

Conductivity of Strong & Weak Acids

Preparer's Version

Introduction

This demonstration visually illustrates the extent of acid dissociation by comparing the conductivity of deionized water, 1 M acetic acid, and 1 M hydrochloric acid. Conductivity depends on the concentration and mobility of ions, which allow electric current to pass through the solution and can be detected by a glowing bulb, digital meter, or visible electrode reaction.

Safety Hazards

- Personal Protective Equipment:
 - Safety glasses/goggles
 - Nitrile gloves
 - Neoprene gloves
 - Chemical & flame retardant lab coat
- Physical Hazards
 - Exposed wiring carries live current and can deliver a hazardous shock if touched while the circuit is powered. Extreme caution must be taken when opening or modifying the circuit to prevent accidental contact with energized components.
- Chemical Hazards
 - Hydrochloric acid is corrosive, may cause eye and skin damage; irritant, may cause severe respiratory irritation.
 - Acetic acid causes severe skin burns and eye damage.

Materials

- 3x 250mL glass beakers
- Lightbulb apparatus
- Extension cord/surge protector
- Deadman switch
- 100mL 1M Hydrochloric acid
- 100mL 1M Acetic acid
- 100mL deionized water
- DI water spray bottle
- Polypad
- Paper towels

Safety Data Sheet(s)

- [Hydrochloric acid](#)
- [Acetic acid](#)



Procedure

1. Measure 91.67mL deionized water. Measure 8.33mL of 12M (12N) Hydrochloric acid, and add it to the deionized water. *Remember to always add acid to water, not water to acid!*
2. Measure 94.25mL deionized water. Measure 5.75mL of 17.4M (glacial) acetic acid, and add it to the deionized water. *Remember to always add acid to water, not water to acid!*
3. Measure 100mL of deionized water.
4. On a large polypad mat, place three clearly labeled beakers down, leaving ample room in between. Set the roll of paper towels and DI water spray bottle to the side.
5. Plug the extension cord/surge protector in, and turn it on and back off again to ensure that it's working. *Keep the surge protector turned off while setting up the demonstration.*
6. Plug the Deadman switch into the extension cord/surge protector.
7. Plug the lightbulb apparatus into the Deadman switch.
8. Make sure that the wires are pulled through the rubber stopper enough that they will reach the level of solution in each of the beakers.
9. Pour the three solutions into their respective beakers: 100mL deionized water, 100mL 1M acetic acid, and 100mL 1M hydrochloric acid.

Tips & Tricks

- The suggested order is as follows: DI water (no light), 1M acetic acid (mild light – it may take a moment to warm up the filament), and finally 1M hydrochloric acid.
- Turn the lights off for optimal visibility!

Clean-Up Procedures

1. Neutralize the solution using weak acid/weak base.
 - a. When the solution is acidic, you can use either dilute sodium hydroxide (0.01M or 0.1M works well, but be careful not to overshoot) or baking soda.
2. Pour into an acid/base waste stream with other compatible substances.
3. Rinse the labware thoroughly with deionized water at least three times, emptying the runoff into the waste stream.
4. Clean thoroughly with laboratory detergent.