

# known Substance lab

## Creating a Qualitative Analysis Chart

Name : \_\_\_\_\_

Hour \_\_\_\_\_

**Question:** How can chemists help keep drinking water safe?

**Prediction:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Background Information

A qualitative analysis scheme can be used to determine the identity of an unknown compound.

In this experiment you will perform simple chemical and physical tests designed to identify 10 white solids.

### Discovery

You will be performing tests on the 10 white solids to determine how they will react to the testing reagents. **Follow the instructions very carefully so you can positively identify the substances!** You will work with your lab partners to complete the flowchart.

### **\*\*Important\*\***

**If you have a question or are having difficulty with a reaction, ask your teacher for help!**

### Equipment

- Test tubes (you will need to reuse some of your test tubes to perform all the tests)
- Test tube rack

### Compounds Used as Unknowns

#### Compound

- |   |  |
|---|--|
| 1. Sodium chloride, NaCl                                | 6. Calcium sulfate, CaSO <sub>4</sub>    |
| 2. Sodium bicarbonate, NaHCO <sub>3</sub>               | 7. Calcium carbonate, CaCO <sub>3</sub>  |
| 3. Sodium carbonate, Na <sub>2</sub> CO <sub>3</sub>    | 8. Cornstarch                            |
| 4. Borax, Na <sub>2</sub> B <sub>4</sub> O <sub>7</sub> | 9. Sucrose                               |
| 5. Boric acid, H <sub>3</sub> BO <sub>3</sub>           | 10. Magnesium sulfate, MgSO <sub>4</sub> |

**Terms:** Solubility - ability to dissolve

Dissolve - to mix completely (break into very small pieces until you can't see it in the liquid anymore)

## Identification Instructions

Be sure to follow each instruction carefully to acquire accurate results.

### Warm water Solubility Test

1. Put a pea-sized amount (the amount that fits on the end of a wood splint) of material in a test tube with about 5 mL of warm water. Mix by tapping/flipping the side of the test tube with your finger until you determine if it dissolves in water or not.
2. Record on your flow chart which substances are insoluble (does not dissolve) and which are soluble.

\*\*\* Do NOT clean out the test tubes \*\*\*

### Iodine Test

1. For the three substances that were insoluble, put 2 drops of iodine in the test tube and wash down with a little water.
2. Separate the substances on your flow chart according to their color (deep blue or brownish).

\*\*\* Clean out these three test tubes only \*\*\*

### Vinegar Test (1)

1. You are now going to test the substances that turned brownish in the iodine test. Place a pea-sized amount of the solid substance in a clean test tube. Add about 1 mL (about one squirt) of vinegar and note whether gas bubbles are produced.
2. Finish the insoluble substance portion of the flowchart by separating the substances based on whether the substance bubbled or not.

\*\*\* Clean out these two test tubes only \*\*\*

### Thymolphthalein Test

1. Take the seven substances that are water-soluble and add 3 drops of thymolphthalein solution to each test tube that contains the solid dissolved in water.
2. Separate the substances based on whether they turn blue or not.

\*\*\* Clean out the test tubes that turned blue \*\*\* DO NOT clean out the other five

### Vinegar Test (2)

1. The two substances that turned blue with thymolphthalein can now be separated. Use two new test tubes and add 1 mL (about one squirt) of vinegar to each of the solids.
2. Separate the two substances based on whether the substance bubbled or not.

\*\*\* Clean out these test tubes \*\*\*

### Ammonia Test

1. Of the five remaining substances, one will precipitate (solid substance will form) at the top of the liquid when ammonia is added. Add 3 - 5 drops of ammonia to the five test tubes. (don't tap them)
2. Separate the one that forms a white precipitate at the top of the liquid. (clump of stuff at the top.)

\*\*\* Clean out all the remaining test tubes \*\*\*

### Vinegar Test (3)

1. There are four substances remaining to be identified. Take new solid samples of these four substances in clean test tubes and add 1 mL (about one squirt) of vinegar to each.
2. One substance will evolve carbon dioxide gas and therefore will bubble. Separate this compound on your flowchart.

\*\*\* Clean out all the remaining test tubes \*\*\*

### Alcohol Test

1. Of the three substances remaining, one will dissolve more readily in alcohol (also known as rubbing alcohol). Place these three solids (new samples) into clean test tubes and add 7mL of alcohol.
2. Separate the one substance that dissolves best in the alcohol.

\*\*\* Clean out all the remaining test tubes \*\*\*

### Hot Water Test

1. The remaining two substances can be separated by how they react to temperature. Place a small amount of each solid into clean test tubes. Add 5 mL of water. (don't need to tap them)
2. Place the two test tubes into the warm water bath at the back of the lab to determine which substance will dissolve more readily in hot water.
3. Separate the two substances based on which is very soluble and which is less soluble.

**This is the end of your identification tests for your known compounds.**