

# Record of a risk assessment

## Task: Custard rocket kit assembly and use

This is an open-ended task suitable for STEM clubs or as a demonstration aid. These mini-rockets have been used with a variety of audience's from primary to A level STEM students.

**There is a requirement for close supervision with the younger age groups and a recommendation that safety spectacles are worn when launching the mini-rockets.**

It is anticipated that you perform your own risk assessment appropriate to the specific age range, and space available.

### Kit contents



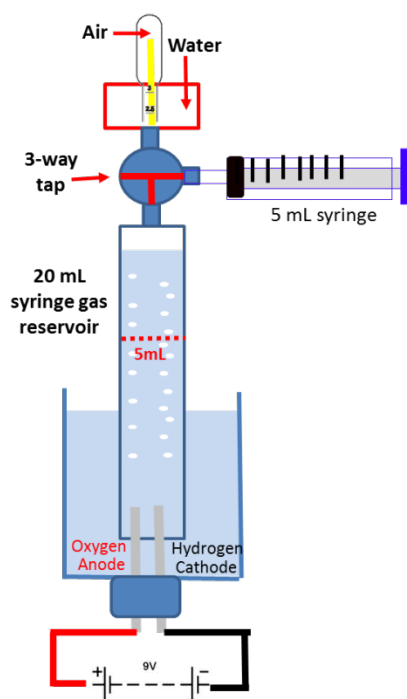
- 20g citrate buffer mixture
- 9V battery and clip
- Electrode assembly blue bottle top 2x2mm ss screws
- 20ml Leur lock syringe (cut down)
- 5ml Leur lock syringe
- 1ml Leur lock syringe
- Three way syringe tap
- Fuelling station – red bottle top with blunted syringe needle
- Launching station – 10ml syringe with needle and wire attached
- Igniter – 5ml syringe disposable lighter piezo unit insulated crocodile clips

### Outline of procedure

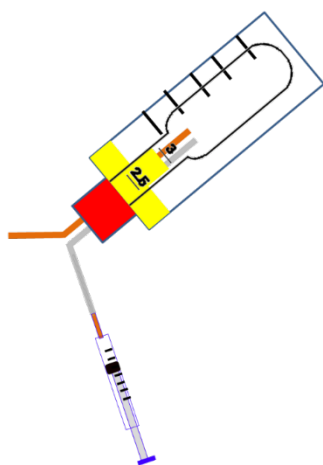
Students can explore various experiential variables to optimise the distance travelled by a mini-rocket; they can travel in excess of 8m. These mini-rockets are constructed from readily available 3mL plastic pipettes. They are fuelled by a 2:1 mixture of hydrogen and oxygen generated by electrolysis of water, using citrate buffer as an electrolyte.

Fuel is transferred from the electrolysis cell to the mini rocket.

They can then be launched in a safe area by the application of a spark from the piezoelectric spark generator (provided).

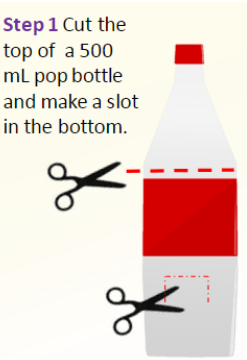



**Electrolysis cell**



**Mini-rocket launcher**

Department	Chemistry	Assessment ID	Date
Assessor	John Baum	Date of assessment	Jan 2019
Authorised by		Review date	Jan 2021

<b>Step 1</b> List significant hazards	<b>Step 2</b> Who might be harmed	<b>Step 3</b> Determine appropriate controls	<b>Step 4</b> Make it happen
<p>Assembly of electrolysis cell involves the use of sharp scissors and an associated risks</p> 	<p><b>Anyone assembling the electrolysis cell</b></p>	<p><b>The kit does contain some sharp elements</b></p> <p>It does involve the use of sharp scissors and two components have blunted syringe needles in place.</p> <p>The electrodes are small 2mm ss self-tapping screws which do extend beyond the bottle cap.</p> <p>We recommend that you pre-prepare the electrolysis cell for younger pupils.</p>	<p><b>Staff leading the activity to ensure risk assessments / COSHH assessments are undertaken and suitable controls put in place in line with your schools policies.</b></p> <p><b>This information is as a guide for you own RA to be performed suitable for the age range and circumstances of the activity.</b></p>
<p><b>Preparing the electrolyte</b></p> <p>The electrolyte components (citric acid and trisodium citrate) are pre-weighed and need to be dissolved in approximately 200 mL water the resultant citrate buffer (0.45M) solution is a low hazard material suitable for use by year 7.</p>	<p><b>Anyone preparing the electrolyte</b></p> <p><b>Possible spillage</b></p>	<p><b>Pre-prepare electrolyte solution for younger age range</b></p> <p>Citric acid buffer solutions</p> <p><b>CLEAPSS Hazard 36C</b></p> <p>Solids are an irritant (gloves)</p>  <p>Solution low hazard and any spill can be absorbed onto tissue and disposed of as solid waste.</p> <p>Electrolyte can be disposed of to the foul waste (sink).</p>	
<p>Launching the rocket</p> <p>The rockets are low mass 3 mL plastic pipettes so do not represent a significant physical hazard</p>	<p><b>People launching the rocket and observers</b></p>	<p>Tape off an area ca 10 m (rockets can go over 8 m).</p> <p>To prevent unauthorised launches</p>	

<p>The fuel in the rocket is ignited with a piezo electric spark generator (this is a repurposed lighter piezo unit) and will give a small shock if activated whilst holding the exposed crocodile clips.</p>		<p>When I perform this activity, I keep the piezo electric launchers in this area and transport the prepared rockets to the area.</p> <p>There is a potential for slip hazard from ejector liquid building up in the launch area.</p> <p>The 50% custard water mix does dry quite quickly to a powder and can be swept up. If alternative ejector fluids are chosen you may wish to cover the floor with a suitable absorbent ( I have used brown paper)</p>	
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