

# SPARQ-ed Risk Assessment Sheet : DNA Gel Electrophoresis

Description of Risk	Hazard				Analyse / Evaluate Risk			Overall Risk Category (see explanation on last page)						
	Source	Current Controls	Event	Category	Consequences	Exposure	Probability							
<b>Burns from Heating Agarose in a Microwave Oven :</b> Agarose is heated to boiling point in glassware using a microwave oven.	Thermal	PPE worn (gloves, labcoat, closed footwear) and faceshield available. Prepare a small amount of gel in an open, large volume conical flask. Be careful not to overheat (watch while heating it up) and take care handling melted agarose - leave in microwave for 30secs to ensure it is safe to move. Wear heat resistant gloves.	Superheated liquid might bubble up and out of conical flask causing skin burns with contact. Microwave explosion from sealed flask causing body injury and burns from hot liquid. Dropping and breakage of flask containing hot liquid with spillage onto unprotected skin.	Contact or exposure to heat and cold	<b>Substantial :</b> Major burns to hand	<b>Frequent :</b> Agarose gels are usually made at least several times a week	<b>Remotely Possible :</b> Possible if control measures and care are not taken	Exposure						
								Prob	VR	R	U	O	F	C
								AC	Low	Mod	Subs	Subs	High	VH
								QP	Low	Low	Mod	Mod	Subs	High
								UP	Low	Low	Low	Mod	Mod	Subs
								RP	Low	Low	Low	Low	Low	Mod
								C	Low	Low	Low	Low	Low	Low
								PI	Low	Low	Low	Low	Low	Low
<b>Exposure to UV Radiation :</b> Agarose gels are examined with a UV light source (transilluminator) in order to detect the presence of DNA. Nucleic acids bind SYBR Green in the gel and fluoresce under UV light.	Radiation	The transilluminator features a plastic shield which blocks transmission of UV radiation. This is kept closed whenever the UV light is switched on. Users are instructed to switch the UV lamp off when opening the transilluminator and placing the gel on the plate. When using the transilluminator it is necessary to wear a UV-resistant full face shield, nitrile gloves and lab coat with sleeves rolled down to protect the arms. Exposure time to the UV radiation should be minimised as much as possible.	Burns to skin and eyes	Exposure to radiation	<b>Substantial :</b> Burns due to UV radiation	<b>Frequent :</b> Agarose gels are usually made at least several times a week	<b>Remotely Possible :</b> Wear all protective equipment minimise exposure time by turning off lamp before opening.	Exposure						
								Prob	VR	R	U	O	F	C
								AC	Low	Mod	Subs	Subs	High	VH
								QP	Low	Low	Mod	Mod	Subs	High
								UP	Low	Low	Low	Mod	Mod	Subs
								RP	Low	Low	Low	Low	Low	Mod
								C	Low	Low	Low	Low	Low	Low
								PI	Low	Low	Low	Low	Low	Low
<b>Risk of Electrocutation :</b> Electrophoresis gel tanks are connected to a power source during operation and run at a high current and voltage.	Electrical	Caution signage. Training in use of electrophoresis equipment and power packs. Operators are instructed to always switch off the power source while loading tanks and before opening tanks after running gels. All equipment is to be handled with dry gloved hands and benches are to be kept dry. Keep electrical appliances away from sink or water. Equipment meets Australian Stds and be purchased from a reputable company. All mobile equipment is tested and tagged yearly. Power leads should be visually inspected before each use. Do not use double adaptors. If using multi outlet powerboards ensure they are individually switched and have an overload switch.	Forgetting to switch off power source and contacting live equipment with wet hands leading to electric shock or more serious electrocutation	Contact with electricity	<b>Substantial :</b> Electric shock requiring medical treatment.	<b>Frequent :</b> Gel electrophoresis is a common procedure	<b>Conceivable :</b> If control measures are not followed	Exposure						
								Prob	VR	R	U	O	F	C
								AC	Low	Mod	Subs	Subs	High	VH
								QP	Low	Low	Mod	Mod	Subs	High
								UP	Low	Low	Low	Mod	Mod	Subs
								RP	Low	Low	Low	Low	Low	Mod
								C	Low	Low	Low	Low	Low	Low
								PI	Low	Low	Low	Low	Low	Low

