Science Nine

Module Two:

Matter and Chemical Change

Name:

Date Received:

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Science Ninja

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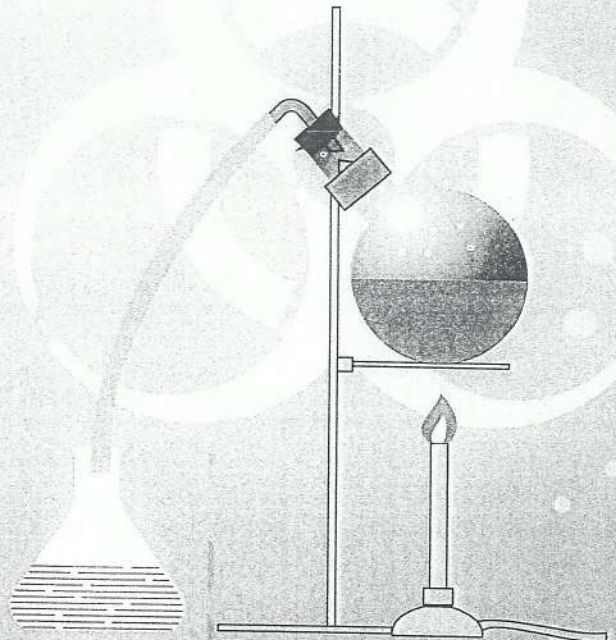
MATTER AND CHEMICAL CHANGE



GRADE 9
TOPIC TWO

NAME

Lacombe Outreach School

Part A: What is Matter?

Matter is anything that has mass (is heavy) and occupies space (takes up room). Matter has two **properties** (ways in which it can be described)—chemical and physical.

Physical properties are characteristics that can be noticed (seen) when the substance is **alone** and **chemical** properties are characteristics that can be noticed(seen) when the substance **interacts** with (is put together with) other substances.

Examples of Physical Properties:

- colour
- lustre...shininess
- melting point...the temperature at which it changes from solid to liquid
- boiling point...the temperature at which it changes from liquid to gas
- hardness
- malleability...whether it can be pressed or pounded into a new shape without breaking
- ductility...whether it can be stretched thin like wire
- crystal shape...the shape of the tiny pieces it is made of
- solubility...how well it can dissolve in other substances
- density...how heavy a certain amount is—how closely its particles are packed together
- conductivity...how well heat or electricity can move through it

Examples of Chemical Properties:

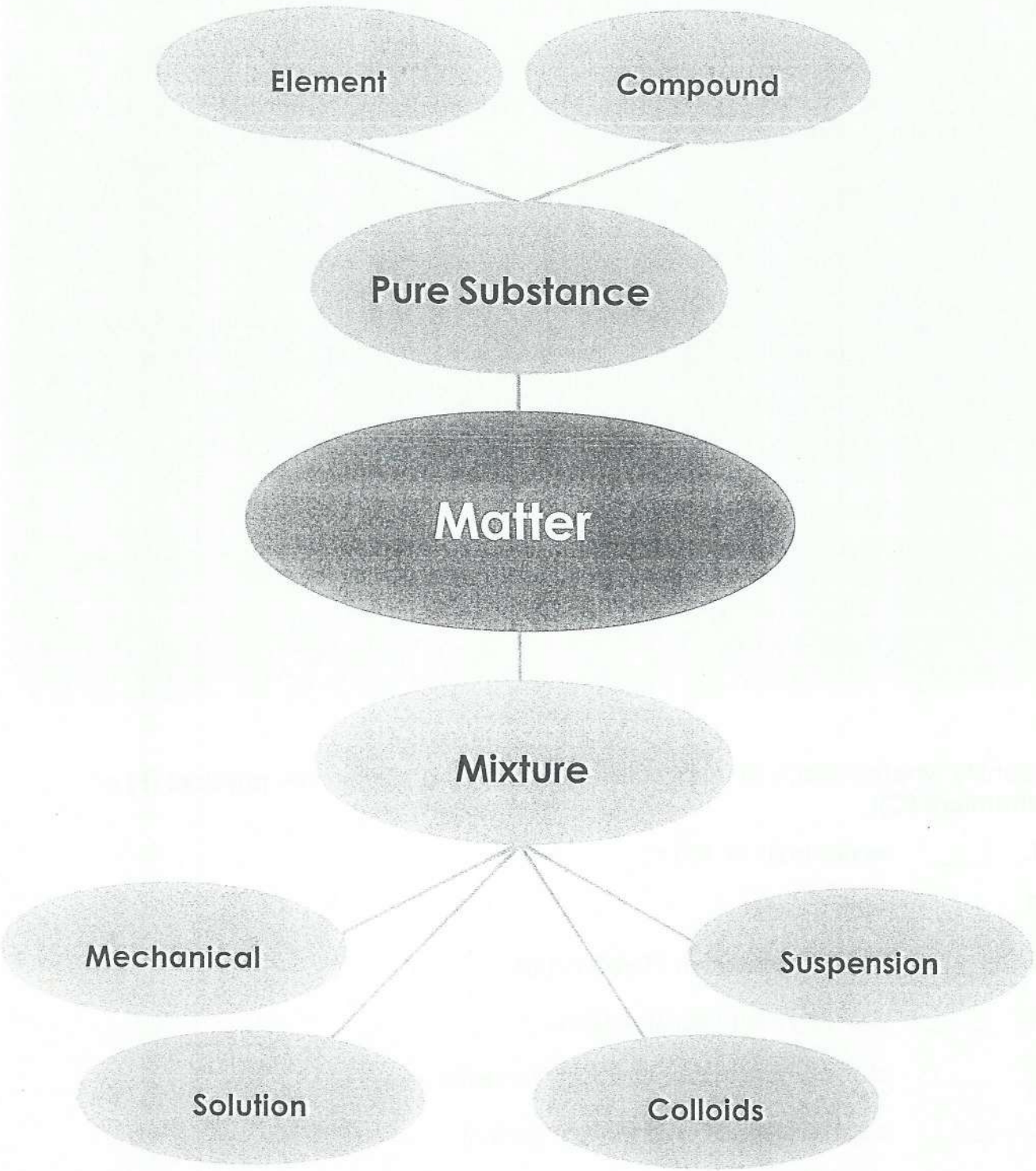
- how a substance reacts when it is mixed with acids
- a substance's ability to burn
- how a substance reacts with another substance
- it will burn a substance

