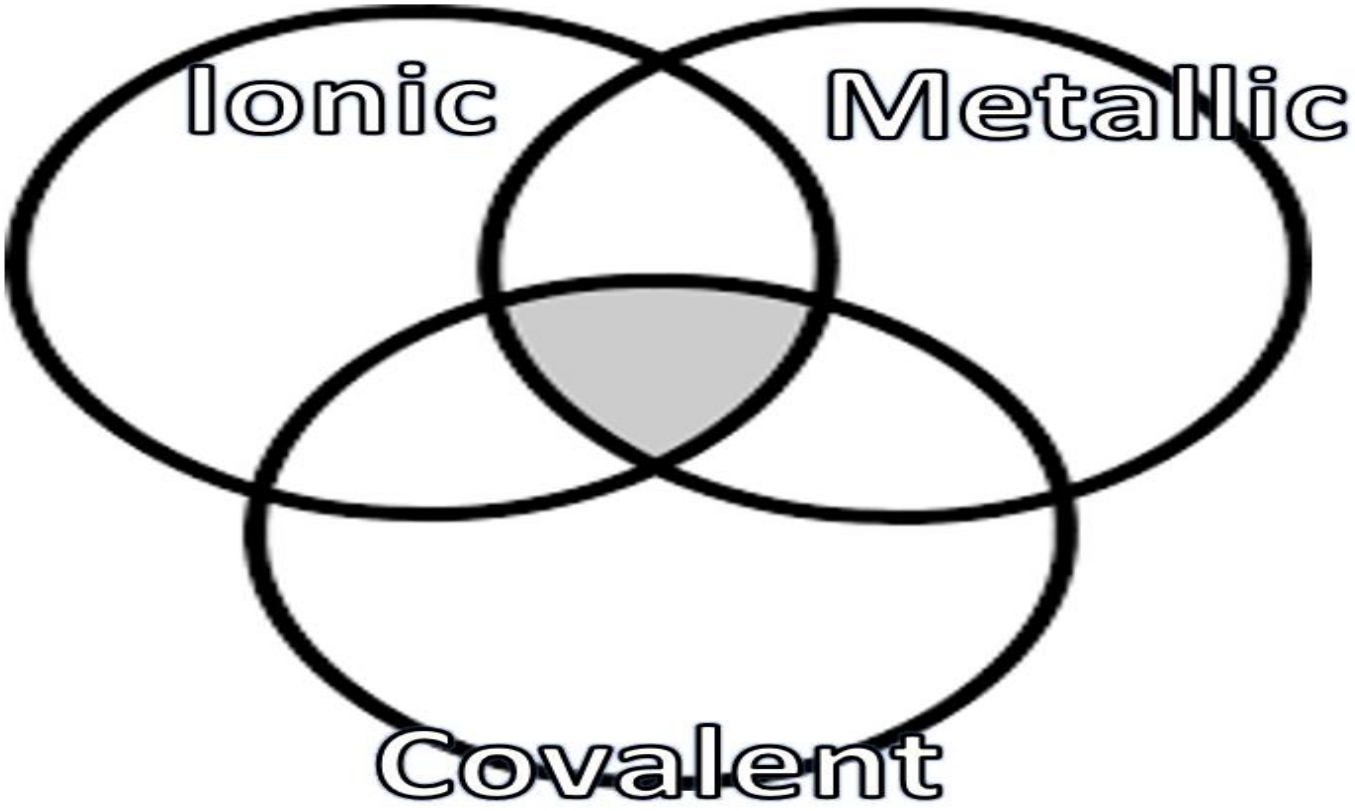
B.) The electrostatic bond between two ions formed through the transfer of one or more electrons.

C.) An electrostatic bond between a hydrogen atom in a covalent bond and an electronegative atom such as oxygen.

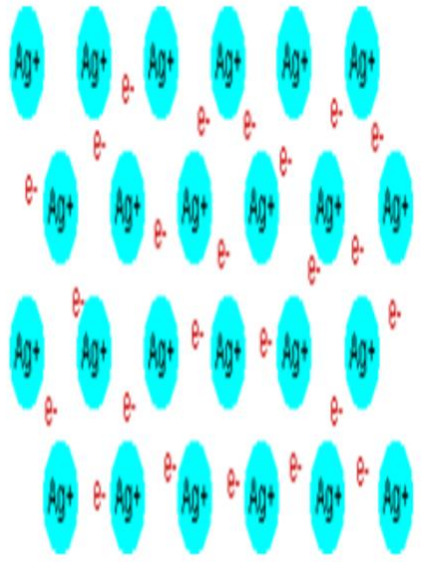
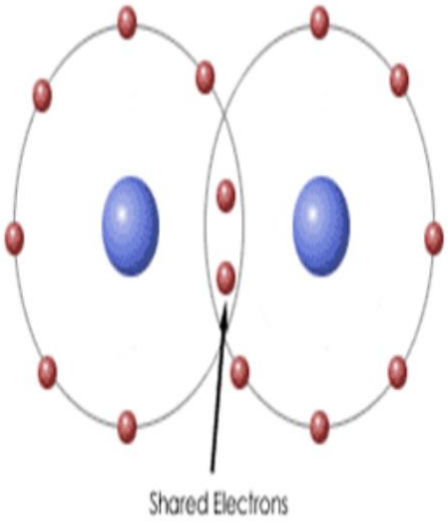
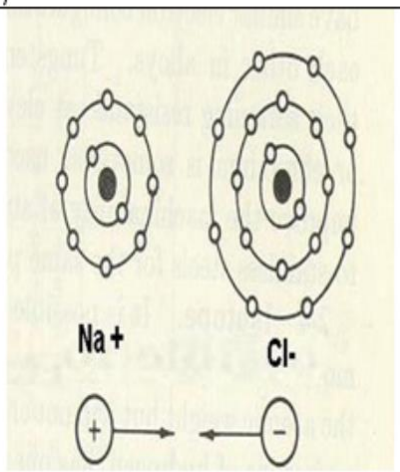
D.) The bond formed by the sharing of a pair of electrons by two atoms.

Optional Notes

Provide some information about the three bonds below



Please label as ionic, covalent, or metallic bond (Anion? Cation?)

Please label as ionic, covalent, or metallic bond (Anion? Cation?)		
		
	Shared Electrons	METAL BONDING TO A Nonmetal

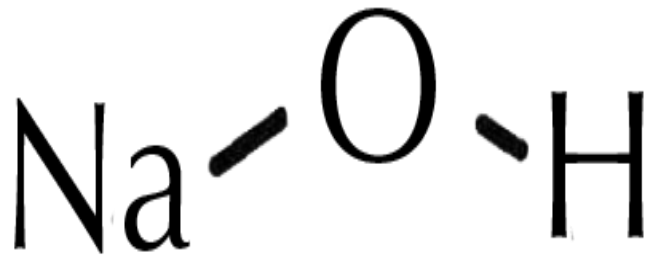
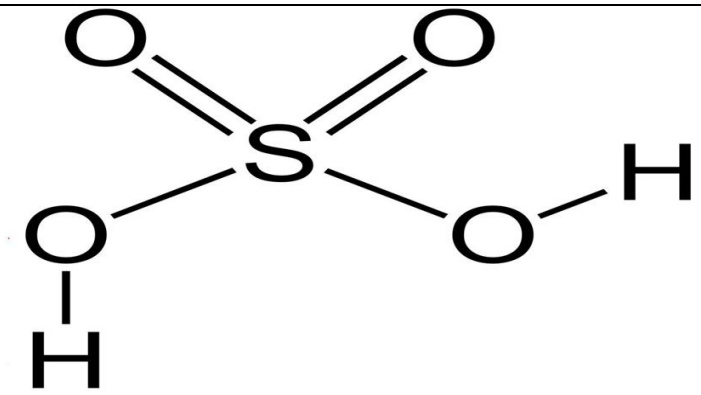
Part 5 Lesson 4 Acid Base

An acid is any hydrogen-containing substance that is capable of _____ a proton (hydrogen ion) to another substance.

Acidic substances are usually identified by their _____ taste. ... Acids are known to turn litmus _____.

A base is a molecule or ion able to _____ a hydrogen ion from an acid.

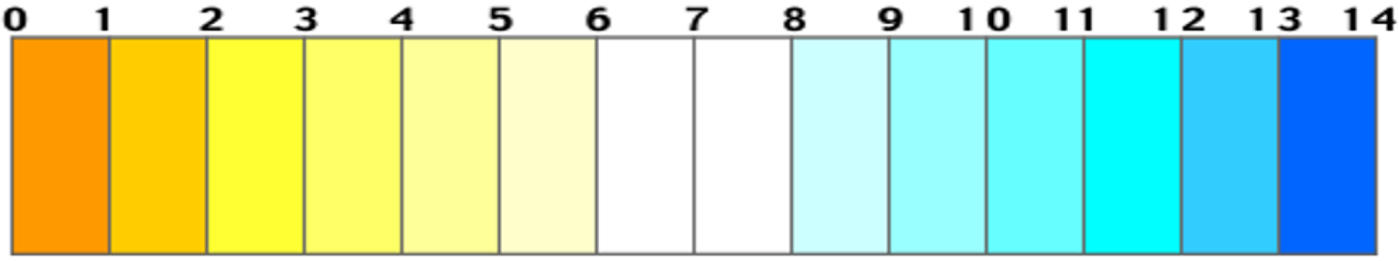
Which is the acid and which is the base?

 Answer=	 Answer=

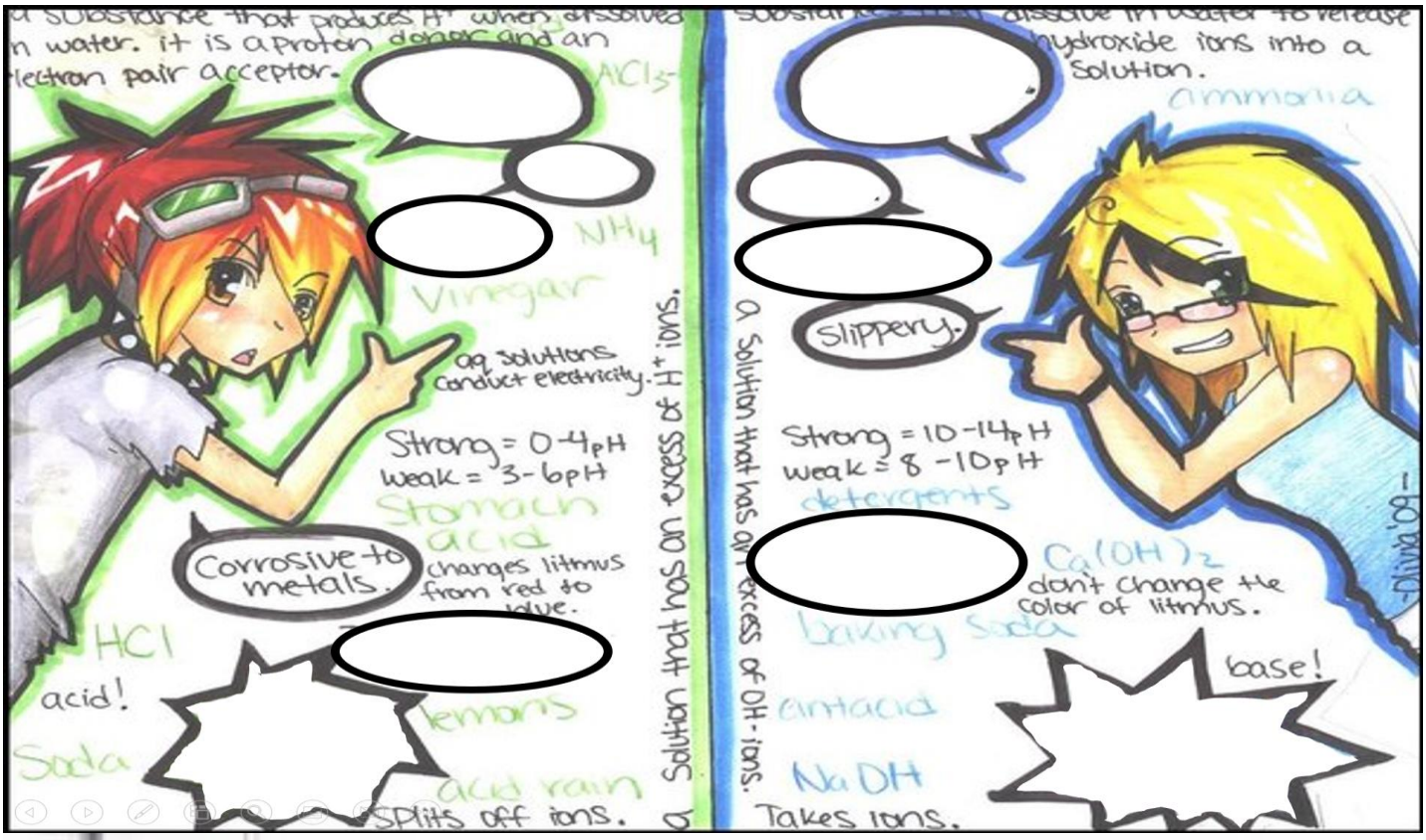
Water in a pure state has a _____ pH.

- Pure water is neither acidic or basic.

Provide some info on the pH scale below as described in the slideshow.



Use the diagram below to assist you in writing a short paragraph that describes the differences between acids and bases?



Which is an acid? And which is a base?

A substance which when added to water produces hydroxide ions [OH^-]. Turns litmus blue. They react with most cations to precipitate hydroxides. Taste bitter Do not taste in the lab.	A substance which when added to water produces hydrogen ions [H^+]. React with zinc, magnesium, or aluminum and form hydrogen ($H_{2(g)}$). React with compounds containing CO_3^{2-} and form carbon dioxide and water. Turns litmus red. Taste sour (lemons contain citric acid, for example). Tasting Acids in the lab would be unsafe.

Please complete as described in the slideshow? What are some of the mystery solutions.

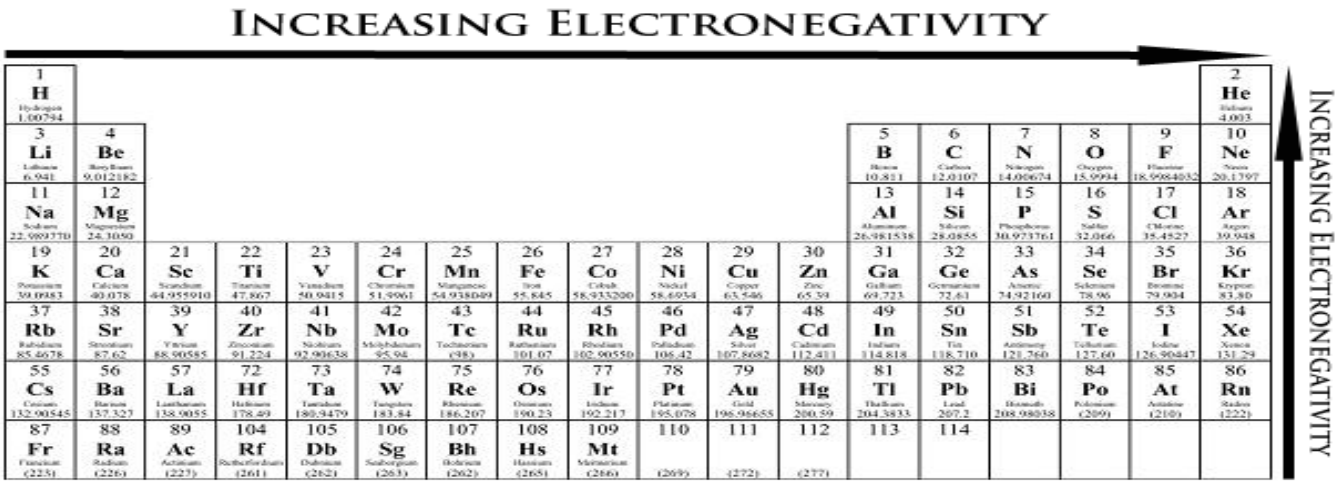
1-2 2-4 4-6 6-8 8-10 10-12 12-14

Part 5 Lesson 6 Bonds, Hydrogen Bonds

Electronegativity is the tendency for an atom to _____ _____ when forming a bond.

It is affected by both its atomic number and _____ of its valence electrons from the nucleus.

Electronegativity _____ from lower left to upper right.



The most strongly electronegative element is =_____
The least electronegative element is =_____

Electronegativity is a measure of the _____of an atom for the electrons in a chemical bond.

The higher the electronegativity of an atom, the _____ its attraction for bonding electrons.

- Electrons with low ionization energies have a _____ electronegativity because their nuclei do not exert a strong attractive force on electrons.
- Elements with high ionization energies have a _____ electronegativity due to the strong pull exerted on electrons by the nucleus.

A polar bond: Results in the _____ sharing of the electrons in the bond.

When two unlike atoms are covalently bonded, the _____will be more strongly _____ to the atom of greater electronegativity

Hydrogen Bond (Weak): A chemical bond in which a _____ atom of one molecule is attracted to an _____ atom.

- Especially a nitrogen, oxygen, or flourine atom of another molecule.

Which choice best describes a hydrogen bond? A.) This bond is formed from the attraction between mobile electrons and fixed positively charged metallic atoms. B.) The electrostatic bond between two ions formed through the transfer of one or more electrons. C.) An electrostatic bond between a hydrogen atom in a covalent bond and an electronegative atom	What's the electron negativity difference of water H_2O? What's the electron negativity difference of

such as oxygen. D.) The bond formed by the sharing of a pair of electrons by two atoms.	C_2H_6 Ethane?

The three classes of bonds

Nonpolar _____

_____ Covalent

Ionic

The most commonly used electronegativity scale is Pauling's. Most Periodic Tables gives the value for each element.

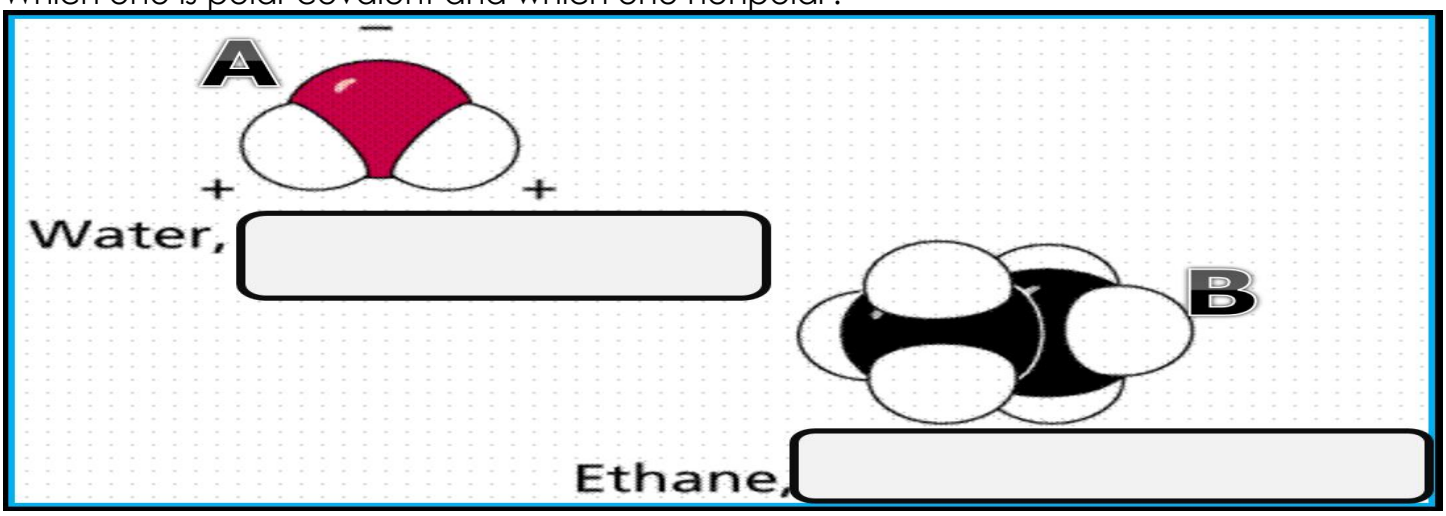
Differences 1.7 or greater, the bond is usually ionic,

Differences Less than 1.7, the bond is usually covalent,

Unless the difference is less than 0.5 the bond has some degree of polarity

Differences of less than 0.5 are considered to be nonpolar.

Which one is polar covalent and which one nonpolar?



Please record the type of bond based on electron negativity differences. Nonpolar Covalent, Polar Covalent, Ionic (Use your periodic table)

CH_4	CO_2	H_2O
Carbon = 2.55 Hydrogen = 2.20	Carbon = 2.55 Oxygen = 3.44	Hydrogen = 2.20 Oxygen = 3.44

Differences 1.7 or greater, the bond is usually ionic,

Differences Less than 1.7, the bond is usually covalent,

Unless the difference is less than 0.5 the bond has some degree of polarity

Differences of less than 0.5 are considered to be nonpolar.

