

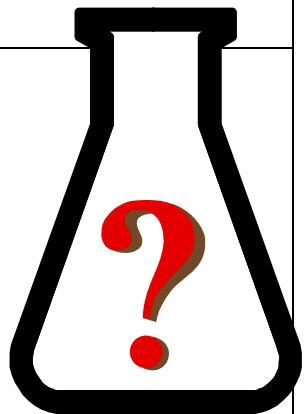
Purpose:

1. To create a working model of an indicator
2. To classify different substances according to their reaction to an indicator

Materials:

1. Red cabbage juice (can be made before hand, but the smell adds to the ambiance)
 - a. Hot plate
 - b. Red cabbage
 - c. Water
 - d. Large pot
2. Lemon juice
3. Baking soda
4. Several 9 oz clear plastic cups
5. Variety of liquids from kitchen and bathroom (kids can bring these from home)
6. 1000 ml graduated cylinder, or tall thin clear jar

What Makes Different Stuff Different?

**Procedure:**

1. Boil red cabbage in water until liquid turns purple (few minutes)
2. Pour cabbage juice into one cup. Hold up to class and add lemon juice. Tell students it turns pink because lemon juice is an acid, which means it is made up of hydrogen atoms.
3. Repeat step 2 showing that every time the same reaction occurs.
4. Add cabbage juice to a clean cup. Hold up to the class and add baking soda. Tell the students it turns blue because baking soda is a base, which means it is made up of hydrogen and oxygen atoms that are chemically bonded together. Anything that has that combination of atoms will turn blue in cabbage juice. That's why scientists call cabbage juice an indicator... because it indicates, or tells you, that there is either acid or base present in a mixture.
5. Ask them what they think will happen if you combine an acid and base together...
6. After listening to responses, pour the cup with the lemon juice into the cup with the baking soda (Do this over a pan, you get purple bubbles that overflow the cups)
7. Explain that there are varying strengths of acids & bases. The stronger the base is the bluer the cabbage juice will become. The stronger the acid is the redder the cabbage juice will become.
8. fill the remaining cups half full with liquids.
9. Have students smell the liquids, guess what they are and guess what color the cabbage juice will turn when added. Have them record their predictions on a chart.
10. Add cabbage juice to each liquid and record actual results next to predicted ones
11. Pour all liquids into graduated cylinder one at a time. Depending on what's in them the mixture will change from red to blue, showing the sliding scale between acid and base.
12. Have students bring liquids from home to test as an extension to this lesson.

Results Kind of Liquid	Prediction	Actual
1.		
2.		

Conclusion

Everything is made up of atoms. Scientists found out that if you take something that has the element Hydrogen in it and put it in an indicator like cabbage juice, the indicator will turn red. There are lots of substances that contain Hydrogen. Scientists call them ACIDS. Acids are sour tasting. Fruit juice is a natural acid.

Sometimes hydrogen and oxygen atoms get too close to each other and their electrons get stuck together causing a chemical bond. Scientists found out that if you put substances that have hydrogen & oxygen atoms stuck together in them into an indicator like cabbage juice, the indicator will turn blue. There are lots of substances that have this compound in them. Scientists call them BASES. Bases are smooth and slippery. Most cleaning products are bases.

Red cabbage juice is a natural indicator. It will change form red (acidic) to purple (neutral) to blue (base) and back again according to the mixtures you put in it. Adding different acids and bases randomly creates a visual sliding scale.