Chemistry Packet 3 Assignment Summary

**Instructions:** Read the instructions for each assignment carefully. Be sure to complete the **entire** assignment.

**Assignment 1:** complete the single page classification of matter worksheet.

**Assignment 2:** Complete the 2 page classifying matter worksheet from Flinn Scientific.

**Assignment 3:** Complete the Periodic table reading and assignment. This assignment has 5 pages, they are labeled 3a-3e. Complete each one. If you need to color the pages with a pattern or use different **colors be sure to create a key.**

**Assignment 4:** Complete the Martian periodic table.

If you are having any trouble completing any of the assignments please e-mail me or call me at 903-347-3588.
Worksheet 1

**Directions:** Classify each sample to its most specific form possible (furthest down on the paper). Write the number to the corresponding sample in the correct space provided.

**Matter** Takes up space and has mass

**Pure Substance**

**Element** Cannot be further decomposed. Represented on the periodic table by an atomic symbol. ______. ______. ______

**Compound** Chemical combination of two or more elements. Can be decomposed by chemical reaction. Ex: \( \text{H}_2\text{O}, \text{CaCO}_3 \) ______

**Mixture** Physical combination of 2 or more substances, each of which retains its own chemical properties.

**Homogeneous** Same appearance throughout; single phase (solid or liquid or gas)

**Particles get bigger**

**Suspension** Particles in liquid settle out due to gravity. Can see particles with eye. Very thick, and sticky ______. ______

**Colloid** Particles do not settle out through time. Cannot see particles with eye. Very thick, and sticky ______. ______

**Heterogeneous** Components can be distinguished. Not uniform in appearance; possibly more than one phase (solid, liquid, gas) ______. ______. ______
### Classifying Matter Worksheets

**Physical and Chemical Changes**

<table>
<thead>
<tr>
<th>Activity or Observation</th>
<th>Physical or Chemical Change?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Boiling water for tea</td>
<td></td>
</tr>
<tr>
<td>2. Digesting food</td>
<td></td>
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<tr>
<td>3. Soda goes “flat”</td>
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<tr>
<td>4. Shooting a rubber band</td>
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<tr>
<td>5. Grilling a hamburger</td>
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<tr>
<td>6. Adding sugar to your tea</td>
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<tr>
<td>7. Adding lemon to your tea</td>
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<tr>
<td>8. Mowing the grass</td>
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<tr>
<td>9. The smell of perfume “wafts” across the room</td>
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<tr>
<td>10. Candle wax melts</td>
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<tr>
<td>11. Breaking glass</td>
<td></td>
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<tr>
<td>12. Making cement</td>
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<tr>
<td>13. Lighting a match</td>
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<tr>
<td>14. LED display glows in the dark</td>
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<tr>
<td>15. Firefly glows in the dark</td>
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<tr>
<td>16. Snow disappears without melting</td>
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<tr>
<td>17. Bleaching your hair</td>
<td></td>
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<tr>
<td>18. Turning on a light bulb</td>
<td></td>
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<tr>
<td>19. Milk goes sour</td>
<td></td>
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<tr>
<td>20. Shooting off fireworks</td>
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</tr>
</tbody>
</table>
# Classifying Matter Worksheets

## Element, Compound or Mixture?

<table>
<thead>
<tr>
<th>Material</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Salt</td>
<td></td>
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<tr>
<td>2. Block of iron</td>
<td></td>
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<tr>
<td>3. Glass of cola</td>
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<tr>
<td>4. Mercury in a thermometer</td>
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<tr>
<td>5. Ice</td>
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<tr>
<td>6. Vinegar and oil</td>
<td></td>
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<tr>
<td>7. Copper wire</td>
<td></td>
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<tr>
<td>8. Earth's atmosphere, when dusty</td>
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<tr>
<td>9. Earth's atmosphere, when dust-free</td>
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<tr>
<td>10. Rust</td>
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<tr>
<td>11. Brass</td>
<td></td>
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<tr>
<td>12. Aluminum foil</td>
<td></td>
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<tr>
<td>13. Homogenized milk</td>
<td></td>
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<tr>
<td>14. Sugar</td>
<td></td>
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<tr>
<td>15. Sugar water</td>
<td></td>
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<tr>
<td>16. Sandy water</td>
<td></td>
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<tr>
<td>17. Neon gas in a neon sign</td>
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<tr>
<td>18. Blood</td>
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</tbody>
</table>
Classifying Matter Flow Chart

Use this flow chart to determine if a sample of matter is an element, a compound, a heterogeneous mixture or a homogeneous mixture (solution).

Sample of Matter

Is it homogeneous or heterogeneous?

Homogeneous

Is it a single chemical substance or more than one substance?