Which choice best describes a covalent bond? Bond types: Ionic, Covalent, Metallic, Hydrogen

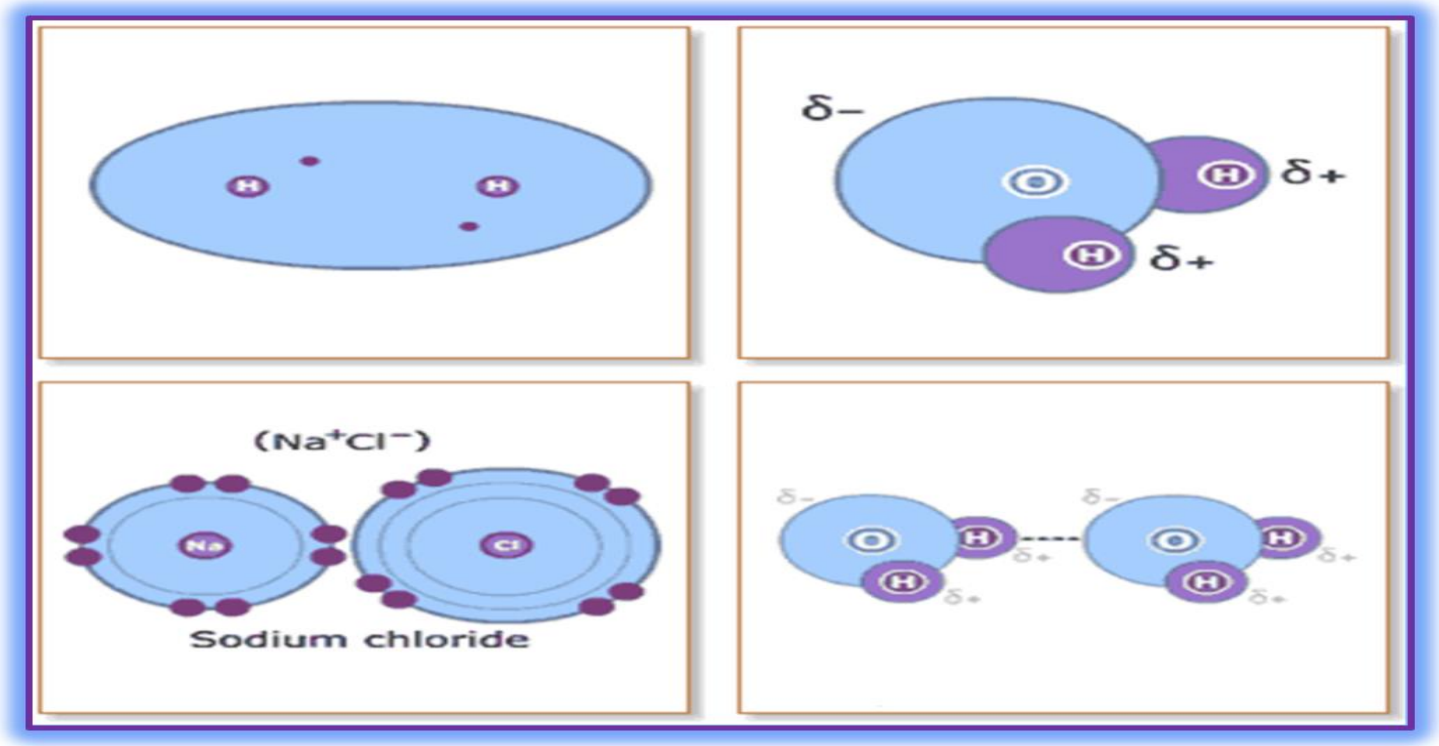
A.)_____ This bond is formed from the attraction between mobile electrons and fixed positively charged metallic atoms.

B.)_____ The electrostatic bond between two ions formed through the transfer of one or more electrons.

C.)_____An electrostatic bond between a hydrogen atom in a covalent bond and an electronegative atom such as oxygen.

D.)_____The bond formed by the sharing of a pair of electrons by two atoms.

Name the type of bond below. Ionic, Covalent, Metallic, Hydrogen



Part 5 Lesson 6 Quiz and Review

Quiz Wiz 1-10: Label as either…

Covalent, Ionic, Metallic, Hydrogen Bonding

Polarity would be nice for covalent bonds if you can.

1)	2)	3)
4)	5)	6)
7)	8)	9)
10)	*11)	

Activation Energy: The _____ amount of energy needed for a chemical reaction to take place.

Part 5 Lesson 7 Endothermic and Exothermic RXN's

Endothermic and Exothermic Reactions

Endo = _____

Exo = _____

Exothermic Reactions: Chemical reactions that _____ energy in the form of heat, light, or sound.

The products contain _____ energy than the reactants

Heat is _____ to the surroundings. (Not destroyed)

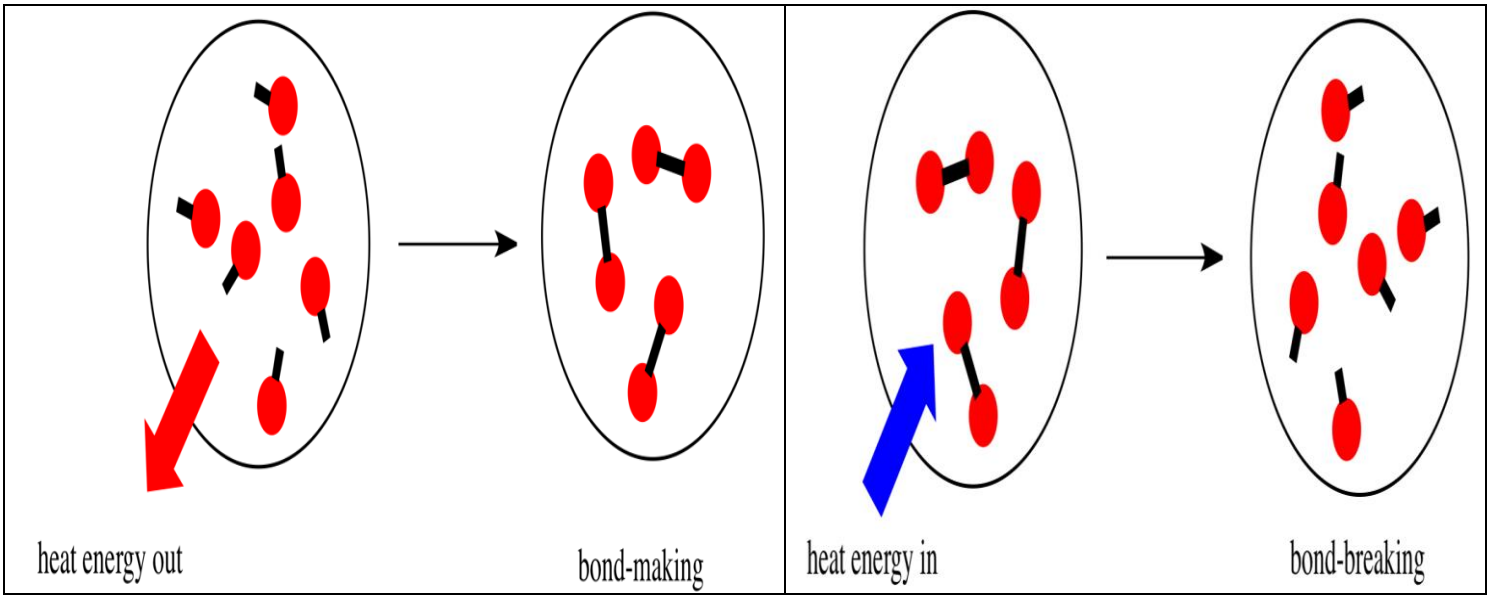
Bond-making is an exothermic process.

Energy is released when _____ bonds form.

Potential Energy

When two atoms form a strong covalent or ionic bond, chemical energy is _____ into other forms of energy, usually in the form of heat and light

Which is an Exothermic RXN? And which is a endothermic RXN?



Bond-breaking is an endothermic process.

To figure out if a reaction is exothermic or endothermic.

Observe how the temperature of the surroundings _____.

An exothermic process releases _____ that causes the temperature of the immediate surroundings to increase.

An endothermic process _____ heat and makes the surroundings colder.

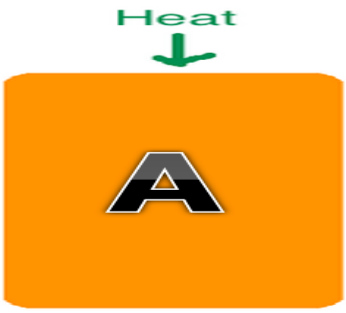
Thermite Reaction.

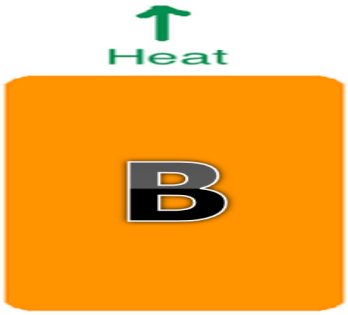
Can we balance this before the video.

___ Al (s) + ___ Fe_2O_3 → ___ Fe(s) + ___Al_2O_3 (s)

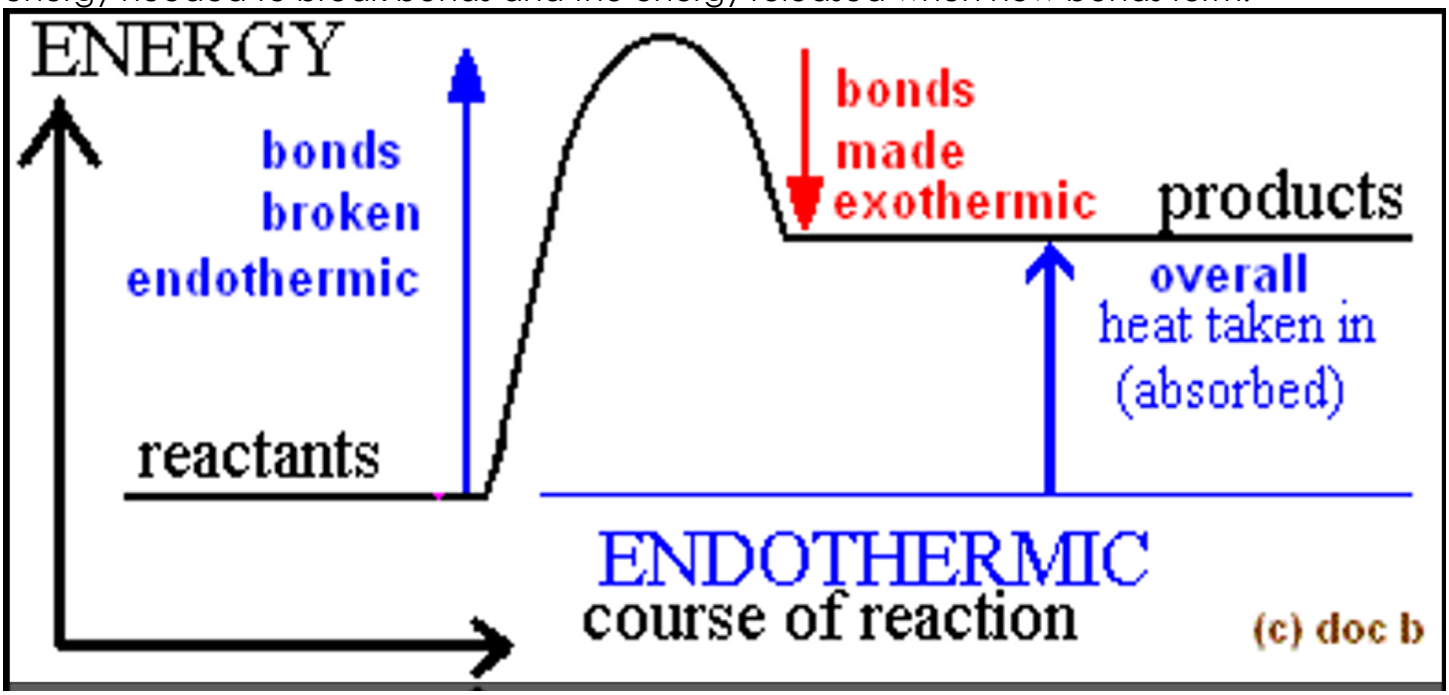
- Is this an endothermic or exothermic reaction?

Which is endothermic and which is exothermic?

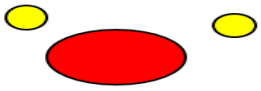




Whether a reaction is endothermic or exothermic depends on the difference between the energy needed to break bonds and the energy released when new bonds form.

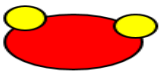


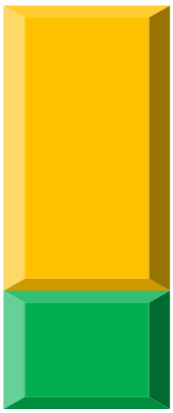
Please fill out the diagram below as described in the slideshow.



Reactants

Products





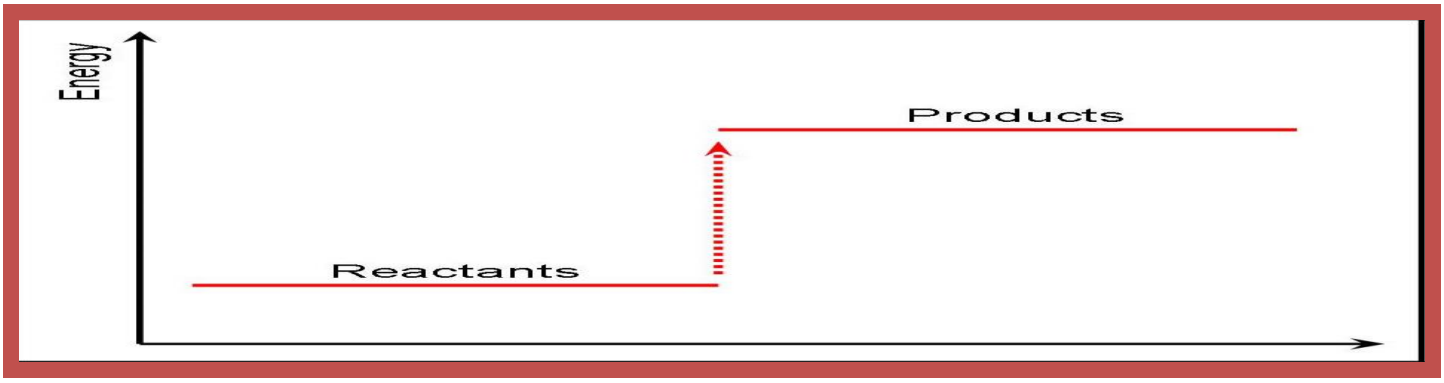
Elephant Toothpaste Procedure

1.) Mix 120 ml of hydrogen peroxide ($H_2O_{2\ aq}$) with 60 ml of liquid dish (OI^- aq) soap and a few drops of food coloring.
2.) Add this mixture to the empty soda bottle and place it on the spill tray.
3.) In a separate container, mix one packet (1 teaspoon or 11 ml / 7 grams) of active yeast with a little warm water (2 tablespoons / 30 ml) and let it sit for 5 minutes.
4.) Remove clumps of yeast so you just add the liquid with funnel.
5.) Pour the yeast mixture into the soda bottle with a funnel and watch the reaction.
6.) Feel the container for heat. (Exothermic)
7.) All contents can be disposed of in the sink.

Elephant Toothpaste

The chemical formula for hydrogen peroxide is H2O2.
Hydrogen peroxide is not stable so it's always decomposing into water and oxygen.
This occurs slowly under normal conditions.
Yeast make the reaction go much faster and the dishwashing soap creates the foam.
The overall equation for this reaction is:
$H_2O_2(aq) + OI^-(aq) \rightarrow I^-(aq) + H_2O(l) + O_2(g)$

Endothermic reactions: These reactions _____energy in order to proceed.
The products contain _____ energy than the reactants, heat is taken in or absorbed from the surroundings.
A temperature _____ is measured during the reaction.

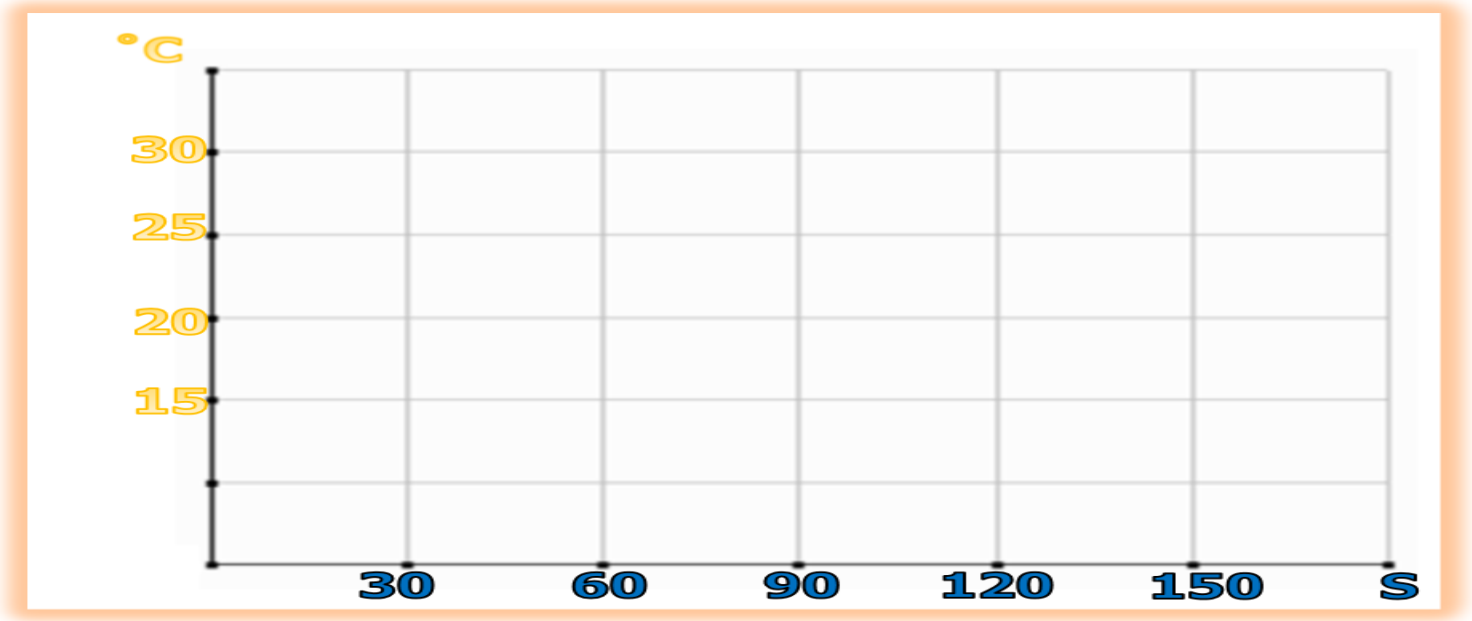


Endothermic Reaction "Alka-Seltzer" Procedure
Fill clear container with 100 ml of water.
Record temperature of water for 30, 60, 90, 120 seconds in spreadsheet.
Keep thermometer in container
Add 2 Alka-Seltzer tablets to the 100 ml of water.
Record temperature for 30, 60, 90,120 seconds on spreadsheet.

Time in Seconds (H_2O)	Temperature (Celsius)
0	
30	
60	
90	
120	

Time in Seconds (Alka-Seltzer)	Temperature (Celsius)
0	
30	
60	
90	
120	

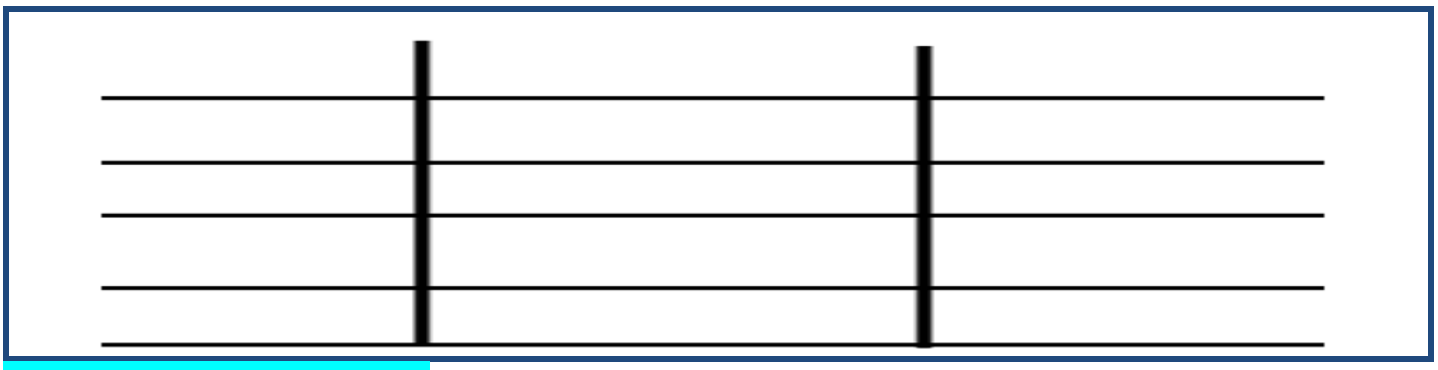
Please complete a line graph below. (Note: The graph below should be in the range of your highest and lowest temperatures) not 0 to 100 °C



Please describe the reaction in the space below. Can you balance the equation below.

___ $C_6H_8O_7(aq)$ + ___$NaHCO_3(aq)$ → ___ $H_2O(l)$ + ___ $CO_2(g)$ + ___$Na_3C_6H_5O_7(aq)$

citric acid + sodium bicarbonate → water + carbon dioxide + sodium citrate



Any reaction between an element or compound and _____ is known as oxidation.

The reaction between magnesium metal and oxygen, for example, involves the oxidation of magnesium.

____ $Mg(s) + O_2(g) \rightarrow$ ___ $MgO(s)$

This is also true of hydrogen. Oxidation is loss of hydrogen. Reduction is gain of hydrogen.

Vinegar, Steel Wool, and the Law Conservation of Matter & Oxidation. What happened?

