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" POLY " mer the Indicator Worm

Concept: Identifying pH using a homemade polymer indicator device

National Science Standards:

A	B	C	D	E	F	G

Background: The pH scale uses numbers used to determine the acidity or alkalinity (base) of various substances. The numbers commonly range from 1-14. Numbers 1-6 are acids, with 1 being the strongest acid and 6 the weakest. Seven is neutral. Numbers 8-14 are bases, with 8 the weakest base and 14 the strongest. There are decimal degrees between the whole numbers, but they are not commonly used with elementary students. Cabbage juice changes to various colors at different pH levels and thus is a useful acid-base indicator.

Objective: Students will identify household substances as acids or bases.

Suggested grade levels: 3-6

Estimated time:

- 20-25 minutes teacher prep
- 30-40 minutes lab time (may extend into several class periods)

Materials needed:

- cabbage worms (see procedure below)
- test tubes
- various household liquids
- shallow containers
- GOGGLES
- hot plate
- water
- cabbage indicator color chart

Safety/Disposal: Students should wear goggles.

Discard the household liquids following appropriate methods. These will vary depending on the substances used.

Make the cabbage worms ahead of time using this recipe:

2 cups cabbage juice (Blend and strain.)

3 packages Knox™ gelatin (a natural polymer)

Mix gelatin into cabbage juice and bring to a boil. Pour into glass test tubes and let set in refrigerator.

If the worms will not be used within three to four days, they should be frozen.

Procedure:

1. Place several household substances into separate shallow containers.
2. To loosen gelatin, place test tube containing cabbage worm into warm water for no more than one minute.
3. Immediately slide worm into shallow container of household liquids. Use a different worm for each container. Watch the fun and record the results.

Wrap-up:

- Worms will change color indicating acids or bases.

Resources:

This activity is based on a presentation at the MATR Institute by Sandra Van Natta, a middle school teacher in Cincinnati, Ohio.