Identify whether each of the following properties of matter are **physical (P)** or **chemical (C)**:

1. _____ water boils at 100°C
2. _____ silver is shiny
3. _____ oil separates from / floats on oil
4. _____ a penny can't scratch glass
5. _____ aluminum can be stretched to make wire
6. _____ copper statues oxidize (turn green)
7. _____ wood burns

Part B: How is matter classified (grouped)?

Study the following diagram carefully and then read the information on the next page.



Read the following information carefully and use it to help you understand the diagram on page two and complete the activity on page four.

Element

An element is a "basic" substance that cannot be broken down into different substances. Elements are combined to make new substances.

Compound

A compound is made when two or more elements are combined (mixed chemically) to become a new substance.

Pure Substance

A pure substance is made up of only one type of matter and has a unique set of chemical and physical properties that are not exactly the same as the set of properties for other substance.

Matter is anything that has mass (weight) and occupies space (takes up room).

Mixture

A mixture is made when two or more pure substances are combined (physically mixed). The pure substances keep their own properties, they just become mixed together.

Mechanical Mixture

A mechanical mixture is when the different substances that are in a mixture can be seen.

Suspension

A suspension is a cloudy mixture in which the tiny particles of one substance float within another and can be separated.

Solution

A solution is when the substances that are in a mixture are mixed (dissolved) so well that it looks pure (can't see the individual substances).

Colloid

A colloid is a cloudy mixture in which the tiny particles of one substance float within another but are so small they can't be seen or easily separated.

Use the information on pages two and three to help you complete the following activity:

1. Number the following types of matter in order from purest (1) to least pure/ most poorly mixed (6).

___ colloid	___ compound	___ suspension
___ element	___ solution	___ mechanical mixture

2. Identify each of the following examples as a **colloid**, **compound**, **suspension**, **element**, **solution** or **mechanical mixture**.

a. _____ Carbon is a basic substance that is unique and cannot be broken down into different substances.

b. _____ Sugar dissolved in hot coffee can be tasted but not seen.

c. _____ Homogenized milk contains tiny drops of cream floating in whey (liquid protein) that don't separate out.

d. _____ Tomato juice contains small solid particles that can be separated out by pouring it through filter paper.

e. _____ Water is made by combining the basic elements of Hydrogen and Oxygen.

f. _____ Vegetable soup contains salty flavoured liquid and chunks of different vegetables.

3. What is the difference between a pure substance and a mixture?

_____

_____

_____

_____

_____

_____

Part C: How are elements classified (grouped)?

All elements can be grouped into three distinct (different) categories (groups)—*metals*, *non-metals*, and *metalliods*. What this basically means is that all pure substances are either metals or not and some substances are somewhere in-between. It may not seem very scientific but it is an effective and widely-used way of classifying elements.