Single substance

Does it contain one chemical element or more than one chemical element?

One chemical element: Element

Ex. Oxygen gas

More than one chemical element: Compound

Ex. Water

Heterogeneous Mixture

Ex. River water

More than one substance: Solution or Homogeneous Mixture

Ex. Sports drink, Gatorade®

Notes
The Periodic Table of Elements

In 1871, the first periodic table was developed by Dmitrii Mendeleev. Mendeleev is known as the father of the current day periodic table. He arranged the known elements at the time in order of increasing atomic mass. There was a predictive power in his table - based on the periodic law, Mendeleev believed that more elements would be discovered someday. He left spaces in his table where the elements would be placed once they had been discovered. Unlike Mendeleev's table, the currently accepted periodic table is arranged in order of increasing atomic number.

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**Mendeleev's Periodic Table:**

<table>
<thead>
<tr>
<th>Group</th>
<th>Period</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
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<tbody>
<tr>
<td>1</td>
<td></td>
<td>H</td>
<td>He</td>
<td>Li</td>
<td>Be</td>
<td>B</td>
<td>C</td>
<td>N</td>
<td>O</td>
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<td>2</td>
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<td>K</td>
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<td>7</td>
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<td>He</td>
<td></td>
<td></td>
<td>Ne</td>
<td>Na</td>
<td>Mg</td>
<td>Al</td>
<td>Si</td>
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<td>8</td>
<td></td>
<td>Ar</td>
<td>Kr</td>
<td>Xe</td>
<td>Rn</td>
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</table>

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**Current Periodic Table:**

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**The Periodic Law**

The Periodic Law states that when elements are arranged in order of increasing atomic number, there is a periodic repetition of their physical and chemical properties.

**Periods and Groups**

Elements in the periodic table are arranged in **periods** (rows) and **groups** (columns). Atomic number increases as you move across a period.

**Metals**

Metals are located on the left side of the periodic staircase on the periodic table. They are malleable, ductile, good conductors of heat and electricity, solid at room temperature (except for Mercury), and they have a high luster (they are shiny). Metals make up most of the elements in the periodic table.

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**Nonmetals**

Non-metals are located on the right side of the periodic staircase on the periodic table (except for Hydrogen). They are brittle, not ductile, poor conductors of heat and electricity, and they have a low luster. Most are gases at room temperature, but some are solids and Bromine is a liquid.
Metalloids

Metalloids have properties of both metals and nonmetals. A metalloid may behave as a metal under some conditions, but the same metalloid may behave as a nonmetal under other conditions.

Color the periodic table below: (Need help look at page 164 in your Chemistry book)

Metals: Green
Non-metals: Blue
Metalloids: Pink

*Temporary names

Based on mass of C-12 at 12.00.
Any value in parentheses is the mass of the most stable or best known isotope for elements that do not occur naturally.
Label the following elements as a metal, non-metal, or metalloid

C  Pd  Xe
Mg  H  Si
Bi  Es  O
Na  Ne  B

Arrangement of the Periodic Table
The periodic table consists of Representative Elements and Transition Elements (Transition Metals and Inner Transition Metals). Representative Elements on many periodic tables are labeled Group A and the Transition Elements are labeled Group B.

Representative Elements
The representative elements are found in groups 1 through 2 and groups 13 through 18 on the periodic table. They display a wide variety of properties that represent the table as a whole. They represent each category of metals, nonmetals, and metalloids; as well as representing each state of matter solids, liquids and gasses. Representative Elements on many periodic tables have a second group number labeled A to represent the number of valence electrons found in the elements of that group. For example, elements in group 2 (2A) have 2 valence electrons, while elements in group 15 (5A) have 5 valence electrons, group 17 (7A) have 7 valence electrons and so on.

Transition metals
The transition metals are groups 3 through 12 in the middle of the periodic table. These metals are solid at room temperature (except for Mercury). Transition Metals show a second group number labeled B that corresponds to the number of valence electrons.

Inner transition metals
The inner transition metals are found underneath the periodic table. The Lanthanide series belongs in period 6 and the Actinide series belongs in period 7. These metals are also solid at room temperature.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57-70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89-102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120

Color the periodic table below:

Representative Elements: yellow
Transition Metals: orange
Inner Transition Metals: green

Circle the following element that is a metalloid
Argon  Germanium  Bismuth  Zinc  Hydrogen

Circle the following element that is not a transition metal
Osmium  Titanium  Gold  Radon  Copper

Circle all of the following elements that are representative elements
Sulfur  Cerium  Sodium  Aluminum  Iron

Circle the following element that is an inner transition metal
Nitrogen  Hassium  Californium  Mercury  Lithium

There are ________ groups and ________ periods in the periodic table.

