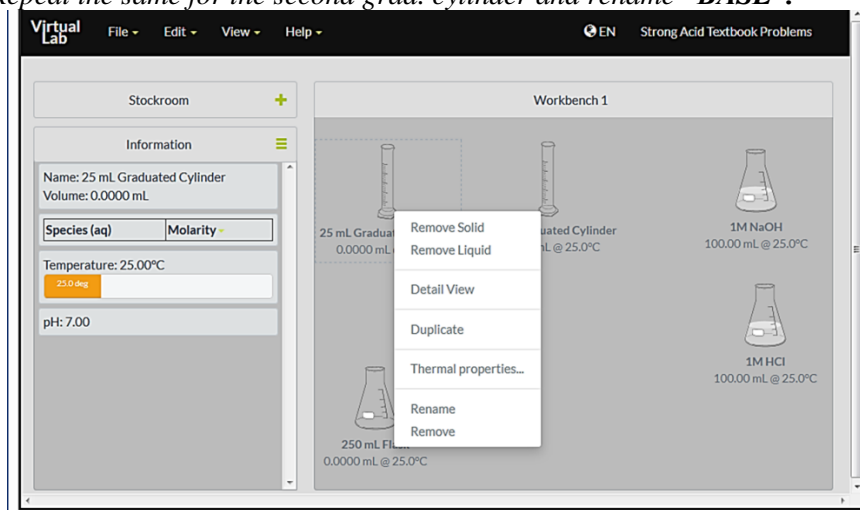


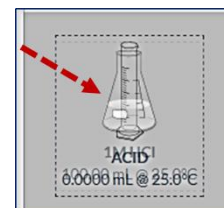
## Qualitative Assessment of BSN Student Responses to an Online Lab Exercise: Urinalysis, pH and Molarity

### EXPERIMENTAL PROCEDURES

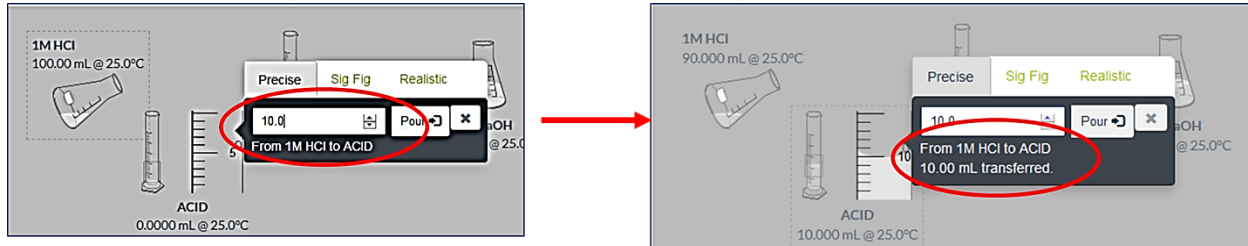
- Access Course Specific Virtual Lab Site (using Laptop or Tablet)
- Open “Strong Acids & Bases” Lab Module.
- From the left pane locate the “STOCKROOM” tab.
- Add TWO (2) 10mL Graduated Cylinders [located under Glassware] to your “lab bench” by clicking the following tabs: **Stockroom** > **Glassware** > **Graduated Cylinders** > **25mL graduated cylinder** --- complete this step Twice (to add 2).
- Add ONE (1) 250mL Erlenmeyer [located under Glassware] to your “lab bench” by clicking the following tabs: **Stockroom** > **Glassware** > **Erlenmeyers** > **250mL flask**.
- Add STRONG ACID to your bench top: For example, first add the 1M HCl (“1 molar hydrochloric acid”) by clicking the following tabs: **Stockroom** > **Solutions** > **Strong Acids** > **1M HCl**
- Add STRONG BASE to your bench top: For example, first add the 1M NaOH (“1 molar sodium hydroxide”) by clicking the following tabs: **Stockroom** > **Solutions** > **Strong Acids** > **1M NaOH**.
- 8. LABEL each graduated cylinder: Right click the cylinder, select “Rename” and type “ACID”. Repeat the same for the second grad. cylinder and rename “BASE”.