	Metals	Non-Metals	Metalloids
State at Room Temperature (solid/liquid/gas)	solid (except Mercury)	some solid some gas (Bromide liquid)	solid
Appearance (colour/lustre)	shiny	not very shiny	can be dull or shiny
Conductivity (ability to pass heat or electricity along)	good conductors of heat and electricity	poor conductors of heat and electricity	sometimes conduct electricity poor conductors of heat
Malleability and Ductility (ability to be shaped or stretched)	very malleable very ductile	brittle (breaks easily) not ductile	brittle (breaks easily) not ductile

Use the information on page five to help you identify whether each of the following elements is a **metal**, **non-metal** or **metalloid**:

1. _____ Copper is solid and shiny at room temperature, conducts both heat and electricity, and is able to be shaped and stretched into wire.

2. _____ Argon is a gas at room temperature, does not conduct heat or electricity and cannot be shaped or stretched.

3. _____ Boron is a solid at room temperature, does not conduct heat or electricity and cannot be shaped or stretched.

4. _____ Zinc is solid and shiny at room temperature, conducts both heat and electricity, and is able to be shaped and stretched.

5. _____ Silicon is solid at room temperature, is not shiny, doesn't conduct heat but can conduct electricity.

6. _____ Oxygen is a gas at room temperature, does not conduct electricity and is very brittle when it is solid.

Part D: What is a chemical reaction?

Chemical Reaction

A chemical reaction is when two or more substances are mixed and a chemical change occurs. The atoms in the elements join together in different ways and a new substance is created that is different from either of the substances used to make it.

The two original substances are called "reactants" and the new substance that is formed is called the "product."

reactant + reactant = product

Some chemical reactions involve mixing more than two reactants together and some reactions produce (make) more than one product. This happens when a liquid is formed that also has gas bubbles or has solid particles floating in it.

We know when a chemical reaction has happened because there is proof in any of the following forms:

- colour change
- smell is produced
- a new solid or gas is created
- heat is produced or absorbed

Conservation of Mass

Convservation means "saving" or "keeping" something from disappearing. Conservation of mass is a scientific rule that states that in a chemical reaction the total mass (weight) of the reactants will equal the mass of the product and nothing is lost in the process.

Exothermic Reaction

An exothermic reaction is a chemical reaction that produces heat energy. Explosions are an extreme form of exothermic reaction; the more heat energy that is produced, the more violent the reaction is. Because of this, it is important to know what might happen before you mix substances together.

Endothermic Reaction

An endothermic reaction is a chemical reaction that absorbs energy (feels cool or cold). Extreme endothermic reactions can freeze any of the containers and tools nearby. Because of this, it is important to know what might happen before you mix substances together.

Use the information from page seven to help you complete the following passage in a way that makes sense.

When two or more _____ (1) are mixed together and the _____ (2) group together in a different way it is called a _____ (3). _____ (4). The substances that are mixed together are called _____ (5) and the new substance that is formed is called the _____ (6). Some reactions produce more than one _____ (7). When chemical reactions happen, there is always evidence and the total amount of substances doesn't change. This is called the law of _____ (8) _____. A chemical reaction that produces heat energy is called an _____ (9) reaction. A chemical reaction that absorbs heat and cools down is called an _____ (10) reaction.

Why is it important to know what *might* happen when you mix two substances before you actually mix them?

Investigate 1

What kinds of substances produce exothermic reactions?

Consider: Will highly concentrated compounds (mixtures) produce an exothermic reaction?

Hypothesis: (check the one you agree with)

☐ mixing highly-concentrated compounds may produce an exothermic reaction

☐ mixing highly-concentrated compounds may produce an endothemic reaction

Materials:

- epoxy-resin from local hardware store
- plastic lid (from margarine container or other)
- toothpick

Procedure:

1. Read the ingredients and instructions on the epoxy resin container.
2. Squeeze a small amount (the size of a quarter) onto the plastic lid.
3. Feel the plastic lid underneath the epoxy resin sample.
4. Mix the sample with the toothpick (being careful not to touch it!)
5. Feel the plastic lid underneath the epoxy resin.

Analysis/Conclusion:

1. Now, answer the original question using evidence from your investigation OR prove why your hypothesis was correct.

Chemical Reactions Using Oxygen

Combustion

Combustion is an exothermic reaction caused by mixing oxygen with certain substances.

Corrosion

Corrosion is the oxidization of metals or rocks caused by air or water. Basically, this means that the oxygen in air and water is able to "react and eat away" at the surface of some metals and rocks.

Identify whether each of the following is an example of **combustion** or **corrosion**.

1. _____ Rust forms on iron left in moist (wet) air and flakes off in layers until all of the iron is gone.