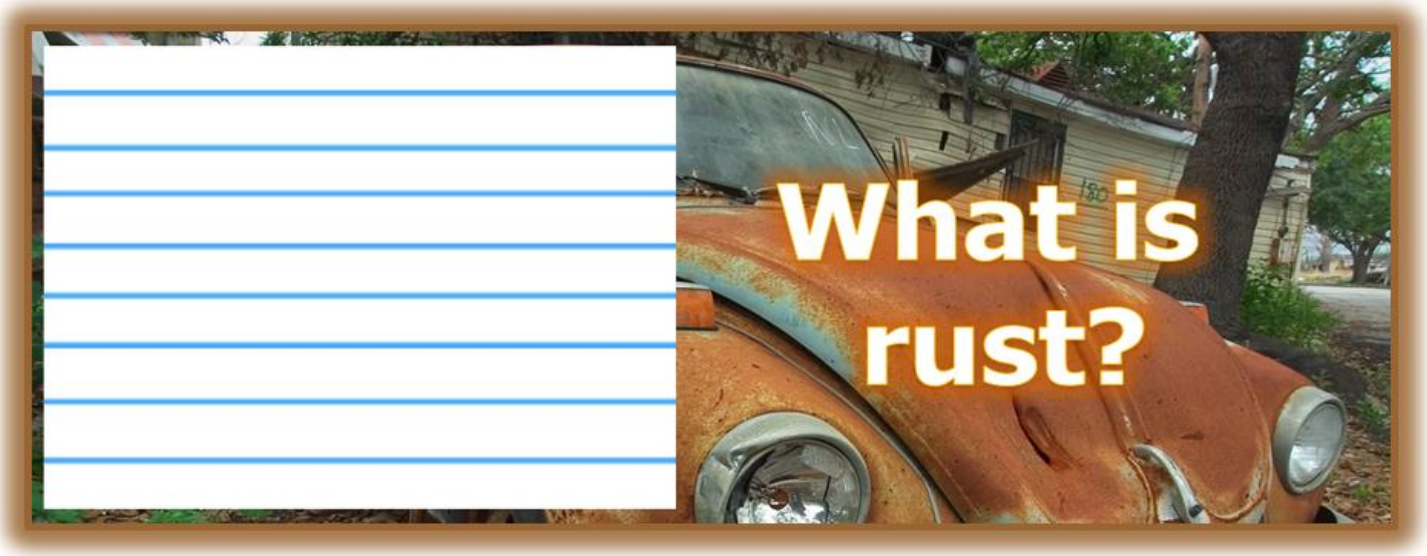
Oxidation number of an element: The number of electrons _____, _____, or _____as a result of chemical bonding. **Oxidation is always followed by reduction**

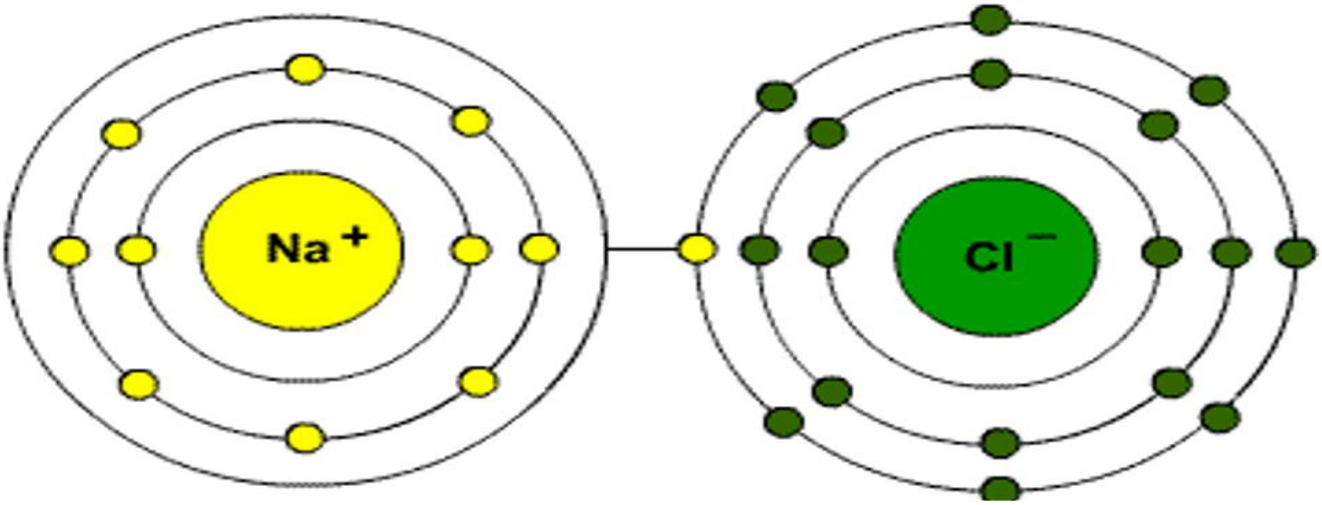
- Oxidation: A _____ in oxidation number
- Reduction: A _____ in oxidation number

$CuO + Mg \rightarrow Cu + MgO$

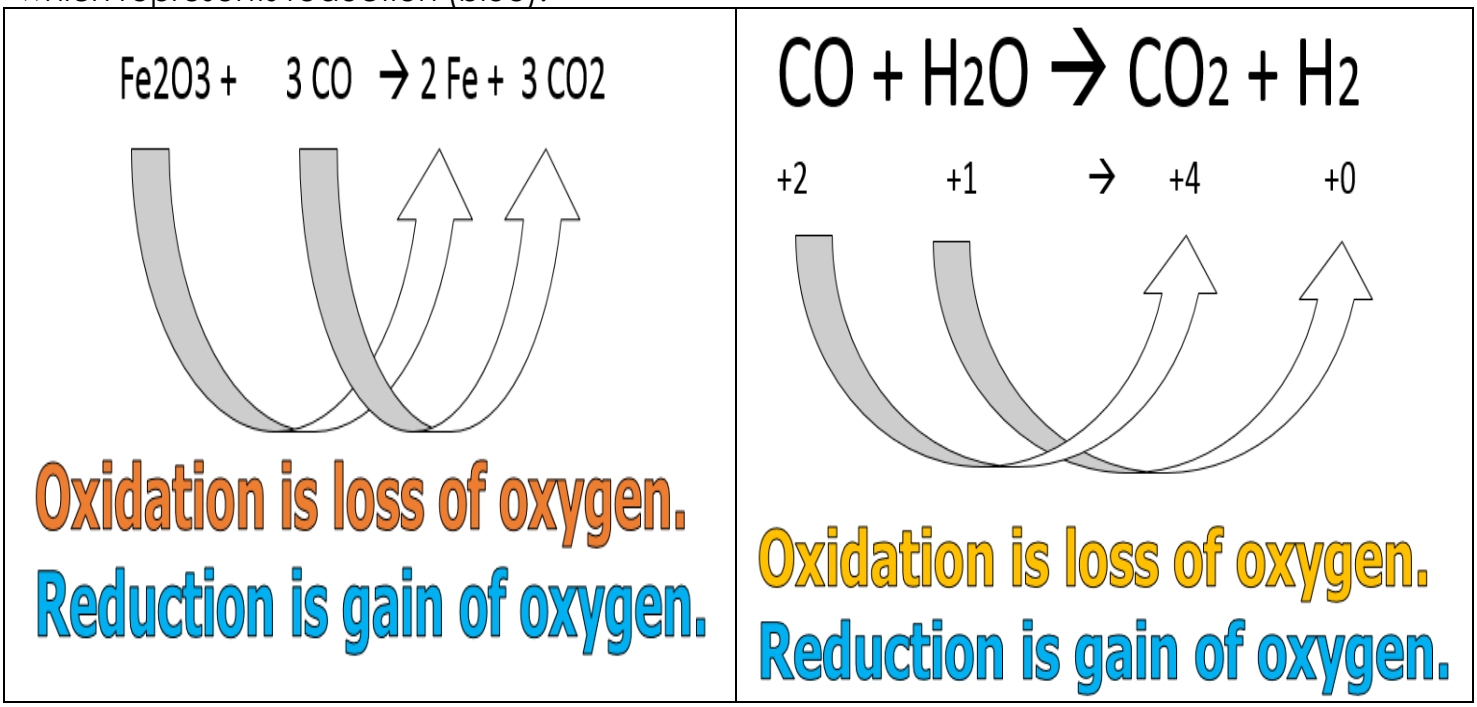
Who lost their oxygen?
Who gained an oxygen?

To oxidize an atom or molecule means you have increased its overall positive charge. Removing electrons does this. Atoms or molecules that give up electrons (or become oxidized) are electron donors. Atoms or molecules that take on electrons (or become reduced) are called electron acceptors.





Color the arrows correctly. Please describe which arrow represents oxidation (Orange), and which represents reduction (blue).

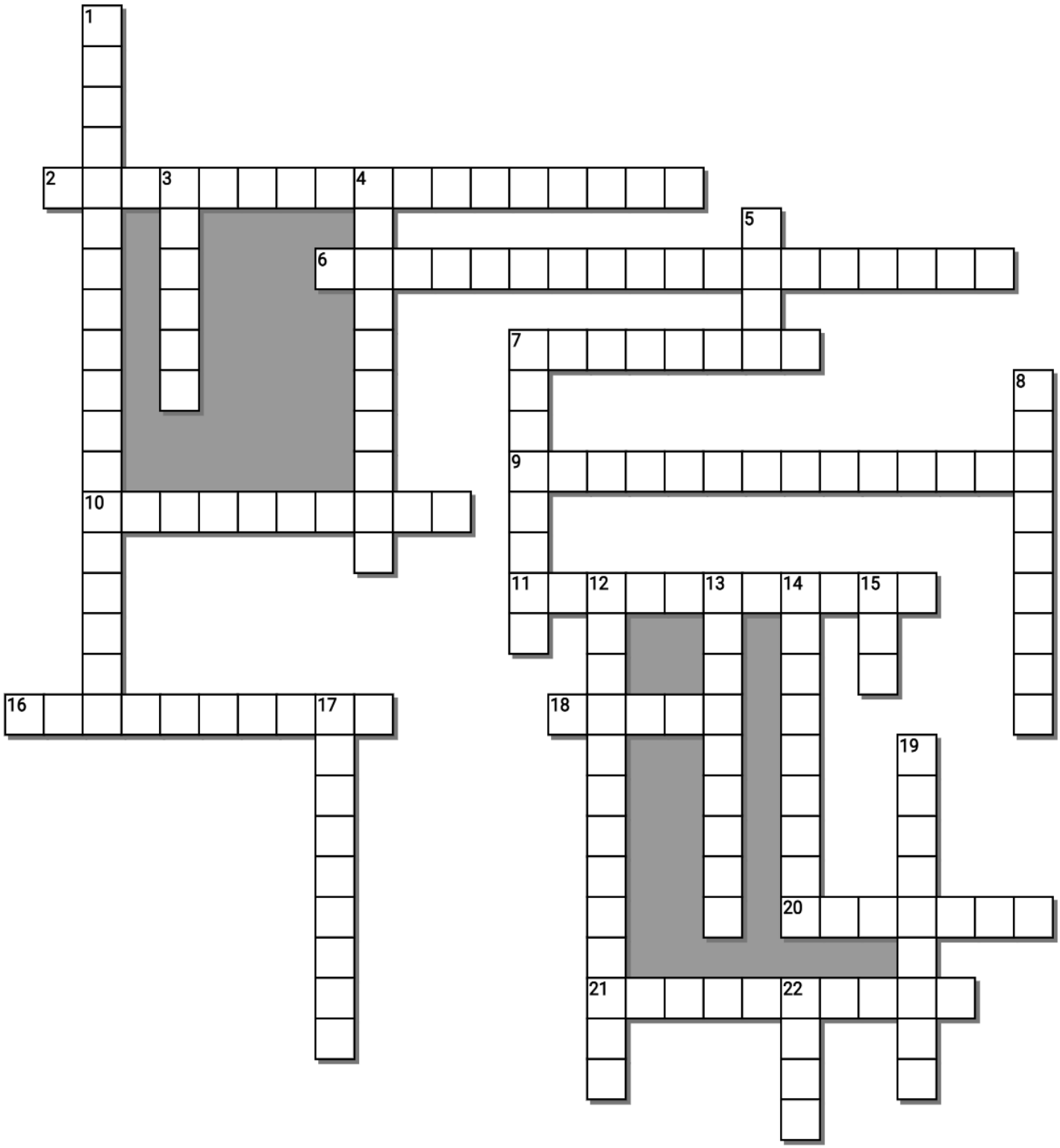


An oxidation-reduction (redox) reaction is a type of chemical reaction that involves a _____of electrons between two species. An oxidation-_____ reaction is any chemical reaction in which the _____ number of a molecule, atom, or ion changes by _____ or _____an electron.

Iron Copper Switch-A-Roo

- Place a clean nail into a plastic dish
- Add 10 drops of Copper Sulfate CuSO4 to a part of a nail.
- Wait 2 minutes

Observe nail? What happened? Rinse spot on nail if you need a better look



----------Teacher can remove this word bank to make more difficult----------

Possible Answers

IONIZATION, ACID, ACTIVATION, BASE, CATION, COMBUSTION, DECOMPOSITION, DOUBLEDISPLACEMENT, ELECTRONEGATIVITY, ELECTRONS, ENDOTHERMIC, EXOTHERMIC, HYDROGEN, ION, OXIDATION, REDUCTION, REORGANIZATION, SINGLEDISPLACEMENT, SYNTHESIS, HYDROGEN, HYDROXIDE , NEUTRAL, POLAR

Across

2. _____ is a measure of the attraction of an atom for the electrons in a chemical bond.
6. (Two Words) When the anions and cations of two different molecules switch places, forming two entirely different compounds.
7. Acid: a substance which when added to water produces _____ ions [H+].
9. Chemical Change: The change of substances into other substances through a _____of the atoms
10. When oxygen combines with another compound to form water and carbon dioxide.
11. _____ reactions: These reactions absorb energy in order to proceed.
16. _____ Energy: The least amount of energy needed for a chemical reaction to take place.
18. A _____ bond: Results in the unequal sharing of the electrons in the bond.
20. Water in a pure state has a _____ pH.
21. Electrons with low _____ energies have a low electronegativity because their nuclei do not exert a strong attractive force on electrons.

Down

1. (Two words) When one element trades places with another element in a compound.
3. When an atom strips an electron, now one atom has 1+ (_____),
4. _____ Reactions: Chemical reactions that releases energy in the form of heat, light, or sound.
5. Acid-_____ RXN: The acid and base neutralize each other producing a _____. TheH(+) cation of the acid combines with the OH(-) anion of the base to form water and salt.
7. _____ Bond: A chemical bond in which a hydrogen atom of one molecule is attracted to an electronegative atom.
8. _____ Reaction: When two or more simple compounds combine to form a more complicated one
12. _____ Reaction: A complex molecule breaks down to make simpler ones.
13. Base: a substance which when added to water produces _____ ions [OH-].
14. A decrease in oxidation number
15. A charged atom.
17. Any reaction between an element or compound and oxygen is known as _____.
19. To oxidize an atom or molecule means you have increased its overall positive charge. Removing _____ does this.
22. An _____ is any hydrogen-containing substance that is capable of donating a proton (hydrogen ion) to another substance.

Part 5 Review Game

Name:

1-10 = 10 pts * = Bonus + 1 pt, Lesson 8

Due: Today

(Secretly write owl in correct space +1 pt)

Score ____ / 100

Final Question = 5 pt wager

BONDING TIME	NEGATIVIITY LOST	STICK AROUND	STICK AROUND	SPY GAMES Bonus round 1 pt each
1)	6)	11)	16)	*21)
2)	7)	12)	17)	*22)
3)	8)	13)	18)	*23)
4)	9)	14)	19)	*24)
5)	10)	15)	20)	*25)

Final Question Wager ___/5 Answer: _____

Part 5 Chemical RXN's

Name:

Due Date:

1 H 1.00794																	2 He 4.002602
3 Li 6.941	4 Be 9.012182											5 B 10.811	6 C 12.0107	7 N 14.00674	8 O 15.9994	9 F 18.9984032	10 Ne 20.1797
11 Na 22.989770	12 Mg 24.3050											13 Al 26.581538	14 Si 28.0855	15 P 30.973761	16 S 32.066	17 Cl 35.4527	18 Ar 39.948
19 K 39.0983	20 Ca 40.078	21 Sc 44.955910	22 Ti 47.867	23 V 50.9415	24 Cr 51.9961	25 Mn 54.938049	26 Fe 55.845	27 Co 58.933200	28 Ni 58.6534	29 Cu 63.545	30 Zn 65.39	31 Ga 69.723	32 Ge 72.61	33 As 74.92160	34 Se 78.96	35 Br 79.504	36 Kr 83.80
37 Rb 85.4678	38 Sr 87.62	39 Y 88.90585	40 Zr 91.224	41 Nb 92.90638	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.90550	46 Pd 106.42	47 Ag 196.56655	48 Cd 112.411	49 In 114.818	50 Sn 118.710	51 Sb 121.760	52 Te 127.60	53 I 126.90447	54 Xe 131.29
55 Cs 132.90545	56 Ba 137.327	57 La 138.9055	72 Hf 178.49	73 Ta 180.94.79	74 W 183.84	75 Re 186.207	76 Os 190.23	77 Ir 192.217	78 Pt 195.078	79 Au 196.56655	80 Hg 200.59	81 Tl 204.3833	82 Pb 207.2	83 Bi 208.58038	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 (269)	111 (272)	112 (277)		114 (289) (287)		116 (289)		118 (293)

58 Ce 140.116	59 Pr 140.50765	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.964	64 Gd 157.25	65 Tb 158.92534	66 Dy 162.50	67 Ho 164.93032	68 Er 167.26	69 Tm 168.93421	70 Yb 173.04	71 Lu 174.967
90 Th 232.0381	91 Pa 231.035888	92 U 238.0289	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)

Part 5 Lesson 1 Types of Chemical Reactions

Chemical Change: The change of substances into other substances through a rearrangement of the atoms.

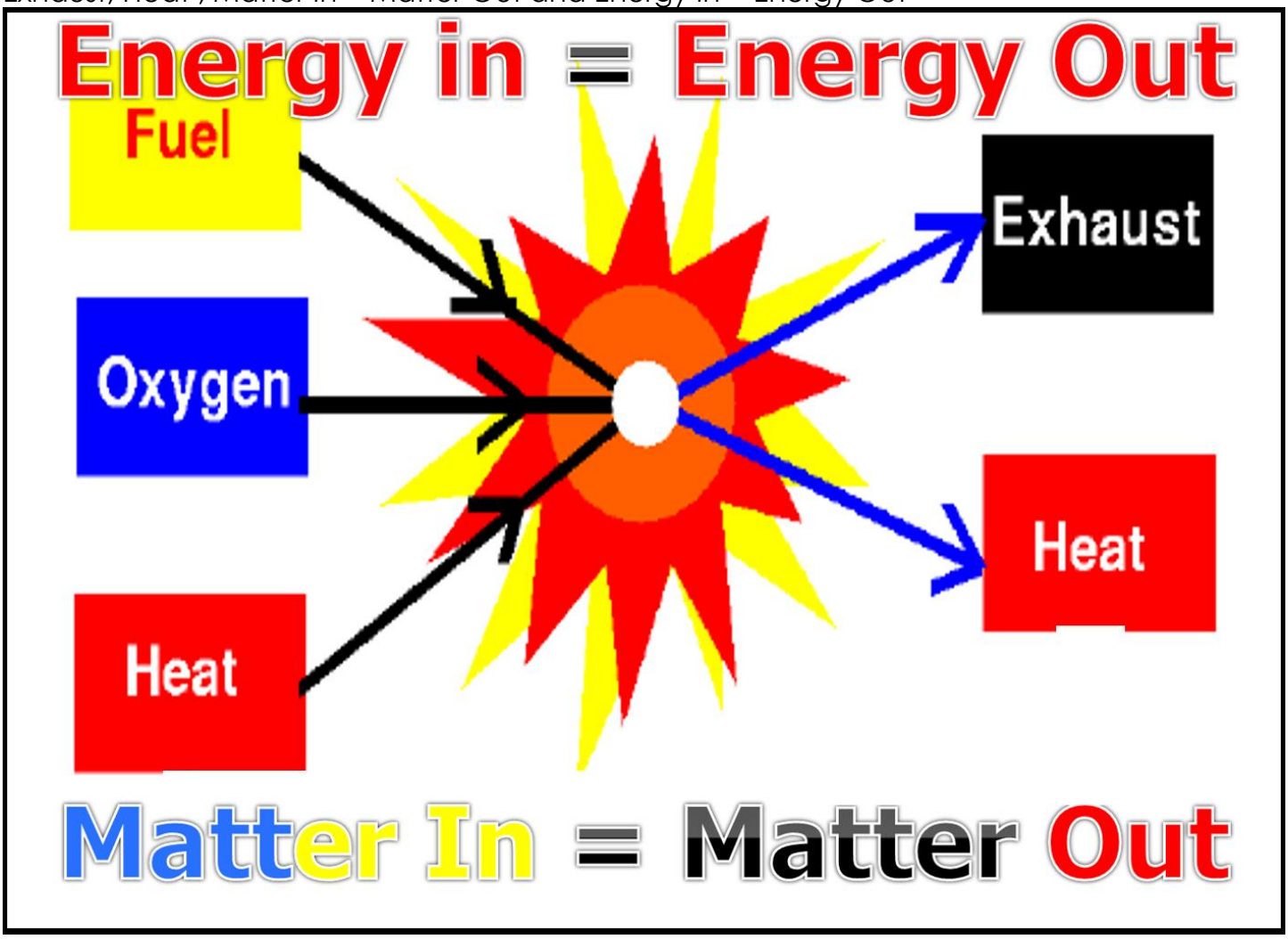
The 6 Types of Chemical Reactions

Combustion: When oxygen combines with another compound to form water and carbon dioxide.

$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2\,H_2O(g)$

Methane Oxygen Carbon Dioxide Water

Describe what goes in and out of combustion below. Word bank: Fuel, Oxygen, Heat, Exhaust, Heat , Matter In = Matter Out and Energy In = Energy Out



Synthesis Reaction: When two or more simple compounds combine to form a more complicated one. A + B = AB

___Zn + 2 HCl → _$ZnCl_2$ + _H_2 (g)

- Steel Wool is Iron (Fe).
- The battery sends an electric current through the thin wire (700°C)
- Iron reacts with Oxygen in air and creates Iron Oxide.

Iron + Oxygen Iron Oxide

4 Fe + 3 O2 → 2 Fe2O3

Decomposition Reaction: A complex molecule breaks down to make simpler ones.
Opposite of Synthesis Reaction. AB → A + B
2 H_2O ---> 2 H_2 + ___O_2 (Electrolysis of Water)

Demonstration – Electrolysis.
What is happening in the beaker? Can you guess the chemical change?

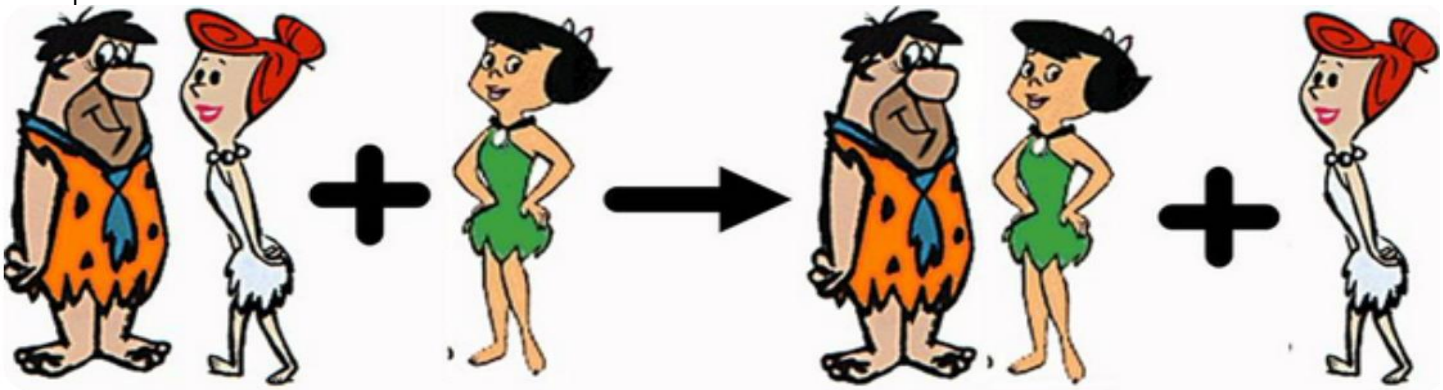
- Electrolysis of water is the decomposition of water (H2O) into oxygen (O2) and hydrogen (H).

