

## ACID AND BASE STRENGTH

### Extra Credit (10 Points)

#### PURPOSE:

1. To distinguish between acids, bases and neutral substances, by observing their effect on some common indicators.
2. To distinguish between strong and weak acids and bases, by conductivity testing.
3. To identify an unknown, as an acid (strong or weak), a base (strong or weak) or a neutral substance.

#### PROCEDURE:

You will determine the conductance and the effect on indicators (Red litmus paper, Blue Litmus paper, and phenolphthalein) of a set of 10 substances and an unknown identified by a number. From the data you gather you will be able to determine: the electrolyte character, the formula of the predominant species in solution and the acidic, basic, or neutral character of the solution.

If the solution is acidic or basic, you will be able to determine if the acid or the base is strong or weak.

All your aqueous solutions (including your unknown) have the same concentration: 0.1 M  
The formulas and the names of your solutions are listed below:

HC <sub>2</sub> H <sub>3</sub> O <sub>2</sub> (aq)	acetic acid	HNO <sub>3</sub> (aq)	nitric acid
D.I. H <sub>2</sub> O	deionized water	NH <sub>3</sub> (aq)	aqueous ammonia
NaOH(aq)	sodium hydroxide	KOH(aq)	potassium hydroxide
NaCl(aq)	sodium chloride	HC <sub>3</sub> H <sub>5</sub> O <sub>3</sub> (aq)	lactic acid
HCl(aq)	hydrochloric acid		

There are several stations set-up in the lab. All stations have some of the solutions available for testing. You may start working at any station and may go from station to station, in any order depending on availability.

As you move from station to station:

- DO:**
- take with you:
    - your own Chemplate (rinse very well between tests)
    - a 250 mL beaker with D.I. water, and
    - your own wash bottle, containing D.I. water
  - check if the electrodes are clean before testing (D.I. water t
  - rinse the electrodes very well after testing.

- DO NOT:**
- remove reagents from stations
  - leave reagent bottles open
  - switch droppers from dropper bottles
  - remove or disconnect the conductivity apparatus

You will do the experiment with a partner. However the unknown will be assigned to you individually.

Do not forget the report your unknown number in your lab notebook and on your Report Form.

At each station, you will perform the following tests:

1. Conductance testing

Check if the electrodes are clean (D.I. water test should give negative test).

Fill one depression of the Chemplate with 30 drops of the solution to be tested.

Perform the conductance test as it was done in a previous experiment.

Record the result

Do not discard the test solution.

For the tests that follow use a sheet of white paper as a background to better distinguish the color changes.

2. Red Litmus Paper Test

Immerse the strip of “red” (actually pink) litmus paper in the solution you are testing.

Remove the strip and examine its color.

You may obtain two possible results:

(a) The “red” litmus paper turns blue (actually faint lavender), or

(b) The “red” litmus paper stays “red”; indicate “NO CHANGE” in your lab notebook.

(c) Do not discard the test solution.

(d) Discard the used litmus paper in the trashcan.

3. Blue Litmus Paper Test

Immerse the strip of “blue” (actually faint lavender) litmus paper in the solution you are testing.

Remove the strip and examine its color.

You may obtain two possible results:

(a) The “blue” litmus paper turns “red” (actually faint lavender), or

(b) The “blue” litmus paper stays “blue”; indicate “NO CHANGE” in your lab notebook.

(c) Do not discard the test solution

(d) Discard the used litmus paper in the trashcan.

4. Phenolphthalein Test

Place a sheet of white paper underneath the Chemplate, as a background.

Add 2 drops of phenolphthalein solution to the test solution.

Note any color change. If the solution remain colorless, so indicate.

Discard your test solution

Wash your Chemplate with plenty of tap water.

Rinse your Chemplate with D.I. water from your wash bottle.

ACID-BASE STRENGTH  
REPORT FORM

NAME: \_\_\_\_\_

PARTNER: \_\_\_\_\_

		Conductance (+, +/-, or -)	Electrolyte Character (SE, WE or NE)	Color with Red Litmus paper*	Color with Blue Litmus paper**	Color with phenolphthalein solution	Formula of predominant particles	Acid, Base or Neutral***	Strong or Weak
	1. HC <sub>2</sub> H <sub>3</sub> O <sub>2</sub> , 0.1M								
PART	2. D.I. H <sub>2</sub> O								
I	3. NaOH, 0.1 M								
	4. NaCl, 0.1 M								
	5. HCl, 0.1 M								
PART	6. HNO <sub>3</sub> , 0.1 M								
II	7. NH <sub>3</sub> , 0.1 M								
	8. KOH, 0.1 M								
PART	9. HC <sub>3</sub> H <sub>5</sub> O <sub>3</sub> , 0.1 M								
III	10. Unknown # _____								

\* The original color of "Red" Litmus paper is actually Pink.

- If its color does not change, report : N.C. (No Change)

- If its color changes to faint lavender, report "Blue"

\*\* The original color of "Blue" Litmus paper is actually Faint Lavender

- If its color does not change, report : N.C. (No Change)

- If its color changes to Pink, report "Red"

\*\*\* If the solution is neutral, do not complete the last column (Strong or Weak)