2. _____ Gasoline combines with oxygen to release the energy needed to make a car move.

3. _____ Aluminum oxide forms on aluminum cans in landfill sites and very slowly breaks down the can.

4. _____ The food we eat is combined with oxygen to create the energy we need to live.

5. _____ A green substance is called verdigris or patina and appears on copper that is exposed to (left out in) moist air.

Investigate

The Rusting Power of Common Metals

Consider: What kinds of metals rust?

Hypothesis: (check the one you agree with)

- ☐ all metals will rust
- ☐ only some metals will rust

Materials:

- A supply of water
- 4 small bowls or plastic containers
- aluminum foil
- steel wool (local hardware store)
- uncoated iron nail (local hardware store)
- copper wire (local hardware store)

Procedure: (record information in the chart below)

1. Fill each bowl with water and drop a sample of metal into the water.
2. Wait a few days and record your observations.

Iron	Copper	Steel	Aluminum

Analysis/Conclusion:

Now, answer the original question using evidence from your investigation OR prove why your hypothesis was correct.

Chemical Reaction Rate (Speed)

Reaction rate is a measure of how **fast** a chemical reaction happens—either how quickly one of the reactants disppears or how quickly the new product appears. The rate (speed) at which any chemical reaction happens depends on four main things:

Temperature

When temperature increases, the particles inside the substances (reactants) move much more quickly and bang into one another more often; this makes them mix faster and speeds up the reaction.

Concentration

When substances are more concentrated, that means that there are more atoms in each of the substances mixing together and banging into each other. This makes them mix faster and speeds up the reaction.

Surface Area

When surface area (the outside layer of something) is bigger, that means there is more space for the chemical reaction to happen so it happens faster.

Catalysts

When something is added or a tool is used to get the reaction going, it is called a catalyst.

Identify whether each of the following is an example of **temperature**, **concentration**, **surface area** or a **catalyst** affecting the rate of reaction.

1. _____ Cutting iron into smaller pieces increases the speed at which it will corrode because there are more places for oxygen touch.
2. _____ When coffee is hot, sugar will dissolve faster.
3. _____ Pure peroxide dissolves blood almost instantly.
4. _____ Stirring a mixture speeds the dissolving process.
5. _____ It's hard to get salt to dissolve in really cold water.

Changing Matter

Consider: Are changes in matter permanent?

Hypothesis: (check the one you agree with)

- ☐ a change in matter is always permanent (you can't get the reactants back)
- ☐ a change in matter is never permanent (you can get the reactants back)
- ☐ a change in matter is sometimes permanent (you may get the reactants back)

Materials:

- 1 cup (each) rubbing alcohol and water
- 1 cup sugar
- 2 clear containers and spoons (or other mixing utensil)

Procedure: (record information in the chart below)

1. Mix as much sugar as you can into each liquid.
2. Leave each sugar solution to evaporate.
3. Observe what happens to the sugar as the liquids evaporate.

Water	Alcohol

Analysis/Conclusion:

Now, answer the original question using evidence from your investigation OR prove why your hypothesis was correct.

Part D: How do scientists group elements?

The Periodic Table

Over a hundred years ago, a scientist called Dmitri Ivanovich Mendeleev invented a table (chart) that organized all of the known **elements** into groups according to their **chemical** and **physical properties** (characteristics). Although new elements have been discovered over time, his chart, called the Periodic Table, is still the most effective way of organizing and grouping the elements. The basic rules of the table are:

- every element has a **number** (called its atomic number) that identifies how **heavy** its atoms (tiny pieces) are
- every element has a long name shortened to one or two letters (chemical symbol)
- elements are listed in order (lightest to heaviest) going **across** the table (the rows are called **periods**)
- elements are grouped in "**families**" going **down** the chart (usually in columns or staircases) that have similar characteristics (properties)

The chart is called the "periodic" table because certain characteristics of elements repeat over time. Each row in the chart is called a period because where the row begins and ends, the pattern begins and ends.

The chart below is a simplified version of the periodic table with only some of the elements. Study it carefully and then answer the questions below.

1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Db													

1. Which element has heavier atoms—Carbon (C)or Silicon (Si)? Explain how you know.

_____

_____

_____

2. The non-metals are He, C, N, O, F, Ne, P, S, Cl, Ar, Se, Br, Kr, I, Xe, Rn and H. Come up with a "rule" that explains where you can find all of the non-metals on the periodic table.

_____

_____

_____

3. The metalloids are B, Si, Ge, As, Sb, Te, Po and At. Come up with a "rule" that explains where you can find all of the metalloids on the periodic table.

