

Name: _____

Period: _____

Fall Semester Review – IPC

IPC Chemistry Review

Fill in the table at the right from your periodic table.

Element	Chemical Symbol	Atomic #	Valence Electrons	Oxidation #	# of Protons	Atomic Mass	Metal or Nonmetal	Gains or Loses Electrons	# of Full Electron Levels
Oxygen									
Argon									
Calcium									
Nitrogen									
Potassium									
Sulfur									
Helium									

Find the molecular mass of the following compounds

Calcium oxide (CaO)

Water

Classify (ionic, covalent or polyatomic) and name the following compounds.

1. CO₂ _____2. Na₂O _____3. BeCrO₄ _____

Draw the Lewis Dot Diagrams for:

1. Carbon

2. Sodium

Make Balanced Ionic Compounds from:

1. Li + O _____

3. Be + NO₃¹⁻ _____

2. Na + Ar _____

4. Ca + O _____

With dot diagrams draw the covalent bond of O₂:

With dot diagrams the covalent bond of OF₂:

1. Valence electrons are the outermost electrons of an atom that are involved in chemical bonding? True/False.

2. Lithium has _____ valence electrons, will (lose or gain) _____ electrons and become (positive or negative). This is why lithium's oxidation number is _____.

3. A metal and non-metal will form a _____ compound; two non-metals form a _____ compound.

Atom A Atom B

Which one is the ion?
Give the ion notation for the ion:

Matching:

If you change the number of protons you change the _____.

- A. Ion
- B. Element
- C. Isotope
- D. Oil

If you change the number of neutrons, you change the _____.

If you change the number of electrons, you change the _____.

Every 5,000 miles you should change a car's _____.

Matching:

____ Unit of length; equal to 3.3 ft.

- A. Law of Conservation of Mass
- B. Meter
- C. Centimeter
- D. Liter
- E. Gram

____ Mass is neither destroyed or created in chemical reactions.

____ Unit of mass; about 1 dollar bill.
____ 1/100th of meter; width of pinky finger.

____ Unit of volume; just bigger than a quart.

Matching:

____ Molecules that are tightly packed and retain their shape and size.

- A. Solid
- B. Liquid
- C. Gas
- D. Oil

____ Molecules that bounce off of each other, can be compressed, and take the shape of their container.

____ Molecules that can move (slide) over each other and have a definite size (volume), but not shape and can not be compressed.

Matching:

- A. Mixture
- B. Compound
- C. Element
- D. Matter
- E. Heterogeneous
- F. Homogeneous

____ A substance made up of two or more atoms that must be separated by chemical means.

____ Something made up of 2 or more substances that can be separated by physical means.

____ A substance that is pure and made up of only one type of atom.

____ Anything that has mass and takes up space.

____ A mixture that is the same throughout.

____ A mixture that is different throughout.

Name: _____

Period: _____

Matching: A. Melting Point B. Boiling Point C. Condensation D. Freezing Point	___ Temperature at which a liquid turns to a gas. ___ Temperature at which a solid changes to a liquid. ___ Temperature at which a liquid turns to a solid. ___ Process of a gas changing to a liquid.
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Matching: A. Proton B. Neutron C. Electrons D. Bromon	___ Negative particles that are involved in chemical bonding. ___ Positive particles that are in the nucleus and determine the element. ___ Neutral particles that determine the isotope. ___ A particle used to confuse inattentive chemistry students.
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Matching: A. Solution B. Suspension C. Alloy D. Dissolves	___ When a substance is mixed into a solution it does this. ___ A homogeneous mixture at the molecular level. ___ A temporary solution: the solute will eventually fall out. ___ A solution of two or more metals.
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Matching: A. pH B. Base C. Acid D. Neutral	___ pH 7, when there is equal amount of acid and base (distilled water is also this). ___ A chemical that adds H ⁺ ions when mixed in water. ___ Scale used to measure acids and bases. ___ A chemical that adds OH ⁻ ions to a water solution.
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A 30 milliliter object rock is 15 grams. Find its density.

Draw a density column for these liquids: Liquid A, 2.43 g/mL; Liquid B, 1.0 g/mL; Liquid C, 0.87 g/mL. Label what you know.

1. "If I ___ I full" is an easy way to remember the _____ rule that says that atoms want to have a full outershell of ___ electrons.
2. Protons are _____; electrons are _____; neutrons are _____.
3. Protons and neutrons are in the center of the atom, which is called the _____.

