

## Mixtures: A Science Study

### A. Access your background knowledge:

1. What is everything – all matter, all substances – made of?
2. What is the difference between an atom and a molecule?
3. What is the difference between physical and chemical change?
4. What is the difference between a compound and a mixture?
5. What is density?

### B. Record your background knowledge using one or more of these methods:

1. write sentence answers to the questions above (fully meeting expectations)
2. add little coloured diagrams to help explain your answers (exceeding)

### C. Read:

1. Your science text – Nelson Science: Chemistry: Mixtures – page 58 – 111. (meeting)
2. At least 2 nonfiction books about chemistry. (exceeding)

### D. Record your new knowledge:

1. Copy the diagram on page 62. (meeting expectations)
  - a. add coloured illustrations (fully meeting)
  - b. add 3 examples to each column (exceeding)
2. Make a diagram of four types of colloids (p. 72 -75). (meeting)
  - a. add coloured illustrations (fully meeting)
  - b. add 3 examples to each column (exceeding)
3. Make a diagram of seven ways to separate mixtures: p. 100-101. (meeting ex.)
  - a. add coloured illustrations (fully meeting)
  - b. add at least one real-life example for each method (exceeding)
4. Make a diagram showing five reasons indigenous people separated mixtures.
  - a. add coloured illustrations (fully meeting)
  - b. add at least one real-life example for each reason (exceeding)
5. Make a diagram showing five ways mixtures are filtered in nature: p. 84-85.
  - a. add coloured illustrations (fully meeting)
  - b. add at least one real-life example for each method (exceeding)

### E. Do at least 2 experiments:

- Use light to decide if a liquid is a homogeneous or heterogeneous mixture: p. 67.
  - complete the attached worksheet (meeting)
  - write out the whole completed worksheet yourself (fully meeting)
  - write out the experiment and add coloured illustrations (exceeding)
- Mix oil and water and add an emulsifier: p. 72.
  - complete the attached worksheet (meeting)
  - write out the whole completed worksheet yourself (fully meeting)
  - write out the experiment and add coloured illustrations (exceeding)

- Make a gel: p. 74.
  - notes of your results (minimally meeting)
  - a lab write-up: hypothesis, materials, procedure, observations, results (fully)
  - a lab write-up with illustrations (exceeding)
- Make a foam: p. 76-77.
  - notes of your results (minimally meeting)
  - a lab write-up: hypothesis, materials, procedure, observations, results (fully)
  - a lab write-up with illustrations (exceeding)
- Use centrifuge to separate chocolate milk: p. 93.
  - notes of your results (minimally meeting)
  - a lab write-up: hypothesis, materials, procedure, observations, results (fully)
  - a lab write-up with illustrations (exceeding)
- Separate a mixture using magnetism: p. 96.
  - notes of your results (minimally meeting)
  - a lab write-up: hypothesis, materials, procedure, observations, results (fully)
  - a lab write-up with illustrations (exceeding)
- Separate a mixture using chromatography: p. 99.
  - notes of your results (minimally meeting)
  - a lab write-up: hypothesis, materials, procedure, observations, results (fully)
  - a lab write-up with illustrations (exceeding)
- Make a dye: p. 104-105.
  - notes of your results (minimally meeting)
  - a lab write-up: hypothesis, materials, procedure, observations, results (fully)
  - a lab write-up with illustrations (exceeding)

**F. Do some research by completing one of the following projects:**

1. Make an illustrated diagram of substances in your kitchen at home:
  - a. homogeneous solutions
  - b. heterogeneous mixtures
  - c. compounds
2. Make an illustrated diagram of heterogeneous mixtures in your home:
  - a. suspensions
  - b. colloids
    - i. foams
    - ii. emulsions
    - iii. gels
    - iv. sol

