

SCH 3UI Unit 1 Outline
Introduction to Chemistry: Review and Labs

Lesson	Topics Covered	Homework Questions and Assignments
1	<ul style="list-style-type: none"> • Introduction to SCH 3UI • Course Outline, expectations • SCH 3UI website: pattersonscience@weebly.com • Purchase Periodic Tables (\$0.50) • Note: Introduction to Chemistry 	<ul style="list-style-type: none"> • Complete Handout: Chemical Symbols for the Elements • Begin to memorize chemical symbols and names (spelled correctly). You will be quizzed at the beginning of Lesson #4.
2	<ul style="list-style-type: none"> • Note: Classifying Matter • Complete Handout: Classifying Matter 	<ul style="list-style-type: none"> • Review and UNDERSTAND today's lesson • Complete Practice Questions: Classifying Matter • Continue to memorize chemical symbols and names (spelled correctly)
3	<ul style="list-style-type: none"> • Take up questions from homework • Note: Characteristic Physical and Chemical Properties of Matter • Lab Safety Rules, Lab Reports 	<ul style="list-style-type: none"> • Complete the questions on handout: Chemical vs. Physical Changes. You can check your answers on the website. • Read the Background Information for Lab #1 on the website: Unit 1, Lesson 3 • Read over Lab #1 in preparation for the doing the lab tomorrow (handed out in class)
4	<ul style="list-style-type: none"> • Prelab for Lab #1, demo electrical conductivity • Perform Lab #1 	<ul style="list-style-type: none"> • Begin the lab report for Lab #1 (follow the lab report outline carefully). The lab report is due at the beginning of lesson 7. • Prepare for a quiz on the chemical names and symbols at the beginning of next class
5	<ul style="list-style-type: none"> • Quiz on chemical names and symbols of some common elements (10 minutes) • Complete Lab #1, begin lab report 	<ul style="list-style-type: none"> • Work on lab report for Lab #1, due at the beginning of lesson 7
6	<ul style="list-style-type: none"> • Take up questions from Lab #1 • Do errors for Lab #1 together • Begin Unit 2: Atomic Theory 	<ul style="list-style-type: none"> • Complete lab report for Lab #1. It is due at the BEGINNING of the next class. • Print out "Unit 02 Handouts to Print, up to Quiz #1" for Atomic Theory Unit. Bring the printed notes to next class.

Chemical Symbols for the Elements

Each type of atom (element) has a unique chemical symbol, which has been agreed upon by the International Union of Pure and Appplied Chemistry (IUPAC). The same symbols are used around the world. Some of the symbols are derived from the element's Latin name, as shown in brackets, below.

You are responsible for memorizing the chemical symbols and names (spelled correctly) for the following common elements. Use your Periodic Table to find each chemical symbol. You will be quizzed on the names and symbols in a few days.

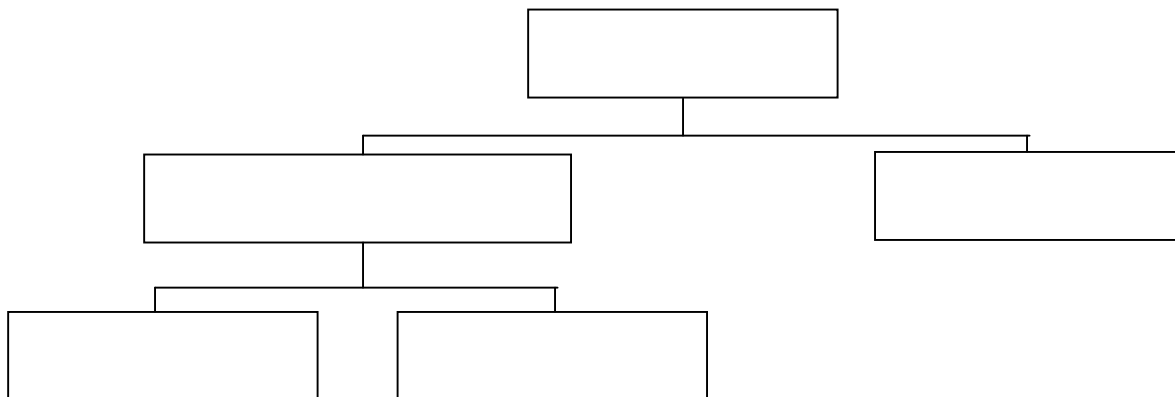
_____ aluminum	H _____	Zn _____
_____ argon	Ba _____	H _____
_____ barium	Ar _____	Li _____
_____ beryllium	Li _____	Cr _____
_____ boron	P _____	N _____
_____ bromine	Be _____	Pt _____
_____ calcium	Pb _____	Au _____
_____ carbon	Al _____	F _____
_____ chlorine	Fe _____	He _____
_____ chromium	Mn _____	B _____
_____ copper (<i>cuprum</i>)	Ca _____	Al _____
_____ fluorine	Pt _____	Mn _____
_____ gold (<i>aurum</i>)	S _____	Ar _____
_____ helium	Ag _____	I _____
_____ hydrogen	N _____	Ni _____
_____ iodine	Br _____	Pb _____
_____ iron (<i>ferrum</i>)	O _____	Fe _____
_____ lead (<i>plumbum</i>)	I _____	Ne _____
_____ lithium	Au _____	S _____
_____ magnesium	Cr _____	Ag _____
_____ manganese	B _____	O _____
_____ mercury (<i>hydrargyrum</i>)	Hg _____	Br _____
_____ neon	Na _____	Ba _____
_____ nickel	Sn _____	C _____
_____ nitrogen	Ne _____	Mg _____
_____ oxygen	K _____	Cu _____
_____ phosphorus	Cl _____	Hg _____
_____ platinum	Ni _____	K _____
_____ potassium (<i>kalium</i>)	F _____	Si _____
_____ silicon	Si _____	P _____
_____ silver (<i>argentum</i>)	Cu _____	Ca _____
_____ sodium (<i>natrium</i>)	Mg _____	Be _____
_____ sulfur	Zn _____	Sn _____
_____ tin (<i>stannum</i>)	C _____	Na _____
_____ zinc	He _____	Cl _____

