

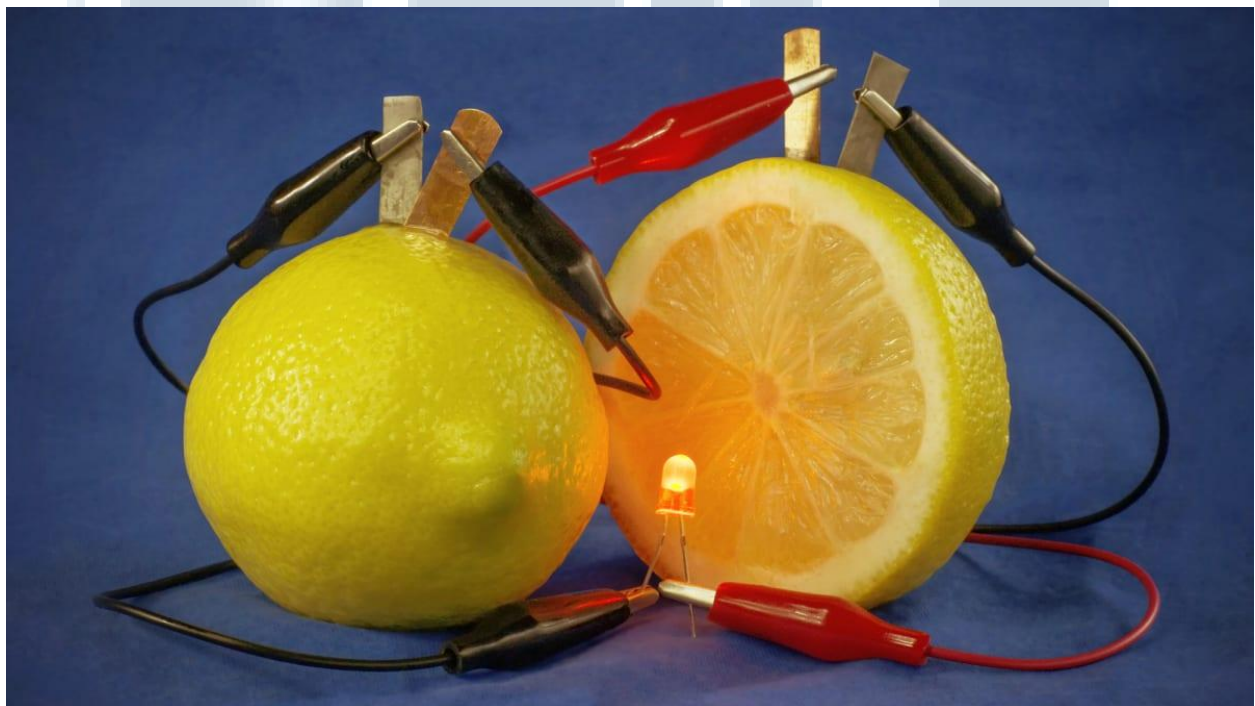


THE NILE EXPLORER BUS  
STEM COMPONENT: INVESTIGATION & EXPERIMENTATION

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# DEMONSTRATION OF LEMON BATTERY EXPERIMENT

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In this activity, students will experiment with Lemon and light bulbs to learn that Power generated by the reaction of the metals is used to power a small device such as a light-emitting diode (LED).

<b>Category: STEM</b>	<b>Mode of Learning:</b> Hands-on group activity	<b>Age Group:</b> 13-19 years old	<b>Number of Learners Required:</b> 3-15
Goals:	<ul style="list-style-type: none"> <li>• Learners will be able to build a simple circuit</li> <li>• Learners will know that a lemon can be used to generate electricity</li> <li>• Learners will practice teamwork</li> <li>• Learners will be able to use a voltmeter</li> </ul>		
Materials Needed:	<ul style="list-style-type: none"> <li>• Electricity and magnetism lab kit</li> <li>• Lemons</li> </ul>		
<b>Time Duration: 1 Hour</b>			
Duration: 10 minutes	Duration: 20 minutes	Duration: 20 minutes	Duration: 10 minutes
<b>Instructor's activity:</b>  Group the learners in their working teams. Distribute the kits to the teams. Review the contents of the kit with learners.	<b>Instructor's activity:</b>  Demonstrate what should be done and have learners imitate you  a) Rolling lemon on the table b) Inserting copper and zinc strips in the lemon. c) Connecting a wire to each electrode d) Connecting to the LED	<b>Instructor's activity:</b>  Guide learners to use a voltmeter to check the voltage between the two electrodes	<b>Instructor's activity:</b>  Ask learners to share about the experience.  Ensure that learners throw away the lemons and know that they should not eat them

<p><b>Learners' Activity:</b></p> <p>Learners get in their groups</p> <p>Learners will receive kits and study the contents</p>	<p><b>Learners' Activity:</b></p> <p>Learners will observe and imitate what the teacher is doing</p> <p><b>** More than one lemon may be needed to light the LED</b></p> <p><b>** The LED needs to be connected in the right direction so change its connection (the legs) if it doesn't light with 4 lemons.</b></p>	<p><b>Learners' Activity:</b></p> <p>Learners will use the voltmeter to measure the amount of voltage in the system.</p>	<p><b>Learners' Activity:</b></p> <p>Learners will share their experience</p> <p>Learners will throw away the lemons and clean up</p>
<p><b>Explanation</b></p>	<p>Power generated by the reaction of the metals is used to power a small device such as a light-emitting diode (LED). The lemon battery is similar to the first electrical battery invented in 1800 by Alessandro Volta, who used brine (saltwater) instead of lemon juice.</p> <p>The lemon battery illustrates the type of chemical reaction (oxidation-reduction) that occurs in batteries. The zinc and copper are called the electrodes, and the juice inside the lemon is called the electrolyte.</p> <p>There are many variations of the lemon cell that use different fruits (or liquids) as electrolytes and metals other than zinc and copper as electrodes</p> <p><b>Caution: **Always connect the copper strip to a zinc strip of the next lemon and not zinc to zinc or copper to copper.</b></p>		