Black Snake Experiment

Sodium bicarbonate breaks down into sodium carbonate, water vapor, and carbon dioxide gas. The burning sugar in oxygen produces water vapor and carbon dioxide gas. The snake is carbonate with black carbon particles:

2 $NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$
$C_2H_5OH + 3\ O_2 \rightarrow 2\ CO_2 + 3\ H_2O$

Single Displacement: When one element trades places with another element in a compound. BC + A → AC + B



Which was the single displacement reaction and which was the combustion reaction?

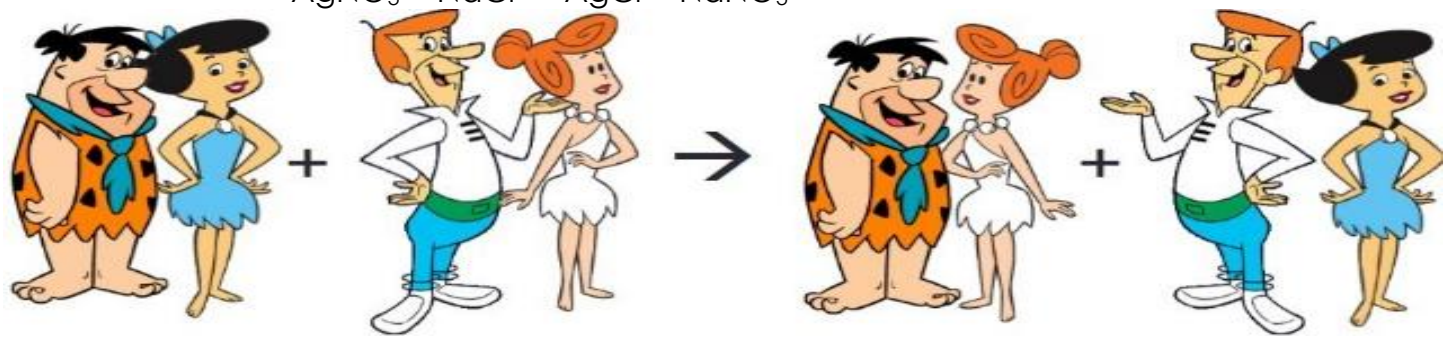
Hydrogen gas reacts with Oxygen. $2H_2 + O2 \rightarrow 2H_2O$ Answer=	Reaction between zinc and hydrochloric acid is $Zn + HCl \rightarrow H_2 + ZnCl_2$. Answer=

Part 5 Lesson 2 Continued Types of Chemical reactions

Double Displacement: When two different molecules switch places, forming two entirely different compounds.

AB + CD → AD + CB

$AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$



Demonstration – Chemical Change with baking soda and vinegar.

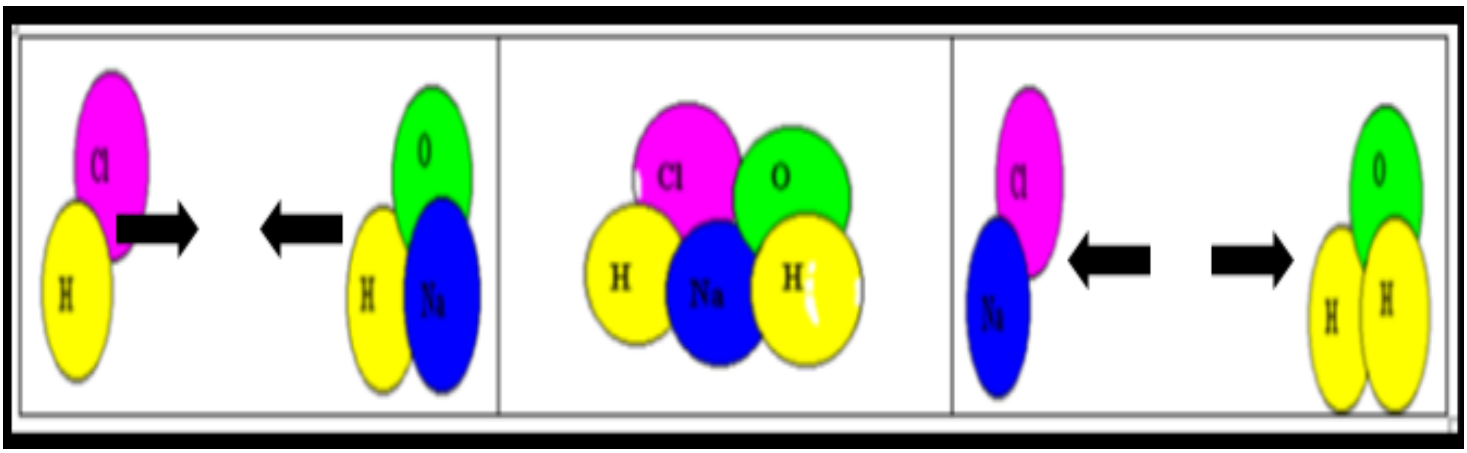
- The chemical reaction occurs in two steps.
- The **double displacement** reaction occurs first. Acetic acid in vinegar reacts with sodium bicarbonate to form sodium acetate and carbonic acid:
- $NaHCO_3 + HC_2H_3O_2 \rightarrow NaC_2H_3O_2 + H_2CO_3$
- Carbonic acid is unstable and goes through a **decomposition** reaction to produce carbon dioxide gas:
- $H_2CO_3 \rightarrow H_2O + CO_{2(g)}$

Cleopatra's Needle (Chalk and Vinegar)

$2\ HC_2H_3O_2 + CaCO_3 \rightarrow Ca(C_2H_3O_2)_2 + CO_2 + H_2O$

Vinegar (l) Chalk (s) Solution (aq) Carbon Dioxide(g) Water (l)

Acid / Base: When an acid and base react with each other.



Acid-Base RXN: The acid and base neutralize each other producing a salt.

The H(+) cation of the acid combines with the OH(-) anion of the base to form water.

The compound formed by the cation of the base and the anion of the acid is called a salt.

HCL + NaOH → H2O + NaCl

Acid + Base -> Water + Salt

Which is the acid and which is the base? KOH is the Base, HCL is the Acid
Which is the salt, and which is the water? KCL is the Salt and H_2O) is Water

$$KOH + HCl \rightarrow KCL + H_2O$$

Which is the acid and which is the base? H_3PO_4 is the Acid and $Ca(OH)_2$ is the base
Which is the salt, and which is the water? H2O is water, and $Ca_{3(}PO)_4$ is salt

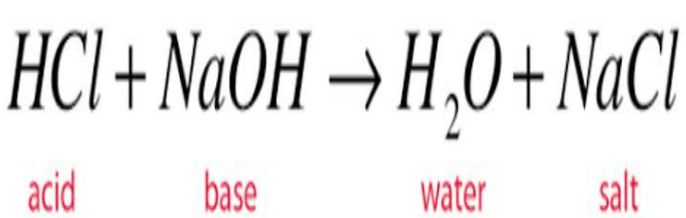
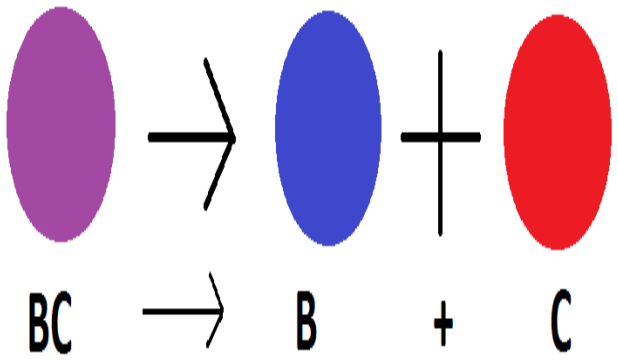
$$2H_3PO_4 + 3Ca(OH)_2 \rightarrow 6H_2O + Ca_3(PO)_4$$

Phosphoric Acid + Calcium Hydroxide react to form water + calcium phosphate

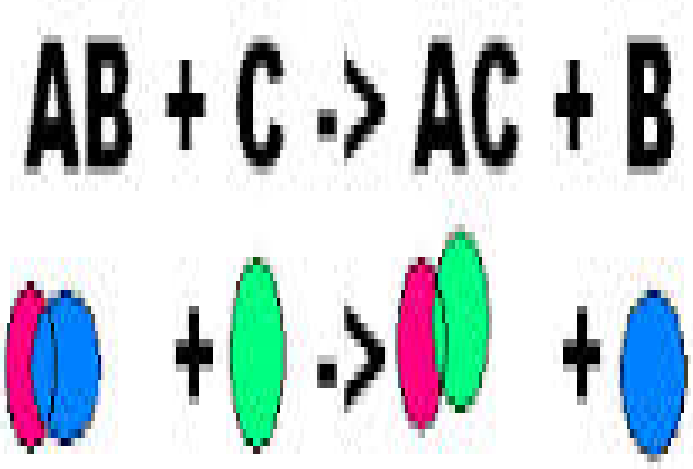
Quiz Wiz, Name the type of Chemical Reaction.
Word Bank is the 6 types of chemical reactions.

1) Single Displacement	2) Acid Base Reaction	3) Decomposition Reaction
4) Combustion	5) Single Displacement	6) Synthesis Reaction
7) Single Displacement	8) Double Displacement	9) Combustion
10) Combustion	*11) Gomez Bieber Switch	

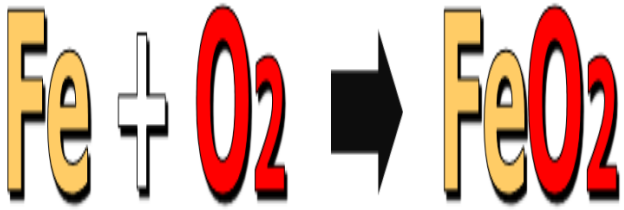
Name the six types of chemical reactions below?

Acid Base Reaction. 	Decomposition Reaction 

Single Displacement Reaction

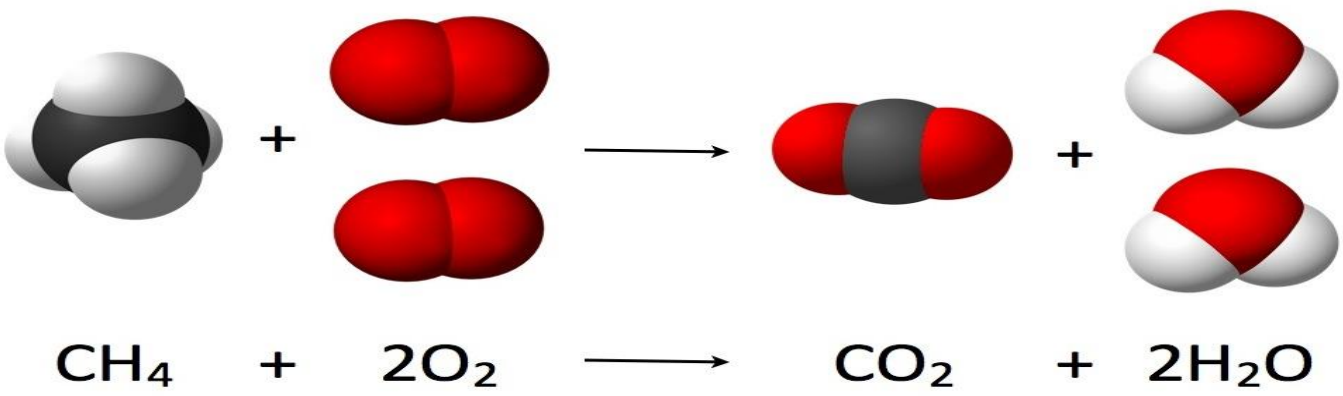


Synthesis Reaction



Double Displacement Reaction

Combustion Reaction



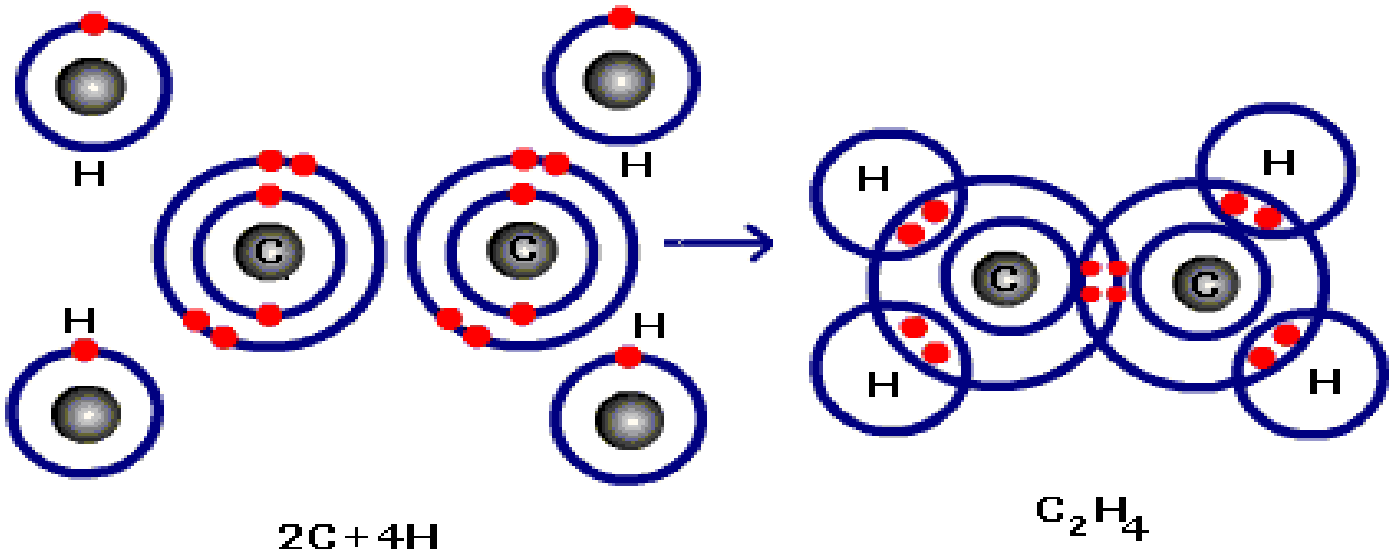
Part 5 Lesson 6 Atomic Bonding

Chemical Bonding: The attraction that holds atoms close to each other.

Ionic, Covalent, Metallic

Covalent – Share electrons
Ionic – Gain or lose electrons (transfer)
Metallic- Many free electrons

Covalent bonding occurs by a sharing of Valence electrons (Strongest) (SPONCH).



Which choice best describes a covalent bond?

A.) This bond is formed from the attraction between mobile electrons and fixed positively charged metallic atoms.

B.) The electrostatic bond between two ions formed through the transfer of one or more electrons.

C.) An electrostatic bond between a hydrogen atom in a covalent bond and an electronegative atom such as oxygen.

D.) The bond formed by the sharing of a pair of electrons by two atoms.

Ionic bonding (+/-) Bonds created by the attraction of opposite charges.

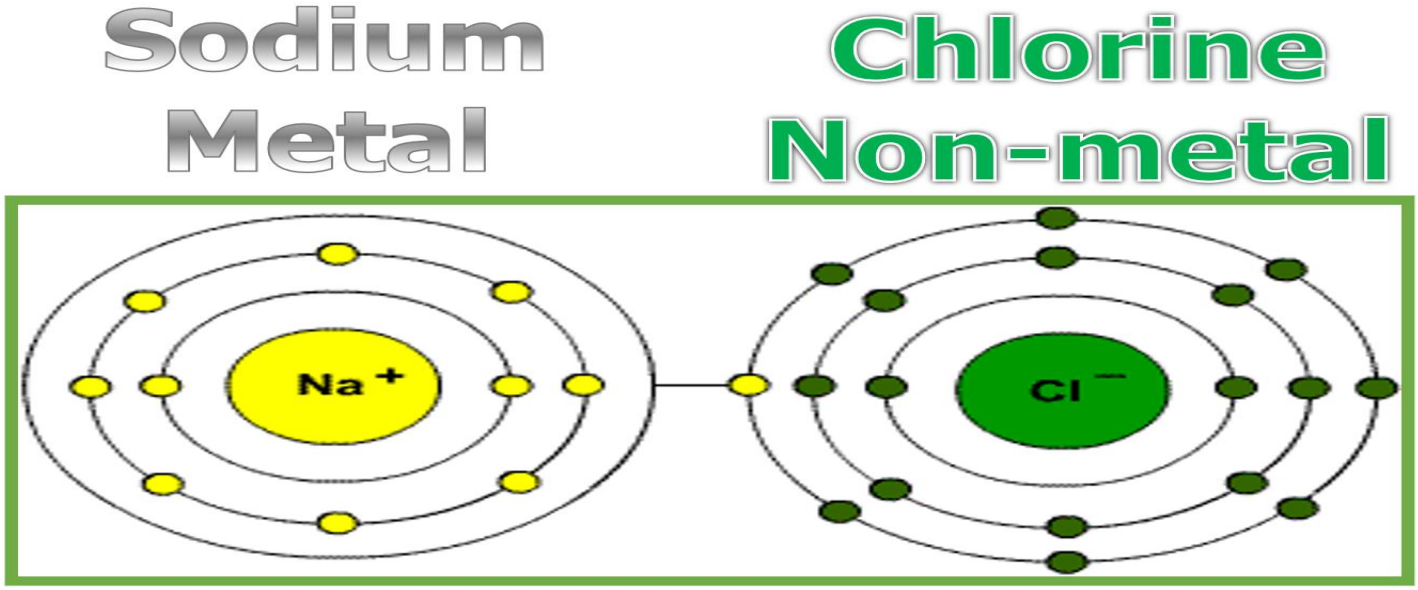
Transfer of an electron

Ionization: The process of removing electrons from an atom to form ions.

Ionic - One atom strips electron from the other so both are now stable. Held then by + /- charge

Ionic Bonding: Forms crystal lattice.
Metal bonding to a non-metal will always be an ionic bond.

Which is a metal? and which is a non-metal? What type of bond is this?



Which choice best describes a Ionic bond?

A.) This bond is formed from the attraction between mobile electrons and fixed positively charged metallic atoms.

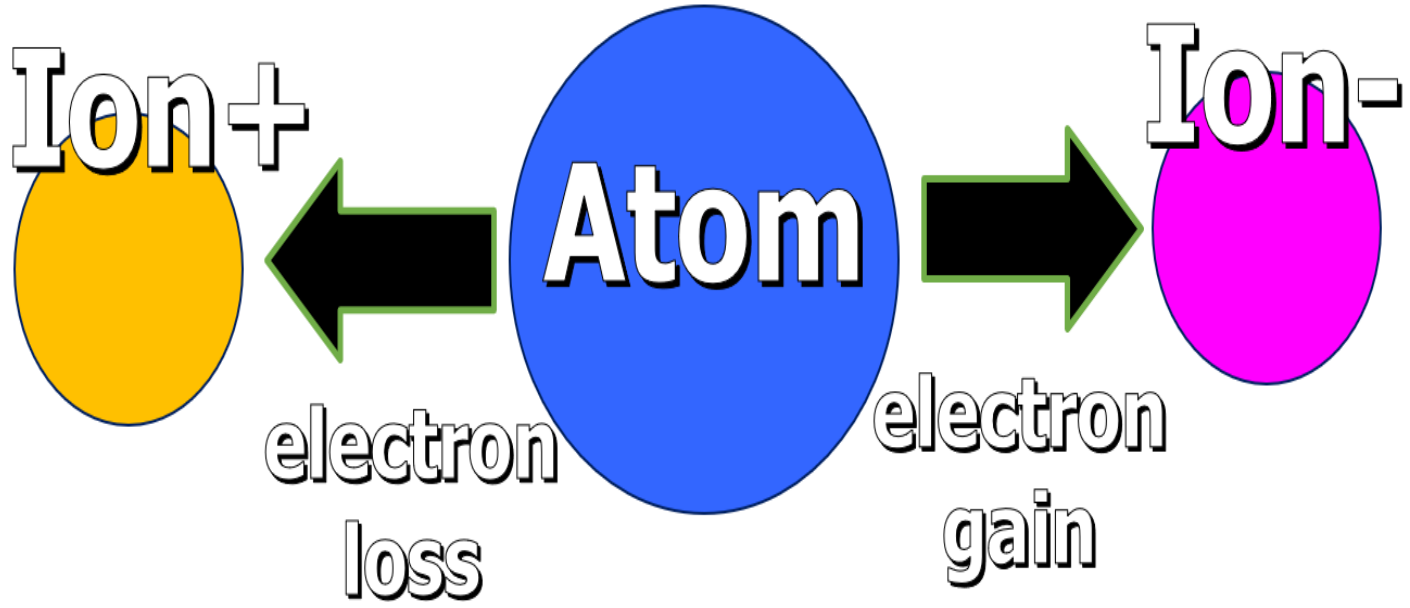
B.) The electrostatic bond between two ions formed through the transfer of one or more electrons.

C.) An electrostatic bond between a hydrogen atom in a covalent bond and an electronegative atom such as oxygen.

D.) The bond formed by the sharing of a pair of electrons by two atoms.

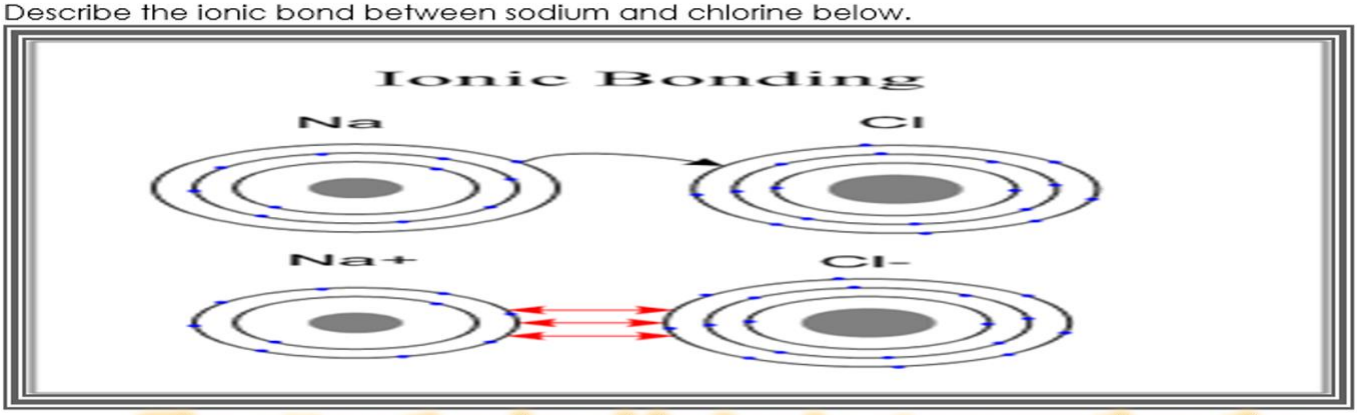
Ion: A charged atom.