1. Density	a. A measurement of how easily a solid can be pounded into thin sheets	1. tensile strength	a. Upward force of a liquid or gas pushing upon something immersed in it.
2. Hardness	b. A measurement of the "compactness" of a substance; ratio of mass to volume.	2. viscosity	b. Any material that flows; either a gas or a liquid.
3. Brittleness	c. Measure of a solid's ability to return to its original shape after stretching.	3. buoyancy	c. Measure of a fluid's resistance to flow. (How thick a fluid is.)
4. Elasticity	d. A measure of how easily a solid will shatter.	4. g/mL	d. Measure of how hard it is to break something by pulling.
5. Malleability	e. A measure of how easily a solid can be	5. fluid	e. Unit of density.

Classify the reactions as: addition; decomposition; single displacement; double displacement or combustion.

Balance These Chemical Equations

Endothermic OR Exothermic

_____	1. ___ Fe ₂ O ₃ + ___ C → ___ Fe + ___ CO
_____	2. ___ HgO → ___ Hg + ___ O ₂
_____	3. ___ K + ___ SO ₄ → ___ K ₂ SO ₄
_____	4. ___ MgO + ___ LiCl → ___ MgCl ₂ + ___ Li ₂ O
_____	5. ___ CH ₄ + ___ O ₂ → ___ H ₂ O + ___ CO ₂

1. Combustion _____
2. Heat is a product _____
3. Heat is on the reactant side _____
4. If it absorbs heat _____

Chemical or Physical Changes

1. Boiling of water _____
2. If it gets hot or cold _____
3. Burning plastic _____
4. If it changes shape _____
5. Digestion _____
6. Dissolving something _____

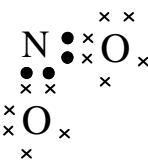
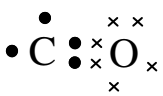
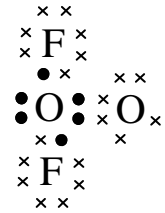
<u>Metal or Non-metal?</u>	<u>Ionic or Covalent?</u>	<u>Name These Ionic Compounds</u>	<u>Use the Polyatomic Ion Chart on the front of the worksheet to name these Polyatomic Ions:</u>
<i>M N</i> Iron Oxide	<u>Ionic</u>	MgF ₂ Magnesium Fluor- <u>ide</u>	
Barium Chloride	_____	Li ₂ O Lithium Ox- _____	HCO ₃ ¹⁻ <u>Hydrogen carbonate</u>
Carbon Dioxide	_____	NaCl Sodium Chlor- _____	SO ₄ ²⁻ _____
Magnesium Oxide	_____	K ₂ O Potassium Ox- _____	O ₂ ²⁻ _____
Aluminum Fluoride	_____	CaS _____ Sulf- _____	SO ₃ ²⁻ _____
Nitrogen Tribromide	_____	BeI ₂ _____ Iod- _____	NO ₃ ¹⁻ _____
Chromium Fluoride	_____	AlBr ₃ _____ Brom- _____	NH ₄ ⁺ _____
Potassium Oxide	_____	CaF ₂ _____	CrO ₄ ²⁻ _____
		MgO _____	OH ¹⁻ _____
		LiCl _____	PO ₄ ³⁻ _____
			CO ₃ ²⁻ _____

<u>Define these Greek Prefixes</u>			<u>Name These Covalent Compounds</u>
Penta = _____	Tetra = _____	1. CO ₂	A. Carbon monoxide
Nona = _____	Hexa = _____	2. C ₂ O ₄	B. Carbon dioxide
Mono = _____	Hepta = _____	3. C ₃ O ₅	C. Dicarbon monoxide
Octa = _____	Deca = _____	4. CO	D. Tricarbon pentoxide
Tri = _____	Di = _____	5. C ₂ O	E. Dicarbon tetroxide
		6. CO ₈	F. Carbon octoxide
			Si ₂ O ₃ Disilicon ____oxide
			N ₃ Cl ₄ ____nitrogen tetrachloride
			SO ₂ Sulfur ____oxide
			PO ₅ Phosphorous ____ox____
			S ₂ F ₄ ____sulfur ____fluor____

