

LEGOLAS Chemistry Guide*

***For Henderson-Hasselbalch Experiment**

Items Needed

- Glacial Acetic Acid (*> 100 mL* recommended for multiple experiments*)
- Sodium Acetate Anhydrous (*> 80 g**)
- Deionized Water (*5-10 L**)
- Extra pH storage solution (*1 M KCl*)
 - Alternatively, you can make the solution, in which case you need KCl Salt (*>10 g**)
- Chemistry Equipment
 - Graduated Cylinder
 - Paper or Plastic Funnel (*for pouring salts into mixing containers*)
 - Digital Scale (*mg accuracy*)
 - 1 mL Syringes
 - 50 – 400 mL glassware with screw on/off tops (*for holding solutions*)

**recommended for ~2 L of both acid and base (20 reservoirs full)*

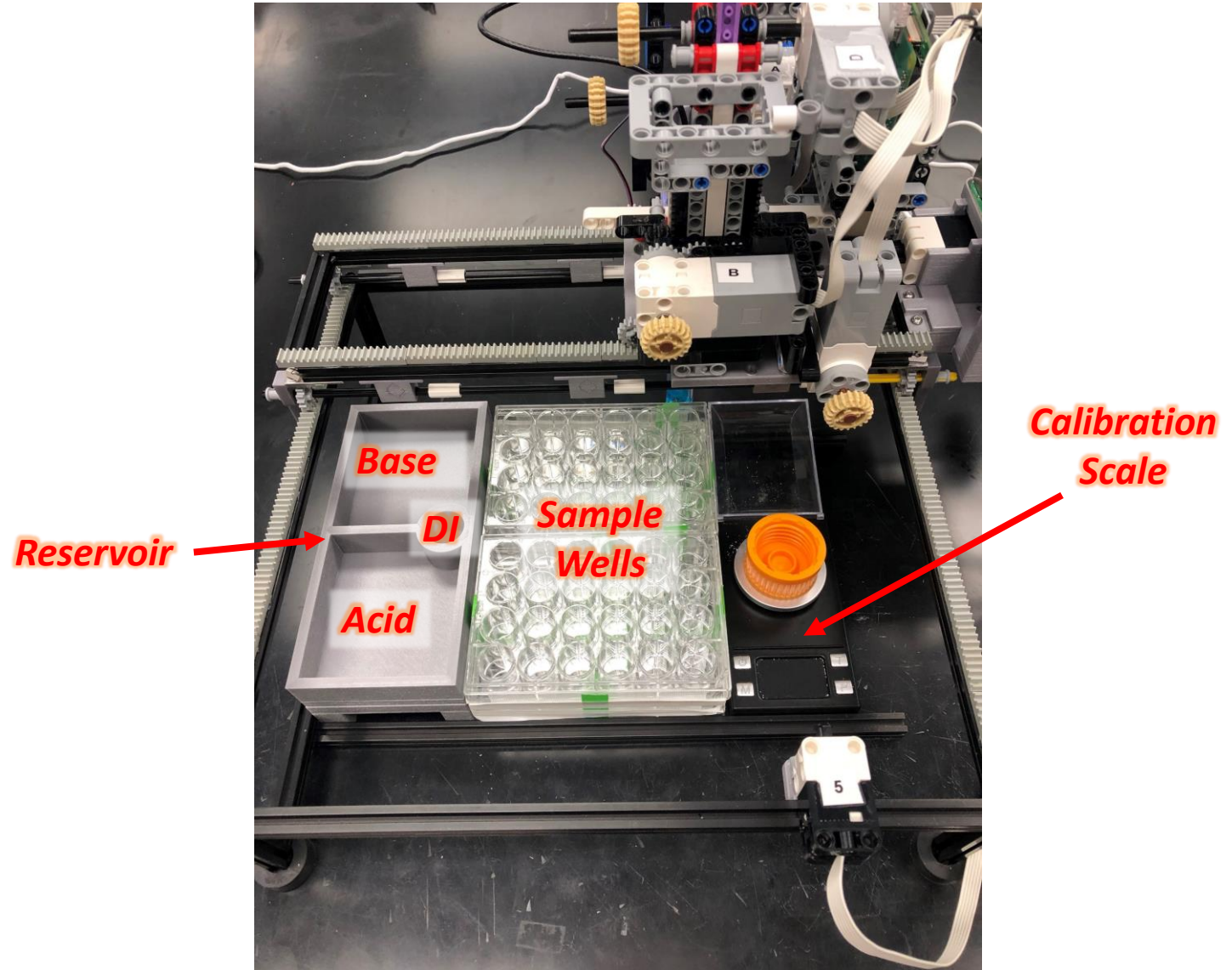
1. Solution Preparation Guide

This is a guide for creating ~50 mL of each solution. The amounts can be scaled up for larger batches.

Solution	DI Water Volume	Active Chemical Amount	Tips
[1M] Acetic Aid	50 mL	3 mL Glacial Acetic Acid	Use syringe (acid) and graduated cylinder (water). Mix well in container and keep lid shut until time of experiment.
[1M] Acetate Base	50 mL	4300 mg Sodium Acetate Anhydrous	Use mg scale and graduated cylinder. Mix well in container and keep lid shut until time of experiment. Do not transfer base to reservoirs via syringe.
[1M] KCl (pH Storage)	50 mL	3727 mg KCl Salt	Use mg scale and graduated cylinder. Mix well in container and use to refill pH storage caps when needed.

2. Setting up the Sample Space

Manually move the trolley and bridge so that the pH sensor is out of the sample space area. Slide the Reservoir Stand and Tanks in between the sample space guide extrusions, adjusting their width if necessary to keep the reservoir tightly clamped and stationary. Next, slide the sample wells in as shown, and lastly place the scale. This scale will be used to calibrate the volume the syringe is able to pick up using the LEGO motor controls.



3. Implementation Tips

Each Reservoir Tank (*left*) holds 50 mL of either Acid / Base solution when completely full. To avoid changes in pH due to exposure to air, experimental solutions should only be dispensed into the reservoir tanks immediately prior to the execution of an autonomous loop. Do not use a syringe to dispense the liquids from their containers into the reservoirs. These reservoirs can be refilled during an experiment if necessary (they hold enough to create 50 2 mL samples). It is also recommended to use an epoxy coating (right) on the inside of the reservoir tanks, where they contact the solution. This prevents any absorbance of the solution by the PLA since it is prone to swelling and allowing leaks between FDM layer lines

