Key

Chemistry Worksheet: Matter #1

1. A mixture **(is/is not)** a chemical combining of substances.

2. In a compound the **(atoms/molecules)** are **(chemically/physically)** combined so that the elements that make up the compound **(retain/lose)** their identities and **(do/do not)** take on a new set of properties.

3. The smallest identifiable unit of a compound is a(n) ~~_____~~ molecule or formula unit, which is made up of elements which are chemically bonded.

4. True or False: A mixture is always made up of a combination of elements.

5. In a mixture, the substances **(lose/retain)** their identities.

6. In a mixture the substances involved **(can/cannot)** be separated by a simple physical process.
   In a compound the elements involved **(can/cannot)** be separated by a simple physical process because the elements are **(physically combined/chemically bonded)**.

7. True or False: An element can be broken down into a simpler substance.

8. The smallest identifiable unit of an element is a(n) atom.

9. From the following list of substances, circle the ones that are elements:

silver	carbon dioxide	wood alcohol	chromium
water	hydrogen (sometimes H_2)	carbon	nitrogen (sometimes N_2)
oxygen (sometimes O_2)	gold	sugar	salt
air	sulfur (sometimes S_6)	magnesium	nickel

10. Explain how to separate the sugar and water in a solution of sugar and water.

heat until solid remains

11. How would you separate a mixture of alcohol and water?

boil H_2O off after alcohol

12. How would you separate sand and water?

filter

13. Classify the following as pure substances or as mixtures:

air mix	gasoline mix	grain alcohol mix
water pure	sugar pure	gold pure
mercury pure	oxygen pure	salt water pure

14. Classify the following as heterogeneous or as homogeneous:

sand & salt mixture 1	hydrogen 2	iron 2
salt water 2	unfiltered air 1	iron with rust 1
pure water 2	an apple 1	nitric acid
tossed salad 1	granite 1	wood 1

15. Classify the following as an element, a compound, a solution, or a heterogeneous mixture:

aluminum E	raisin bread H
carbon dioxide C	water C
sugar and water S	sulfur E
sulfuric acid C S (if diluted)	mercury C if S_8 E
an orange H	water & instant coffee S
a pencil H	carbon particles & sugar H
nitrogen E C - if N_2	air S
gasoline C - petroleum S - octane levels	grain alcohol C S (if diluted)

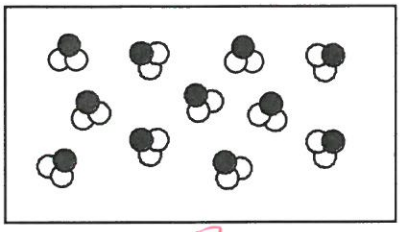
Key

Elements, Compounds, and Mixtures

Classify each of the pictures below by placing the correct label in the blanks below:

A= Element
B= Compound
C= Mixture of elements
D= Mixture of compounds
E= Mixture of elements and compounds

Each circle represents an atom and each different color represents a different kind of atom. If two atoms are touching then they are bonded together.



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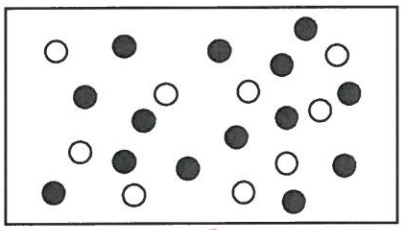

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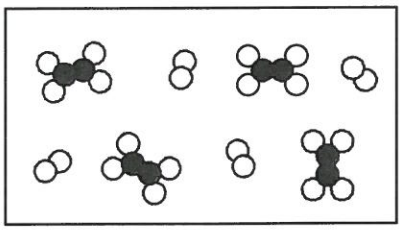
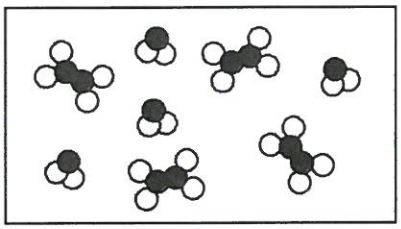