Classifying Matter

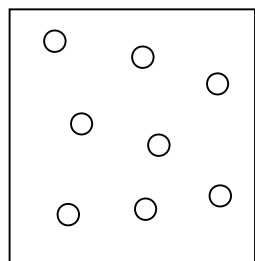
In chemistry, substances can be classified three ways:

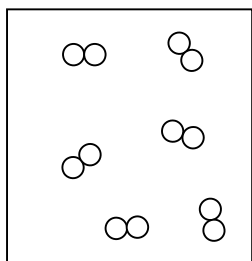
- a) by the type of particle: as an _____ or a _____
- b) by the types of atoms in the particle: as an _____ or a _____
- c) by the number of types of particles: as a _____ or a _____

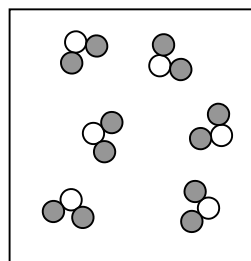
The relationships between the different types of matter can be shown using the following chart:

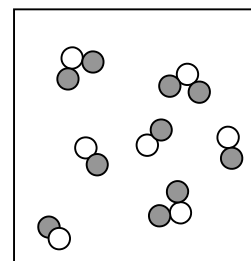


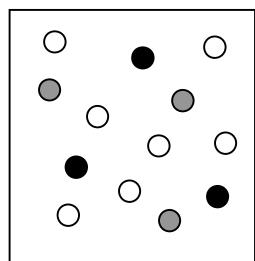
eg. Classify each of the following substances three ways (each different colour circle represents a different type of atom):