<u>Name these Polyatomic Compounds (Remember — no prefixes!)</u>	<u>Classify and Name These Compounds</u>	
	<u>Ionic, Covalent, or Polyatomic</u>	<u>Name</u>
CaSO ₄ Calcium _____	1. BaCl ₂ <u>Ionic</u>	<u>Barium chloride</u>
K ₂ CO ₃ _____ carbonate	2. CO _____	_____
CuNO ₃ Copper (I) _____	3. Ag ₂ O _____	_____
NH ₄ Cl _____ chloride	4. K ₂ SO ₄ _____	_____
Mg(NO ₃) ₂ Magnesium _____	5. MgBr ₂ _____	_____
K ₃ PO ₄ Potassium _____	6. SO ₃ _____	_____
Li ₂ (CrO ₄) Lithium _____	7. P ₂ O ₄ _____	_____
Mg(OH) ₂ M_____ H_____	8. Be(CrO ₄) _____	_____
Al(PO ₄) A_____ P_____	9. LiF _____	_____
K(NO ₃) _____	11. CO ₂ _____	_____
Ca ₂ SO ₃ _____	12. OF ₂ _____	_____

1. X's	A. A bond of negatively and positively charged atoms.	1. Electrolyte	A. When 4 valence electrons are shared.
2. Covalent	B. Used instead of dots to show a different atom's valence electrons.	2. Double Bond	B. Used instead of dots to simplify the writing on bonds. Means 2 electrons.
3. Ionic	C. A bond where electrons are shared.	3. Triple Bond	C. Shows 6 valence electrons being shared.
4. Diatomic Molecule	D. Number of electrons each atom in a covalent compound has after sharing.	4. Line (—)	D. Something dissolved in water that allows electricity to flow.
5. 8 Valence Electrons	E. A molecule of two atoms of the same element.	5. Single Bond	E. Occurs when 2 valence electrons are shared in a covalent compound.

Decide what's wrong with these covalent compounds and then draw them correctly..

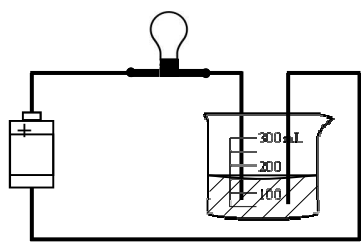
Wrong	Right	Wrong	Right	Wrong	Right
					

Using the short hand notation, count how many electrons the atoms have and if they have a full number of valence electrons.

$\text{P} \equiv$	# of electrons: <u>8</u> Full? <u>Yes</u> .	$\text{O} -$	# of electrons: _____ Full? _____
$\text{C} =$	# of electrons: _____ Full? _____	$\text{N} =$	# of electrons: _____ Full? _____
$\text{Cl} -$	# of electrons: _____ Full? _____	$\equiv \text{Si} -$	# of electrons: _____ Full? _____
$\text{I} =$	# of electrons: _____ Full? _____	$- \text{S} -$	# of electrons: _____ Full? _____

Draw the Lewis Dot Diagram for molecular Chlorine (Cl_2). Short hand	Draw the Lewis Dot Diagram for molecular Oxygen (O_2). Short hand
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Using Lewis Dot Diagrams to predict how Oxygen and Fluorine will combine. Short hand	Using Lewis Dot Diagrams to predict how Nitrogen and Bromine will combine. Short hand
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Are these Electrolytes? Yes or No?	In this setup, is the dissolved compound ionic or covalent? How do you know?										
<table style="width: 100%;"> <tr> <td>NaCl _____</td> <td>Li_2S _____</td> </tr> <tr> <td>CO_2 _____</td> <td>Al_2O_3 _____</td> </tr> <tr> <td>MgCl_2 _____</td> <td>SeO _____</td> </tr> <tr> <td>NBr_3 _____</td> <td>FeO _____</td> </tr> <tr> <td>BeO _____</td> <td>$\text{Li}(\text{NO}_3)$ _____</td> </tr> </table>	NaCl _____	Li_2S _____	CO_2 _____	Al_2O_3 _____	MgCl_2 _____	SeO _____	NBr_3 _____	FeO _____	BeO _____	$\text{Li}(\text{NO}_3)$ _____	
NaCl _____	Li_2S _____										
CO_2 _____	Al_2O_3 _____										
MgCl_2 _____	SeO _____										
NBr_3 _____	FeO _____										
BeO _____	$\text{Li}(\text{NO}_3)$ _____										

1. Octet Rule	A. Elements found on the right side of the periodic table.	<p>How many valence electrons?</p> <p>Calcium (<u>Ca</u>) <u>2</u> Hydrogen (___) _____</p> <p>Potassium (___) _____ Helium (___) _____</p> <p>Oxygen (___) _____ Aluminum(___) _____</p> <p>Argon (___) _____ Sodium (___) _____</p> <p>Boron (___) _____ Nitrogen (___) _____</p>
2. Metals	B. Elements found on the left side of the periodic table.	
3. Valence electrons	C. Says that atoms tend to be more stable with eight valence electrons.	
4. Non-metals	D. Electrons in the outermost electron level. Involved in chemical bonding.	