3) D



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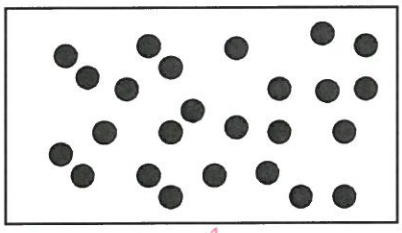
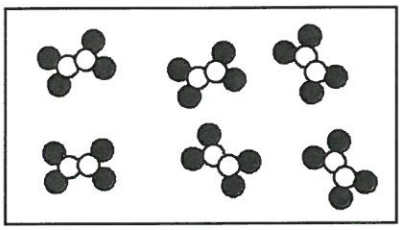
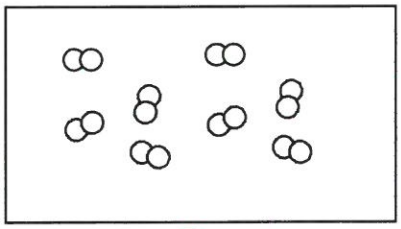


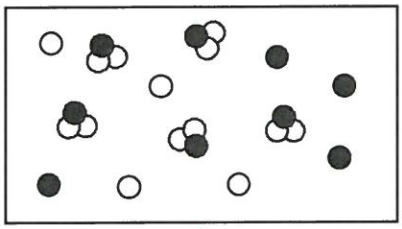
5) A



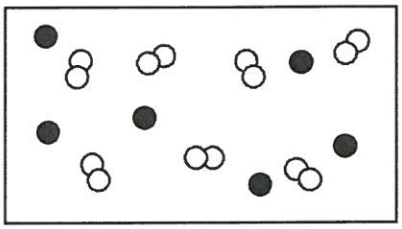
6) B



7) B



8) E



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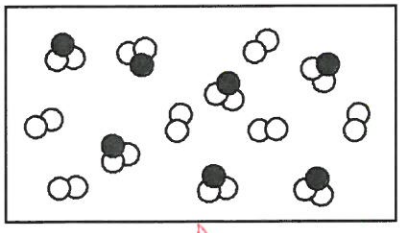

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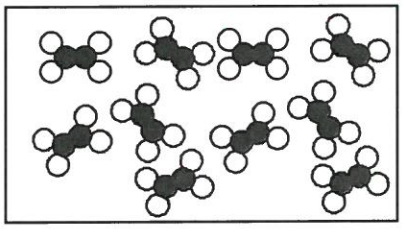

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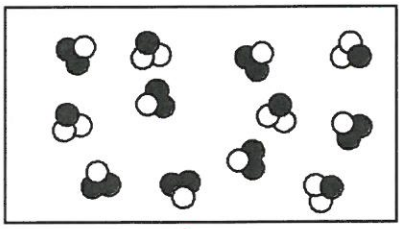
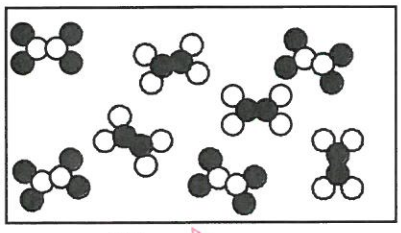


12) D



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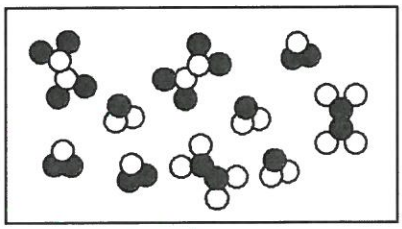
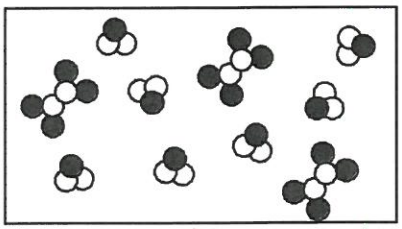


14) D



15) D

Physical and Chemical Changes

Name: Key

Date: _____ Hour: ___

Place a check in the appropriate column:

Change	Physical Change	Chemical Change
Salt dissolves in water.	✓	
Hydrochloric acid reacts with magnesium to produce hydrogen gas.		✓
A piece of copper is cut in half.	✓	
A sugar cube is ground up.	✓	
Water is heated and changed to steam.	✓	
Iron rusts.		✓
Ethyl alcohol evaporates.	✓	
Ice melts.	✓	
Milk sours (goes bad).		✓
Sugar dissolves in water.	✓	
Sodium and potassium react violently with water.		✓
Pancakes cook on a griddle.		✓
Grass grows on a lawn.		✓
A tire is inflated with air.	✓	
Food is digested in the stomach.		✓
Water is absorbed by a paper towel.	✓	
Ethyl alcohol boils at 79°C.	✓	
Paper burns.		✓
Water freezes at 0°C.	✓	
Fireworks explode.		✓
Alka-Seltzer gives off carbon dioxide when added to water.		✓
Clouds form in the sky.	✓	

NAME Key

Chemistry I Worksheet
Classification of Matter and Changes

INSTRUCTIONS: Write **E** in the blank if the material is *heterogeneous* or **O** if it is *homogeneous*.