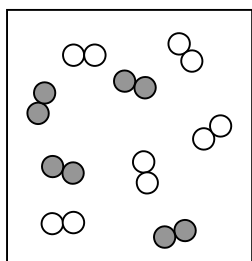


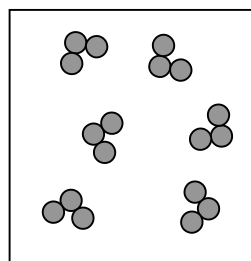


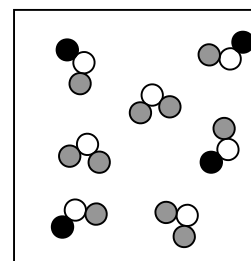












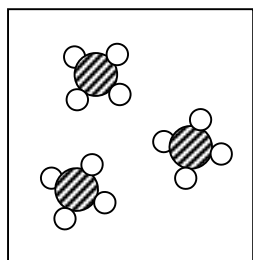
Practice Questions: Classifying Matter

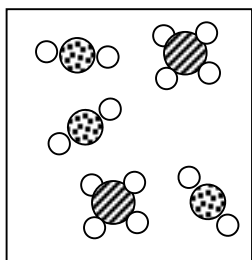
1. Write complete definitions for the following terms and include one additional piece of information for each, such as a note of clarification or an example:
matter, pure substance, mixture, atom, element, molecule, and compound.
2. Distinguish between: a pure substance and a mixture, an element and a compound, and an atom and a molecule.
3. After carefully re-reading your notes, answer the following true or false questions:
 - a) All compounds are molecules.
 - b) All molecules are compounds.
 - c) Elements contain only one type of atom.
 - d) Some elements may also be classified as compounds.
 - e) Some elements may also be classified as molecules.
 - f) Compounds can be broken down into simpler substances by chemical reactions.
 - g) Atoms can be broken down into simpler substances by chemical reactions.
 - h) H_2O and H_2O_2 are the same compound.
 - i) The chemical formula of a compound tells us the number and type of each atom in the compound.
 - j) If the chemical formula of a compound is changed, then the type of compound is also changed.

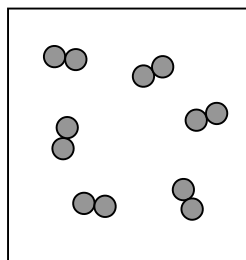
4. Classify the following substances as either elements or compounds. State the number of each type of atom that is present in one particle of each substance:

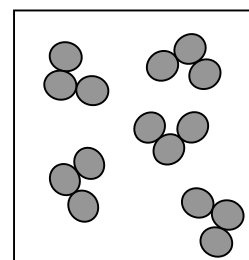
$\text{Al}(\text{OH})_3$ I_2 $\text{Ca}_3(\text{PO}_4)_2$ Mg $\text{Sn}(\text{C}_2\text{H}_3\text{O}_2)_4$ P_4 $\text{C}_4\text{N}_3\text{H}_9\text{O}_2$ Ne

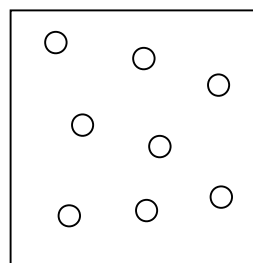
5. Each different circle represents a different type of atom. Classify the contents of each box 3 ways:
 - a) as a pure substance or a mixture
 - b) as atoms or molecules
 - c) as elements or compounds

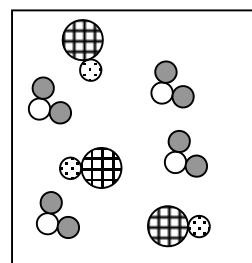


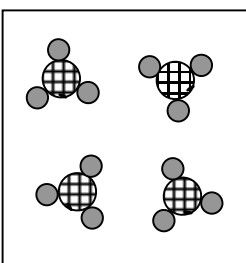


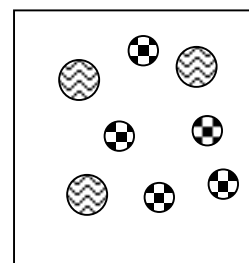












Characteristic Physical and Chemical Properties of Matter

There are _____ different naturally occurring elements and _____ of compounds. How do we tell all these substances apart? By their _____.

A **characteristic property** is a characteristic of matter (elements or compounds) that is _____ (_____) for that type of matter. Characteristic properties can be used to _____ a substance or _____ it into a group. For the purposes of this course, a property is understood to be a characteristic property.

There are two types of properties: _____ properties and _____ properties.

1. **Physical properties** are characteristics of matter that can be _____ or _____ without changing the _____ or _____ of the matter in any way. There are two types of physical properties: _____ and _____.

a) **Qualitative Characteristic Physical Properties** are properties of matter which are always the same for a substance and which can be _____ but not _____, for example:

- colour: _____, _____, _____, _____
- state at room temperature: _____, _____ or _____. In chemistry, instead of writing “room temperature” which is about _____ and _____ pressure, you can write _____. _____ stands for _____
_____. SATP is defined as exactly _____ and _____
- clarity: transparent (_____), translucent (_____) or _____
- odour: does it have a distinctive odour? (check by _____)
- conductivity: is it a good conductor of _____ or _____?
- _____: can it be pounded into thin sheets or is it _____
- _____: can it be stretched into a thin wire?
- lustre: is it _____ or _____?
- is it _____?

b) **Quantitative Characteristic Physical Properties** are properties of matter that can be _____ and assigned a _____ with _____. Because they are specific to each substance, quantitative properties are very useful for _____ substances.

