

# Learning About Pure Substances

Scientists often examine the particles that make up a substance. Close observation shows that in some cases all the particles that make up a substance are alike. In other cases all the particles are not alike. When all the particles are alike the substance is called a pure substance. A pure substance is made of only one kind of substance, is the same throughout and cannot be separated by physical means. All the particles in a pure substance are exactly the same.

Elements are the simplest pure substance. They cannot be changed into a simpler substance by any chemical or physical process. Compounds are also pure substances. Water, salt and sugar are compounds that are pure substances because even though they are made of more than one element they are the same throughout.

So, compounds are pure substances and cannot be broken down into simpler substances without changing their properties. Elements cannot be broken down into simpler substances without losing their identity.

If you place a pure substance into water you create a solution. A solution is a mixture – not a pure substance. Kool-Aid and lemonade are solutions.

## Teacher Demo

**Materials:** baking soda, Damp Rid, 2 -250 mL beakers with 50 mL of water, small spoon

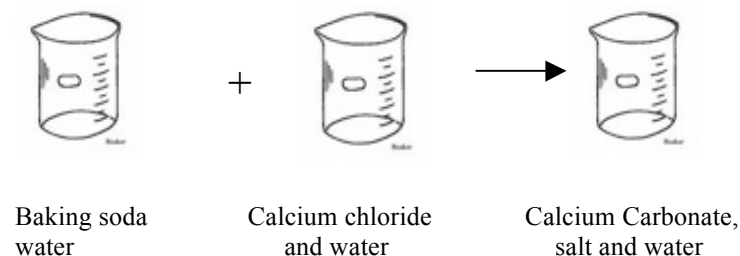
### What To Do:

1. Observe the baking soda your teacher shows you. It is a compound with the chemical formula  $\text{NaHCO}_3$ . Is it the same throughout? \_\_\_\_\_ Is it a pure substance? \_\_\_\_\_
2. Observe the calcium chloride your teacher shows you. It is a compound with the chemical formula  $\text{CaCl}_2$ . Is it the same throughout? \_\_\_\_\_ Is it a pure substance? \_\_\_\_\_

3. Observe the beakers of water your teacher shows you. Is it the same throughout? \_\_\_\_\_ Is it a pure substance? \_\_\_\_\_
4. Your teacher will now mix half a small spoon of baking soda in one of the beakers of water until it is clear. Can this substance be separated by physical means? \_\_\_\_\_ Is it a pure substance? \_\_\_\_\_
5. Your teacher will now mix half a small spoon of Damp Rid in the other beaker of water. Can this substance be separated by physical means? \_\_\_\_\_ Is it a pure substance? \_\_\_\_\_
6. Your teacher will now pour the solution of baking soda into the solution of Damp Rid. Observe what happens.

### Observations:

1. In the beakers below draw what happened in the demonstration.



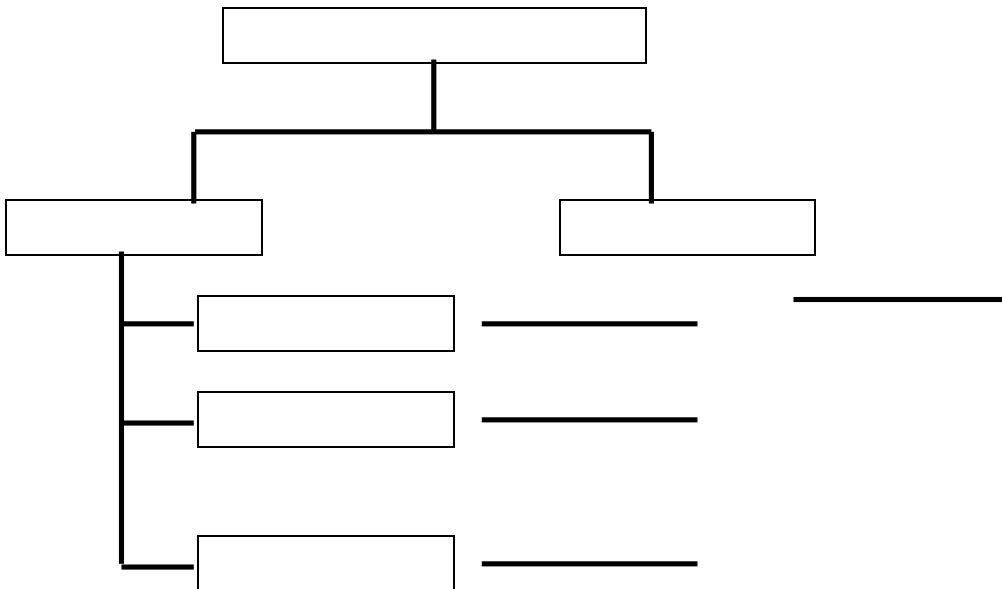
When two liquids are mixed together, sometimes they form a solid. When this happens the solid is called a precipitate and it is a chemical change. In this demonstration the water became cloudy with the precipitate. Your teacher will keep it over night and you will observe it again tomorrow.

## Questions:

3. Give three examples of pure substances.

Watch the video “Types of Pure Substances” from [www.missdoctorbailer.com](http://www.missdoctorbailer.com) and fill in the concept map below.

Place an example of each substance on the lines.



1. Cut out the large rectangle and fold on the dotted line.
2. Write Pure Substances on the top and Elements and Compounds at the bottom.
3. Under the flap have students write at least 3 examples of elements and 3 examples of compounds.
4. Decorate the top flap.



Name \_\_\_\_\_ period \_\_\_\_\_

## EXIT TICKET

Learning About Pure Substances

Determine if the following substances are pure substances or not. If they are pure substances place a P on the line. If not, leave it blank.

- \_\_\_\_\_ 1. Water ( $H_2O$ )
- \_\_\_\_\_ 2. Salt ( $NaCl$ )
- \_\_\_\_\_ 3. Lemonade
- \_\_\_\_\_ 4. Copper ( $Cu$ )
- \_\_\_\_\_ 5. Iron ( $Fe$ )
- \_\_\_\_\_ 6. Baking Soda ( $NaCHO_3$ )
- \_\_\_\_\_ 7. Baking Soda and water mixed together
- \_\_\_\_\_ 8. Sulfur ( $S$ )

**Conclusion:** (precipitate, elements, chemical, compounds, cannot, properties)

\_\_\_\_\_ and \_\_\_\_\_ are pure substances. A pure substance \_\_\_\_\_ be broken down and still maintain its \_\_\_\_\_. When a solution becomes cloudy is shows a \_\_\_\_\_ change. The solid that forms is called a \_\_\_\_\_.



Name \_\_\_\_\_ period \_\_\_\_\_

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