1. Wood E
2. Freshly-brewed black coffee O
3. Water O
4. Lucky Charms® E
5. Salt O
6. Dirt E
7. Sausage-and-mushroom pizza E
8. Air O
9. Milk O
10. Gold O

INSTRUCTIONS: Classify each of the following as an *element* [**E**], a *compound* [**C**], or a *mixture* [**M**].

11. Gold E
12. Water C
13. Seawater M
14. Sugar C
15. A chocolate sundae M
16. Air M
17. Carbon dioxide C
18. Silver E
19. Ice C
20. A Big Mac® M

INSTRUCTIONS: Classify each of the following properties of matter as *physical* [**P**] or *chemical* [**C**].

21. Color P
22. Density P
23. Burns easily (flammable) C
24. Not affected by acids C
25. Boils at 450 °C P
26. Reacts violently with chlorine C
27. Good conductor of heat P
28. Dissolves readily in water P
29. Melts at 145 °C P
30. Malleable P

INSTRUCTIONS: Classify each of the following changes in matter as *physical* [**P**] or *chemical* [**C**].

31. Grinding chalk into powder P
32. Dissolving salt in water P
33. Dissolving zinc in acid C
34. Tearing a piece of paper P
35. Stretching copper into wire P
36. Burning gasoline C
37. Hammering gold into foil P
38. Melting ice P
39. Digesting food C
40. Making hydrogen from water C

INSTRUCTIONS: Classify each of the following as an *intensive property* [**I**] or an *extensive property* [**E**]. changes w/size

