

Chemistry 12

Lab 20B Brønsted-Lowry Acid and Base Equilibria

NAME _____

Partner _____

DATE _____ BLOCK _____

Pre-Lab Questions:

1. Give the definition for a Brønsted-Lowry acid.

2. How does the Brønsted-Lowry definition of an acid include the Arrhenius definition for an acid?

3. What special property of acid/base indicators make them useful in acid/base experiments?

4. What is the difference between the acid and base of a conjugate acid/base pair?

5. What is the conjugate base of the bisulfate ion (HSO_4^-)?

6. What is the conjugate acid of the bisulfate ion?

Experimental Procedure:

Careful kiddies!!! This lab is a little tricky! The actual procedure of the lab is quite straight-forward but the interpretation of the data is a wee bit nasty. Good luck!

Follow the instructions as given on page 234 of the lab book.

You **must read** and **understand** the Post Lab Discussion on page 234 in order to interpret the results.

The acids (HA_x) and indicators (HIn_x) below are written in the data table as conjugate acid / base pairs.

For example the conjugate acid / base pair for the first acid is acid = HA_1 base = A_1^-

In each box simply identify the colour observed for the mixture of acid and indicator.

Table 1

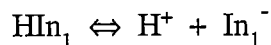
	HIn_1 / In_1^-	HIn_2 / In_2^-	HIn_3 / In_3^-	HIn_4 / In_4^-	HIn_5 / In_5^-
HCl					
NaOH					
HA_1 / A_1^-					
HA_2 / A_2^-					
HA_3 / A_3^-					
HA_4 / A_4^-					
HA_5 / A_5^-					
HA_6 / A_6^-					

1. What is the purpose of using HCl and NaOH in the above tests?

HCl _____

NaOH _____

2. If HCl is the strongest acid of the above series of acids and indicators, what will the presence of HCl do in the presence of indicator-1 (HIn_1 / In_1^-)? In other words, in which direction will the presence of HCl force the equilibrium of indicator-1?



3. From the above data table, any "stronger" acid will cause any "weaker" indicator to show which of its colors - acid or base?

1. The indicators listed below are the ones used in this experiment. Look in Appendix 4 at the back of the lab book to identify the pH range over which the following indicators work.

bromocresol green _____

bromthymol blue _____

indigo carmine _____

orange IV _____

phenolphthalein _____

2. From the pH ranges listed in question #1, identify each of the indicators with the notation used in the experiment ($\text{HIn}_1 - \text{HIn}_5$).

HIn_1 _____

HIn_2 _____

HIn_3 _____

HIn_4 _____

HIn_5 _____

3. The pH values of each of the acids used in the lab ($\text{HA}_1 - \text{HA}_6$) were all whole number values. Try to work out the pH of each unknown acid solution from the pH's of the indicators in questions #1 and #2 above. If you can't work out the pH to a single whole number, you should be able to narrow it down to a small range of 2 whole numbers.

HA_1 _____

HA_2 _____

HA_3 _____

HA_4 _____

HA_5 _____

HA_6 _____