_____

_____

_____

Chemical Families

Chemical families are groups of related elements that have similar properties (characteristics). Some of the main families are:

Alkali Metals

Alkali metals are very reactive (they produce extreme reactions very easily) so they often have to be stored carefully to prevent unwanted violent reactions.

Lithium—Li
Sodium—Na
Potassium—K
Rubidium—Rb
Cesium—Cs
Francium—Fr

Alkaline Earth Metals

Alkaline earth metals produce strong reactions with some substances but aren't as reactive as the alkali metals.

Beryllium—Be
Magnesium—Mg
Calcium—Ca
Strontium—Sr
Barium—Ba
Radium—Ra

Noble Gases

Noble gases are very unreactive. They don't produce chemical reactions with many substances; in fact, their particles actually "bounce away" from other substances.

Helium—He
Neon—Ne
Argon—Ar
Krypton—Kr
Xenon—Xe
Radon—Rn

Halogens

Halogens are also very reactive elements. Many produce reactions that are corrosive or otherwise harmful.

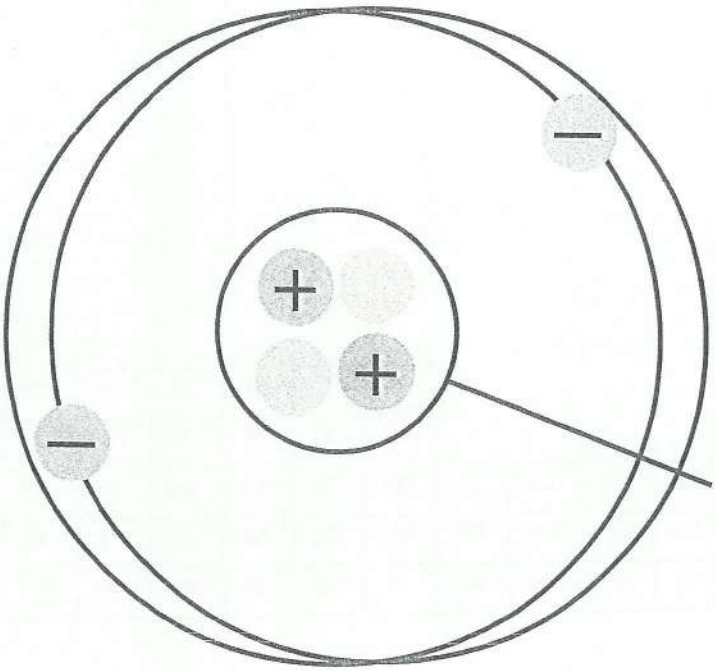
Fluorine—F
Chloriine—Cl
Bromine—Br
Iodine—I
Astatine—At

Use the information on page 16 to help you identify four of the chemical families in the periodic table.

- colour the alkali metals dark red
- colour the alkaline earth metals blue
- colour the noble gases green
- colour the halogens yellow

1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Db													

Part E: What do atoms have to do with it?



This is a helium atom. It has two electrons (-), two protons (+) and two neutrons. Atoms must have the same number of electrons and protons to be balanced (stable).

Electrons

Electrons are tiny, negatively-charged particles outside the nucleus of an atom. In the diagram above, the electrons have minus signs (-) on them to identify that they are negative.

Protons

Protons are tiny, positively-charged particles inside the nucleus (centre) of an atom. In the diagram above, the protons have plus signs (+) on them to identify that they are positive.

Neutrons

Neutrons are tiny, uncharged particles inside the nucleus (centre) of an atom. In the diagram above, the neutrons have no signs on them to identify that they have no charge.

Atoms

An atom is the simplest (smallest) part of an element that still has all of the properties (characteristics) of the element. Atoms are so small they have never been seen even through the most powerful microscopes. Scientists have had to theorize (make educated guesses) that they exist based on experiments they have conducted (tried) for many years. As scientists learn more about atoms, they create models (pictures) of what they think atoms look like. The diagram on page 18 is a model of an atom.

Scientists have learned the following things about atoms:

- atoms have no charge (they are neutral)
- the small particles (electrons and protons) inside an atom have positive and negative charges
- in order for the atom to be neutral, it must always have the same number of electrons and protons so it stays balanced (neutral)
- the number of protons and neutrons in the nucleus of an atom are not always the same
- the atomic number tells us both the number of electrons as well as the number of protons

