

Demonstration Risk Assessment Form

**SCIENCE IN SCHOOLS- WE'VE GOT THE POWER**  
**APRIL 2021- COVID MEASURES**

Please note this document is to be read alongside The Full Risk Assessment for the We've Got the Power Show

The follow demonstrations from that stated document will need adaptations:

1. Infrared 'Ray' Gun
2. Solar Panel Explainer
3. Leyden Jar
4. Electroball 3000 Explainer and Pass Around
5. Voltaic Pile
6. Igniting Hydrox Bubbles with E-match using Electroball 3000

Likelihood		Severity of impact		Current risk
Certain	5	Death or total destruction	5	<b>Multiply Likelihood and Severity of impact to get Current Risk rating</b>
High	4	Major injury or damage	4	
Medium	3	Serious injury or damage	3	
Low	2	Minor injury or damage	2	
Very low	1	Negligible	1	

Action Rating	
10 and above	The work is too dangerous and should not be undertaken
8 or 9	The work is high risk. Those undertaking the work must be fully competent and experienced for the type of work, equipment to be used and fully understand all risks present.
5 or 6	Moderate risk Workers must be fully competent for the type of work and risks present, or under competent supervision.
4	Low risk. Those undertaking the work must be aware or be made aware of the risks and mitigation measures required.
2 or 3	Slight risk. Those undertaking the work should be aware or be made aware of the risks and mitigation measures required.
1	Insignificant risk. Activity suitable for all workers

**Risk assessed by:** Fran Scott  
**Date of last review:** 22/04/2021  
**Review date:** 21/04/2022

**GENERAL COVID MEASURES:**

Those at risk (please tick)	Ri Staff	On-Stage Volunteers	Audience	Non-Ri Workers	Others
	Y	Y	Y	Y	Y

Method Statement	Hazards	Mitigation	Likelihood	Severity of impact	Current Risk
<p><b>In light of COVID-19 extra precautions will be taken to ensure that Ri Science in Schools does not contribute to the spreading of the virus. The measures are detailed here.</b></p>	COVID Infection	<p>It is of prime importance that we protect both your school and our presenters from potential COVID infection. Firstly our presenters will wear masks whilst moving throughout the school building. They will take them off to perform.</p> <p>The presenters will strictly follow the latest guidelines in place at the time. And any addition rules followed within your school building.</p> <p>We will provide the presenter with gloves, virus-grade sanitiser and a mask.</p> <p>If they experience any of symptoms of COVID-19 they will not enter the school building.</p> <p>Tables used in the show will be sanitised before being handed back to the school</p>	2	3	6
	Handling infected props	Before every show the presenter will sanitise all props handled by others throughout the show.	2	3	6

**PPE Requirements**

Item	Item	Item	Item
Flameproof overalls	Gloves contact	High visibility	Waterproof clothing
Hardhat	Dust Mask	Gloves chemical	Wellington boots
Hearing protection	Mask chemical vapour/mist	Y	Safety shoes
	Laboratory Coat		Eye protection

**Demonstration:** Infrared ‘Ray Gun’

Those at risk (please tick)	Ri Staff	On-Stage Volunteers	Audience	Non-Ri Workers	Others
	Y	Y	Y		

Method Statement	Hazards	Mitigation	Likelihood	Severity of impact	Current Risk
<p><b>An off-the-shelf infrared lamp has been attached onto a toy gun, to give the appearance of a sci-fi ray gun.</b></p> <p><b>This ‘ray-gun’ will then be shown near the audience so that they can feel the heat coming from it.</b></p>	Social distancing from audience	The presenter will position themselves at least 2m away from the audience, and therefore will only be able to ‘shine’ the lamp on the front row or outside edges of audience rather than walking amongst.	1	1	1

PPE Requirements

Item	Item	Item	Item
Flameproof overalls	Gloves contact	High visibility	Waterproof clothing
Hardhat	Dust Mask	Gloves chemical	Wellington boots
Hearing protection	Mask chemical vapour/mist	Safety shoes	
	Laboratory Coat	Eye protection	

**Demonstration:** Solar Panel Explainer

Those at risk (please tick)	Ri Staff	On-Stage Volunteers	Audience	Non-Ri Workers	Others
	Y	Y	Y		