41. Mass E
42. Density I
43. Melting point I
46. Color I
47. Volume E
48. Length E

Key

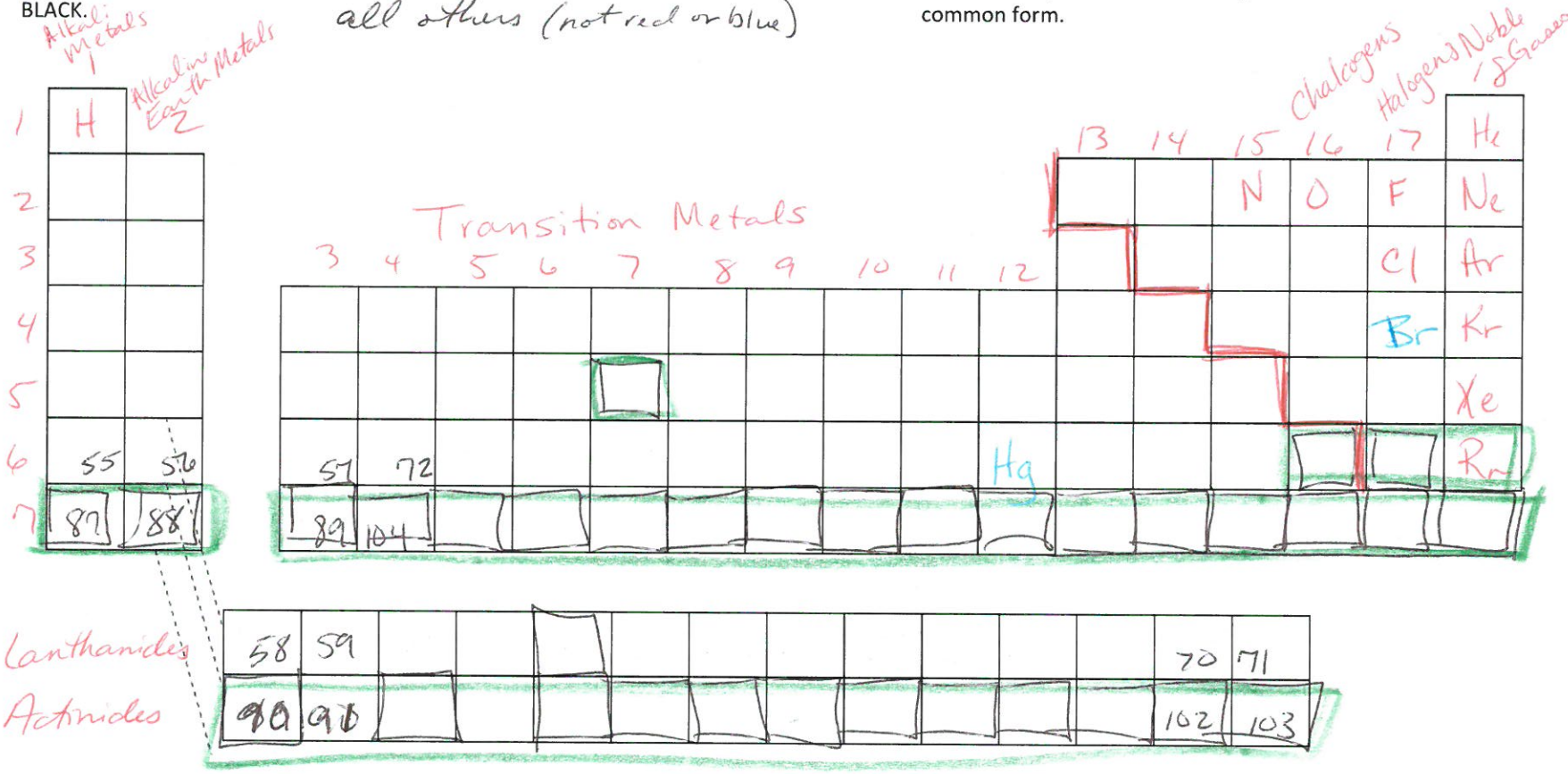
Getting To Know the Periodic Table

1. Number the groups.
2. Number the periods
3. Draw a heavy black line between the metals and nonmetals.
4. Write the name of each of the following groups above the number:
   Group 1 alkali metals
   Group 2 alkaline earth metal
   Group 3-12 (collectively) transition metals
   Group 16 chalcogens
   Group 17 halogens
   Group 18 Noble gases
5. Write the names of the two rows at the bottom of the chart: lanthanides and actinides
6. Write the symbol of each element that exists as a gas at ordinary conditions in RED.
7. Write the symbol of each element that is a solid at ordinary conditions in BLACK. all others (not red or blue)
8. Write the symbol of each element that is a liquid at ordinary condition in BLUE.
9. Write the symbol of each element that is a man-made element as an outline. Example: **Pm** Box is outlined
10. Place the atomic number for each element above the symbol.
11. Use the following chart to color the periodic table.

Halogen	blue	
Noble gases		yellow
Alkali metals		purple
Alkaline earth metals	red	
Transition elements		green
Chalcogens		brown
Lanthanides		orange
Actinides		light blue

(labeled)