# SPARQ-ed Risk Assessment Sheet : DNA Gel Electrophoresis (continued)

Description of Risk	Hazard			Analyse / Evaluate Risk			Overall Risk Category (see explanation on last page)							
	Source	Current Controls	Event	Category	Consequences	Exposure	Probability	Prob	Exposure					
									VR	R	U	O	F	C
<b>Sharps Risk from Pipette Tips :</b> Loading an agarose gel requires pipetting DNA into the wells. General hazards relate to the event of a sharps injury (i.e. piercing of skin).	Mechanical	PPE worn (blue nitrile gloves, labcoat and closed footwear). Disposal of tips into sharps container.	When ejector of the pipette fails the tip is removed manually or when ejected tip bounces back causing sharps injury (contact or exposure to chemical or biological substances).	Other contact with chemical or substance	<b>Minor :</b> A sharps injury from a pipette tip is unlikely to require more than first aid treatment.	<b>Frequent :</b> loading agarose gel is a common procedure.	<b>Conceivable :</b> Unlikely to occur - PPE is worn and pipette tip ejected straight into sharps container.	Prob	Exposure					
								AC	Low	Low	Low	Low	Mod	Subs
								QP	Low	Low	Low	Low	Low	Mod
								UP	Low	Low	Low	Low	Low	Low
								RP	Low	Low	Low	Low	Low	Low
								<b>C</b>	Low	Low	Low	Low	Low	Low
								PI	Low	Low	Low	Low	Low	Low
<b>Toxicity from SYBR Green Used to Stain the Agarose Gel :</b> SYBR Green is used in SPARQed labs as an alternative to Ethidium Bromide, a chemical which can bind to DNA and cause mutations. While The toxicity of SYBR Green is reported as lower than Ethidium Bromide, the mode in which it works is similar. Therefore the use of SYBR Green in the laboratory mirrors that of Ethidium Bromide. SYBR Green is added after the agarose has been melted in the microwave.	Chemical	Wearing gloves, safety glasses, labcoat and enclosed shoes. Have a dedicated area when working with SYBR Green to contain any spills. Users are instructed to let the agarose cool to about 60°C before adding the SYBR Green - i.e. just before pouring the gel.	Accident exposure to chemical through spill, splash, inhalation	Single contact with chemical or substance	<b>Substantial :</b> Exposure to ethidium bromide may result in mutation of DNA which could have long-term health consequences. Such side effects are not reported with SYBR Green.	<b>Frequent :</b> Agarose gel preparation and gel electrophoresis is a common procedure.	<b>Remotely Possible :</b> Could possibly occur but appropriate PPE is worn (particularly use of nitrile gloves when handling SYBR Green). SYBR Green is used in place of ethidium bromide	Prob	Exposure					
								AC	Low	Mod	Subs	Subs	High	VH
								QP	Low	Low	Mod	Mod	Subs	High
								UP	Low	Low	Low	Mod	Mod	Subs
								<b>RP</b>	Low	Low	Low	Low	Low	Mod
								C	Low	Low	Low	Low	Low	Low
								PI	Low	Low	Low	Low	Low	Low
<b>PC2 Laboratory Work :</b> Being present and working in a PC2 lab involves many risks.	Microbiological	Have induction training and subsequent training/ supervision in procedures and operations. Wear PPE (lab coat, gloves) when conducting all lab work. Do not wear PPE outside of PC2 laboratory area. Tie back long hair. Wear closed in footwear. Do not eat or drink in the laboratory. Do not touch door handles, computers, study areas etc with gloves on. Wash hands thoroughly when leaving the PC2 laboratory area.	Lack of attention to proper PC2 laboratory rules. This may lead to loss of containment or exposure of a staff member to chemical/ microbiological/ genetically modified samples.	Other and multiple incident types	<b>Substantial :</b> Lack of containment within the laboratory may have an impact on staff/ other people/the environment.	<b>Continuous :</b> All work within the Diamantina Institute is conducted under, at minimum, PC2 regulations.	<b>Conceivable :</b> Conceivable but unlikely if proper PC2 laboratory guidelines are followed.	Prob	Exposure					
								AC	Low	Mod	Subs	Subs	High	VH
								QP	Low	Low	Mod	Mod	Subs	High
								UP	Low	Low	Low	Mod	Mod	Subs
								RP	Low	Low	Low	Low	Low	Mod
								<b>C</b>	Low	Low	Low	Low	Low	Low
								PI	Low	Low	Low	Low	Low	Low

## Explanation of Overall Risk Categories

Exposure					
<b>Very Rare (VR)</b> – extremely rare (has not yet occurred)	<b>Rare (R)</b> – hardly every occurs (but has been known to occur)	<b>Unusual (U)</b> – does not occur often (from once per month to once per year)	<b>Occasional (O)</b> – sometimes occurs (from once per week to once per month)	<b>Frequent (F)</b> – occurs often (approximately once daily)	<b>Continuous (C)</b> – occurs repeatedly (or many times daily)
Probability (Prob)					
<b>Almost Certain (AC)</b> – is the most likely and expected result if the hazard event takes place	<b>Quite Possible (QP)</b> – is quite possible, not unusual, has an even 50/50 chance	<b>Unlikely but Possible (UP)</b> – Would be an unusual sequence or coincidence	<b>Remotely Possible (RP)</b> – would be a remotely possible coincidence	<b>Conceivable (C)</b> – has never happened after many years of exposure, but is conceivably possible	<b>Practically Impossible (P)</b> – has never happened after many years of exposure and is virtually impossible

## Overall Risk Category

<b>Low</b> – risk is normally acceptable	<b>Moderate (Mod)</b> – should be dealt with as soon as possible but situation is not an emergency	<b>Substantial (Subs)</b> – should receive attention as soon as possible	<b>High</b> – immediate correction required	<b>Very High (VH)</b> – immediate correction required
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The Overall Risk Category for each element is highlighted in **green**.