Indicators

Sections

Joey Scouts
Cub Scouts
Scouts
Venturer Scouts
Rover Scouts

Scouts VICTORIA

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Challenge Areas

COMMUNITY
CREATIVE
OUTDOOR
PERSONAL GROWTH

Scout Method Elements

COMMUNITY INVOLVEMENT
LEARNING BY DOING
NATURE AND THE OUTDOORS
PROMISE AND LAW
PERSONAL PROGRESSION
PATROL SYSTEM
SYMBOLIC FRAMEWORK
YOUTH LEADING, ADULTS SUPPORTING

SPICES Growth Areas

CHARACTER
EMOTIONAL
INTELLECTUAL
PHYSICAL
SOCIAL
SPIRITUAL

The Adventure

Explore acids and bases and how we can indicate the pH of a substance.

Plan

1. Investigate acids and bases, and their properties. Try identifying some household acids and bases you encounter every-day.
2. Investigate the pH scale as a way to measure the strength of acids and bases. What is the pH of a weak acid, strong acid, weak base, and strong base?
3. Collect the materials required for the experiments and recording your results. Communicate with your patrol and leaders if you need to bring items from home.
4. Develop hypotheses about what will happen during your experiment. What colour will the cabbage juice turn in different liquids? Will any liquids turn the cabbage juice the same colour, why?
5. Read the safety requirements and discuss with your leaders/adult supervisors what supervision and safety requirements might be needed.
6. Gather the ingredients and equipment that you need for this experiment. You will need the following: chopped red cabbage, a large saucepan/pot, water (ideally demineralised), a strainer, a range of substances with different pH such as vinegar, juice, bicarbonate of soda, soap, Coke, bleach, ammonia, water, drain cleaners, and citric acid, test tubes or other sample cups.

Do

1. Set up the experiment and record materials and hypotheses.
2. Make sure everyone is aware of the safety rules.
3. Add 2-3 cups of red cabbage to a pot of water and allow to boil for a few minutes. Set aside and allow to cool for at least 10 minutes or until safe to work with. The water should now be a purple colour.
4. Strain your cabbage water and pour some into a series of clear cups.
5. Carefully add a small amount of different household products to your cups of cabbage water to test the homemade indicator. Gently stir the liquids together. You might like to test vinegar, juice, bicarbonate of soda, soap, Coke, bleach, ammonia, water, drain cleaners, etc. Check out https://www.compoundchem.com/2017/05/18/red-cabbage/ for information on what colour different pH levels will show as in red cabbage indicator.
6. Make sure you record your observations along the way.
7. Now test out some store-bought indicators in the different liquids.

Review

1. Evaluate your hypotheses. Which liquids turned the cabbage water the same colour, why? Was this what you had predicted?
2. What other household chemicals could you test? What colour would they turn the cabbage water and why?
3. Did all the acids and bases change the indicator to the same colour? Why or why not?
4. What colour are the indicators in water? Is water and acid or a base?
5. If you were to do this activity again, what would you do the same? What would you do differently?

Safety

- Chemicals warning: When choosing your household acids and bases think about the safety requirements involved. Stronger chemicals like bleach or ammonia might need an adult to handle them. Consider if your chemicals need personal protective equipment such as gloves, lab coats and safety glasses. When pouring chemicals into the cabbage water be mindful of spills and splashes.
- Sharps warning: This challenge card requires use of a knife and may also include glass. Ensure broken glass is cleaned up and disposed of properly and ensure knives are used only under supervision where appropriate, or by adults only.
- Temperature warning: This challenge card requires use of boiling water and a stove top. Ensure everyone participating in this part understands how to safety use a stove. When working on the stove, and especially when pouring hot water all participants should be supervised, or this part of the activity should be done only by adults where appropriate.

Variations

- You could try making indicator strips, using coffee filters soaked in red cabbage juice and left to dry.
- Working safety, you could investigate the effect of mixing acids and bases together on the colour of the indicator. Only practise combining weak acids and bases, such as ones you could eat or safety hold.
- A larger program can be build using other ‘Acid and Bases’ or chemistry challenge cards.
- Consider pre-preparing the cabbage water for younger sections.