Metal or Non-metal?

<u>M</u> Aluminum (<u>Al</u>)	___ Iron (___)
___ Oxygen (___)	___ Fluorine (___)
___ Gold (___)	___ Tin (___)
___ Nitrogen (___)	___ Lithium (___)
___ Bromine (___)	___ Chromium (___)
___ Krypton (___)	___ Lead (___)

Connect the element on the left with the element on the right that has similar reactivity.

Chlorine	Beryllium	<p><i>Elements with the same # of _____ have the same reactivity.</i></p>
Phosphorous	Potassium	
Magnesium	Iodine	
Sodium	Aluminum	
Boron	Oxygen	
Sulfur	Nitrogen	

7 protons and 10 electrons. *Neutral atom or ion?*
 15 protons and 15 electrons. *Neutral atom or ion?*
 35 protons and 37 electrons. *Neutral atom or ion?*

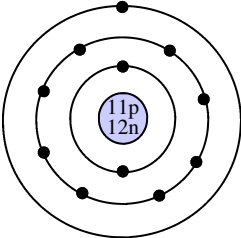
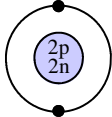
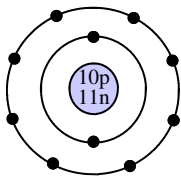
Give the element abbreviation and charge.
 5 protons and 2 electrons: Element: B Charge: +3
 16 protons and 18 electrons: Element: Charge:
 35 protons and 36 electrons: Element: Charge:

Are these elements isotopes of one another?
 Element A: 12 protons; 11 electrons; 13 neutrons.
 Element B: 13 protons; 12 electrons; 13 neutrons.

Are these elements isotopes of one another?
 Element A: 14 protons; 15 electrons; 13 neutrons.
 Element B: 14 protons; 14 electrons; 15 neutrons.

Are these elements isotopes of one another?
 Element A: 12 protons; 11 electrons; 13 neutrons.
 Element B: 12 protons; 12 electrons; 13 neutrons.

Are these elements isotopes of one another?
 Element A: 18 protons; 18 electrons; 18 neutrons.
 Element B: 18 protons; 18 electrons; 19 neutrons.

	Element: _____ # of neutrons: _____ Mass #: _____ # of electrons: _____ # of valence electrons: _____ It is an ion? _____
	Element: _____ # of neutrons: _____ Mass #: _____ # of electrons: _____ # of valence electrons: _____ It is an ion? _____
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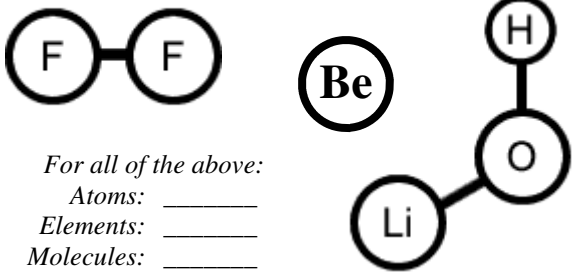
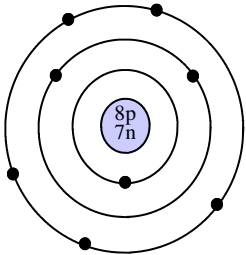
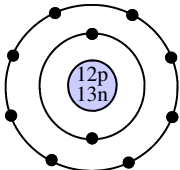
Sulfur (S) is in row 3. Sulfur has 2 complete electron levels and 6 valence electrons in level 3.

Magnesium (___) is in row _____. Magnesium has _____ complete electron levels and _____ valence electrons in level _____.

Carbon (___) is in row _____. Carbon has _____ complete electron levels and _____ valence electrons in level _____.

Potassium (___) is in row _____. Potassium has _____ complete electron levels and _____ valence electrons in level _____.


Argon (___) is in row _____. Argon has _____ complete electron levels and _____ valence electrons in level _____.