Method Statement	Hazards	Mitigation	Likelihood	Severity of impact	Current Risk
<p>The presenter selects 6 pupil volunteers and 1 teacher.</p> <p>The teacher is asked to stand on one side of the stage area and wear a “Sun” hat. They are also given a bucket of yellow foam balls.</p> <p>The pupils stand in two rows of three, perpendicular to the audience, and facing each other, so that one row has their backs to the teacher, they are given a bucket of blue foam balls between them, and one blue ball to each of the volunteers that are stage left (optionally they could be wearing hats, black on the stage left row and red on the stage right row).</p> <p>The game runs as follows: The Sun (teacher) throws a photon (yellow ball) at the pupils. If a photon hits one of the N-type semiconductors (the stage left row of pupils) they must give an electron (blue ball) to a P-type semiconductor (stage left pupils), who must immediately put that electron in to the bucket. At the same time the N-type semiconductor must immediately replace that electron with a new one from the bucket.</p> <p>This process is repeated until the teacher runs out of balls.</p>	Use of volunteers during Covid restrictions	If pupils are within a bubbles with their teachers, this should not be a concern. Balls, buckets, and hats would need to be sprayed with antiviral spray between shows.	1	1	1

PPE Requirements

Item	Item	Item	Item
Flameproof overalls	Gloves contact	High visibility	Waterproof clothing
Hardhat	Dust Mask	Gloves chemical	Wellington boots
Hearing protection	Mask chemical vapour/mist	Safety shoes	Eye Protection

**Demonstration:** Leyden Jar

Those at risk (please tick)	Ri Staff	On-Stage Volunteers	Audience	Non-Ri Workers	Others
	Y	Y	Y		

Method Statement	Hazards	Mitigation	Likelihood	Severity of impact	Current Risk
<p><b>Prepared on the table are:</b></p> <ul style="list-style-type: none"> <li>- A pair of rubber gloves for the presenter and a volunteer if using.</li> <li>- An empty 2ltr plastic bottle with lid.</li> <li>- A matching lid with a nail through it.</li> <li>- 2ltr water in a jug.</li> <li>- A funnel.</li> <li>- Table salt.</li> <li>- A piece of aluminium foil, long enough to wrap around the plastic bottle, with a small piece of tape at both ends.</li> </ul> <p>The rubber gloves are worn. Using the funnel, the water is poured into the bottle. A large dash of salt is added and the lid screwed on and the bottle given a shake. The foil is wrapped around the bottle by rolling the bottle over the foil on the table, the tape is used to secure it in place. Then the lid is removed and replaced with the nail-lid.</p> <p>The leyden jar is now complete and can be charged up by rubbing a silk handkerchief on an acrylic rod and the rod touched to the nail. This can be done repeatedly. For efficiency, a “Fun fly stick” toy is used to charge up by holding the cardboard tube to the nail and running the toy for about a minute.</p> <p>A wire is attached to the foil with tape and when the other end is brought to the nail a spark is made.</p>	<p>The use of a volunteer is close proximity to the presenter during COVID times</p>	<p>No volunteer will be used for this demonstration, instead the presenter will conduct the build themselves whilst explaining to the audience exactly what they are doing.</p>	1	1	1

PPE Requirements

Item		Item		Item		Item	
Flameproof overalls		Gloves contact	Y	High visibility		Waterproof clothing	
Hardhat		Dust Mask		Gloves chemical	Y	Wellington boots	
Hearing protection		Mask chemical vapour/mist		Safety shoes		Eye Protection	

**Demonstration:** Electroball3000 Explainer and Pass Around

Those at risk (please tick)	Ri Staff	On-Stage Volunteers	Audience	Non-Ri Workers	Others
	Y	Y	Y		

Method Statement	Hazards	Mitigation	Likelihood	Severity of impact	Current Risk
<p>The Electroball 3000 is a bespoke piece of equipment with two main components, a 1000µF 16v capacitor and a faraday coil to charge it up. The ball also contains a rectifier bridge to facilitate charging, a key switch (with key trapping), a push button, and a 3.5mm phono jack. The circuit is wired so that if the key switch is on and the button is pressed, then electricity produced by the faraday coil will go directly to the phono socket and whatever is plugged into it, for example an LED. If that circuit is broken at any point, by the switch, button, or if nothing is plugged into the socket, then the capacitor will store up the charge being produced. Any charge stored in the capacitor will be sent to a component when the circuit is closed again.</p> <p>During the show, the presenter can demonstrate that shaking the Electroball 3000 will light an LED by having the key switch on and holding the button down as they shake.</p> <p>Then they can remove the LED plug, switch off and remove the key, and pass the ball around the audience so they can see the components and shake the ball to charge up the capacitor.</p>	<p>Risk of COVID infection by many people handling the same object</p>	<p>If the pupils are in the same 'COVID bubbles' then it can be passed freely between them (ensuring that it is disinfected before and after going around the audience). If the pupils are not in the same bubble then the ball will be infected and passed onto one volunteer (possibly a teacher) who will shake the ball on the presenter's command.</p>	2	2	4