- When an atom strips an electron, now one atom has 1+ (cation), and the other has -1 (anion)



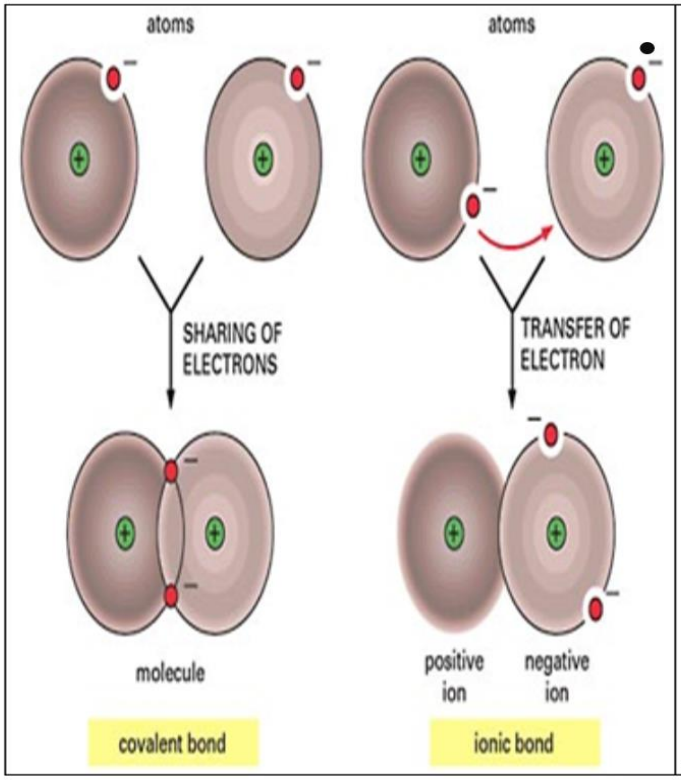
Describe the ionic bond between sodium and chlorine below.

Describe the ionic bond between sodium and chlorine below.



The attraction by chlorine is stronger than the attraction by sodium. An electron is transferred from sodium to chlorine. Sodium becomes a positive ion and chlorine becomes a negative ion. The positive and negative ions attract each other and form the ionic compound sodium chloride.

Please describe the difference between ionic and covalent bonds based on the picture below.

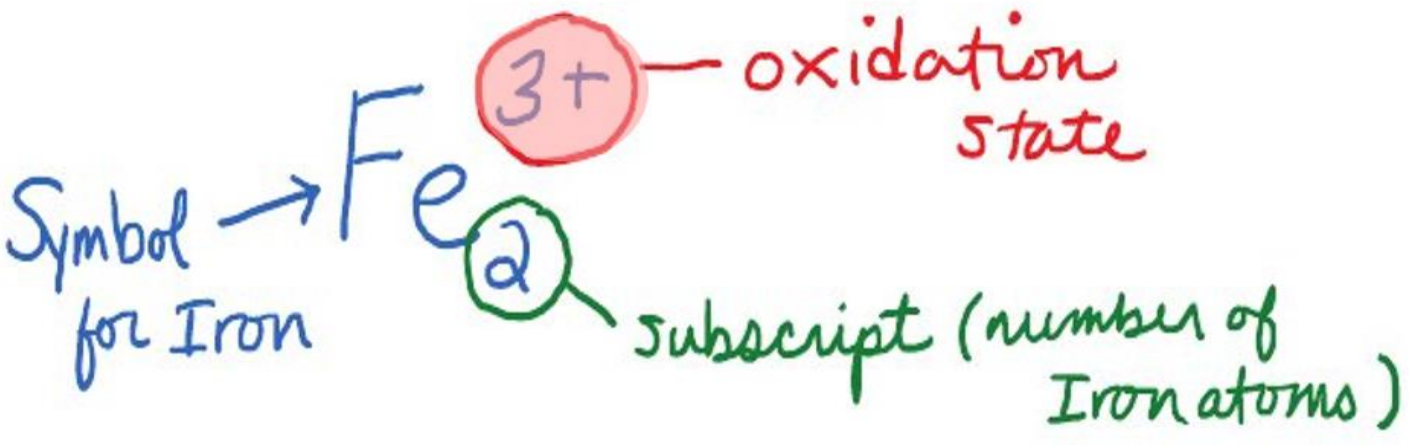


Differences between Ionic and Covalent Bonds.

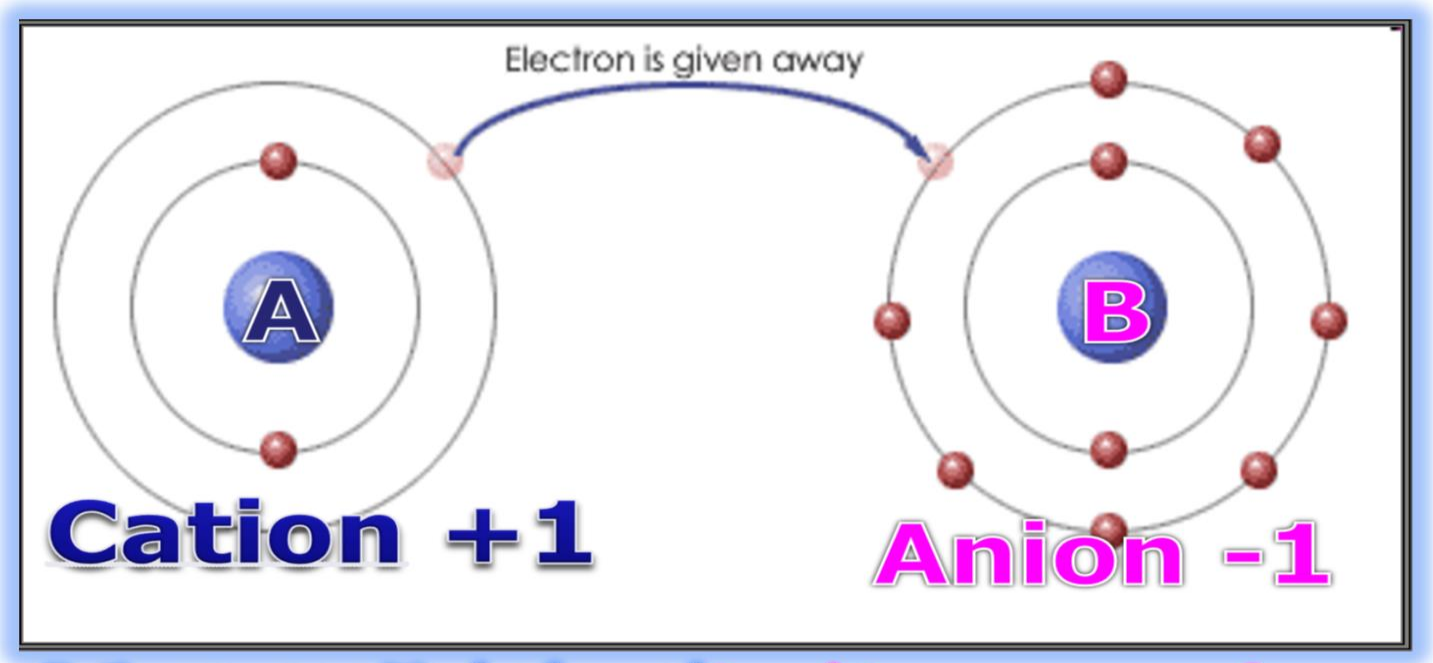
- **Covalent bonds are formed between two non-metals and they share valence electrons.**
- **Ionic bonds are formed between a metal and non-metal, transfer and electron which creates +/- ions.**
- **Molecules formed by covalent bonds have a low melting and boiling point.**
- **Ionic bonds have a high melting and boiling point.**

Superscript can be used in connection with atomic charge or ionization. Some atoms lose an electron or electrons and bear a positive charge.

Example 3+ (lost electrons)



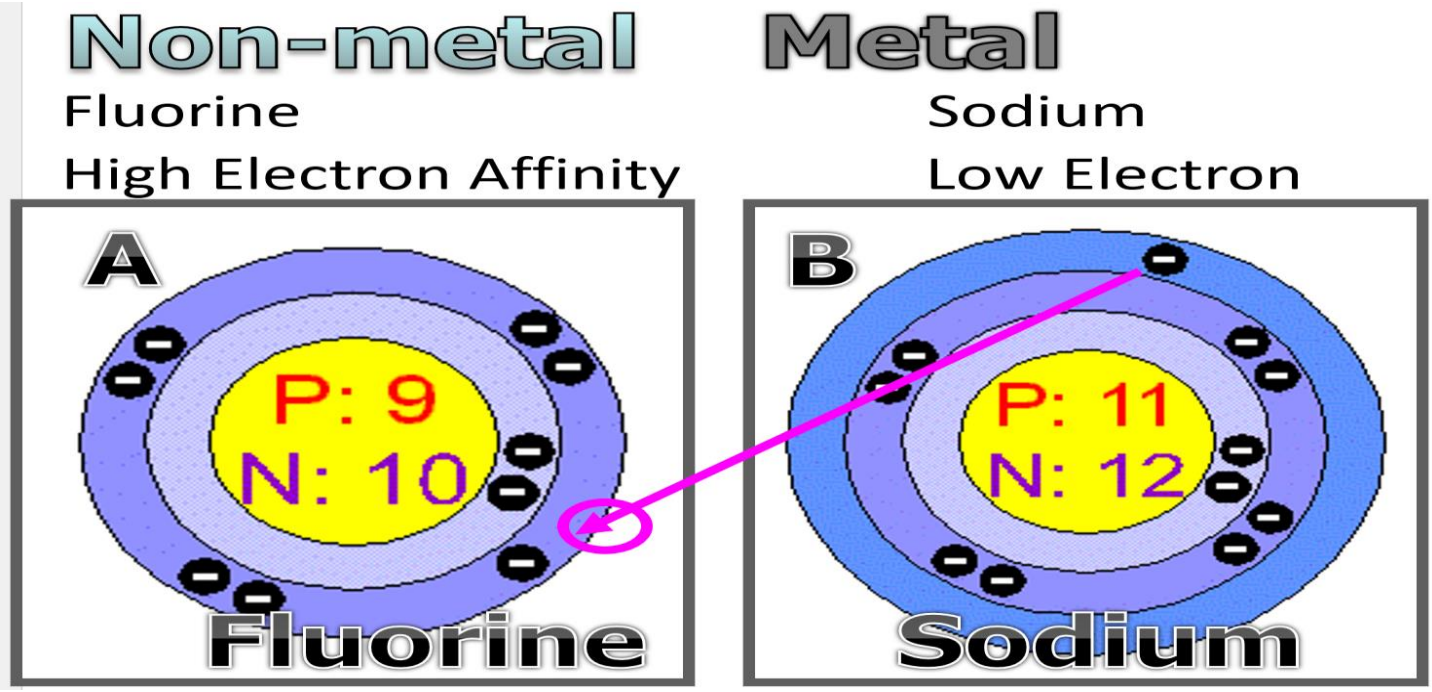
Which atom below formed a cation, and which formed an anion?



Cations are positively-charged ions (atoms or groups of atoms that have more protons than electrons due to having lost one or more electrons). Anions are negatively-charged ions (meaning they have more electrons than protons due to having gained one or more electrons).

Electron Affinity: The amount of energy required to detach an electron from a singly charged negative ion.

Which atom below has a high electron affinity, and which has a low electron affinity?



Precipitation Reactions: Occur when cations and anions of aqueous solutions combine to form an insoluble ionic solid, called a precipitate.

First - $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$

Second- $AgNO_3(aq) + NaI(aq) \rightarrow AgI(s) + NaNO_3(aq)$

Metallic bonding: The bonding between atoms within metals. The sharing of many free electrons. Sharing of free electrons between a lattice of metal atoms.

Which choice best describes a metallic bond?

A.) This bond is formed from the attraction between mobile electrons and fixed positively charged metallic atoms.

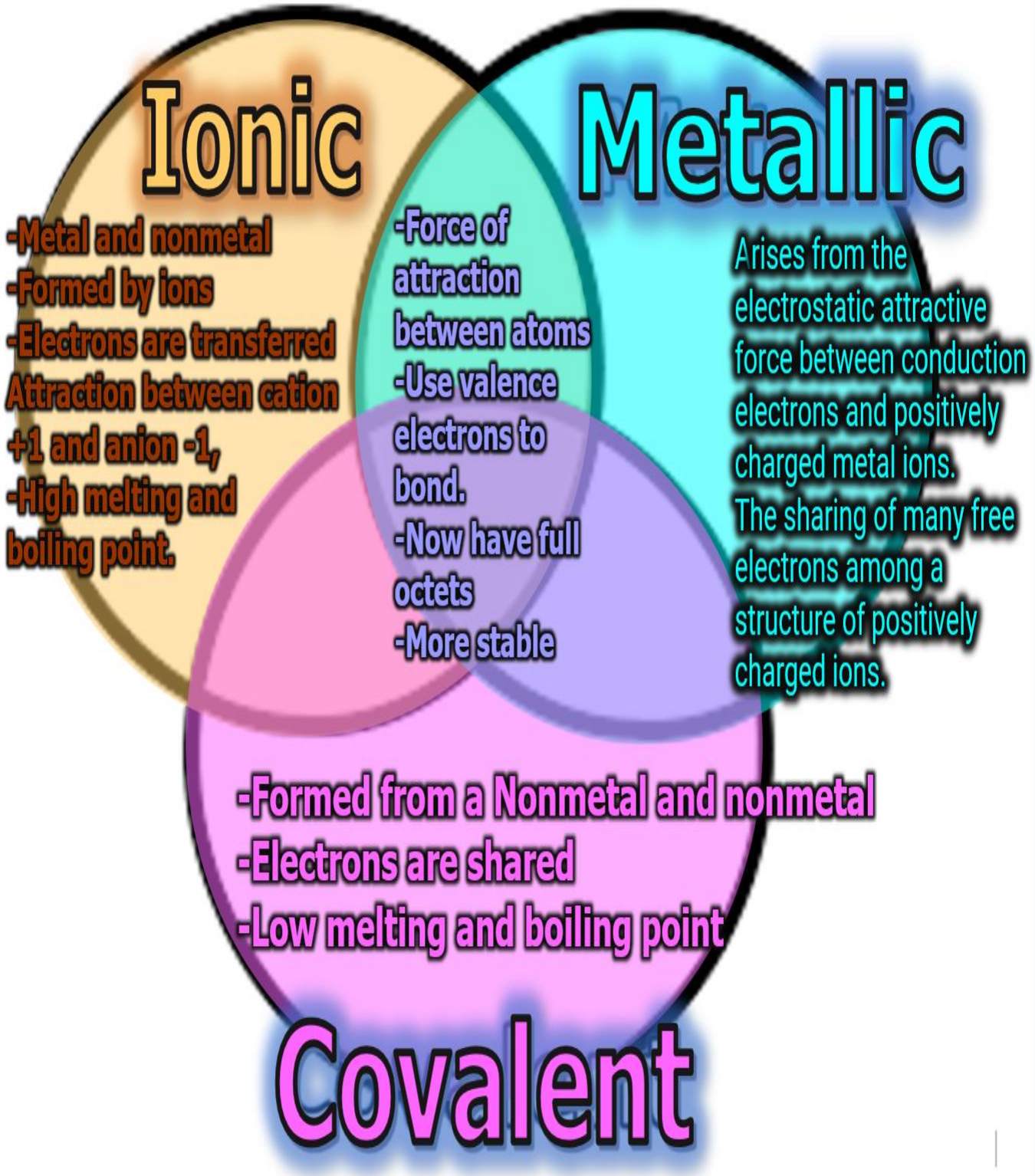
B.) The electrostatic bond between two ions formed through the transfer of one or more electrons.

C.) An electrostatic bond between a hydrogen atom in a covalent bond and an electronegative atom such as oxygen.

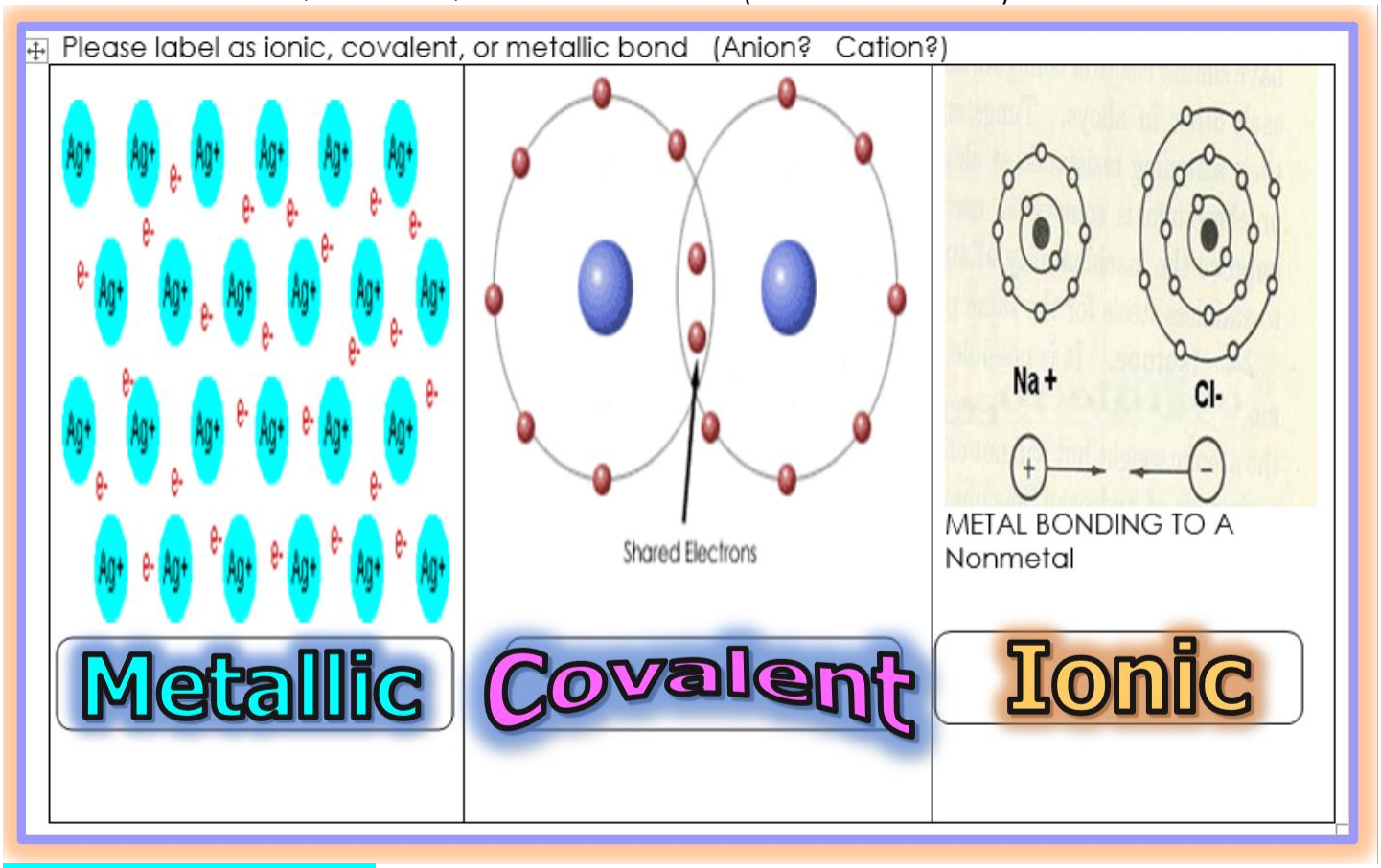
D.) The bond formed by the sharing of a pair of electrons by two atoms.

Provide some information about the three bonds below

Provide some information about the three bonds below



Please label as ionic, covalent, or metallic bond (Anion? Cation?)



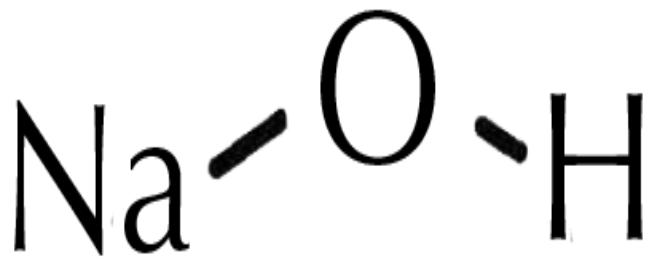
Part 5 Lesson 4 Acid Base

An acid is any hydrogen-containing substance that is capable of donating a proton (hydrogen ion) to another substance.

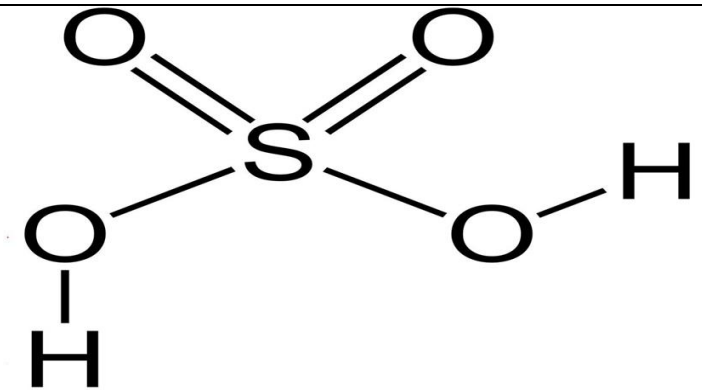
Acidic substances are usually identified by their sour taste. ... Acids are known to turn litmus red.

A base is a molecule or ion able to accept a hydrogen ion from an acid.

Which is the acid and which is the base?