<p>1. Isotope 2. Atomic mass 3. Atomic # 4. Neutral atom 5. Ion 6. Mass #</p>	<p>A. An average of all the isotopes; the mass of average atom. B. An atom with an equal number of electrons and protons. C. An atom with more or less electrons than protons. D. A variation of an element with a different number of neutrons. E. Total number of protons and neutrons in the nucleus. F. Number of protons; determines the element.</p>	<p>How many valence electrons?</p> <p>Helium (____) _____ Lithium (____) _____ Calcium (____) _____ Aluminum (____) _____ Sulfur (____) _____ Nitrogen (____) _____</p>										
<p>Metal or Non-metal?</p> <p>____ Titanium (____) ____ Neon (____) ____ Sodium (____) ____ Hydrogen (____) ____ Chlorine (____) ____ Nickel (____)</p>		<p>Calcium and _____ have the same reactivity. Oxygen and _____ have the same reactivity. Helium and _____ have the same reactivity.</p>										
<p>8 protons and 10 electrons. <i>Neutral atom or ion?</i> 16 protons and 18 electrons. <i>Neutral atom or ion?</i> 20 protons and electrons. <i>Neutral atom or ion?</i></p> <p><i>Give the element abbreviation and charge.</i> 16 protons and 18 electrons: Element: ____ Charge: ____. 35 protons and 36 electrons: Element: ____ Charge: ____. Nitrogen with 10 electrons. Charge: _____.</p>		<table border="1"> <tr> <td data-bbox="803 518 1011 552">1. Bohr</td> <td data-bbox="1011 518 1484 552">A. Discovered that atoms have a nucleus.</td> </tr> <tr> <td data-bbox="803 583 1011 617">2. Dalton</td> <td data-bbox="1011 583 1484 617">B. Realized that there was a smallest part of matter.</td> </tr> <tr> <td data-bbox="803 648 1011 682">3. Democritus</td> <td data-bbox="1011 648 1484 682">C. Discovered that electrons are in distinct orbits.</td> </tr> <tr> <td data-bbox="803 714 1011 747">4. Rutherford</td> <td data-bbox="1011 714 1484 747">D. Discovered the electron.</td> </tr> <tr> <td data-bbox="803 779 1011 812">5. Thompson</td> <td data-bbox="1011 779 1484 812">E. Theorized that atoms cannot be changed chemically.</td> </tr> </table>	1. Bohr	A. Discovered that atoms have a nucleus.	2. Dalton	B. Realized that there was a smallest part of matter.	3. Democritus	C. Discovered that electrons are in distinct orbits.	4. Rutherford	D. Discovered the electron.	5. Thompson	E. Theorized that atoms cannot be changed chemically.
1. Bohr	A. Discovered that atoms have a nucleus.											
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5. Thompson	E. Theorized that atoms cannot be changed chemically.											
 <p><i>For all of the above:</i> Atoms: _____ Elements: _____ Molecules: _____ Compounds: _____</p>		<p>A 35 N object feels like 30 N when lowered into a liquid. How much b_____ force does the liquid give?</p> <p>If put into a more v_____ liquid, the object would feel even lighter.</p>										
<p>What is wrong with this picture of an atom?</p> 		<p>“Atoms are solid.” Respond and give reasons for your response.</p>										
 <p>Element: _____ # of neutrons: _____ Mass #: _____ # of electrons: _____ # of valence electrons: _____ It is an ion? _____</p>		<p><i>Are these different elements?</i> Element A: 17 protons; 18 electrons; 16 neutrons. Element B: 18 protons; 18 electrons; 18 neutrons. <i>Why?</i></p> <p><i>Are these different isotopes of one another?</i> Element A: 12 protons; 11 electrons; 13 neutrons. Element B: 12 protons; 12 electrons; 14 neutrons. <i>Why?</i></p> <p><i>Are these different isotopes of one another?</i> Element A: 18 protons; 18 electrons; 18 neutrons. Element B: 19 protons; 18 electrons; 19 neutrons. <i>Why?</i></p>										
		<p>Calcium (____) is in row _____. Calcium has _____ complete electron levels and _____ valence electrons in level _____.</p> <p>Sulfur (____) is in row _____. Argon has _____ complete electron levels and _____ valence electrons in level _____.</p>										