12. Outline the symbol's box in dark green if it is RADIOACTIVE in its most common form.

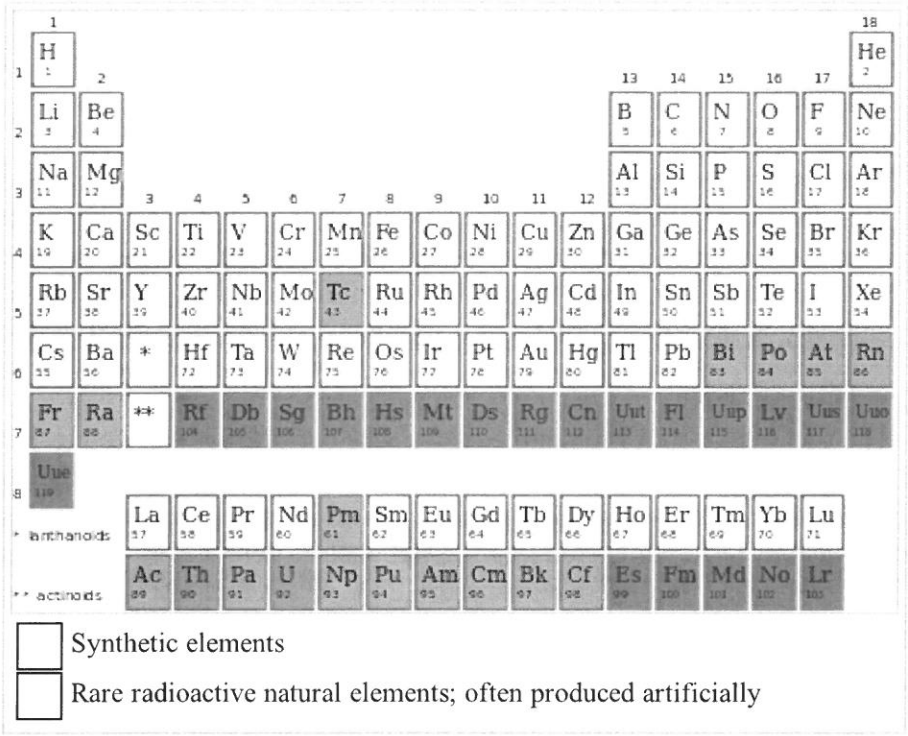


Synthetic element

From Wikipedia, the free encyclopedia

In chemistry, a **synthetic element** is a chemical element that does not occur naturally on Earth, and can only be created artificially. So far, 24 synthetic elements have been created (those with atomic numbers 95–118). All are unstable, decaying with half-lives ranging from 15.6 million years to a few hundred microseconds.

Seven other elements were first created artificially and thus considered synthetic, but later discovered to exist naturally (in trace quantities) as well; among them plutonium—first synthesized in 1940—the one best known to laypeople, because of its use in atomic bombs and nuclear reactors.



Contents

Properties

Synthetic elements are radioactive and decay rapidly into lighter elements—possessing half-lives so short, relative to the age of Earth (which formed approximately 4.6 billion years ago), that any atoms of these elements that may have existed when the Earth formed have long since decayed. Atoms of synthetic elements only occur on Earth as the product of atomic bombs or experiments that involve nuclear reactors or particle accelerators, via nuclear fusion or neutron absorption.

Atomic mass for natural life is based on weighted average abundance of natural isotopes that occur in Earth's crust and atmosphere. For *synthetic* elements, the isotope depends on the means of synthesis, so the concept of natural isotope abundance has no meaning. Therefore, for synthetic elements the total nucleus count (protons plus neutrons) of the most stable isotope, i.e. the isotope with the longest half-life—is listed in brackets as the atomic mass.

Not all radioactive elements are synthetic. For instance, uranium and thorium have no stable isotopes but occur naturally in Earth's crust and atmosphere. Unstable elements such as polonium, radium, and radon—which form through the decay of uranium and thorium—are also found in nature, despite their short half-lives. Plutonium is an outlier: Its half-life, depending on the isotope, can be as long as 80.8 million years. (The *principal* plutonium isotope in use has a half-life of 24,100 years.)

History

The first element discovered through synthesis was technetium—its discovery being definitely confirmed in 1936. This discovery filled a gap in the periodic table, and the fact that no stable isotopes of technetium exist explains its natural absence on Earth (and the gap). With the longest-lived isotope of technetium, Tc-98, having a 4.2-million-year half-life, no technetium remains from the formation of the Earth. Only minute traces of technetium occur naturally in the Earth's crust—as a spontaneous fission product of uranium-238 or by neutron capture in molybdenum ores—but technetium is present naturally in red giant stars.

The first discovered synthetic element was curium, synthesized in 1944 by Glenn T. Seaborg, Ralph A. James, and Albert Ghiorso by bombarding plutonium with alpha particles. The discoveries of americium, berkelium, and californium followed soon. Einsteinium and fermium were discovered by a team of scientists led by Albert Ghiorso in 1952 while studying the radioactive debris from the detonation of the first hydrogen bomb. The isotopes discovered were einsteinium-253, with a half-life of 20.5 days, and fermium-255, with a half-life of about 20 hours.

The discoveries of mendelevium, nobelium, lawrencium followed. During the height of the Cold War, the Soviet Union and United States independently discovered rutherfordium and dubnium. The naming and credit for discovery of those elements remained unresolved for many years but eventually shared credit was recognized by IUPAC/IUPAP in 1992. In 1997, IUPAC decided to give dubnium its current name honoring the city of Dubna where the Russian team made their discoveries since American-chosen names had already been used for many existing synthetic elements, while the name *rutherfordium* (chosen by the American team) was accepted for element 104.

No element with an atomic number greater than 99 has any use outside of scientific research, as they have extremely short half-lives.

List of synthetic elements

The following elements do not occur naturally on Earth. All are transuranium elements and have atomic numbers of 95 and higher.