Answer=BASE

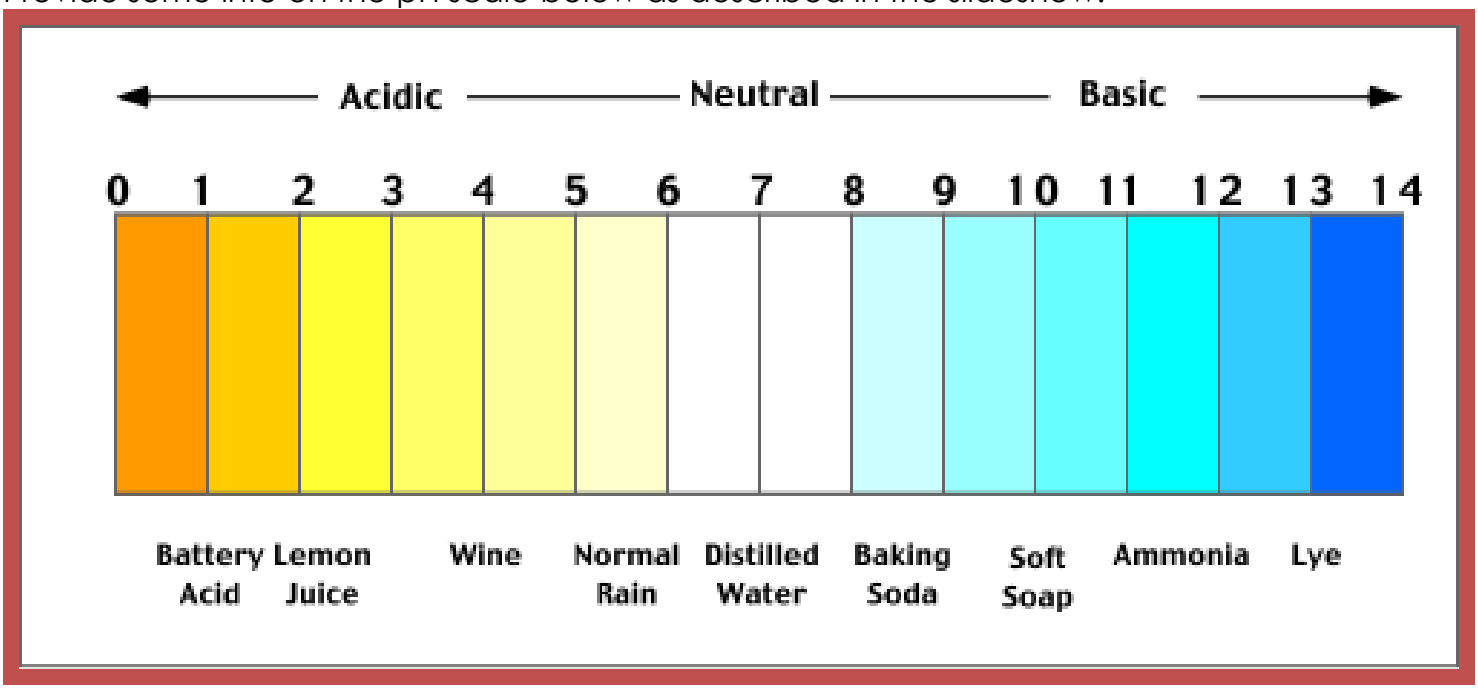


Answer= ACID

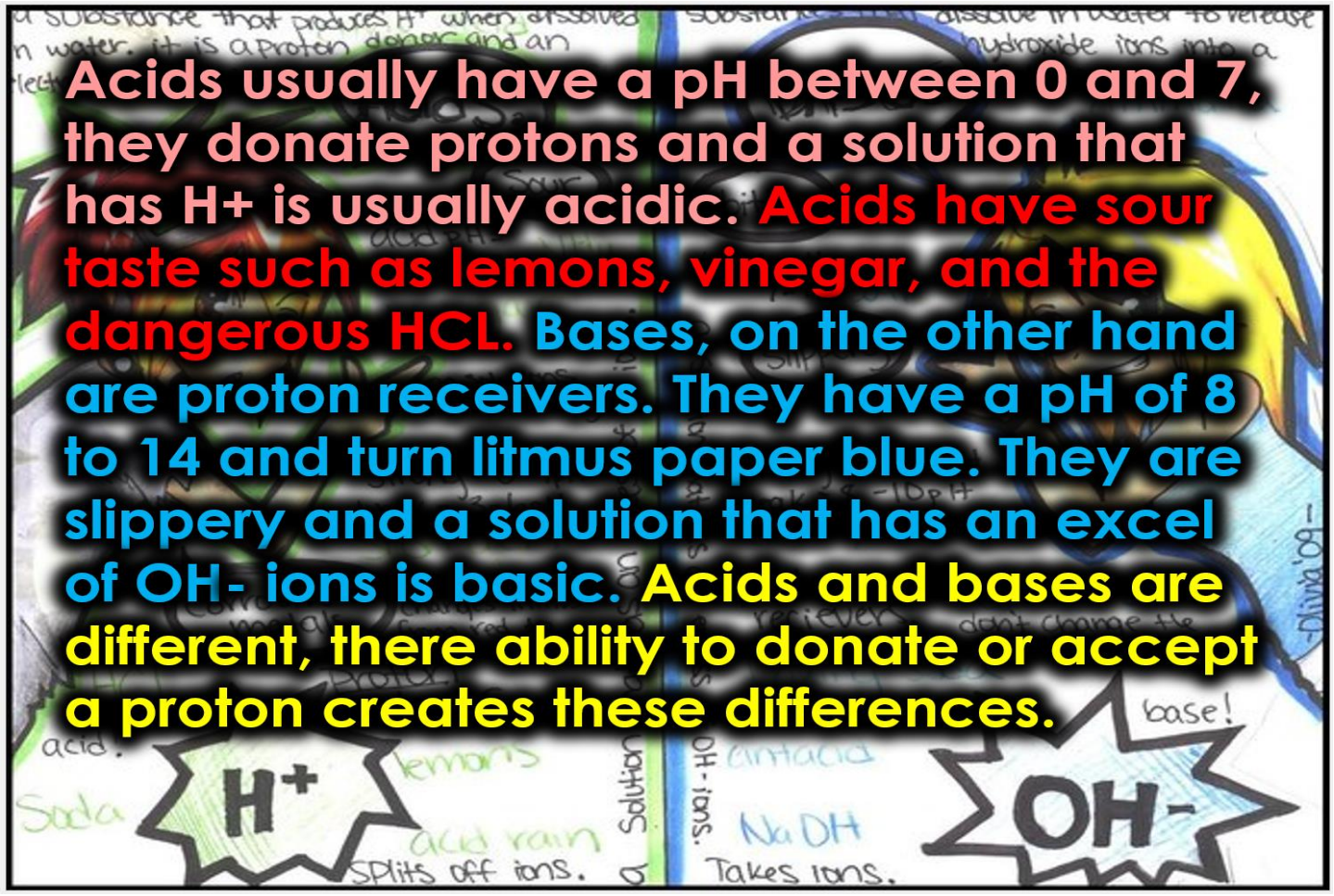
Water in a pure state has a neutral pH.

- Pure water is neither acidic or basic.

Provide some info on the pH scale below as described in the slideshow.



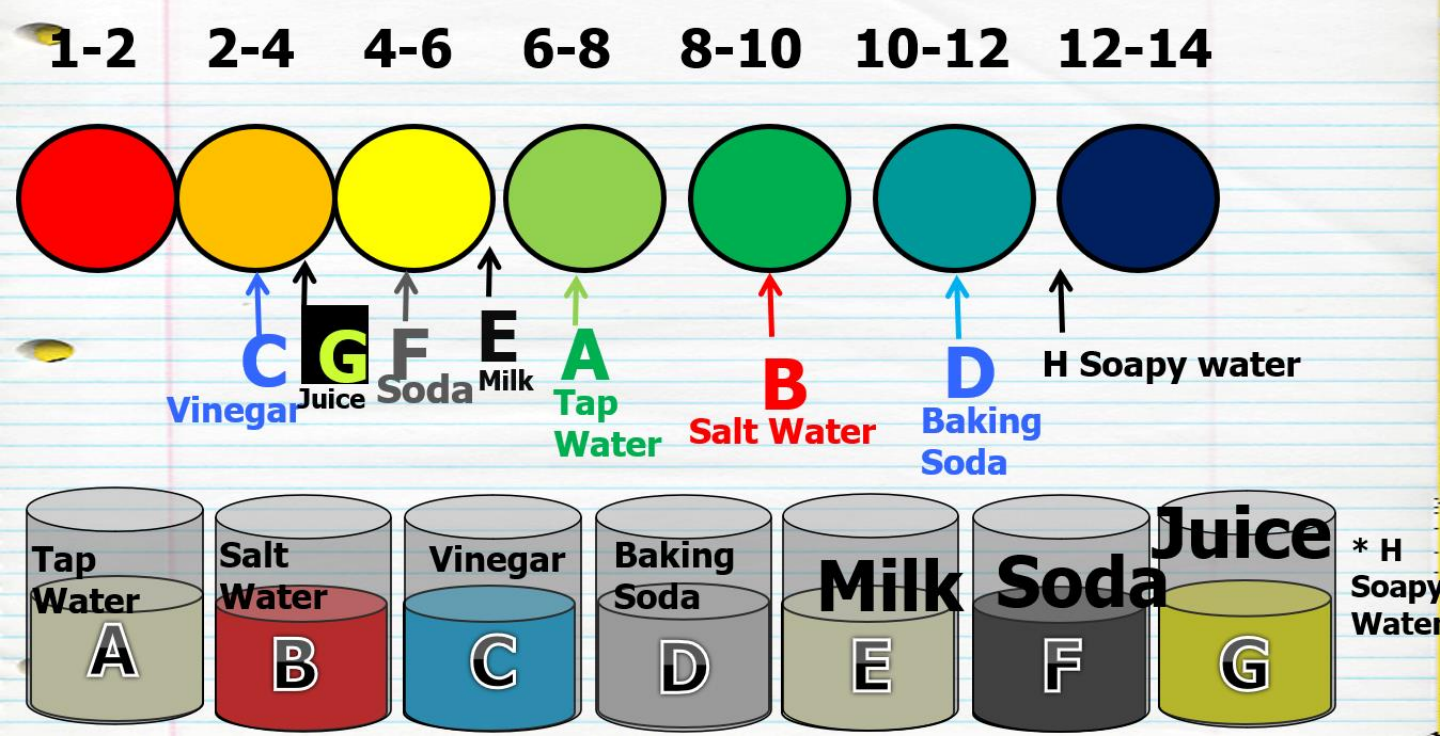
Use the diagram below to assist you in writing a short paragraph that describes the differences between acids and bases?



Which is an acid? And which is a base?

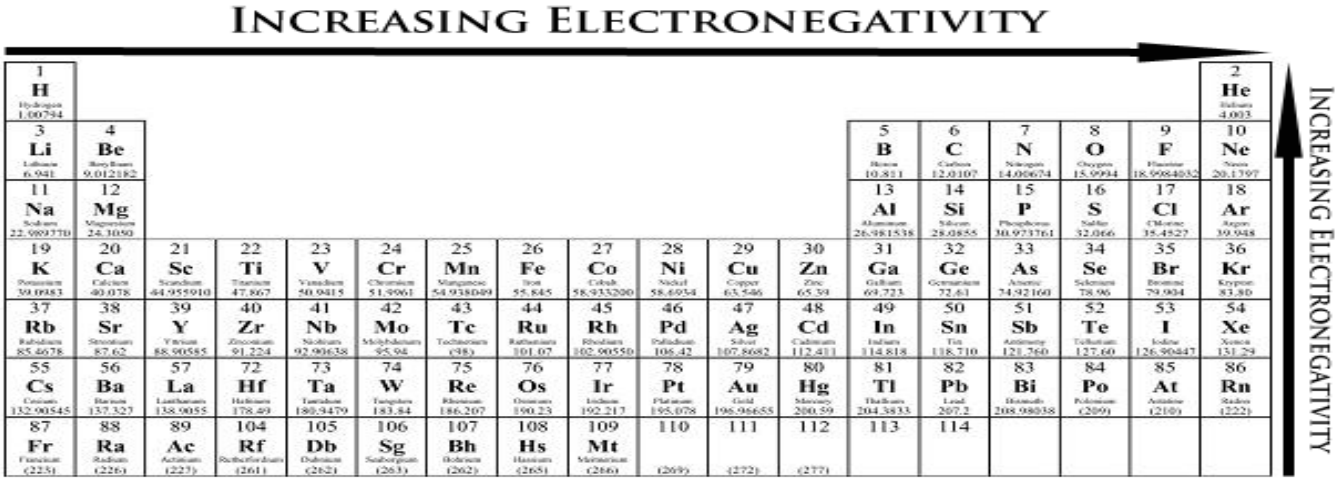
Base	ACID
A substance which when added to water produces hydroxide ions [OH^-]. Turns litmus blue. They react with most cations to precipitate hydroxides. Taste bitter Do not taste in the lab.	A substance which when added to water produces hydrogen ions [H^+]. React with zinc, magnesium, or aluminum and form hydrogen ($H_{2(g)}$). React with compounds containing CO_3^{2-} and form carbon dioxide and water. Turns litmus red. Taste sour (lemons contain citric acid, for example). Tasting Acids in the lab would be unsafe.

Please complete as described in the slideshow? What are some of the mystery solutions.



Part 5 Lesson 6 Bonds, Hydrogen Bonds

Electronegativity increases from lower to upper right.



The most strongly electronegative element is = Fluorine
The least electronegative element is = Francium

Electronegativity is a measure of the attraction of an atom for the electrons in a chemical bond.

The higher the electronegativity of an atom, the greater its attraction for bonding electrons.

- Electrons with low ionization energies have a low electronegativity because their nuclei do not exert a strong attractive force on electrons.

- Elements with high ionization energies have a high electronegativity due to the strong pull exerted on electrons by the nucleus.

A polar bond: Results in the unequal sharing of the electrons in the bond.

When two unlike atoms are covalently bonded, the shared electrons will be more strongly attracted to the atom of greater electronegativity

Hydrogen Bond (Weak): A chemical bond in which a hydrogen atom of one molecule is attracted to an electronegative atom.

- Especially a nitrogen, oxygen, or fluorine atom of another molecule.

Which choice best describes a hydrogen bond? A.) This bond is formed from the attraction between mobile electrons and fixed positively charged metallic atoms. B.) The electrostatic bond between two ions formed through the transfer of one or more electrons. C.) An electrostatic bond between a hydrogen atom in a covalent bond and an electronegative atom such as oxygen. D.) The bond formed by the sharing of a pair of electrons by two atoms.	What's the electron negativity difference of water H_2O? H_2O Electron Negativity Difference Hydrogen = 2.20 Oxygen = 3.44 3.44 – 2.20 = 1.24 What's the electron negativity difference of C_2H_6 Ethane? C_2H_6 Ethane Electron Negativity Diff. Hydrogen = 2.20 Carbon = 2.55 2.55 – 2.20 = .35

The three classes of bonds

Nonpolar Covalent

Polar Covalent

Ionic

The most commonly used electronegativity scale is Pauling's. Most Periodic Tables gives the value for each element.

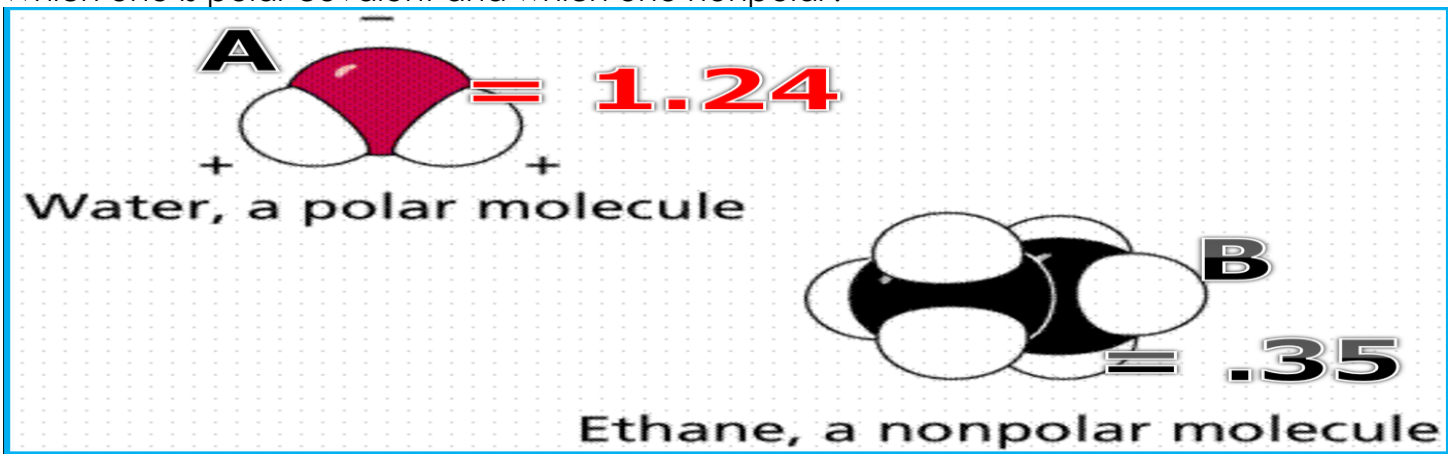
Differences 1.7 or greater, the bond is usually ionic,

Differences Less than 1.7, the bond is usually covalent,

Unless the difference is less than 0.5 the bond has some degree of polarity

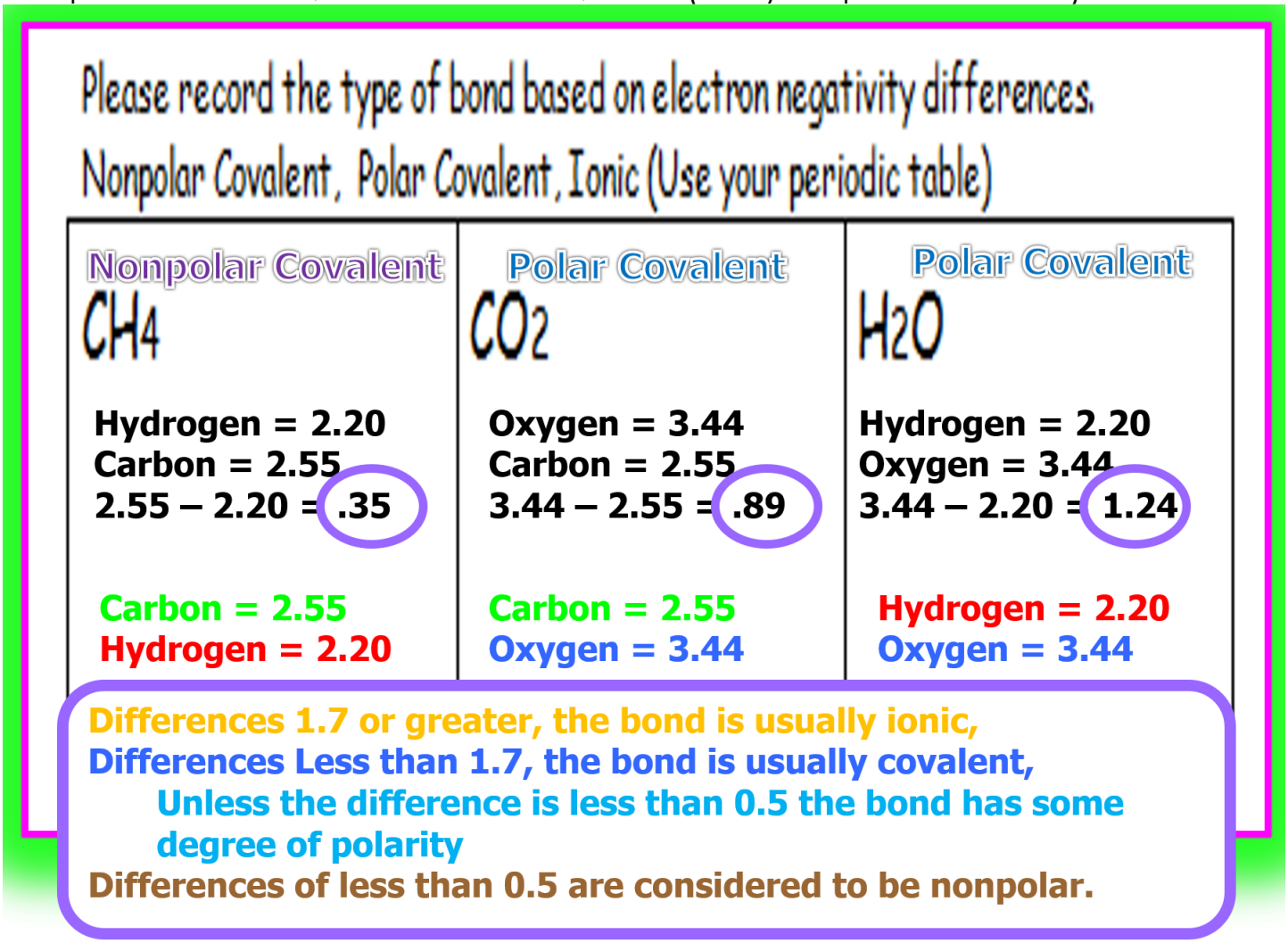
Differences of less than 0.5 are considered to be nonpolar.

Which one is polar covalent and which one nonpolar?



Please record the type of bond based on electron negativity differences.

Nonpolar Covalent, Polar Covalent, Ionic (Use your periodic table)



Differences 1.7 or greater, the bond is usually ionic,
Differences Less than 1.7, the bond is usually covalent,
Unless the difference is less than 0.5 the bond has some degree of polarity
Differences of less than 0.5 are considered to be nonpolar.