Chlorine has ________ valence electrons

Groups 3 – 12 are called the ___________________________ metals.

Write the symbol of the element that is in the 3\text{rd} period and group 13 ___________

Write the symbol of the element that is in the 5\text{th} period and group 11 ___________
Important Groups
Elements in a group share similar chemical and physical properties. There are groups of elements in the periodic table that are given special names.

Alkali Metals (Li, Na, K, Rb, Cs, Fr)
Alkali metals, excluding Hydrogen, are found in Group 1 or also called group 1A. They only have one valence electron in their outermost energy. Only having one valence electron leads to alkali metals being very unstable and highly reactive, meaning it is likely to bond with other elements and lose its 1 valence electron. They are all metals, extremely soft metals, which can be cut with a butter knife. Alkali metals are very abundant in nature. They share many similar chemical and physical properties for example they have low densities and low melting and boiling points.

Alkaline Earth Metals (Be, Mg, Ca, Sr, Ba, Ra)
Alkaline earth metals are found in Group 2 (2A). They have two valence electrons and very reactive, likely to bond with other elements and lose 2 electrons. All the elements in the group bond similarly and there for have similar properties.

Halogens (F, Cl, Br, I, At)
Halogens are found in Group 17 (7A). They have seven valence electrons, so want to gain 1 more electron to make their outer energy level full. A halogen will easily bond with an alkali metal (whom wants to lose 1 e-), together they form a salt. Example NaCl (sodium chloride) is table salt.

Noble Gasses (He, Ne, Ar, Kr, Xe, Rn)
Noble gasses are found in Group 18 (8A). They have eight valence electrons and are the most stable of the elements (non-reactive). Their outermost energy level or shell is full, so they do not naturally bond with other elements. Noble gasses share properties like high densities, high melting points, colorless, odorless, and tasteless.

Lanthanide Series
The lanthanide series include the “rare-earth elements” and are found on the top row of the inner transition metals, these elements are part of period 6. The lanthanide series get it name from the element Lanthanum (La) atomic number 57 where the row would fall after. All the elements in the lanthanide series have common properties to the element Lanthanum.

Actinide Series
The actinide series includes all radioactive metals and can be found on the bottom row of the inner transition metals, these elements are part of period 7. The actinide series is named after the element Actinium (Ac) atomic number 89 where the row would fall after. All the elements in the lanthanide series have common properties to the element Actinium.
Use the following words to match up to the descriptions below.


_________________________ all elements in this series are radioactive

_________________________ poor conductors of heat & electricity; solids are dull & brittle

_________________________ made up of groups 1, 2, & 13-18

_________________________ vertical columns on the periodic table; all elements have similar chemical & physical properties; all elements have the same number of valence electrons

_________________________ made up of the Lanthanide series and the Actinide series

_________________________ do not naturally combine with other elements

_________________________ are ductile, malleable and lustrous

_________________________ all elements of this group have 2 valence electrons

_________________________ made up of groups 3-12

_________________________ elements in this group will easily bond with an alkali metal to form a salt

_________________________ the “Rare Earths Elements”

_________________________ horizontal rows, atomic number increases as you move across a the row

_________________________ all elements in this group have 1 valence electron

_________________________ have the properties of both metals & non-metals
Below is a list of the 30 elements found on Mars. Place them in their proper place in the Martian Periodic Table using the information below. Martian elements follow the same natural laws as the elements on Earth. (Note: The symbols and the elements described below are fictitious.)

**Use the descriptions below to put the elements in the proper place on the Martian Periodic Table.**

1. The most metallic element is R.
2. The most nonmetallic element is O.
3. The inert gases are L, O, G, and V. L is the lightest, G is the heaviest and O is in period 2.
4. Their lightest element of all is E.
5. All of the following elements have three shells and the number of outermost electrons for each is as follows: K = 1; H = 2; ‡ = 3; W = 4; I = 5; D = 6; and C = 7

6. Element W has 14 protons.
7. B has 7 electrons.
8. Q has an atomic weight of 5 and a +1 oxidation state.
9. Y has only 1 electron in its outermost shell, but has 4 shells.
10. The N family is made up of the elements N, ‡, P, and X in order of increasing weight.
11. J is the heaviest of all atoms and is radioactive.
12. M is in period 5 and has an oxidation state of +2.
13. O is in period 2 and group 2
14. U is like our element carbon and is in the same family as W, Z, and J.
15. Their solvent, like our most important liquid has the formula E₂F.
16. The oxidation states of the following elements are: O = -1; S = +2; A = -2, and T = -3.
17. Now every space should be filled. Can you give each element its proper atomic number?