

Grades 4-8

of Cabbages and Chemistry



LAWRENCE HALL OF SCIENCE • UNIVERSITY OF CALIFORNIA AT BERKELEY

Session 1

What You Need

For the class:

You will need three household neutrals, three acids, and three bases. You may substitute other household acids, bases, and neutrals for the ones we suggest if it is more convenient, but make sure you include drain cleaner (a base), vinegar (an acid), and water (a neutral).

Neutrals: (Cabbage juice mixed with a neutral remains purple.)

- 32 oz. (1 liter) rubbing alcohol (isopropyl)
- three teaspoonfuls of table salt (25 g)
- 32 oz. (1 liter) water

Bases: (Bases cause cabbage juice to become green.)

- ½ tsp. (3 g) dry drain cleaner
- 30 tsp. (160 g) baking soda
- 40 antacid tablets

Acids: (Acids cause cabbage juice to become pink.)

- 16 oz. (500 ml) white vinegar
- 40 aspirin tablets
- 32 oz. (1 liter) lemon juice

For making cabbage juice:

- 1 red cabbage
- 1 knife
- 1 non-aluminum pot, 1 gallon (4 liter) or larger
- 1 plastic container with a lid, 1 gallon (4 liter) (for storing cabbage juice)
- a large funnel
- 1 strainer
- stove or hot plate (need not be in classroom)
- 7 containers with screw tops, 2 quart (2 liter) or larger, such as plastic milk containers or vinegar jugs (for mixing solutions of household chemicals)
- a set of measuring spoons (or a metric balance)
- 1 measuring cup (1 cup or larger)
- a roll of masking tape or mailing labels
- a permanent marker
- sponges
- paper towels
- access to a sink or 1 or 2 buckets and 2 large squirt bottles of water for rinsing hands (A dishwashing liquid bottle, thoroughly rinsed to remove all soap residue, makes a good squirt bottle.)

For each group of 4–6 students:

- 1 cafeteria tray
- 12 clear plastic wide-mouthed cups
- 12 medicine droppers
- crayons or colored pencils (including at least pink, green, purple, and blue)

For each student:

- 1 white styrofoam egg carton (white plastic paint trays with at least 6 depressions can be used as an alternative to egg cartons)
- 1 "Telltale Colors" data sheet (master included on page 18.)
- 1 pencil
- 1 pair of safety goggles (*Optional*—see Safety Considerations on page 6.)

Session 2

What You Need

For the class:

- 1 piece each of pink, green, and purple or blue chalk
- all of the test solutions remaining from Session 1
- 32 ounces (2 liters) cabbage juice (from Session 1)

For each group of 4–6 students:

- 1 cafeteria tray
- 2–3 cups labeled “Cabbage Juice” (from Session 1)
- 9 cups labeled for each of the test solutions used in Session 1
- 11–12 medicine droppers (one for each cup)
- a cottage cheese or other wide-mouthed container to be used as a “waste” container for overflow

For each student:

- 1 white styrofoam egg carton
- 1 “Presto-Change-O” data sheet (master included on page 28.)
- 1 pair of safety goggles (*optional*)

Session 3

For each group of 4–6 students:

- 1 cafeteria tray
- 2–3 cups labeled “Cabbage Juice” (from Session 1)
- 6 cups labeled for each of the acid and base solutions used in previous sessions (neutrals not needed)
- 1 cup labeled “Water” from previous session
- 11–12 medicine droppers (one for each cup)

For each pair of students:

- 1 white styrofoam egg carton
- 2 “More or Less Acid” data sheets (master on page 37) or 2 “More or Less Base” data sheets (master on page 38)
- 1 “Acid + Base = Neutral” data sheet (master on page 39)
- 1 pair of safety goggles (*optional*)

For the class:

- 1 piece each of pink, green, and purple (or blue) chalk
- all of the acid and base solutions from previous sessions (see Session 1, “What You Need,” page 9.)
- 32 oz. (2 liters) cabbage juice (remaining from previous sessions)
- 1 roll of masking tape
- 4 clear plastic cups

Session 4

What You Need

For the class:

A collection of household substances including:

- beverages: juices, tea, coffee, milk, soda pop;
- cleaning products: window cleaner, floor cleaner, laundry detergent, cleanser;
- bathroom products: toothpaste (made into a slurry with water), shampoo, mouthwash, soap, aftershave lotion, hair conditioners, skin lotions.

For each group of 4–6 students:

- 1 cafeteria tray
- 2–3 cups labeled “Cabbage Juice” (from Session 1)
- 8–10 medicine droppers

For each student:

- 1 white styrofoam egg carton
- 1 “Household Mysteries” data sheet (master on page 46.)
- 1 pair of safety goggles (*optional*)

Acid and Aliens from Outer Space

What You Need

For each pair of students:

- 1 white styrofoam egg carton or other reaction tray
- 1 cup of acidic solution (such as vinegar or acid solution)
- 1 cup of basic solution (such as baking soda or drain cleaner solution)
- 1 cup of neutral solution (such as water or salt water)
- 1 cup of cabbage juice
- 4 medicine droppers