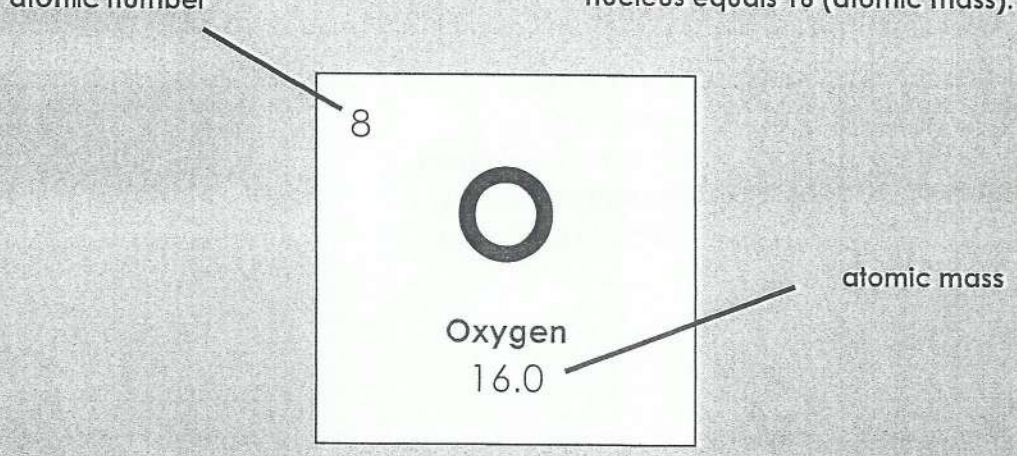
How scientists talk about atoms:

- the atomic number comes from the number of electrons as well as the number of protons in the nucleus of the atom
- the atomic mass (weight) is the total number of protons and neutrons

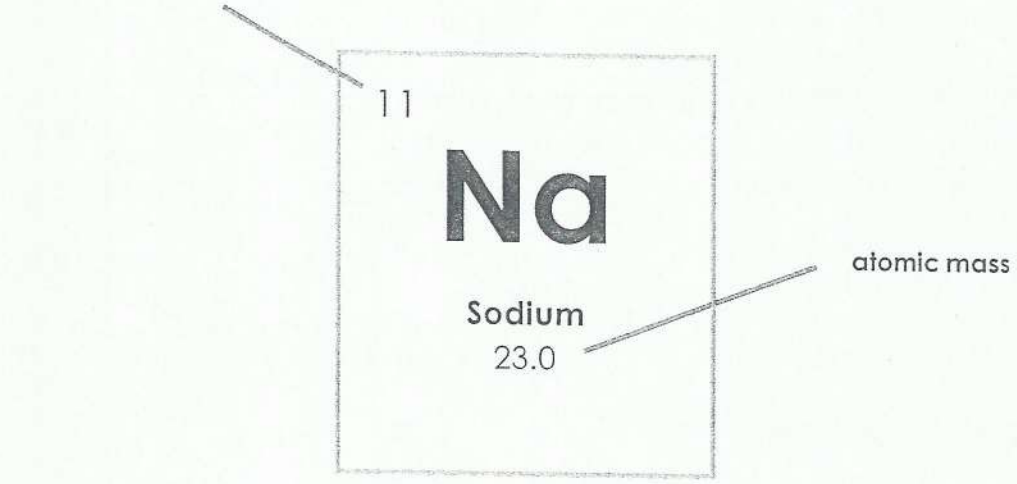
What the periodic table tells us about atoms:

Each block on the periodic table represents a type of element. Along with other information, each block also contains numbers that help us to understand how the atoms inside that element "look."

This block from the periodic table tells us that Oxygen (O) atoms have 8 protons in the nucleus (atomic number) and that the total number of neutrons and protons in the nucleus equals 16 (atomic mass).



This block from the periodic table tells us that Sodium (Na) atoms have 11 protons in the nucleus (atomic number) and that the total number of neutrons and protons in the nucleus equals 23 (atomic mass).



To figure out how many electrons, protons and neutrons are in an atom, follow these steps:

Protons

1. Look at the **atomic number**. It tells you how many **protons** there are.

Electrons

2. There are the **same number of electrons** as protons so copy the number from above.

Neutrons

3. Look at the atomic mass. It is the total number of protons and neutrons. You now know how many protons there are so **subtract the number of protons from the atomic mass** and you will know how many neutrons there are.

Particles in Sodium
11 protons
11 electrons
23 – 11 = 12 neutrons

Calculate the number of electrons, protons and neutrons that exist in each atom of the following elements:

1

13

Al

Aluminum

27.0

___ protons

___ electrons

___ neutrons

2

2

He

Helium

4.0

___ protons

___ electrons

___ neutrons

3

1

H

Hydrogen

1.0

___ protons

___ electrons

___ neutrons

4

7

N

Nitrogen

14.0

___ protons

___ electrons

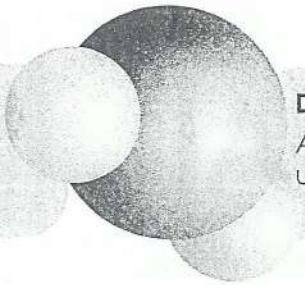
___ neutrons

Part F: What are chemical compounds?

