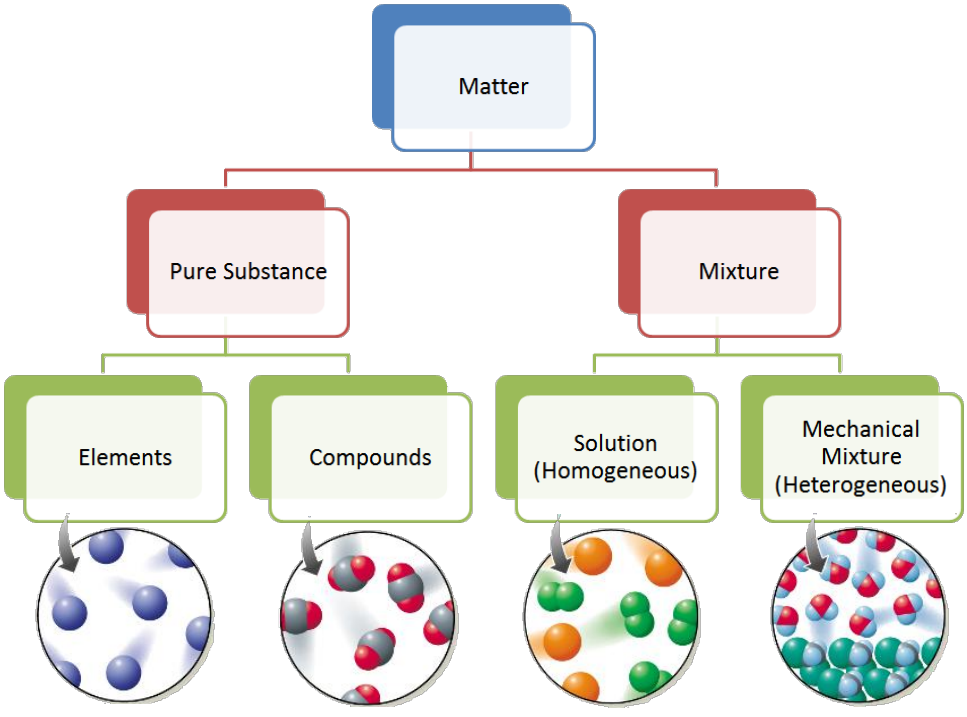
# Grade 7 Science

## Unit 3: Pure Substances and Mixtures

# The Organization of Matter



# Pure Substances

What makes a pure substance "pure"?

*A pure substance is a substance composed of **MANY** identical, **TINY** particles.*

So, just how small are these particles? Let's look at some numbers:

| | |
|---|---|
| Number of people in this classroom: | 26 |
| Number of students at Tuck: | 750 |
| Population of Burlington: | 183 315 |
| Population of Canada: | 36 710 000 |
| Population of the World: | 7 009 940 000 |
| Particles of water in a drop of water: | 2 000 000 000 000 000 000 000 |

... that means that if we took one drop of water, and divided it equally for every person on the planet, we could give every single person 285 309 146 725 particles (285 billion).

# Pure Substances

Let's look at it another way...

In a drop of water there is 2 000 000 000 000 000 000 000 particles.

What if we divide it in half? 1 000 000 000 000 000 000 000

Again? 500 000 000 000 000 000 000

Again? 250 000 000 000 000 000 000

125 000 000 000 000 000 000

62 500 000 000 000 000 000

31 250 000 000 000 000 000

15 625 000 000 000 000 000

If we kept this up, we would have to divide it 71 times to get down to 1 single particle.

# Pure Substances

When we divide a pure substance, such as water, in half, both halves are identical. The reason both halves are identical is because in a true **pure substance**, each and every particle is the same. This means that if we continue to divide it over and over again, we would eventually be left with one particle, and that would be the particle that represents that pure substance.

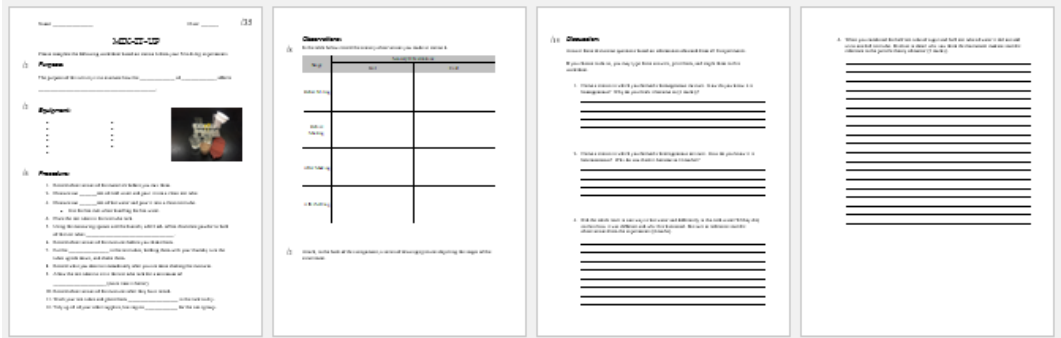
All pure substances are homogeneous, but not every homogeneous substance is a pure substance. In a **homogeneous** substance the particles are not necessarily all identical, however they are evenly distributed so that each area has the same pattern of particles. If you were to divide a homogeneous substance, both halves would be the same.

A heterogeneous substance is not pure. Like homogeneous substances, a heterogeneous substance has different types of particle. However, the particles in a **heterogeneous** substance are not evenly distributed, they are scattered, or random. If you were to divide a heterogeneous substance, the two halves would most likely be different.

# Mix It Up

You have now completed the stations for the Mix It Up experiment. This lab write-up is very similar to the eco-sampling write-up, as far as expectations go.

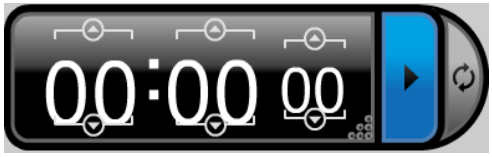
However, this lab is different in that there are 8 mini-experiments. You will have to answer questions based on all of the experiments, but you will only be documenting your observations for one of them.



# Mix It Up

I would like you to use the remaining time during this period to discuss your experiments with your peers. Talk about...

- ...the things you observed
  - What was cool?
  - What was boring?
  - What was unexpected?
  - What was interesting?
- ...the required discussion questions
  - From which stations can you obtain answers?
  - What are some potential ideas for answers?
  - What details could be included?




# Mix It Up

Your lab write-up is due: _____

Note: Next lesson we will learn about "The Particle Theory of Matter." This will be the absolute most important thing I teach you both this year, and next. On top of that, it will be an incredible tool to help you in your discussion sections for this lab write-up.

So, come prepared to listen attentively next class.

## Attachments

3-6 Mix-it-Up Assignment.pdf