Element name	Chemical Symbol	Atomic Number	First definite synthesis
Americium	Am	95	1944
Curium	Cm	96	1944
Berkelium	Bk	97	1949
Californium	Cf	98	1950
Einsteinium	Es	99	1952
Fermium	Fm	100	1952
Mendelevium	Md	101	1955
Nobelium	No	102	1966
Lawrencium	Lr	103	1971
Rutherfordium	Rf	104	1966 (USSR), 1969 (U.S.) *
Dubnium	Db	105	1968 (USSR), 1970 (U.S.) *
Seaborgium	Sg	106	1974
Bohrium	Bh	107	1981
Hassium	Hs	108	1984
Meitnerium	Mt	109	1982
Darmstadtium	Ds	110	1994
Roentgenium	Rg	111	1994
Copernicium	Cn	112	1996
Ununtrium	Uut	113	2003
Flerovium	Fl	114	1999
Ununpentium	Uup	115	2003
Livermorium	Lv	116	2000
Ununseptium	Uus	117	2010
Ununoctium	Uuo	118	2002
* *Shared credit for discovery.*			

Other elements usually produced through synthesis

All elements with atomic numbers 1 through 94 are naturally occurring at least in trace quantities, but the following elements are often produced through synthesis. Except for polonium, francium, actinium, and protactinium, they were all discovered through synthesis before being found in nature.

Element name	Chemical Symbol	Atomic Number	First definite discovery
Technetium	Tc	43	1936
Promethium	Pm	61	1945
Polonium	Po	84	1898
Astatine	At	85	1940
Francium	Fr	87	1939
Actinium	Ac	89	1902
Protactinium	Pa	91	1913
Neptunium	Np	93	1940
Plutonium	Pu	94	1940

References

- http://www.britannica.com/EBchecked/topic/181416/einsteinium-Es
- http://www.britannica.com/EBchecked/topic/374759/mendelevium-Md
- http://encyclopedia2.thefreedictionary.com/synthetic+elements
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Retrieved from "https://en.wikipedia.org/w/index.php?title=Synthetic_element&oldid=733539849"

Categories: Nuclear physics | Synthetic elements | Lists of chemical elements

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Name Key
Teacher _____
Class _____ Block ___
Date _____ **Elements, Compounds & Mixtures Worksheet**

Part 1: Read the following information on elements, compounds and mixtures. Fill in the blanks where necessary.

Elements:

- A pure substance containing only one kind of chemical.
- An element is always uniform all the way through (homogeneous).
- An element cannot be separated into simpler materials (except during nuclear reactions).
- Over 100 existing elements are listed and classified on the periodic table.

Compounds:

- A pure substance containing two or more kinds of atoms or elements.
- The atoms are chemically combined in some way. Often times (but not always) they come together to form groups of atoms called molecules. (nonmetals)
- A compound is always homogeneous (uniform).
- Compounds cannot be separated by physical means. Separating a compound requires a chemical reaction.
- The properties of a compound are usually different than the properties of the elements it contains.

Mixtures:

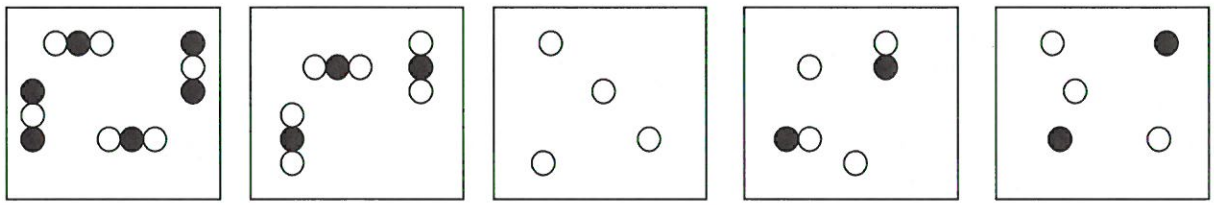
- Two or more elements or compounds NOT chemically combined.
- No reaction between substances.
- Mixtures can be uniform (called homogeneous) and are known as solutions.
- Mixtures can also be non-uniform (called heterogeneous).
- Mixtures can be separated into their components by chemical or physical means.
- The properties of a mixture are similar to the properties of its components.

Part 2: Classify each of the following as elements (E), compounds (C) or Mixtures (M). Write the letter X if it is none of these.

