

GREEN CHEMISTRY COLOR LAB



KEYWORDS

green chemistry

sustainable manufacturing

non-toxic materials

natural indicators

chemical safety

Green chemists and sustainable product designers create chemicals, cleaners, and materials that are safe for people and the environment. They replace toxic ingredients with natural or biodegradable ones and develop manufacturing processes that use less energy and produce less waste. Green chemistry is used to create everything from eco-friendly soap and packaging to clothing dyes and building materials. These jobs are important because they help reduce pollution, protect human health, and make industries more sustainable. The field combines chemistry, environmental science, and innovation to create products that meet today's needs without harming tomorrow's world.

AGE RANGE

9-11 years

INDIVIDUAL ACTIVITY

with group sharing

DURATION

35 minutes

MATERIALS

- 2 cups fresh red cabbage leaves (chopped)
- 4 cups distilled water
- Large pot for boiling
- Strainer or cheesecloth
- Glass jars for storage
- Measuring cups



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PROCEDURE

Step 1: Extract the Indicator

1. Chop red cabbage leaves into small pieces (adult supervision for knife use)
2. Place chopped cabbage in large pot
3. Add 4 cups of distilled water
4. Bring to boil, then reduce heat and simmer for 15-20 minutes
5. Water should turn deep purple/blue color

Step 2: Strain and Store

1. Remove from heat and let cool for 10 minutes
2. Strain liquid through cheesecloth or fine strainer
3. Discard cabbage solids
4. Store purple liquid in glass jars - this is your pH indicator!

Step 3: Test the Indicator Create test solutions to demonstrate color changes:

- Very Acidic (pH 1-2): Lemon juice - indicator turns bright red
- Acidic (pH 3-4): White vinegar - indicator turns pink/red
- Neutral (pH 7): Distilled water - indicator stays purple
- Basic (pH 8-9): Baking soda solution - indicator turns blue/green
- Very Basic (pH 10+): Ammonia solution - indicator turns yellow/green

Testing Procedure:

- Add 2 tablespoons of cabbage indicator to clear cups
- Add 1 tablespoon of test solution to each cup
- Observe and record color changes
- Create a color chart showing pH ranges

Safety Notes:

- Adult supervision required for boiling
- Handle hot liquids carefully
- Do not ingest any test solutions
- Wash hands thoroughly after handling chemicals

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INSTRUCTIONAL GUIDELINES FOR FACILITATOR

- Use only safe, non-toxic testing materials
- Supervise any heating of cabbage water
- Explain chemical reactions at appropriate level
- Connect to green chemistry and sustainable manufacturing careers



LEARNING OUTCOMES

- Understand green chemistry principles
- Learn about sustainable manufacturing careers
- Practice safe laboratory techniques and observation

EXTENSION SUGGESTIONS

- Research biodegradable vs. traditional plastics
- Make other natural cleaning products
- Learn about green chemistry innovations