**G. Review your knowledge by completing these sentences:**

1. There are about \_\_\_\_\_ pure substances on earth. An \_\_\_\_\_ is a type of substance created from atoms. All of these \_\_\_\_\_ are arranged on a \_\_\_\_\_ table.
2. An \_\_\_\_\_ is the smallest part of an \_\_\_\_\_. It contains \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
3. A \_\_\_\_\_ is formed when two or more \_\_\_\_\_ join together. They can be of the same element or of \_\_\_\_\_ elements.
4. A \_\_\_\_\_ is formed when two or more elements make a chemical bond and create a new substance. An example is water, which is made from two \_\_\_\_\_ atoms and one \_\_\_\_\_ atom.
5. A \_\_\_\_\_ is created when two or more elements combine but do not make a new chemical substance. An example is muddy water, which combines soil and water.
6. A \_\_\_\_\_ is when one substance is dissolved into another substance. The substance that dissolved is called a \_\_\_\_\_. The substance that does the dissolving is called a \_\_\_\_\_. An example is salt water, in which the salt is a \_\_\_\_\_ and the water is a \_\_\_\_\_. Light \_\_\_\_\_ through these mixtures.
7. A \_\_\_\_\_ is a heterogeneous mixture in which the particles form \_\_\_\_\_ over time. An example is oil and vinegar, which can be shaken to form a mixture but then will \_\_\_\_\_ after awhile. Light is \_\_\_\_\_ by these mixtures.
8. A \_\_\_\_\_ is a heterogeneous mixture that does not settle into layers. An example is popcorn, which is a \_\_\_\_\_ in a solid. Another example is a gel, which is a \_\_\_\_\_ in a solid. Still another example is fog, which is \_\_\_\_\_ suspended in \_\_\_\_\_.
9. Some substances are good at creating colloids. These substances are called \_\_\_\_\_. An example is \_\_\_\_\_ gum in salad dressing, which prevents the oil and vinegar from \_\_\_\_\_.

100	air	atom	atoms	colloid	compound
different	electrons	element	element	elements	emulsifiers
gas	hydrogen	layers	liquid	oxygen	mixture
molecule	neutrons	periodic	protons	scattered	separate
separating	solute	solute	solution	solvent	solvent
suspension	travels	xanthum	water		

10. \_\_\_\_\_ can be separated in many different ways.
11. \_\_\_\_\_ is a way to separate pigments – or colours – from liquid.
12. \_\_\_\_\_ separates solid substances from liquids such as water.
13. \_\_\_\_\_ uses a filter to separate larger \_\_\_\_\_ from liquids or smaller particles.
14. \_\_\_\_\_ separates mixtures by adding water and letting the lighter \_\_\_\_\_ float to the top.
15. \_\_\_\_\_ separates solid particles from other particles using a magnet. This is used in the mining industry to separate rocks with \_\_\_\_\_ from other rocks.
16. \_\_\_\_\_ separates solid parts - or even liquid particles - by the process of spinning. It is used in hospitals to separate \_\_\_\_\_ and in homes to get the water out of \_\_\_\_\_ in washing machines.
17. \_\_\_\_\_ is often used by just about everyone. It is simply using one's fingers to separate mixtures.

<i>blood</i>	<i>centrifugation</i>	<i>chromatography</i>	<i>clothes</i>	<i>filtration</i>
<i>flotation</i>	<i>iron</i>	<i>magnetism</i>	<i>mixtures</i>	<i>particles</i>
<i>particles</i>	<i>picking apart</i>	<i>settling</i>		

### Suspension, Colloid, or Solution?

Hypothesis: Suspensions have particles that separate into layers over time. Colloids and solutions do not separate into layers. Light is scattered by suspensions and colloids but not by solutions, so I should be able to distinguish between the two types of mixtures by looking at them and shining a light on them.

Materials: clear jar, water, teaspoon, milk, flashlight

Procedure:

1. Fill a 250 ml jar with water.
2. Shine a light on it and notice the effect on the light.
3. Add 2 teaspoons of milk and stir.
4. Notice the appearance of the milky water.
5. Shine a light on it and notice the effect on the light.

Results: The water without milk allowed the light to \_\_\_\_\_ . The water with milk \_\_\_\_\_ . I watched the milk for \_\_\_\_\_ min. and observed that \_\_\_\_\_ .

Conclusion: Milk is a \_\_\_\_\_ rather than a \_\_\_\_\_ or a \_\_\_\_\_ .

Now I will do the experiment again with other liquids, testing to see if they are solutions or suspensions.

### Can I Make a Colloid?

Hypothesis: Some substances allow two liquids that quickly separate into layers to be emulsified so that the particles stay suspended and do not separate.

Materials: clear jar, vinegar, oil, teaspoon, flashlight, xanthum gum

Procedure:

1. Fill the jar with 1 cm of oil.
2. Carefully add 2 cm of vinegar.
3. Observe what happens.
4. Shine a flashlight on the mixture and observe.
5. Add ½ tsp of xanthum gum and stir.
6. Observe what happens.
7. Shine a flashlight on the mixture and observe.

Results: The oil and vinegar allowed the light to \_\_\_\_\_ even though the two substances did not form a \_\_\_\_\_ mixture. The \_\_\_\_\_ was on top because its molecules are larger and cannot pack together as closely as the molecules in v \_\_\_\_\_ (C<sub>2</sub>H<sub>4</sub>O<sub>2</sub>). The xanthum gum caused the two substances to e \_\_\_\_\_ so that the particles of oil can be suspended throughout the vinegar.