E Diamond (C)	C Sugar ($C_6H_{12}O_6$)	M Milk	E Iron (Fe)
M Air	C Sulfuric Acid (H_2SO_4)	M Gasoline	X Electricity
E Krypton (Kr)	E Bismuth (Bi)	E Uranium (U)	M Popcorn
C Water (H_2O)	C Methanol (CH_3OH)	M Pail of Garbage	M A dog
C Ammonia (NH_3)	C Salt (NaCl)	X Energy	E Gold (Au)
M Wood	M Bronze	M Ink	M Pizza
C Dry Ice (CO_2)	C Baking Soda ($NaHCO_3$)	E Titanium (Ti)	M Concrete

Some compounds are sold as mixtures with a solvent and are solutions. (ex. NH_3 is diluted)

Part 3: Match each diagram with its correct description. Diagrams will be used once.



A **B** **C** **D** **E**

C 1. Pure Element – only one type of atom present.

E 2. Mixture of two elements – two types of uncombined atoms present.

B 3. Pure compound – only one type of compound present.

A 4. Mixture of two compounds – two types of compounds present.

D 5. Mixture of a compound and an element.

Part 4: Column A lists a substance. In Column B, list whether the substance is an element (E), a compound (C), a Heterogeneous Mixture (HM), or a Solution (S). = Homogeneous Mixture **(Remember a solution is a homogeneous mixture.)** In Column C, list TWO physical properties of the substance.

Column A	Column B	Column C
1. Summer Sausage	HM	spicy, chewy
2. Steam	C	hot, vapor
3. Salt Water	S	no color, conducts
4. Pencil graphite (C)	E	dark, brittle
5. Dirt	HM	dark, soluble in water
6. Pepsi	HM	see bubbles, liquid
7. Silver (Ag)	E	shiny, conducts
8. Toothpaste (Na_2HPO_4)	C or HM	white, mint, beads
9. A burrito	HM	white tortilla, brown beans
10. Italian Dressing	HM	water, oil, vinegar
11. Chicken Soup	HM	water, broth, oil
12. Lemonade (no pulp)	S	yellow, sugar is dissolved

Name: **Worksheet: Classifying Matter**

Classify each of the materials below. In the center column, state whether the material is a **pure substance** or a **mixture**.

- If the material is a pure substance, further classify it as either an **element** or **compound** in the right column.
- If the material is a mixture, further classify it as **homogeneous** or **heterogeneous** in the right column. Write the entire word in each space to earn full credit.

Material	**Pure Substance** → **Element or Compound** **Mixture** → **Solution(Homogeneous) or Mechanical mixture (Heterogeneous)**
Laundry detergent (contains white and blue crystals)	M	heterogeneous
sugar + pure water ($C_{12}H_{22}O_{11}$ + H_2O)	M	solution
iron filings (Fe)	P	element
limestone ($CaCO_3$)	P	compound
orange juice (water and pulp)	M	het
Pacific Ocean (Water and Salt)	M	sol or het
air	M	sol
aluminum (Al)	P	E
magnesium (Mg)	P	E
acetylene (C_2H_2)	P	C
tap water in a glass	M	
pure water (H_2O)	P	C
soil	M	het
chromium (Cr)	P	E
baking soda ($NaHCO_3$)	P	C
salt + pure water (NaCl + H_2O)	M	sol
benzene (C_6H_6)	P	C
muddy water	M	het
brass (Cu mixed with Zn)	M	sol
Pizza	M	het

Teacher: Mr. Heisz

Name: **Worksheet: Classifying Matter**

Classify the following statements as mechanical mixture, a suspension, a colloid or a solution (homogeneous). (heterogeneous)

1. Spicy salad dressing sus.
2. Soda pop sus. (bubbles)
3. Granular fertilizer that is spread on the lawn. mech.
4. A mixed drink for Captain Morgan (80% Vodka and 20% Water) soln
5. Paint for the walls colloid
6. A compost pile in the backyard for the garden mech.
7. A gold necklace (gold and copper) mech.
8. Laundry detergent (contains white and blue crystals) mech.
9. Pizza mech.
10. Cough syrup that must be shaken before it is ingested. sus.
11. Freshly squeezed orange juice sus.
12. Blueberry muffin mech.
13. Benzene (C_6H_6) soln
14. Nail polish remover (C_3H_6O) soln
15. A muddy pond sus.
16. A mixture of rocks, grass and metal Mech.

Teacher: Mr. Heisz