

Cabbage Juice Indicator



Chemists use indicators to test whether a substance is an acid or a base. Indicators work by turning a distinctive color in the presence of an acid or a base. You can make your own indicator from red cabbage. You can also make indicators from the juice of elderberries, blackberries, radish skins, apple skins, or cherries.

Materials

hot plate

1 head red cabbage

food processor

1000 mL beaker

500 mL beaker

4-5 250 mL beakers

sieve

substances to test **

distilled water

rubbing alcohol

Substitutions

knife and cutting board

large size saucepan

large jar

4-5 small jars

tea strainer or collander

** recommended materials: baking soda, bathroom cleaner (e.g. Formula 409™), washing soda, vinegar, lemon juice, milk, cream of tartar, orange juice, milk of magnesia, lime, soft drinks, or ammonia

Procedure

1. Chop red cabbage up finely. Boil a pint of water in a saucepan.
2. Add the red cabbage carefully to the boiling water and take the saucepan off the heat. Let it stand for 30 minutes or until it is completely cool.
3. Strain the liquid into a jar and throw away the used cabbage. The liquid should be a dark reddish-purple color. Add rubbing alcohol, or refrigerate, to reduce the spoilage of the indicator. Use a 1: 5 ratio of alcohol to water.

4. The color will change as you add acids or alkalis. To test a substance, pour a small amount of your substance into a small jar. Then add a drop or two of the cabbage juice indicator. A change in color indicates its acidity or alkalinity.

* See Teacher's Notes

Colors of Red Cabbage Juice and Different pH values

COLOR	red	rose	purple	blue	green	yellow								
pH	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	ACID			neutral				BASE						

DATA AND OBSERVATIONS

Substance	Color	Approximate pH	Acid or Base?
lemon juice			
lime			
washing soda			
ammonia			
cream of tartar			
muriatic acid			
Formula 409™			
baking soda			
vinegar			
Sprite™			

Extensions

Soak some filter paper in the cabbage juice indicator. Allow the paper to dry, and then cut it into strips. Conduct an "at home" pH test of other household items. Tape your strips to a piece of notebook paper and bring them back to class. Compile your results. What can you say about household cleaners? Where are most household acids found?

Disposal

All solutions can be poured down the sink. Solid bits of cabbage should be put into a solid waste container (and emptied at the end of the school day—owing to their odiferous nature.)

Teacher's Notes

1. Lemons, vinegar, cream of tartar (potassium acid tartrate), orange juice, and sour milk will be acidic solutions.
2. Pure distilled water is the only substance listed that should be neutral.
3. Tap water may be slightly acidic—owing to dissolved carbon dioxide. Baking soda is a weak base.
4. The strong bases will be bathroom cleaners, ammonia, washing soda, milk of magnesia, and lime.
5. The indicator can be frozen in ice trays and saved for use. The indicator mixed with alcohol will last for months! The strips can be refrigerated and will also last for months.

*An alternate source of cabbage juice is to purchase a can or jar of cabbage, drain off the juice, and discard the cabbage.