Before learning about chemical compounds, it's important to know the following terms and definitions:

Molecule

A group of neutral atoms bonded (joined) together.



Diatomic Molecule

A diatomic molecule is always made up of pairs of the same kind of atom.

Ion

An ion is an atom that is no longer neutral. It now has a positive or negative charge because it has either lost or gained electrons. If there are more electrons than protons, the ion is negatively charged; but, if there are more protons than electrons, the atom is positively charged.

Chemical Compounds

A compound is formed whenever two or more elements are chemically joined (stuck together at the atom level) to form a new chemical with new properties (characteristics).

Molecular Compound

A molecular compound is formed by mixing two or more non-metal elements together. The atoms in each element get mixed up and form new bonds (their inner particles are stuck together in a new way). In molecular compounds, the atoms stick together because they are sharing electrons.

Ionic Compound

An ionic compound is formed by mixing elements whose atoms have become positively or negatively charged. Instead of just sticking together, the atoms actually trade pieces and become new atoms. In ionic compounds, the atoms stay together because they are trading electrons.

Use the information on page 22 to help you fill in the blanks in these sentences.

1. A _____ contains neutral atoms.

2. An ion is a postively or negatively _____ atom that has either gained or lost _____.

3. A _____ molecule is made up of pairs of atoms.

4. Molecules and molecular compounds are made up of _____ atoms.

5. Ionic compounds are made up of atoms that are _____ or _____ charged.

6. To become "charged", at atom most gain or lose _____.

7. A chemical compound is formed whenever two or more elements are _____ joined (stuck together at the atom level).

Molecular Compounds vs. Ionic Compounds

Even though we can't see what is happening to the atoms in a compound, we can tell whether a compound is molecular and ionic by studying its properties (characteristics).

Properties of Molecular Compounds

- made by mixing different non-metals
- do not break apart into ions in solutions (wet mixtures)
- do not conduct electricity
- solid, liquid or gas at room temperature

Properties of Ionic Compounds

- made by mixing metals with non-metals
- break apart into ions in solutions (wet mixtures)
- conduct electricity
- solid at room temperature

Use the information above to help you identify whether each of the following descriptions are of compounds that are **molecular** or **ionic**.

1. _____ Carbon Dioxide is a gas at room temperature.
2. _____ Salt is made by mixing Sodium (a metal) and Chlorine (a non-metal).
3. _____ Silver Nitrate can conduct electricity.
4. _____ When sugar is mixed with water to make a solution, it doesn't break apart into ions.
5. _____ When salt is mixed with water to make a solution, it breaks apart into ions.

Part G: How do chemical compounds get their names?

Rules for Naming Chemical Compounds with Words

Molecular Compounds (of two elements)

1. Write the whole name of the first element
2. Add of the second element but change the ending to *ide*
3. Add a number prefix to the second element to show how many atoms of each element.

   mono = 1
   di = 2
   tri = 3
   tetra = 4

Ionic Compounds (of two elements)

1. Write the whole name of the metallic element first.
2. Add of the second element but change the ending to *ide*.

Did you notice that the only difference between the names of molecular and ionic compounds is whether or not we say the numbers?

Use the information above to help you identify whether each of the following names are compounds that are **molecular** or **ionic**.

1. _____ Carbon Dioxide
2. _____ Calcium Oxide
3. _____ Carbon Tetrachloride
4. _____ Magnesium Nitride
5. _____ Carbon Monoxide

Rules for Changing Chemical Compound Names to Formulas with Words

Chemical Formulas

Chemical compounds are also named using chemical formulas. A set of letters and numbers tell you which elements are in the compound and how much of each element there is.

Changing Names to Formulas

1. Write the symbols for the elements (found on the periodic table) in the order they are in the name.
2. Use subscripts (little numbers in the bottom right-hand corner) to show how many atoms of each element.

Use the information on the last few pages to help you write the chemical formulas for the following compounds:

Example: **Carbon Dioxide**

Symbol for first element:	C
Subscript (little number) on first element:	
Symbol for second element:	O
Subscript (little number) on second element:	di = 2
Chemical Formula =	CO_2

1 H Hydrogen																	2 He Helium
3 Li Lithium	4 Be Berylium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluoride	10 Ne Neon
11 Na Sodium	12 Mg Magnesium											13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chronium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Mercury	50 Sn Tin	51 Sb Antimony	52 Te Tellirium	53 I Iodine	54 Xe Xenon
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89 Ac Actinium	104 Rf Rutherfordium	105 Db Dubnium													

Hint: If there is no subscript, leave the space blank.

