pH Adventures

|  |
| --- |
| FRAMEWORK |
| 1. Scientific and Engineering Practices
 |
| 1. Cross-Cutting Concepts
 |
| 1. Physical Sciences
 |

|  |
| --- |
| SKILLS/OBJECTIVES |
| * Understand how pH relates to everyday life
 |
| * Use a wide array of indicators
* Demonstrate understanding of pH scale
* Understand pH and the environment
 |

|  |
| --- |
| MATERIALS |
| * Litmus Paper
 |
| * Note cards
* Markers
* Cabbage juice
* Cups-clear, small
* Small solo cups
* Baking soda
* Vinegar
* Thymol Blue/ Bromphenol Blue
* Phenolphthalein
* Yellow Indicator
* Phenol Red
* Pipettes
* pH pen
* q-tips
* Soil Test Kit
* Soil
* Marker
* Tape
* Chalk
* Soda
 |

|  |
| --- |
| NOTES: Some of the indicators are toxic when ingested. Please be careful! |

**BACKGROUND**

* What did we do last week? What is an acid? What is a base? Acids donate electrons and bases accept them
* What is a pH indicator and scale?
* Why do we think pH is important?

|  |  |
| --- | --- |
| Activity # 1 | **Alien Juice Bar**  |
| Materials | -Baking soda-Vinegar-Cabbage Juice-Plastic cups-Pipettes |
| Worksheet | Y |

* You are now the owner of an Alien Juice Bar! Instead of ordering by name, your customers order by color!
* There are four options, as shown on the menu poster
* Break up into small groups, one volunteer with each group. **Have the volunteer take four small cups, with a quarter cup of cabbage juice in the bottom. Next have students add a little of vinegar or baking soda, trying to reach the desired color**
* Cheat Sheet: Make the two purples Red and Blue, turn the red purple and blue purple again
* Ask the kids why this works! Cabbage is a neutral pH indicator solution; vinegar is an acid, and baking soda a base. Depending on the pH of the solution, the cabbage juice will change color, so we are looking at four different solutions with four different pHs!

|  |  |
| --- | --- |
| Activity # 2 | **Indicator Extravaganza**  |
| Materials | * -Thymol Blue/ Bromphenol Blue
* Phenolphthalein
* Yellow Indicator
* Phenol Red
* Pipettes
* Cups
 |
| Worksheet | Y |

* An acid-base indicator is a weak acid or a weak base.
* There are different indicators that indicate different acids and bases. Each indicator has a color range that forms a spectrum of colors. This spectrum shows a range of pHs. **Have kids guess what will happen as you place drops of the indicators into acids and bases respectively. Why would this be useful to know DO NOT LET KIDS HANDLE INDICATORS**

|  |  |
| --- | --- |
| Activity #3 | **Soil Test**  |
| Materials | * Soil
* Soil test kit
* water
 |
| Worksheet | Y |

* Did you know that soil has a pH? And different plants grow in different pHs! What is your favorite food? (SEE CHART ON BACK OF TEST KIT FOR ANSWERS
* Break into 4 groups, one for each soil kit. **Take some dirt from outside and add water and the indicator pill.** **Shake and ask the kids what could grow!**

|  |  |
| --- | --- |
| Activity # 4 | **pH of the Body** |
| Materials | * Note cards
* Marker
* Tape
* Chalk
* Soda
* Cup
* Water
 |
| Worksheet | Y |

* Chalk and Water example
* Did you know that different substances in the Human Body have pH as well? Which ones are acidic and which ones are basic?
* Give each student a name tag with one of the fluids (NOT THE NUMBER) written on the nametag: blood (7), Intercellular fluid (7), Gastric Juice (2), Small intestine juice (8), Urine (5), Saliva (6), Sweat (4), tears (6.5), Snot (7), eye (7.5)
* **Have the students try and form their own pH scale based on their substance**
* Why is Gastric Juice acidic? Why is small intestine juice basic? Why is it important that the eye and tears have similar pHs?

|  |  |
| --- | --- |
| Activity # 6 | **Name tage** |
| Materials | * pH pen
* notecards
* vinegar
* baking soda
* q-tips
 |
| Worksheet | N |

* Did you know that different substances in the Human Body have pH as well? Which ones are acidic and which ones are basic?
* Give each student a name tag with one of the fluids (NOT THE NUMBER) written on the nametag: blood (7), Intercellular fluid (7), Gastric Juice (2), Small intestine juice (8), Urine (5), Saliva (6), Sweat (4), tears (6.5), Snot (7), eye (7.5)
* **Have the students try and form their own pH scale based on their substance**
* Why is Gastric Juice acidic? Why is small intestine juice basic? Why is it important that the eye and tears have similar pHs?
* Acids kill bacteria
* Bases neutralize it because acids are bad for your body

**CONCLUSIONS**

pH is a way to measure acidity, neutrality, and basicity. There are many different substances that measure and compare pHs. pH is important for not only every day life, like soap, shampoo, and soda, but also in the body!