

24th Science Picnic of Polish Radio and the Copernicus Science

Safety – step by step

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Safety - General Information

Our guests will happily participate in scientific shows and want to watch spectacular experiments. But they then want to return **safe and sound** to their homes. Please ensure that any show/experiment that is performed in front of with audience participation is **totally** safe for everyone involved. We call this the 101% safety rule. Please remember the principle of double-checking so that all activities related to the preparation of the location/equipment for shows are checked by two people. Thus will we minimize the potential danger coming from someone else's oversight/fatigue.

The most common causes of accidents during shows include:

- poor choice of experiment for the place or target group
- inadequate preparation by the presenter
- negligence or failure to observe OHS rules
- failure of your equipment

There are four areas of care for safety (preparation of the site, the presenter, viewers during the show, viewers after the show)

1. Preparation of the site

Shows are held in various locations – indoors, in tents, stands in restricted zones, as well as in open areas. The task of the presenter is to adapt to the prevailing conditions and arrange the show site to make it as safe as possible. This involves the following issues:

a) **Composition:**

a. The layout of the site:

The site must be so located so as not to block escape routes.

b. The operating principles for the local fire protection system in the PGE Narodowy:

Please refer to the location of optical sensors and sprinklers. It is also good to know where the closest emergency exit and fire extinguishers are. If there is a risk that any of the experiments performed in the show may start the fire protection system, or open flame is used, determine the rules for the show with the person responsible for the functioning of the system in the building (this is usually a firefighter dedicated to this task).

c. Access to electricity – location of extensions and protection of electrical cables:

Electrical equipment should be connected to outlets and grounded extension cords. Before the show, make sure that all cables are not damaged and electrical appliances are in working order. Electrical

cables for the site should be secured with tape or placed in special enclosures so that no one can trip over them.

d. The size and organization of the show zone:

Shows should be tailored to the size of the position or site dedicated to performing the show. You should restrict viewers' access to the zone where there is imminent danger to health or life through the use of barriers and zone facilities for shows that are beyond the reach of consumers.

b) Open space

- a. Meteorological phenomena which affect the performance and safety of shows should be taken into account: for example gusts of wind – forecast strength and direction, humidity, sunshine.
- b. If you are unsure as to protection from the rain, you should eliminate any elements of the show that uses equipment presenting a risk of contact with moisture from the show.
- c. When planning a show take into account the space proposed by the organizers: yardage, volume, external conditions, access to electricity, how the site is organized for the audience, the size and the material of which the show site is constructed.
- d. OHS and fire protection rules in force during the events.

The use of chemicals and methods that endanger the health of recipients:

- the use of chemical substances and methods that could endanger the health of viewers should be reported to the organizers so that they can plan the space and methods for protecting the viewers.
- the principle of minimizing risk: if the same experiment or show can be performed in a different, safer version (in terms of materials used and the scale of the experiment), you must observe the principle of 101% safety.
- any doubts related to the technical solutions, scale of the experiment and substances used should be consulted with the organizers.
- **during the Science Picnic do not use methods and substances not notified in advance to the organizers.**
- **any representative of the organizers may suspend a show until the case is judged by safety experts at the Science Picnic.**

2. The demonstrator

The demonstrator has an obligation to take all the necessary security measures required for specific experiments (e.g. apron, eye protection, gloves, etc.). Demonstrators also cannot deliberately expose anyone to danger. It is prohibited to perform experiments while demonstrating in a manner other than as described in the application form. The demonstrator knows the consequences of performing the show in a manner inconsistent with the principles of health and safety.

3. The audience at the show

It is the duty of the demonstrator to ensure an adequate level of safety of persons taking part in shows. This involves a suitable arrangement of the space where the show is performed, the instructions given to the public, and compliance with OHS rules.

Volunteers: When people are invited from the audience (volunteers) to join in the show who participate or assist in carrying out experiments. The demonstrator is responsible for their safety and must adhere to the following rules:

- a) The instructions to volunteers must be easy to understand, based on the technique of "small steps" (if a volunteer performs a complicated operation, instructions should be pitched into smaller, sequential steps).
- b) The volunteer must be located in such a place on site where they will not come into contact with hazardous substances or devices, and also will not stumble on wires or other elements of the set.
- c) Volunteers must be provided for the duration of their appearance on the site with appropriate protection measures for the experiments (e.g. goggles, apron, gloves, etc.).
- d) If there is a high risk that the experiment is a threat to health and life, under no circumstances can it be conducted with volunteers from the audience.

Audience: The duty of the demonstrator is to locate the equipment for the show in such a way that the audience is safe. The demonstrator is responsible for their safety and must adhere to the following rules:

- a) At the start of the show, the audience must receive a clear and simple message about safety rules during the show. The message should be adapted to the nature of the show and the audience (e.g. their age). The standard, universal formula is *"Please remain in your position for the duration of the show. Please do not cross the railings or areas marked with tape, unless I specifically ask you to. If something tips over or spills and is close to you, please do not touch it."*
- b) The audience should be located at a distance sufficient to ensure their safety.
- c) The space in which the show takes place should be organized so that the demonstrator can see all the people and supervise their behavior for the whole duration of the show.

- d) The site should have measures to prevent the negative effects of the show, for example fire extinguishers.
- e) Materials, spare parts for shows and all stages of preparation of the show should be beyond the immediate reach of the public.
- f) Areas for storing materials of increased risk should be fenced off from direct access to the public and be marked as such, e.g. each bottle of chemical reagents should be accurately described.