- Add 10.00 mL of 1 M HCl to the graduated cylinder labelled “ACID”: drag the 1M HCl solution flask onto the “ACID” graduated cylinder – make sure the flask hovers on the graduated cylinder... when prompted add 10.00 mL of the acid by typing in “10.00”, under the “precise” tab and click “pour” and “x” out when done. Volume window will note: “From 1M HCl to ACID 10.00mL transferred”
- REPEAT step #9 for adding BASE (1M NaOH). pH is noted on left pane.



- **\*\*By clicking on the “ACID” and “BASE” graduated cylinders (containing the 1M HCl and 1M NaOH) you can see the pH values for both, located on the left pane.**



- **ADD 10.00 mL of “ACID” to the empty 250 mL Erlenmeyer flask you selected from the STOCKROOM (in step #5).** Same as steps #6-7, hover “ACID” graduated cylinder over empty Erlenmeyer flask. When prompted, under the “precise” tab of the volume transfer window add 10.00 mL of “ACID” and “x” out. **Now, remove the 1M HCl and 1M NaOH flasks by right clicking and selecting REMOVE.** This will make room for more solutions to be added to the Virtual Lab Bench. **-\*HOW MANY MOLES of HCl is in the Erlenmeyer flask?**

- **CONSIDER: WHAT IS THE pH of the ACID (see the pH noted on left pane)?**

- **SELECT the “Methyl Orange” pH INDICATOR: Stockroom > Solutions > Indicators > “Methyl Orange”.** Add 0.50 mL of “Methyl Orange” to the Erlenmeyer flask containing the 10.00 mL of 1M HCl (see steps #5-6).



- **CONSIDER: WHAT COLOR is the 1M HCl solution upon adding the Methyl orange indicator?**

- **ADD 10.00 mL of “BASE” to the empty 250 mL Erlenmeyer flask you selected from the STOCKROOM (in step #5).** Same as steps #6-7, hover “BASE” graduated cylinder over empty Erlenmeyer flask. When prompted, under the “precise” tab of the volume transfer window add 10.00 mL of “ACID” and “x” out. **Now, remove the 1M HCl and 1M NaOH flasks by right clicking and selecting REMOVE.** This will make room for more solutions to be added to the Virtual Lab Bench.

- **CONSIDER: HOW MANY MOLES of NaOH is in the Erlenmeyer flask?**
- **WHAT COLOR IS THE (NEW) 20.00mL ACID-BASE SOLUTION?**
- **WHAT IS THE pH of the ACID-BASE (see the pH noted on left pane)?**
- **WHAT does this tell you about the use of “pH indicators” and “qualitatively” determining pH values of acid-base solutions?**

- **Repeat Steps #6-12 (note the same questions) for the following STRONG ACIDS, WEAK ACIDS, STRONG BASES and WEAK BASES sets – with selected pH indicators. See Procedure Chart (below).**

ACID	BASE	VOLUME	pH INDICATOR
1M HCl (STRONG ACID)	1M NaOH (STRONG BASE)	10.00 mL (each)	Methyl Orange (0.50 mL)
1M H <sub>2</sub> SO <sub>4</sub> , Sulfuric Acid (STRONG ACID)	3M NaOH	10.00 mL	Phenolphthalein (2.00 mL)
3M HNO <sub>3</sub> , Nitric Acid (STRONG ACID)	1M NaOH ( <b>This STEP ONLY! ADD BASE FIRST to Erlenmeyer, then pH indicator and ACID last. Note the change in color.</b> )	10.00 mL	Bromocresol Green (0.50 mL)
1M H <sub>3</sub> PO <sub>4</sub> , Phosphoric Acid (Weak Acid)	1M NaOH	10.00 mL	Methyl Red (0.50 mL)
1M CH <sub>3</sub> COOH, Acetic Acid (Weak Acid)	1M NaOH	10.00 mL	Methyl Orange (0.50 mL)
1M CH <sub>3</sub> COOH, Acetic Acid (Weak Acid)	1M NH <sub>3</sub> (WEAK BASE)	1. 10.00 mL (each) (any color change?) 2. Now try: 10.00 mL of ACID and 15.00 mL of BASE (any color change?)	Phenolphthalein (2.00 mL)

- Complete Steps 1-13 for all SIX Acid-Base Reactions. You can split the 6 experimental reactions with a partner.
- The last procedure has TWO Parts.
- Take notes during procedures, to aide in answering Post-Lab Questions.
- Answer Post-Lab Questions in Course LMS
- Complete Lab Report and submit using LMS.