

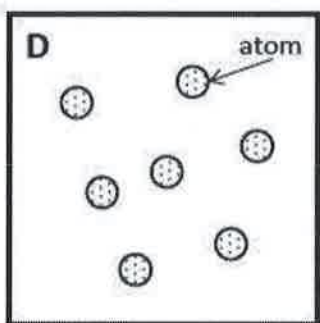
Atoms, Molecules, Pure Substances, and Mixtures Activity

How do atoms combine to make different types of matter?

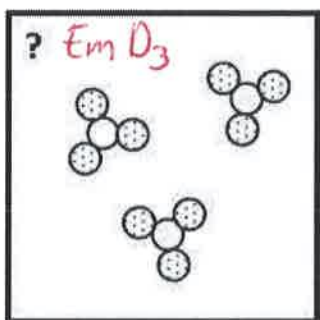
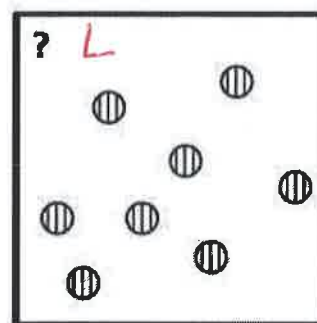
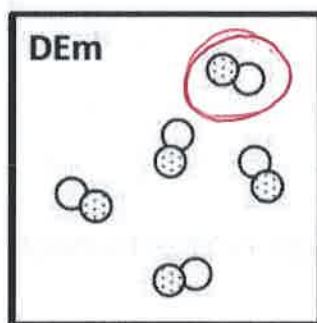
Background: Everything is made of matter. Anything you touch, see, taste, or smell...even things that are invisible to your senses like the air around you, are made of matter. But if you zoomed in with a powerful microscope things would start to look a lot different. You would see that matter is made of particles. Some things that look like one thing might be several types of particles. Other things are pure, because they are only made of one type of particle.

By going through this activity you will be able to *define in pictures and in your own words* some really important chemistry words including: *atom, molecule, particle, pure substance, mixture, element, and compound*.

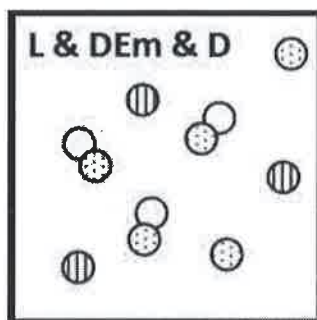
Instructions: Use the pictures on the front page to answer the questions in this activity. If you ever feel stuck on how to answer a question, come back to the pictures, I bet the answer is there.



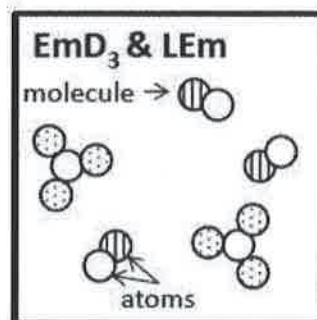
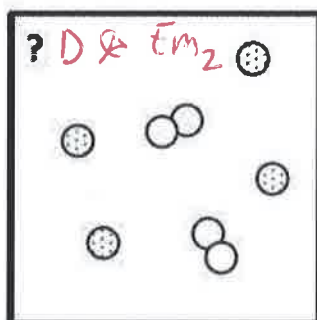
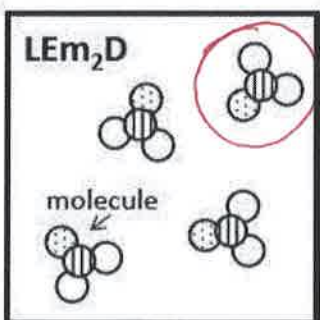
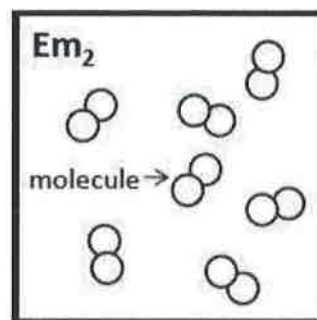
7 particles



3 particles



8 particles



THIS PAE IS BLANK ON PURPOSE

KEEP GOING TO PAGE 3

THERE ARE QUESTIONS ON PAGE 3, I PROMISE!

Atoms, Molecules, Particles & Chemical Formulas

1. Atoms & Molecules

- a) Circle a molecule of DEm on page 1.
b) How many atoms are in a molecule of DEm? 2



- c) Based on the drawings, what is the definition of an atom, in your own words?

An atom is one circle

2. Atoms & Molecules

- a) Circle a molecule of LEm₂D in page 1.
b) How many atoms are found in a molecule of LEm₂D? 4

- c) How many Em atoms are in a molecule of LEm₂D? 2



- d) Based on the drawings, what is the definition of a molecule, in your own words?