4. The audience after the show

After the show all materials and residues should be located in areas with limited access, with regard to safety as referred to above: designated zones, fenced off from public access.

Safe conduct of demonstrations and experiments at the Science Picnic

Factor	How to ensure safety?
Open flame	<p>Have a fire blanket and fire extinguisher.</p> <p>Do not lean over the flame. Do not allow visitors to do so.</p> <p>Do not wear latex/nitrile gloves when working with flame.</p> <p>To use flame, only allow visitors warned of the danger.</p>
High voltage	<p>Get in touch with the organizers and give the specifications of the device. The organizer will help you operate the device safely and secure the site.</p>
Chemical reagents	<p>Make use of protective measures (gloves, apron, goggles) – Equip everyone to whom you give dangerous chemicals with protection measures.</p> <p>Please report the substances you use to the organizers. They will help you secure your site.</p> <p>Read up on the dangers of the substance (Wikipedia provides info on the majority of them)</p> <p>Sign all packaging with reagents.</p> <p>Dangerous chemicals must be out of reach of visitors. Give them only to visitors who have been warned of the danger.</p> <p>If you use toxic liquids, have sorbent materials at the ready (mats, powders and the like.)</p> <p>Hazardous waste should be disposed of in special containers.</p>
Biological material	<p>Please report bacterial strains and micro-organisms that are harmful to the organizers, who will help you secure your position.</p> <p>Use only sterile animal blood.</p> <p>Keep these bacteria and micro-organisms only in sealed containers.</p> <p>Discard biological material, waste and beakers only into special containers.</p> <p>Secure the visitors from contact with bacteria (gloves) and warn them against the danger.</p> <p>At biological sites, do not let visitors eat or drink.</p> <p>If you are going to show the animals, secure them from escaping and care for their comfort.</p>
Cryogenics	<p>Keep large volumes only in special vessels. Small volume in a thermos, or Styrofoam containers.</p>
Noise	<p>Warn before expected noises, e.g. a bang. Frightened visitors can pose a risk.</p>
Electrical devices	<p>Watch out for wires, visitors and volunteers do not know where they are and do not see them, keep them away from them and secure the cables.</p> <p>Use hardware in accordance with generally accepted principles laid down in the device manual.</p>
Wind	<p>If a strong wind is blowing secure electrical equipment, reagents, burners and electrical appliances. A broken container or overturned burner can cause a lot of damage.</p>

Risk Assessment: BEST DEMO COMPETITION

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<p>Likelihood: The Chance of the hazard of event actually occurring based on what 80% of the population would do in this situation.</p> <ol style="list-style-type: none"> Very Unlikely – there is a 1 in a million chance of the hazardous event happening Unlikely- there is a 1 in a 100 000 Fairly Likely – there is a 1 in a 10 000 chance Likely – there is a 1 in a 1 000 chance Very Likely – there is a 1 in a 100 chance 	<p>Consequence: The extent of the harm (injury or ill health) should the hazard occur</p> <ol style="list-style-type: none"> Insignificant – no injury Minor – minor injuries requiring first aid Moderate – up to 3 days absence from work or equivalent Major – more than 3 days absence from work or equivalent Catastrophic- death/permanent disability 	<p>Risk Rating: Once the likelihood and severity have been determined the risk can be calculated below</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th style="background-color: black; color: white;"></th> <th colspan="5">Likelihood</th> </tr> <tr> <th>Consequence</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>2</td> <td>2</td> <td>4</td> <td>6</td> <td>8</td> <td>10</td> </tr> <tr> <td>3</td> <td>3</td> <td>6</td> <td>9</td> <td>12</td> <td>15</td> </tr> <tr> <td>4</td> <td>4</td> <td>8</td> <td>12</td> <td>16</td> <td>20</td> </tr> <tr> <td>5</td> <td>5</td> <td>10</td> <td>15</td> <td>20</td> <td>25</td> </tr> </tbody> </table> <p>Key:</p> <table border="1" style="width: 100%;"> <tr> <td style="text-align: center; color: red;">17-25</td> <td>Unacceptable – stop activity and make immediate improvements</td> </tr> <tr> <td style="text-align: center; color: orange;">10-16</td> <td>Tolerable – look to improve within specified timescale</td> </tr> <tr> <td style="text-align: center; color: yellow;">5-9</td> <td>Adequate – look to improve at next review</td> </tr> <tr> <td style="text-align: center; color: green;">1-4</td> <td>Acceptable – No further action, but ensure controls are maintained</td> </tr> </table>		Likelihood					Consequence	1	2	3	4	5	1	1	2	3	4	5	2	2	4	6	8	10	3	3	6	9	12	15	4	4	8	12	16	20	5	5	10	15	20	25	17-25	Unacceptable – stop activity and make immediate improvements	10-16	Tolerable – look to improve within specified timescale	5-9	Adequate – look to improve at next review	1-4	Acceptable – No further action, but ensure controls are maintained
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Hazard/Risks	Risk Rating (LxC=R)			Additional Controls to reduce risk to as low as reasonably practicable, (ALARP)	Final Risk w wprowadzeniu Rating (LxC=R)		
	L	C	R		L	C	R
e.g. injury from falling off stools	5	2	10	Presenter checks to make sure children are sitting properly on stools and parents/teachers are assisting where required	2	2	4