**Making a pH indicator**

* Some substances are classified as either an acid or a base. Think of acids and bases as opposites—**acids have a low pH and bases have a high pH.**
* For reference, water (a neutral) has a pH of 7 on a scale of 0–14. Scientists can tell if a substance is an acid or a base by means of an **indicator**.
* **An indicator** is typically a chemical that changes color if it comes in contact with an acid or a base.
* As you can see, the purple cabbage juice turns **red** when it mixes with something **acidic** and turns **green** when it mixes with something **basic.**
* Red cabbage juice is considered to be an indicator because it shows us something about the chemical composition of other substances.

**Materials You Will Need**

* Red cabbage
* Blender or knife
* Boiling water
* Filter paper
* One large glass beaker or another glass container
* Glasses with purple cabbage juice.
* Some drops of differents substances

**Red Cabbage pH Indicator Colors**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **pH** | 2 | 4 | 6 | 8 | 10 | 12 |
| **Color** | Red | Purple | Violet | Blue | Blue-Green | Greenish Yellow |

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* Glasses with purple cabbage juice.
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**Procedure**

1. Chop the cabbage into small pieces and you can place about 2 cups of cabbage in a blender, cover it with boiling water, and blend it.
2. Filter out the plant material to obtain a red-purple-bluish colored liquid. This liquid is at about pH 7. **This filtered juice is your pH indicator.**
3. Fill additional glasses with purple cabbage juice and add drops of that substances**:**
   1. the lemon or lime juice solution
   2. the vinegar solution
   3. baking soda
   4. Washing soda
   5. Black coffee
   6. Distilled water
   7. window cleaner
   8. Sprite
   9. fizzy wa­ter
   10. Antacids (calcium carbonate, calcium hydroxide, magnesium hydroxide)
   11. Lye (potassium hydroxide, KOH or sodium hydroxide, NaOH).

•     **Observations and results**  
Did the indicator solution change color when you added other substances?

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| --- | --- | --- | --- | --- | --- | --- |
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**A solution with a pH between**

* 5 and 7 is neutral,
* 8 or higher is a base,
* 4 or lower is an acid

Lime juice, lemon juice and vinegar are acids, so they should have turned the indicator solution red or purple color. Bleach is a strong base, therefore it should have turned the indicator solution a greenish-yellow color.

<https://www.stevespanglerscience.com/lab/experiments/red-cabbage-chemistry/>