1. Displacement	A. To burn something.	1. Single Displacement Reaction	A. The metals in two compounds switch places.
2. Addition	B. To push something out of the way.	2. Addition Reaction	B. An element replaces one of the elements in a compound.
3. Combustion	C. To combine things.	3. Combustion Reaction	C. Two elements combine to form a compound.
4. Decomposition	D. To create something new from ingredients.	4. Double Displacement Reaction	D. A compound breaks up into its elements.
5. Synthesize	E. To break something apart.	5. Decomposition Reaction	E. A fuel burns in oxygen, creates heat, and usually produces CO ₂ .
Which type of reaction has only one reactant?		$\text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{energy}$ Respiration or photosynthesis? Why? Plant or animal?	
Which type of reaction has two compound reactants and two compound products?			
Which type of reaction always has oxygen as a reactant?			
Which type of reaction has only one product?			
Which type of reaction has an element and a compound as reactants?			
Write a reaction of Magnesium chloride combining with Lithium oxide to produce Magnesium oxide and Lithium Chloride. (Be sure that the ionic compounds are balanced.)		Is a combustion reaction exothermic or endothermic? How do you know for sure? What is always a product of combustion? Why do the exhaust pipes (tailpipes) of cars drip water? How can you prove that respiration is combustion?	

Type of Reaction	Balance the reactions:
_____	_____ Na ₂ S + _____ Zn(NO ₃) → _____ Na(NO ₃) + _____ Zn ₂ S
_____	_____ Li + _____ N ₂ → _____ Li ₃ N
_____	_____ KClO → _____ KCl + _____ O ₂
_____	_____ CH ₄ + _____ O ₂ → _____ H ₂ O + _____ CO ₂
_____	_____ Mg + _____ Ag(NO ₃) → _____ Mg(NO ₃) ₂ + _____ Ag

Test Review

1. Products 2. Exothermic 3. Physical change 4. Chemical reaction 5. Endothermic 6. Reactants	A. Chemicals are mixed and get hot. B. The chemicals before the reaction. C. When chemical bonds are broken and new substances are formed. D. A chemical reaction that gets cold. E. The result of a chemical reaction. F. No new chemicals are formed.	1. Coefficient 2. Wafting 3. Ammonia 4. Arrow 5. Precipitate 6. Subscript	A. Correct way to smell chemicals B. Tells you the number of molecules. C. Should never be combined with Chlorine bleach. D. Means "produces" or "creates". E. Tells you the number of atoms in a chemical formula. F. When a liquid turns cloudy. Means a solid was formed.
<i>Endothermic or Exothermic Reaction?</i> ___ Two chemicals are mixed and get hot? ___ Heat goes into the reaction? ___ An activated cold pack? ___ Two chemicals are mixed and get cold? ___ Combustion? ___ Heat comes out of a reaction? ___ An activated heat pack?		<i>Chemical or Physical Change?</i> ___ Bubbles are formed. ___ Evaporation ___ Melting ___ Ripping ___ Gets cold ___ Photosynthesis ___ Color changes ___ Gets hot ___ Boiling ___ Changes smell ___ Digestion ___ Dissolving Salt ___ Changes temperature ___ Combustion ___ Chewing ___ Changes taste	
<i>Find the atomic masses for the following elements</i> A. Lithium = _____ E. Aluminum = _____ B. Helium = _____ F. Bromine = _____ C. Iron = _____ G. Uranium = _____ D. Silver = _____ H. Nickel = _____		Find the molecular mass of the following compounds. Cl ₂ Li ₂ O Na(NO ₃)	
<i>How many total molecules are there?</i> ___ 2H ₂ O ___ 2Be ₃ N ₂ ___ 3C ₂ F ₄ ___ 5Na ₂ S ___ 4Br ₂ ___ 2K(OH)			
<i>How many total atoms are there?</i> ___ 2H ₂ O ___ 2Be ₃ N ₂ ___ 3C ₂ F ₄ ___ 5Na ₂ S ___ 4Br ₂ ___ 2K(OH)			
Products are on the _____ side of a chemical reaction. Reactants are on the _____ side of a chemical reaction. The arrow points to the _____.		<i>Photosynthesis or Respiration?</i> ___ Creates carbon dioxide ___ Necessary to make ATP ___ Creates oxygen ___ Endothermic ___ Uses oxygen ___ Exothermic ___ Uses carbon dioxide ___ A combustion reaction ___ Uses glucose ___ Produces water ___ Produces glucose ___ Uses water ___ Done in animals ___ Occurs in chloroplast ___ Done in plants ___ Occurs in mitochondria ___ Done in all cells ___ Uses sunlight for energy	
$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{energy}$			
Circle the first reactant: _____ Name the first product: _____ How many hydrogen atoms on the product side? _____ How many oxygen atoms on the reactant side? _____ Is this respiration or photosynthesis? _____ What kind of reaction is it? _____ Endothermic or exothermic? _____		Open or closed reaction? Will the mass of his products be greater than, less than, or equal to his reactants? Why? What does this set up allow us to prove?	