- the melting point of pure lead is _____, for pure bromine it is _____.
 - the boiling point of pure lead is _____, for pure bromine it is _____.
 - the density of pure lead is _____, for pure bromine is _____ and for pure chlorine it is _____.
- eg. A pure metal has a density of 2.99 g/cm^3 . It is probably _____.

Please note that mass, volume, temperature and texture are not *characteristic* physical properties of a substance.

- A piece of pure lead can be _____ or _____ and still be pure lead.
- The volume of water can be _____ or _____ and still be pure water.
- The temperature of water can be _____ or _____. It is still pure water.
 - Sugar can be _____ (white sugar) or _____ (icing sugar) and still be pure sugar.

2. **Chemical properties** describe how matter behaves or changes when it is exposed to other _____, _____ or _____. When studying chemical properties, the identity of a chemical may be altered. Some chemical properties are:

- Does the substance react with _____?
- Does the substance react with _____ (_____)?
- Does the substance catch on _____ or _____?
- Does the substance react with an _____?

There are four signs or indications that a chemical change (reaction) has taken place:

- A new _____ appears.
- A _____ is formed. You may see _____ or smell a new _____.
- A _____ forms (a _____ forms when two _____ are mixed).
- _____ is released or absorbed in the form of _____, _____, _____ or _____.

If you observe one of the above signs, then you know that a _____ has formed because the characteristic _____ have changed.

The following are **NOT** signs of a chemical reaction because a new substance has not been formed.

- Changes of state are not chemical changes. Substances can be _____, _____, _____ or _____ without changing what they are.
- _____ in water is not a chemical change (unless the substance _____ with water). If the water is allowed to evaporate, the original substance is still there, unchanged.
- Heating a metal until gives off _____ is not a chemical change, if when the metal is cooled it has the same _____ and _____ as it did before heating.

Homework:

1. Complete the questions on the next page: Chemical vs. Physical Changes. You can check your answers on the website.
2. Read the Background Information for Lab #1 on the website: Unit 1, Lesson 3

Chemical vs. Physical Changes

In a chemical change, a chemical reaction occurs and a new substance is formed. The new substance has different properties from the original materials and you will see one or more of the four signs that a chemical change has taken place.

In a physical change, the substance may change its physical form, but the chemical composition and identity of the substance do not change. The following are physical changes:

eg. changes of state: boiling, melting, freezing, sublimating, evaporating or condensing

eg. dissolving a substance in water (as long as the substance does not react with the water)

eg. heating a metal until it gives off light (as long as it looks the same after it cools as it did before)

Classify the following as either physical a (P) or chemical (C) change, and state your reasoning:

1. A piece of chalk is ground into powder.
2. An iron nail rusts.
3. The element of an electric stove glows orange.
4. A silver necklace tarnishes and turns black.
5. Wood pulp is bleached white to make paper.
6. Paper is shredded.
7. Alka-seltzer bubbles when it is put in water.
8. A pancake is cooked in a frying pan.
9. Oil bubbles as it is heated to cook French fries.
10. A tree grows.
11. Glass is heated and blown to make a vase.
12. Milk is made into cheese.
13. Peanuts are ground up to make peanut butter.
14. Phenolphthalein turns pink when it is added to a base.
15. Sugar dissolves in a cup of tea.
16. When lemon is added to tea, the colour of the tea changes from brown to pale yellow.
17. Magnesium bubbles and dissolves in hydrochloric acid.
18. A light bulb gives off light.
19. After being heated in a bunsen burner, a copper wire is coated with a black substance.
20. When the contents of a cold pack are mixed, the cold pack becomes icy cold.
21. Grapes are crushed to make grape juice.
22. When yeast is added to sugar water, the mixture becomes frothy and smells of alcohol.
23. Bread is toasted.
24. Bread dries out when it is left on the counter for a couple of hours.
25. The copper roof on a building turns green.
26. Clouds form in the sky.
27. Parmesan cheese is grated onto pasta.
28. When copper metal is added to nitric acid, a strong brown gas is produced.
29. Garbage rots and gives off methane gas.
30. The wire in a toaster glows red hot when the toaster is plugged in.
31. Potassium metal catches on fire in water.
32. A campfire burns.
33. Liquid nitrogen bubbles as it boils.
34. Food is digested in your stomach and intestines.
35. When carbon dioxide is bubbled through lime water, a white solid forms in the lime water.
36. Gallium metal melts in your hand.
37. An egg is cooked.
38. A nichrome wire glows white when it is held in a bunsen burner flame.
39. A firefly glows at night.
40. An airbag "explodes" during a collision.