

Name: _____

Charge and Current Lab Activity SPH4C

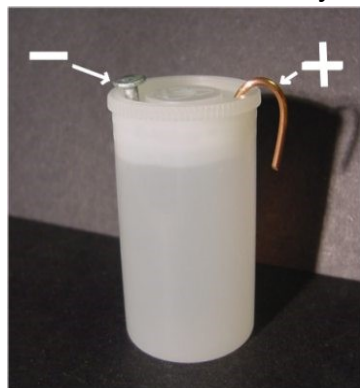
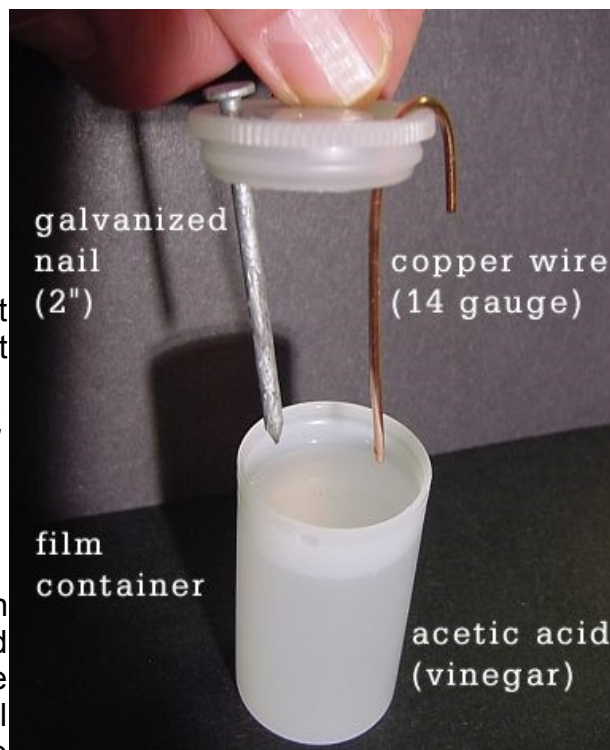
Part 1: Build a Simple Voltaic Cell (Battery)

Materials: Film canister
Galvanized (zinc-coated) nail
Copper wire
Vinegar (acetic acid)
Voltmeter with electrical leads

Construct your battery as shown in the photo at right. Put the lid on the film container and connect a voltmeter to the nail and to the copper wire. *(If you are not getting a reading on the voltmeter, reverse your connections.)*

What is the voltage of your battery? _____

When a battery is connected, a chemical reaction at one electrode (a metal end) creates ions and another chemical reaction at the other electrode (the other metal end) absorbs them. The material that conducts the ions from one electrode to the other inside the battery is called the electrolyte.



Which part of your battery is the negative electrode (the anode)?

Which part of your battery is the positive electrode (the cathode)?

Which part of your battery is the electrolyte? _____

Extension: Note that current can only flow when the electrodes are connected, supplying a return path for the charges, i.e., a complete circuit. You are capable of being that return path:

Hold a 9 V battery in your hand with the terminals facing up. Touch your tongue to both terminals for no more than a second. Your saliva will provide the pathway to complete the circuit and a current will flow. Current flowing through your body is the definition of an **electric shock**. You can taste the shock because it stimulates the nerve receptors in your tongue. It is the disruptions to the electrical signals of the nervous system, including those that control your heartbeat, that make electrical shocks so dangerous.



Part 2: More Fun with Electric Shocks

Stand on the insulating platform and place your hand on the large collector sphere of the Van De Graaff generator. Turn the generator on. The collector sphere will build up a large static charge, some of which will be transferred to you.

Describe the sensation: _____

Why don't you receive a shock? _____

Turn off the generator and discharge the collector sphere as directed by your teacher before removing your hand.

Place the discharge wand in the ground slot, bend it so that it is close to the large collector sphere, and turn the generator on again. Describe what you see and hear:



This is called an **electric arc** and is a **discharge** of the static electricity: the potential difference between the collector sphere and the ground becomes large enough that it can pull the electrons off the atoms in the air, creating a pathway of free electrons that can carry the charge to ground.

Extension: Repeat, holding the discharge wand yourself and not standing on the insulating platform. You are now the path to ground. (Do not allow the collector sphere to build a large charge before discharging.) Repeat while standing on the insulating platform and holding the hand of someone who is not. (This is sometimes called the “chain of pain” and works best when the person at the end of the chain touches a metal object connected to ground such as a metal doorknob.)