A molecule is when 2 or more atoms are stuck together

3. Atoms & Molecules

- a) How many total *molecules* are shown in the drawing of EmD₃ & LEm? 5

- b) How many total *atoms* are shown in the drawing of EmD₃ & LEm? 14

- c) How many different types of *molecules* are found in a mixture of EmD₃ & LEm? 2

- d) How many different types of *atoms* are found in a sample of EmD₃ & LEm? 3

5. Particles

- a) How many particles are in the diagram of the sample of "D"? 7

- b) How many particles are in the diagram of the sample of "L & DEm & D"? 8


- c) Why does the drawing of "L & Dem & D" have only 8 particles, even though there are 11 atoms in the picture?

A particle can be an atom or a molecule. An atom is a particle if it is by itself.

d) Can a particle be a single atom? *Yes*

e) Can a particle be a molecule? *Yes*

f) How many particles are in the drawing of EmD₃ & LEm? *5*


 g) As a group, agree on a definition of the word "particle", as it is used in chemistry.


A particle is an individual circle (atom) or group of circles (atoms) that are separate from others.

6. Chemical Formulas


Compare the codes listed at the top of each diagram with the shapes in the box.

a) What do the letters D, Em and L in the codes represent?

D = dots  *Em = empty*  *L = lines* 

 b) What do the small numbers (the subscripts) in the codes represent?

The subscripts are the number of each type of atom in the molecule

 c) When atoms are bonded in a molecule, how is that communicated in the code (chemical formula)?


The molecules are shown when the letters are all together

d) When atoms or molecules are not bonded, how is that communicated in the code?

When they are not bonded the code has an \emptyset between the (no \emptyset in between) particle formulas

e) There are three drawings that are labeled "?". Write codes to properly label these drawings.

7. Chemical Formulas

 a) Why would the formula "3L & 3DEm & 2D" be a better formula for the "L & DEm & D" drawing?

There are 3 L, 3 DEm, and 2 D in the picture. The first formula shows how many of each particle

b) Following the same pattern, what would be a better formula for the "EmD₃ & LEm" drawing?

2 EmD₃ & 3 LEm

8. Pure Substances & Mixtures

Read This! Matter is classified as a pure substance when all of the particles are the same. Matter is classified as a mixture if there are different types of particles present.

a) Sort the drawings into pure substances and mixtures. List the formulas for each set here.

Pure Substances

D
DEm
L
EmD₃
Em₂
LEm₂D

Mixtures

L & DEm & D
D & Em
EmD₃ & LEm



b) How are the chemical formulas for pure substances different from those for mixtures?

Mixtures are shown with a &, pure substances do not have a &

8. Elements & Compounds

Read this! Elements are pure substances made from only one type of atom. Compounds are pure substances made from two or more types of atoms.

a) Sort the pure substances into compounds and elements. List the formulas for each set here.

Elements

D
L
Em₂

Compounds

EmD₃
DEm
LEm₂D



b) How are the codes (chemical formulas) for elements different from those for compounds?

Elements only have 1 abbreviation,
compounds have more than 1 abbreviation
& put together.

9. Actual Chemicals

Key:

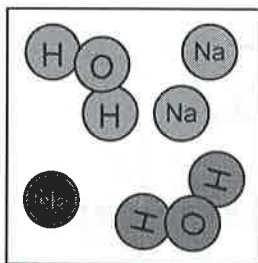
Br = Bromine
O = Oxygen

Na = Sodium
Cu = Copper

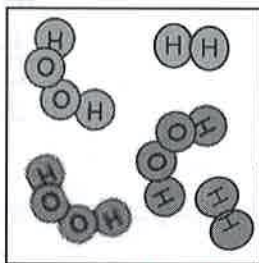
H = Hydrogen
Zn = Zinc

C = Carbon
Al = Aluminum

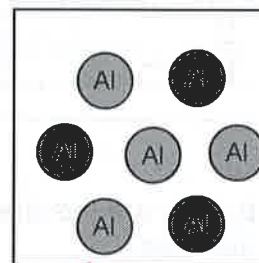
a) Apply what you've just learned to write formulas for these "actual chemicals".



H₂O & Na



H₂O₂ & H₂



Al

b) How many molecules are in the first drawing in question (a)?

2

c) How many particles are in the first drawing in question (a)?

5

d) Are any of the drawings in question (a) an element? Which one?

Yes, the Al

e) Identify whether each of the following is a compound, mixture or element.

a. Br₂

element

b. NaHCO₃

compound

c. C₆H₁₂O₆ & H₂O

mixture

d. Cu & Zn

mixture

e. CO₂

compound

f. Al

element