SCIENCE 10  
8.L: Acids, Bases, and pH

**Materials**:

* 1 M HCl solution
* 1 M NaOH solution
* spot plate
* phenolphthalein
* methyl orange
* bromothymol blue
* red & blue litmus
* universal indicator
* “unknown” solution
* various household chemicals

**Safety**:

* Put on your lab coat and safety goggles before starting!
* Be very careful around acids and bases! They are corrosive compounds and will badly burn any skin that touches them.

**Report**:

When you are finished, write up your findings into a neatly typed or written lab report with the following sections as headings:

* Name, Date, & Block
* Title (Acids, Bases, and pH)
* Purpose (Why? What did you do and what did you hope to learn from it?)
* Methods (Write, “See lab procedures.”)
* Results (Table A and Table B.)
* Discussion (Answer the questions below.)
  1. Is your unknown an acid or a base? How do you know?
  2. Arrange your household chemicals from most acidic to least acidic. Include pH.
  3. Arrange your household chemicals from most basic to least basic. Include pH.
  4. Explain how pH is related to the amount of H+ ions in solution.
  5. How does a solution of pH 3 compare to pure water in terms of acidity?
  6. Do your own research to find out if there are any naturally occurring chemical indicators. Write down at least two.

**Marking Checklist**:

|  |  |
| --- | --- |
| Content  (20 points) | Table A completed with both HCl and NaOH (5)  Table B completed with each household chemical and the unknown (5)   Discussion questions answered thoughtfully (10) |
| Presentation  (10points) | Title, Purpose, Methods, Results, and Discussion sections present (2)  Each section contains all required information (3)  Effort, including neatness & general quality (5) |

Total: 30 points

**Procedure**:

Part A: Testing Known Solutions

1. Copy down Table A into your notebook:

Table A

|  |  |  |
| --- | --- | --- |
| **Indicator** | **HCl Solution** | **NaOH Solution** |
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|  |  |  |
|  |  |  |
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|  |  |  |
| **pH** |  |  |

1. Place a few drops of the acid (HCl) solution into 6 separate wells in the spot plate.
2. Place two drops of **EACH** indicator (methyl orange, bromothymol blue, and phenolphthalein) into the first 3 wells, separately. Record your observations in Table A.
3. Place a **HALF** strip of red litmus paper into well 4 and a **HALF** strip of blue litmus paper into well 5. Record your observations in Table A.
4. Use the universal indicator in the last well and record your observations. Also estimate the approximate pH of the HCl solution by using the colour chart.
5. Repeat Steps 2-5 for the basic solution (NaOH).

Part B: Testing Unknown Solutions

1. Copy down Table B into your notebook:

Table B

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Indicator** |  |  |  |  |  | **Unknown** |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |
| pH |  |  |  |  |  |  |

1. Test each of the household chemicals you have available by performing Steps 2-5 from Part A on them. Fill in the name of the household chemical and record all of your observations in Table B.
2. Do the same for the unknown solution. Record your observations and whether you believe it is an acid or a base.
3. Clean up the station when you are done and wash your hands! Stay safe! Be cool!