Which choice best describes a covalent bond? Bond types: Ionic, Covalent, Metallic, Hydrogen

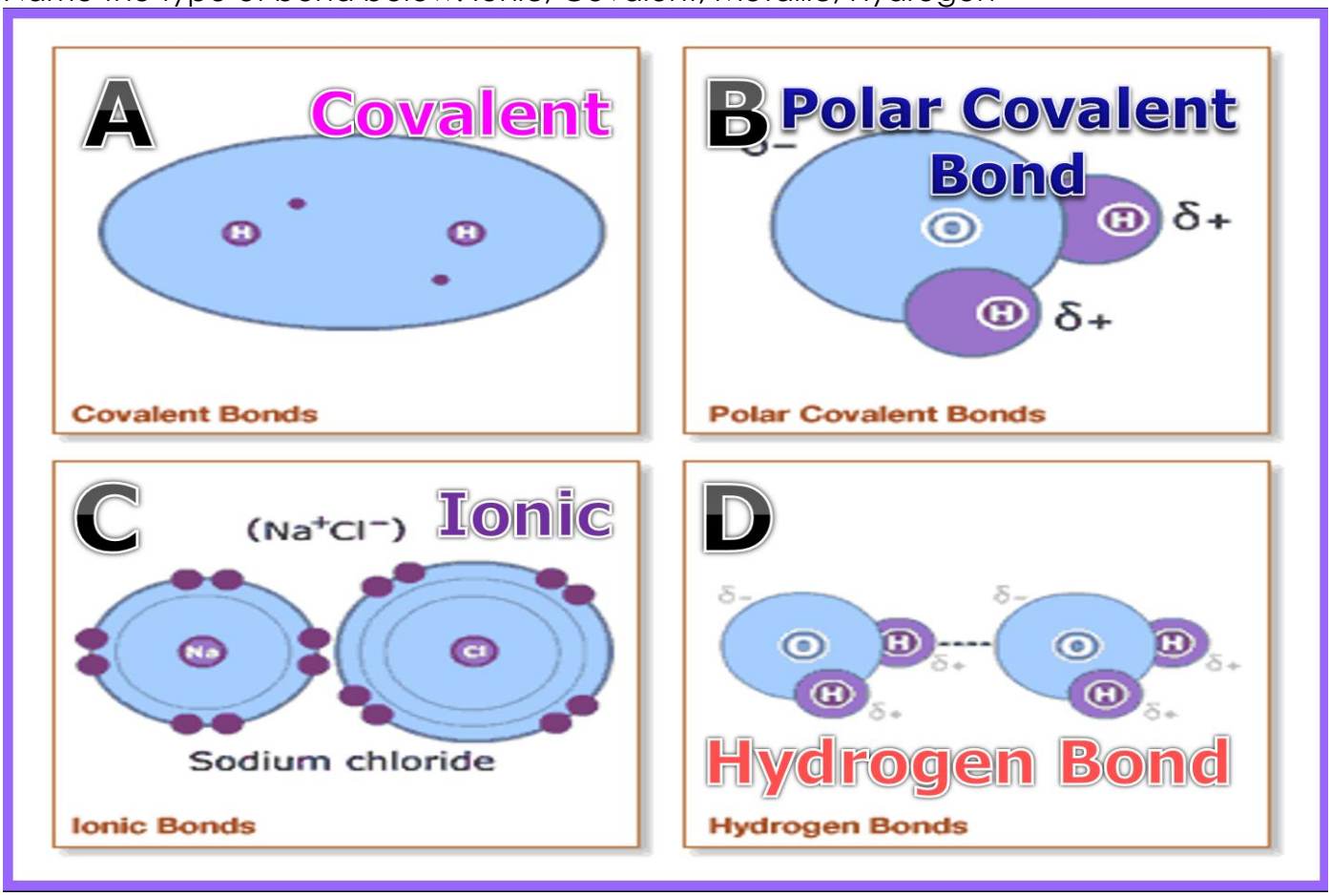
A.)Metallic: This bond is formed from the attraction between mobile electrons and fixed positively charged metallic atoms.

B.) Ionic: The electrostatic bond between two ions formed through the transfer of one or more electrons.

C.)Hydrogen: An electrostatic bond between a hydrogen atom in a covalent bond and an electronegative atom such as oxygen.

D.) Covalent: The bond formed by the sharing of a pair of electrons by two atoms.

Name the type of bond below. Ionic, Covalent, Metallic, Hydrogen



Part 5 Lesson 6 Quiz and Review

Quiz Wiz 1-10: Label as either…

Covalent, Ionic, Metallic, Hydrogen Bonding

Polarity would be nice for covalent bonds if you can.

1) Covalent Polar	2) Ionic Bond **Sodium = .93** **Fluorine = 3.98** **3.98 – .93 = 3.05**	3) Ionic Bond
4) Metallic Bond	5) Covalent	6) Metallic
7) Covalent	8) Covalent Non-polar **Hydrogen = 2.20** **Carbon = 2.55** **2.55 – 2.20 = .35**	9) Ionic
10) Hydrogen Bond	*11) Sean Connery	

Activation Energy: The least amount of energy needed for a chemical reaction to take place.

Part 5 Lesson 7 Endothermic and Exothermic RXN's

Endothermic and Exothermic Reactions

Endo = Inside

Exo = Outside

Exothermic Reactions: Chemical reactions that release energy in the form of heat, light, or sound.

The products contain less energy than the reactants

Heat is lost to the surroundings. (Not destroyed)

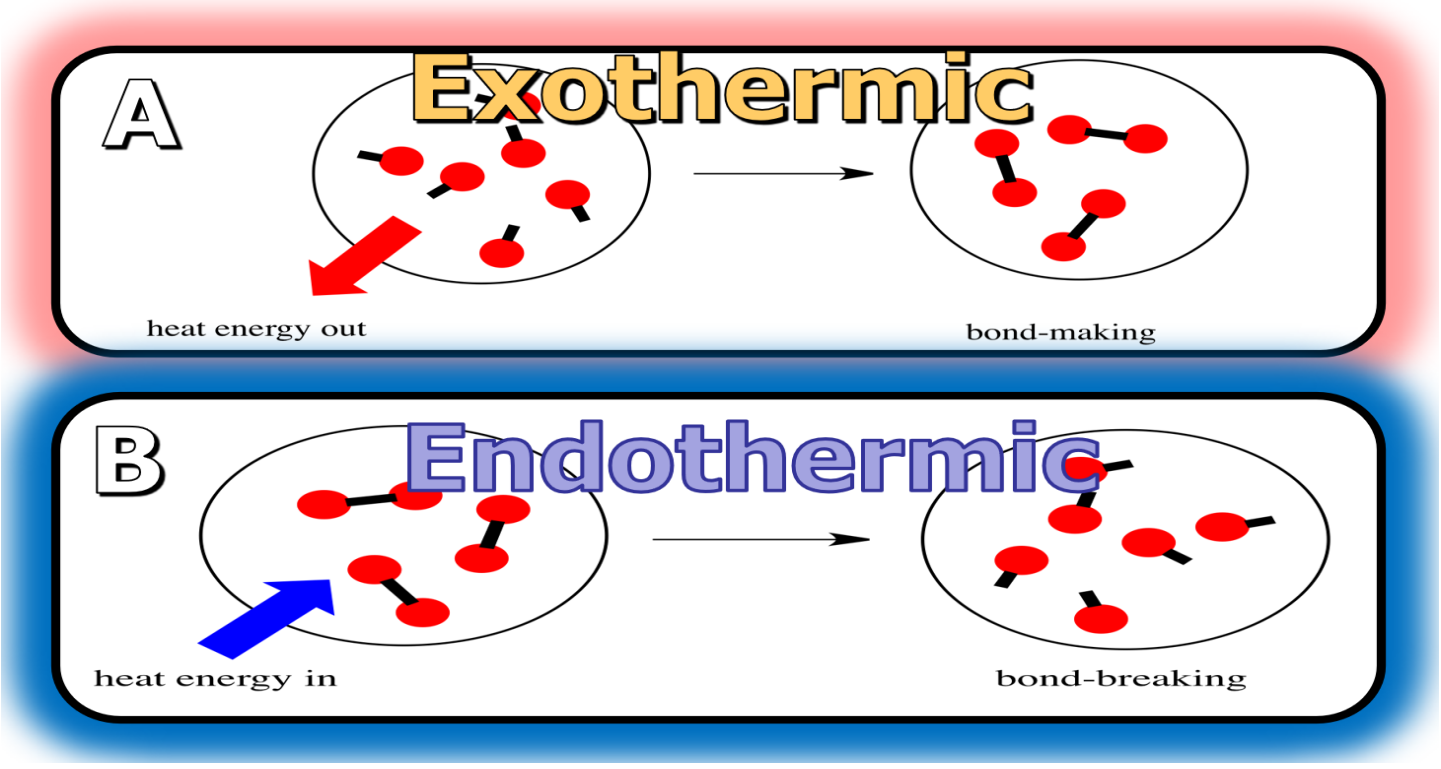
Bond-making is an exothermic process.

Energy is released when new bonds form.

Potential Energy

When two atoms form a strong covalent or ionic bond, chemical energy is converted into other forms of energy, usually in the form of heat and light

Which is an Exothermic RXN? And which is a endothermic RXN?



Bond-breaking is an endothermic process.

To figure out if a reaction is exothermic or endothermic.

Observe how the temperature of the surroundings change.

An exothermic process releases heat that causes the temperature of the immediate surroundings to increase.

An endothermic process absorbs heat and makes the surroundings colder.

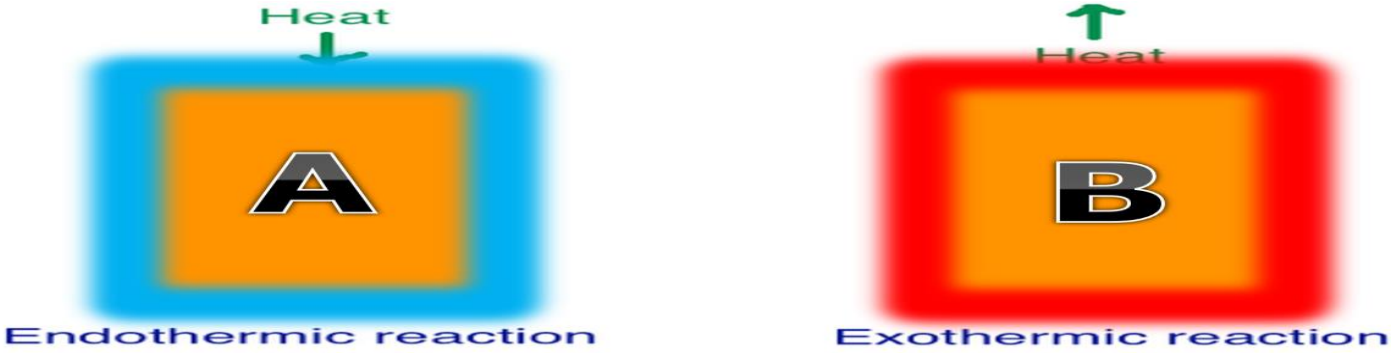
Thermite Reaction.

Can we balance this before the video.

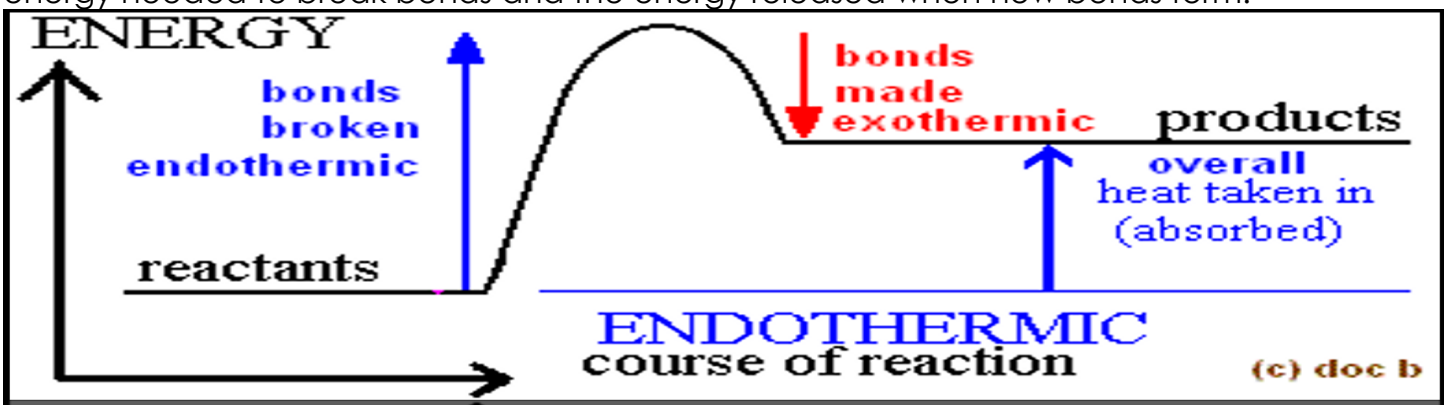
2 Al (s) + ___ Fe2O3 → 2 Fe(s) + ___Al2O3 (s)

- Is this an endothermic or exothermic reaction?

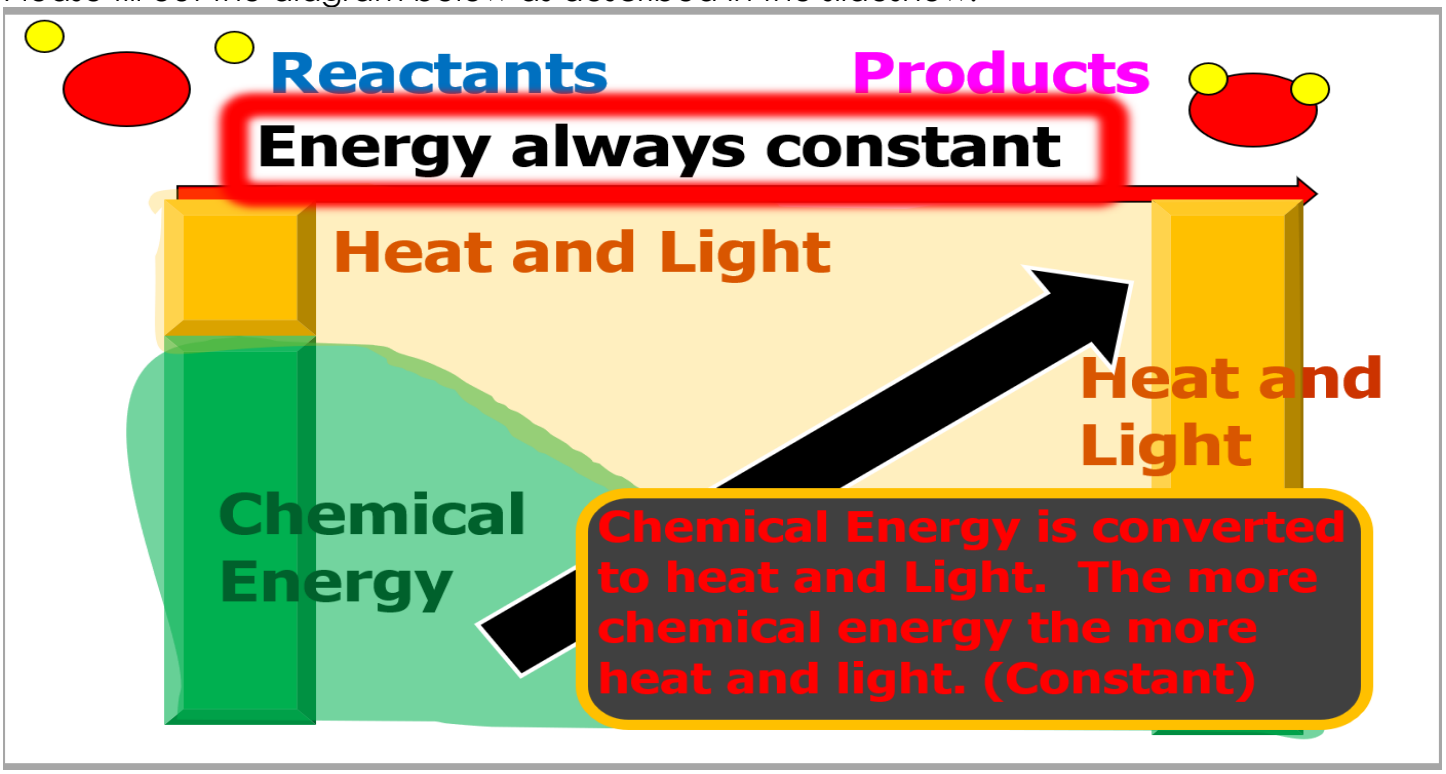
Which is endothermic and which is exothermic?



Whether a reaction is endothermic or exothermic depends on the difference between the energy needed to break bonds and the energy released when new bonds form.



Please fill out the diagram below as described in the slideshow.



Elephant Toothpaste Procedure

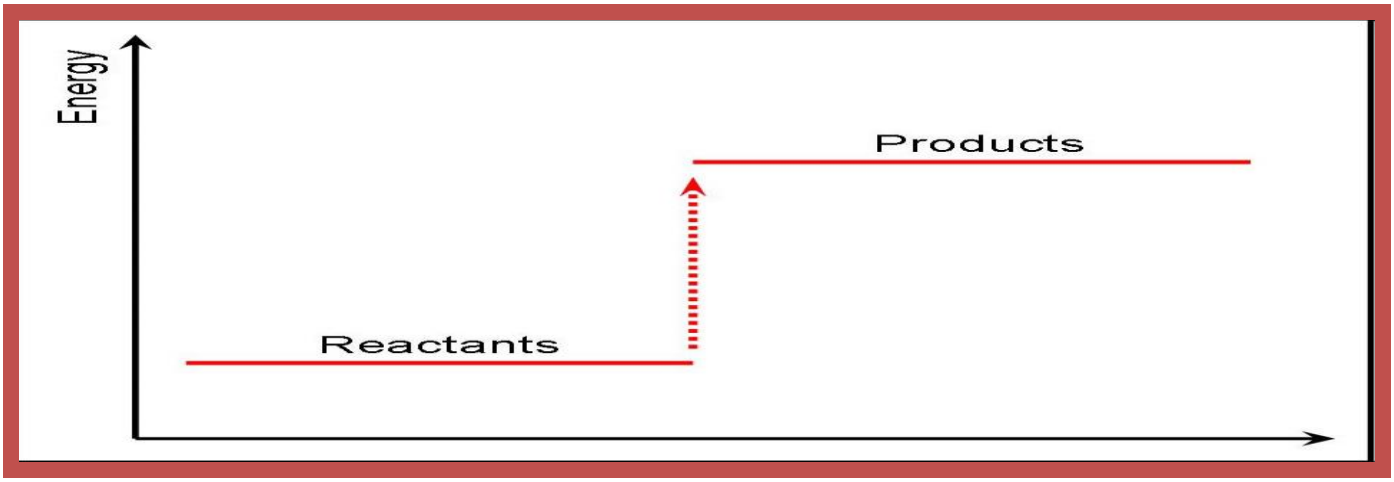
1.) Mix 120 ml of hydrogen peroxide ($H_2O_{2\ aq}$) with 60 ml of liquid dish (OI^- aq) soap and a few drops of food coloring.
2.) Add this mixture to the empty soda bottle and place it on the spill tray.
3.) In a separate container, mix one packet (1 teaspoon or 11 ml / 7 grams) of active yeast with a little warm water (2 tablespoons / 30 ml) and let it sit for 5 minutes.
4.) Remove clumps of yeast so you just add the liquid with funnel.
5.) Pour the yeast mixture into the soda bottle with a funnel and watch the reaction.
6.) Feel the container for heat. (Exothermic)
7.) All contents can be disposed of in the sink.

Elephant Toothpaste

The chemical formula for hydrogen peroxide is H2O2.
Hydrogen peroxide is not stable so it's always decomposing into water and oxygen.
This occurs slowly under normal conditions.
Yeast make the reaction go much faster and the dishwashing soap creates the foam.
The overall equation for this reaction is:

$$H_2O_2(aq) + OI^-(aq) \rightarrow I^-(aq) + H_2O(l) + O_2(g)$$

Endothermic reactions: These reactions absorb energy in order to proceed.
The products contain more energy than the reactants, heat is taken in or absorbed from the surroundings.
A temperature drop is measured during the reaction.



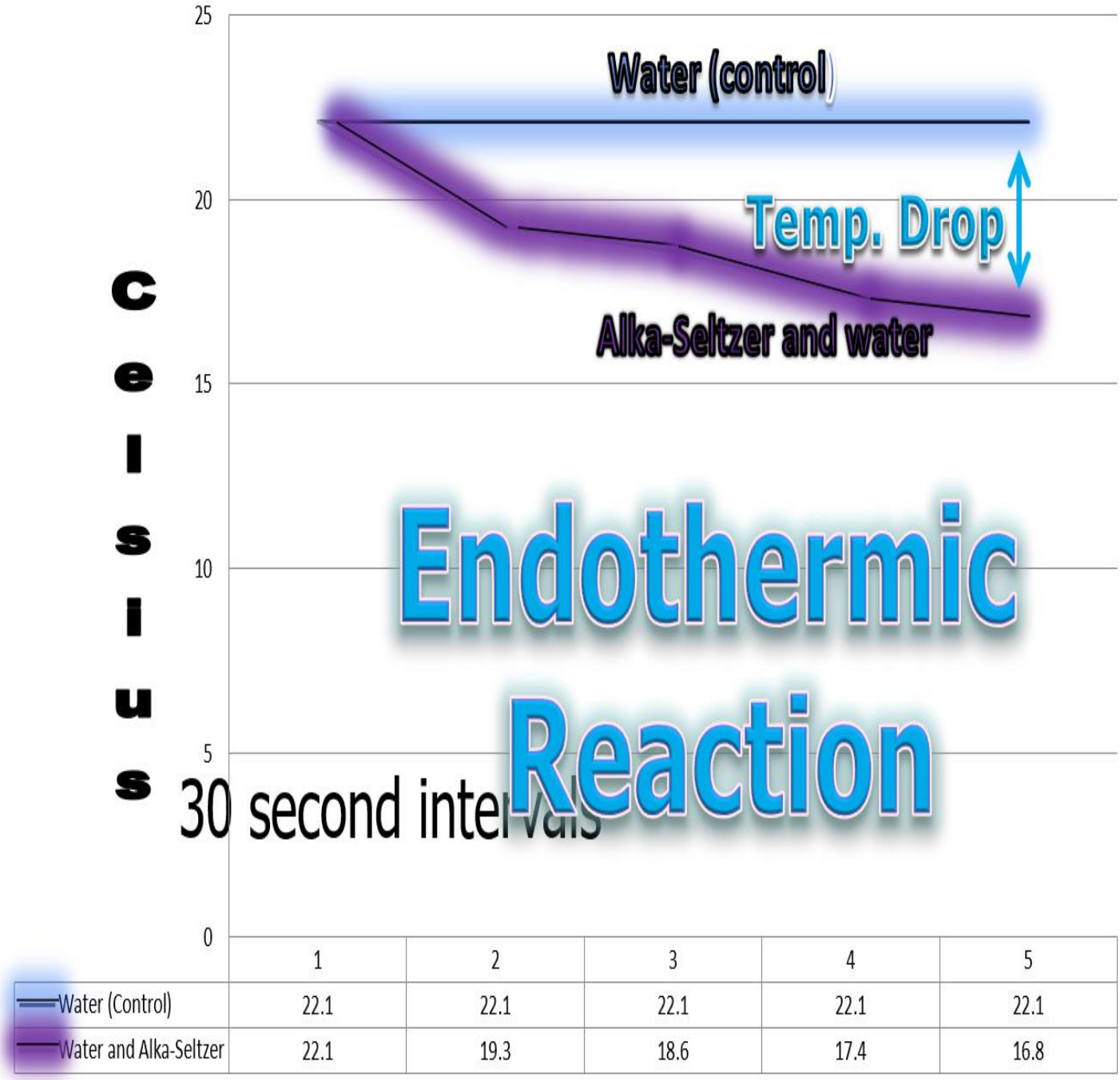
Endothermic Reaction "Alka-Seltzer" Procedure

Fill clear container with 100 ml of water.
Record temperature of water for 30, 60, 90, 120 seconds in spreadsheet.
Keep thermometer in container
Add 2 Alka-Seltzer tablets to the 100 ml of water.
Record temperature for 30, 60, 90,120 seconds on spreadsheet.