1. **Hydrogen Dioxide**

   Symbol for first element: _____
   Subscript on first element: _____
   Symbol for second element: _____
   Prefix on second element: _____
   Chemical Formula: _____

2. **Sodium Chloride**

   Symbol for first element: _____
   Subscript on first element: _____
   Symbol for second element: _____
   Subscript on second element: _____
   Chemical Formula: _____

3. **Dinitrogen Trioxide**

   Symbol for first element: _____
   Subscript on first element: _____
   Symbol for second element: _____
   Subscript on second element: _____
   Chemical Formula: _____

4. **Carbon Monoxide**

   Symbol for first element: _____
   Subscript on first element: _____
   Symbol for second element: _____
   Subscript on second element: _____
   Chemical Formula: _____

5. **Carbon Tetrachloride**

   Symbol for first element: _____
   Subscript on first element: _____
   Symbol for second element: _____
   Subscript on second element: _____
   Chemical Formula: _____

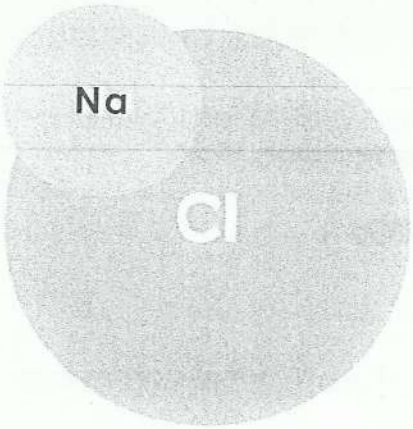
6. **Silver Chloride**

   Symbol for first element: _____
   Subscript on first element: _____
   Symbol for second element: _____
   Subscript on second element: _____
   Chemical Formula: _____

Part H: What kinds of chemicals do we use everyday?

Use what you learned on pages 24 through 28 to help you classify and name each of these everyday chemical compounds.

Table Salt... crystals that add flavour to the food we eat!

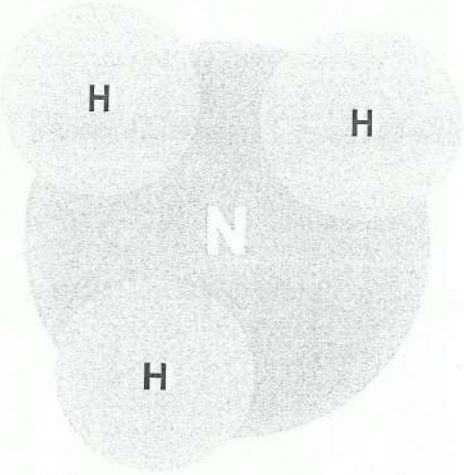


Is a molecular / ionic compound.
(circle one)

Chemical Name (in words):

Chemical Formula:

Ammonia...liquid we use for cleaning!

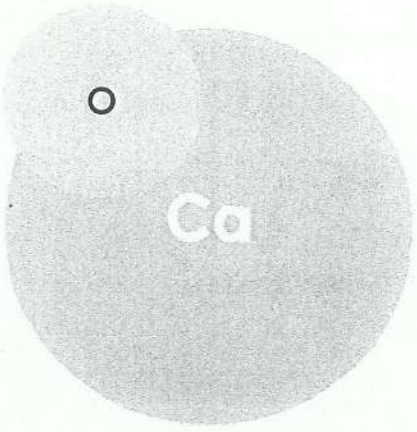


Is a molecular / ionic compound.
(circle one)

Chemical Name (in words):

Chemical Formula:

Lime...powder used in fertilizer.



Is a molecular / ionic compound.
(circle one)

Chemical Name (in words):

Chemical Formula:

States of Matter

Chemical formulas (especially when they are written in reaction equations like the one below) usually have a letter in brackets afterwards to let you know what state the substance is in at room temperature.

S = solid g = gas l = liquid

Use what you have learned about naming chemical compounds to help you fill in the missing information in the explanation of this chemical reaction.

$$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$$

At room temperature, _____ (1) is in a _____ (2) state. When it comes into contact with pure _____ (3), the chemicals _____ (4) and form _____ (5) _____ (6), which is a _____ (7). Each _____ (8) in the gas is made up of _____ (9) atom of _____ (10) and a _____ (11) of atoms of _____ (12).

In this chemical _____ (13), the _____ (14) are carbon and oxygen. The _____ (15) is carbon dioxide.

The missing words from the passage are:

oxygen carbon reactants solid one
carbon react gas molecule product
oxygen pair reaction carbon dioxide