PPE Requirements

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Flameproof overalls	Gloves contact	High visibility	Waterproof clothing
Hardhat	Dust Mask	Gloves chemical	Wellington boots
Hearing protection	Mask chemical vapour/mist	Safety shoes	Eye Protection

**Demonstration:** Voltaic Pile

Those at risk (please tick)	Ri Staff	On-Stage Volunteers	Audience	Non-Ri Workers	Others
	Y	Y	Y		

Method Statement	Hazards	Mitigation	Likelihood	Severity of impact	Current Risk
<p><b>Presenter will have prepared felt pads by soaking them in a bicarbonate of soda solution.</b></p> <p><b>Presenter and/or volunteer construct the voltaic pile from the soaked felt pads, 15-20 discs of copper, 15-20 discs of zinc (Actually steel galvanised with zinc), and an acrylic stand.</b></p> <p><b>A copper disc is placed on the stand first, followed by a felt pad, and then a zinc disc. This constitutes one “cell”. This order is repeated, copper&gt; felt&gt;zinc, over and over until the discs run out, being sure to end on a zinc disc.</b></p> <p><b>Wires can be attached to the top and bottom discs using crocodile clips. The bottom copper disc is the positive end, or Cathode, while the top zinc disc is the negative anode.</b></p> <p><b>The voltaic pile should produce enough current to run an LED.</b></p>	<p>The use of a volunteer is close proximity to the presenter during COVID times</p>	<p>No volunteer will be used for this demonstration, instead the presenter will conduct the build themselves whilst explaining to the audience exactly what they are doing.</p>	1	1	1

PPE Requirements

Item	Item	Item	Item
Flameproof overalls	Gloves contact	High visibility	Waterproof clothing
Hardhat	Dust Mask	Gloves chemical	Wellington boots
Hearing protection	Mask chemical vapour/mist	Safety shoes	

**Demonstration:** Igniting Hydrox Bubbles with E-match using Electroball3000

Those at risk (please tick)	Ri Staff	On-Stage Volunteers	Audience	Non-Ri Workers	Others
	Y		Y		

Method Statement	Hazards	Mitigation	Likelihood	Severity of impact	Current Risk
<p>The electroball 3000 is circulating in the audience or with a specific volunteer. The electrolysis kit is set up and running as above.</p> <p>A small dish, or upturned paint tin lid is secured in a clamp stand with a small amount of soapy water in it.</p> <p>An e-match is fixed to the clamp stand, so that it is just above and aimed at the soapy water. The e-match is wired into a speaker connector box with a long cable with a 3.5mm phono plug at the end. The end of the cable should be un-plugged.</p> <p>This whole assembly must be close enough to the electrolysis kit that the rubber hose can reach the soapy water.</p> <p>During the show the Electroball 3000 is collected, optionally with a volunteer.</p> <p>On the electrolysis power supply the voltage is turned up to max (32v) to increase hydrogen and oxygen production. The hose is taken out of the conical flask and held into the soapy water creating bubbles. A dome of bubbles is made, then the hose is placed back into the conical flask of water and the power supply turned back down to 4v or turned off completely.</p> <p>The cable that the e-match is wired to is plugged into the electroball 3000 at least 2m away.</p> <p>Ear defenders and goggles are worn, and the audience instructed to cover their ears.</p> <p>The key can be inserted into the electroball 3000. a countdown is begun from 3, the key is turned on 2 and the button pressed after 1,</p>	The Electroball presents its own risks	See separate Electroball Risk Assessment	-	-	-
	The Electrolysis apparatus presents its own risks	See separate Electrolysis Risk Assessment above.			
	The use of a volunteer is close proximity to the presenter during COVID times	No volunteer will be used for this demonstration, instead the presenter will conduct the build themselves whilst explaining to the audience exactly what they are doing.	1	1	1



firing the e-match which ignited the hydrogen and oxygen bubbles.

PPE Requirements

Item		Item		Item		Item	
Flameproof overalls		Gloves contact		High visibility		Waterproof clothing	
Hardhat		Dust Mask		Gloves chemical		Wellington boots	
Hearing protection	Y	Mask chemical vapour/mist		Safety shoes		Eye Protection	Y