Time in Seconds (H_2O)	Temperature (Celsius)
0	22°
30	22°
60	22°
90	22°
120	22°

Time in Seconds (Alka-Seltzer)	Temperature (Celsius)
0	22°
30	21°
60	18°
90	17°
120	15°

Please complete a line graph below. (Note: The graph below should be in the range of your highest and lowest temperatures) not 0 to 100 ˚C



	1	2	3	4	5
Water (Control)	22.1	22.1	22.1	22.1	22.1
Water and Alka-Seltzer	22.1	19.3	18.6	17.4	16.8

Please describe the reaction in the space below. Can you balance the equation below.

- The reaction in this activity involves using sodium bicarbonate and citric acid to produce water and carbon dioxide. The tablets contain sodium bicarbonate ($NaHCO_3$) and citric acid. When the tablet is dissolved in water, bicarbonate (HCO_3^-) and hydrogen ions (H^+) are formed. Heat was lost to the surroundings measured by a small decrease in the temperature of the surrounding water.

___ $C_6H_8O_7(aq)$ + 3 $NaHCO_3(aq)$ → 3 $H_2O(l)$ + 3 $CO_2(g)$ + ___$Na_3C_6H_5O_7(aq)$

citric acid + sodium bicarbonate → water + carbon dioxide + sodium citrate

Element	Before	After
C	9	9
H	11	11
O	16	16
Na	3	3

Part 5 Lesson 7 Redox RXN's

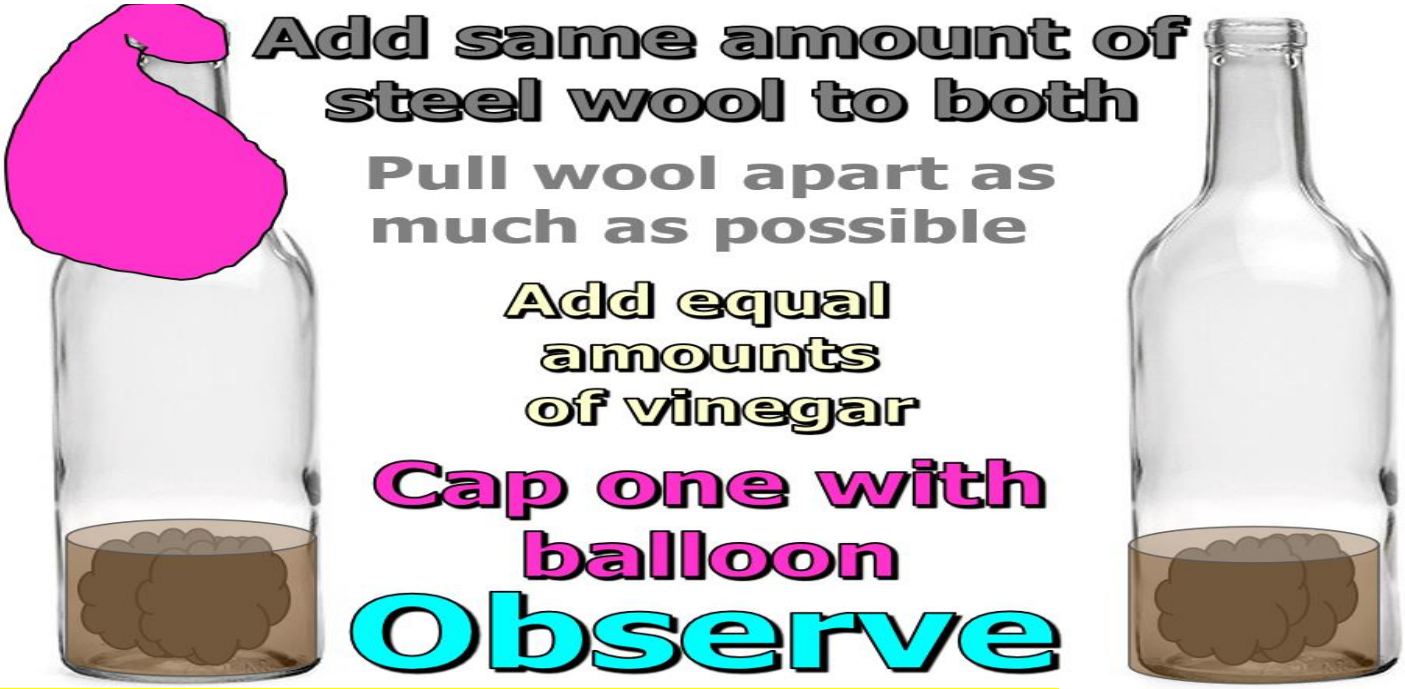
Any reaction between an element or compound and oxygen is known as oxidation.

The reaction between magnesium metal and oxygen, for example, involves the oxidation of magnesium.

2 $Mg(s) + O_2(g)$ → 2 $MgO(s)$

This is also true of hydrogen. Oxidation is loss of hydrogen. Reduction is gain of hydrogen.

Vinegar, Steel Wool, and the Law Conservation of Matter & Oxidation. What happened?



Vinegar is acidic and wears away the coating around the steel wool.
The steel wool then oxidizes with the oxygen in the air.

$4Fe + 3O_2 \Rightarrow 2Fe_2O_3$

The oxidation reaction pulls the balloon into the bottle because with less O2 as a gas, air pressure is less inside the bottle and the outside air pressure pushes the balloon inward.
The bottle without the balloon may have gained a little mass as it pulled in oxygen from the surrounding air. The covered bottle did not gain any mass.

Oxidation number of an element: The number of electrons lost, gained, or shared as a result of chemical bonding. **Oxidation is always followed by reduction**

- Oxidation: A increase in oxidation number
- Reduction: A decrease in oxidation number

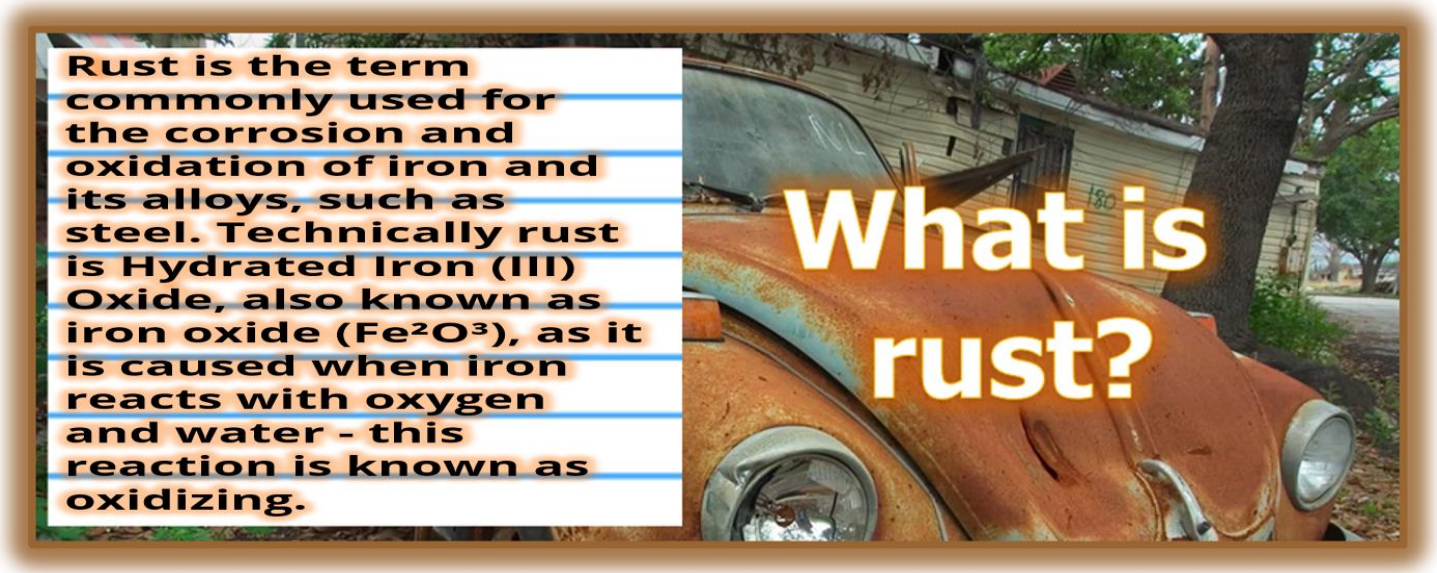
OIL RIG -> Oxidation is Losing Reduction is Gaining	LEO says GER -> Losing Electrons is Oxidation, Gaining Electrons is Reduction
	

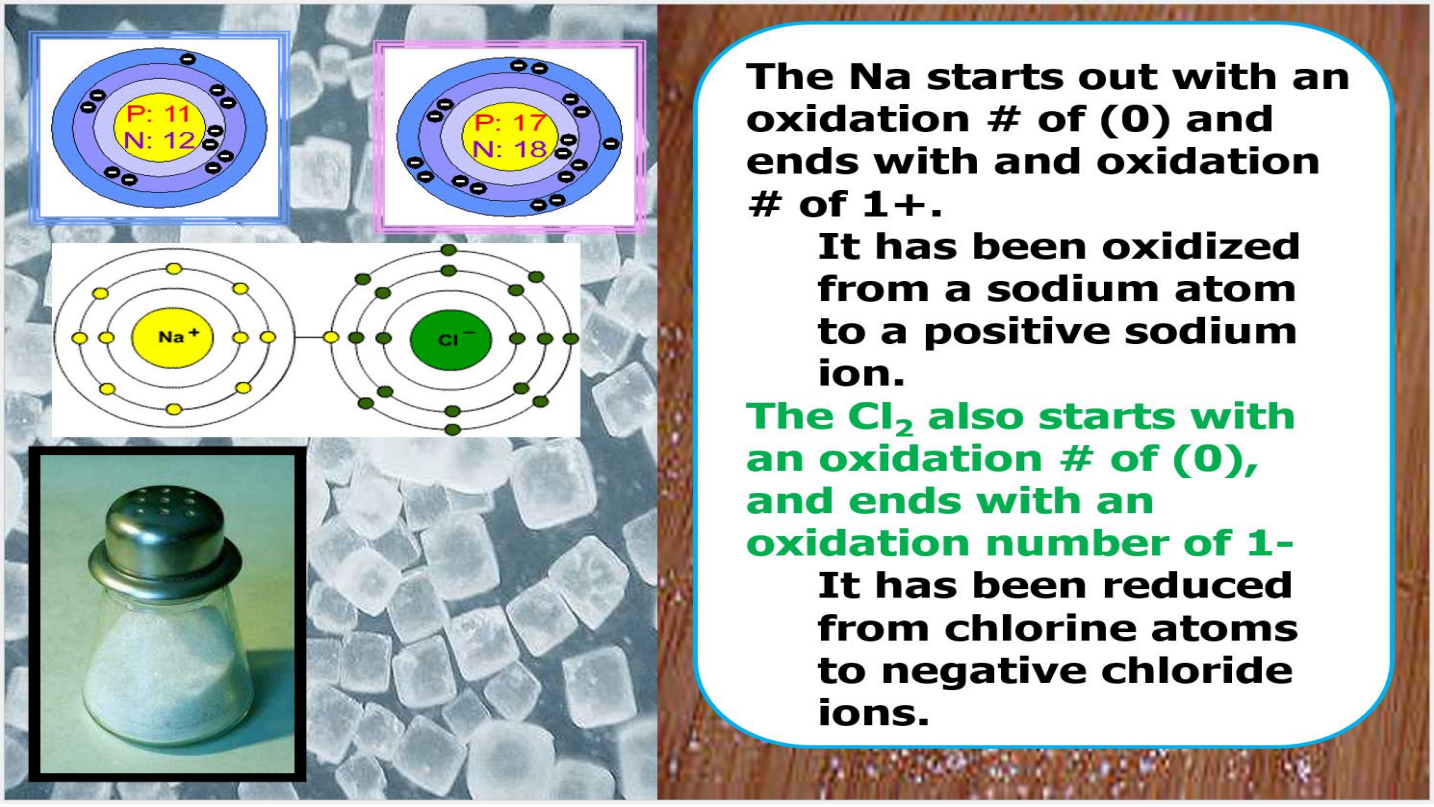
$CuO + Mg \rightarrow Cu + MgO$

Who lost their oxygen? **Cu**

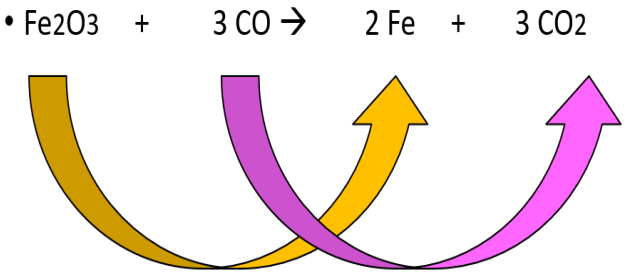
Who gained an oxygen? **Mg**

To oxidize an atom or molecule means you have increased its overall positive charge. Removing electrons does this. Atoms or molecules that give up electrons (or become oxidized) are electron donors. Atoms or molecules that take on electrons (or become reduced) are called electron acceptors.

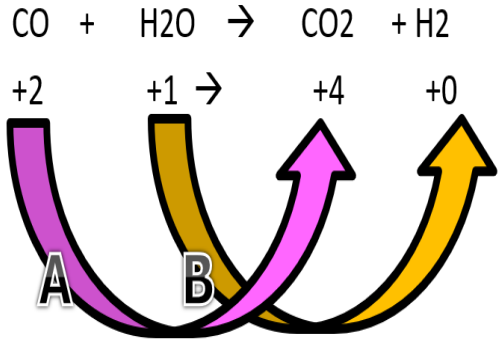




Color the arrows correctly. Please describe which arrow represents oxidation (Orange), and which represents reduction (blue).



Oxidation is loss of oxygen.
Reduction is gain of oxygen.



Oxidation is loss of oxygen.
Reduction is gain of oxygen.

An oxidation-reduction (redox) reaction is a type of chemical reaction that involves a transfer of electrons between two species. An oxidation-reduction reaction is any chemical reaction in which the oxidation number of a molecule, atom, or ion changes by gaining or losing an electron.

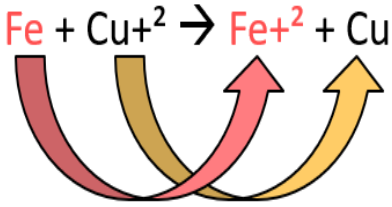
Iron Copper Switch-A-Roo

- Place a clean nail into a plastic dish
- Add 10 drops of Copper Sulfate CuSO4 to a part of a nail.
- Wait 2 minutes

Observe nail? What happened? Rinse spot on nail if you need a better look

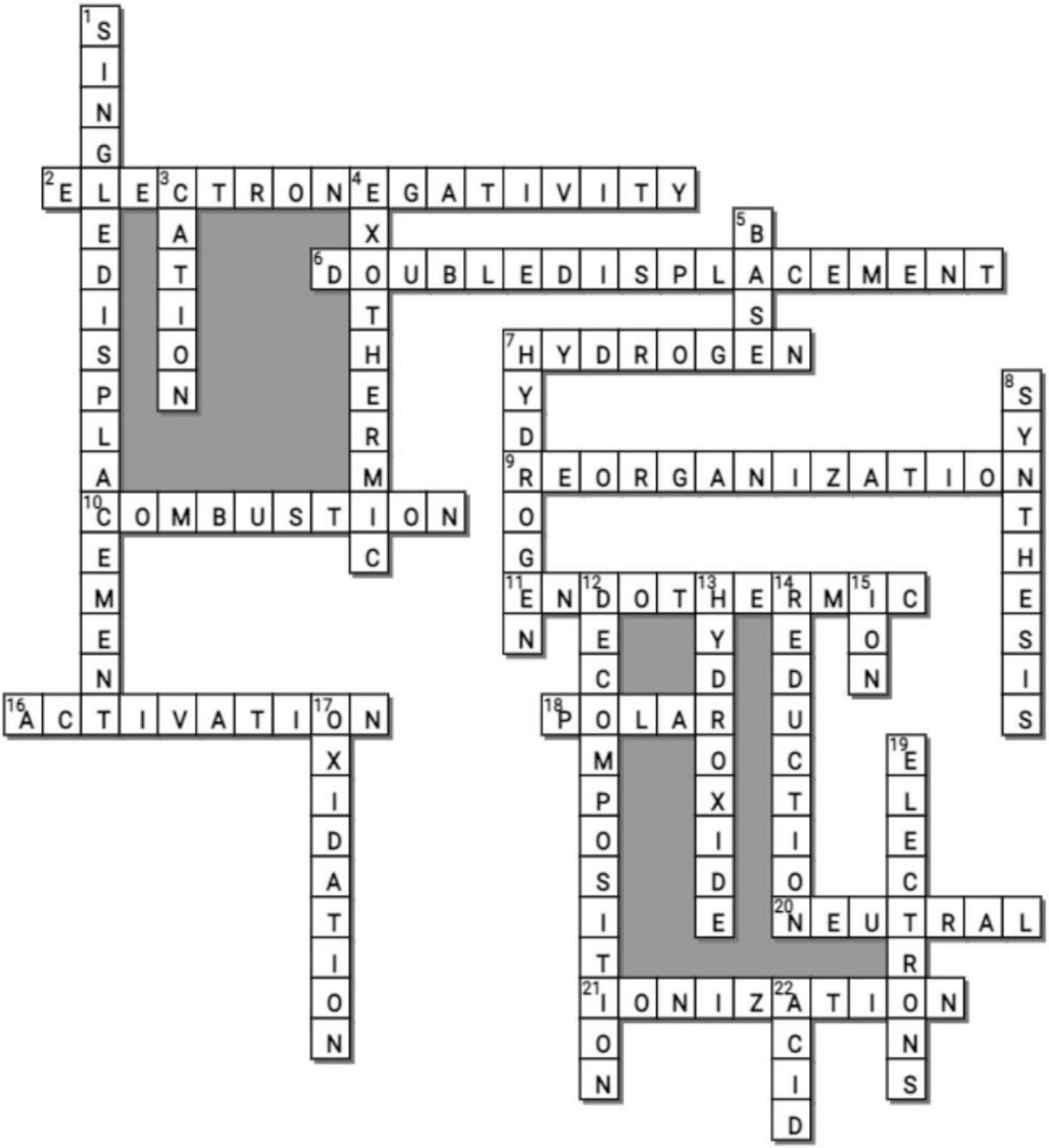
Questions? Iron Copper switch-A-roo

- Which was oxidized and which was reduced in the reaction below?



The iron was oxidized because it changed from 0 to $+^2$. (donated 2 electrons)

The copper was reduced because it changed from $+^2$ to 0. (gained 2 electrons)



----------Teacher can remove this word bank to make more difficult----------

Possible Answers

IONIZATION, ACID, ACTIVATION, BASE, CATION, COMBUSTION, DECOMPOSITION, DOUBLEDISPLACEMENT, ELECTRONEGATIVITY, ELECTRONS, ENDOTHERMIC, EXOTHERMIC, HYDROGEN, ION, OXIDATION, REDUCTION, REORGANIZATION, SINGLEDISPLACEMENT, SYNTHESIS, HYDROGEN, HYDROXIDE , NEUTRAL, POLAR

Across

2. _____ is a measure of the attraction of an atom for the electrons in a chemical bond.
6. (Two Words) When the anions and cations of two different molecules switch places, forming two entirely different compounds.
7. Acid: a substance which when added to water produces _____ ions [H+].
9. Chemical Change: The change of substances into other substances through a _____of the atoms
10. When oxygen combines with another compound to form water and carbon dioxide.
11. _____ reactions: These reactions absorb energy in order to proceed.
16. _____ Energy: The least amount of energy needed for a chemical reaction to take place.
18. A _____ bond: Results in the unequal sharing of the electrons in the bond.
20. Water in a pure state has a _____ pH.
21. Electrons with low _____ energies have a low electronegativity because their nuclei do not exert a strong attractive force on electrons.

Down

1. (Two words) When one element trades places with another element in a compound.
3. When an atom strips an electron, now one atom has 1+ (_____),
4. _____ Reactions: Chemical reactions that releases energy in the form of heat, light, or sound.
5. Acid-_____ RXN: The acid and base neutralize each other producing a _____. TheH(+) cation of the acid combines with the OH(-) anion of the base to form water and salt.
7. _____ Bond: A chemical bond in which a hydrogen atom of one molecule is attracted to an electronegative atom.
8. _____ Reaction: When two or more simple compounds combine to form a more complicated one
12. _____ Reaction: A complex molecule breaks down to make simpler ones.
13. Base: a substance which when added to water produces _____ ions [OH-].
14. A decrease in oxidation number
15. A charged atom.
17. Any reaction between an element or compound and oxygen is known as _____.
19. To oxidize an atom or molecule means you have increased its overall positive charge. Removing _____ does this.
22. An _____ is any hydrogen-containing substance that is capable of donating a proton (hydrogen ion) to another substance.

Part 5 Review Game

Name:

1-10 = 10 pts * = Bonus + 1 pt, Lesson 8

Due: Today

(Secretly write owl in correct space +1 pt)

Score ____ / 100

Final Question = 5 pt wager

BONDING TIME	NEGATIVIITY LOST	STICK AROUND	STICK AROUND	SPY GAMES Bonus round 1 pt each
1) Atoms	6)Side A Gives an electron +1 Side B Gains an electron -1	11) C.) Precipitation Reaction	16) A=Hydrogen B=Metallic C=Covalent D=Ionic	*21) MAD Magazine
2) A=Acid Base B=Combustion C=Single Displacement D=Single Displacement E=Synthesis F=De--composition	7) Ionic Bonding	12) H+ is Acid, OH- is Base	17) A=Endothermic B=Exothermic	*22) AUSTIN POWERS
3) SPONCH ELEMENTS	8) Metallic Bonding	13) Electron Negativity	18) A=Endothermic B=Exothermic	*23) Jason Bourne
4) Ionic Bond (Metal and nonmetal)	9) A formed Cation +1 B formed an Anion -1	14) A=Covalent B=Polar Covalent C=Ionic D=Hydrogen	19) A=Oxidation B=Reduction	*24) Mr. Bean Johnny English
5) Ionization	10) Fluorine High Electron Affinity Sodium Low Electron Affinity	15) Cl = 3.16, K = .82 3.16 - .82 = 2.34	20) (B) Oxidation is loss of oxygen. (A) Reduction is gain of oxygen.	*25) SPY KIDS

Final Question Wager ___ /5 Answer: Non-Polar Oil, Polar Water