THE UNIVERSITY OF WESTERN ONTARIO
BIOLOGICAL AGENTS REGISTRY FORM
Approved Biohazards Subcommittee: July 9, 2010
Biosafety Website: www.uwo.ca/humanresources/biosafety/

This form must be completed by each Principal Investigator holding a grant administered by the University of Western Ontario (UWO) or in charge of a laboratory/facility where the use of Level 1, 2 or 3 biological agents is described in the laboratory or animal work proposed. The form must also be completed if any work is proposed involving animals carrying zoonotic agents infectious to humans or involving plants, fungi, or insects that require Public Health Agency of Canada (PHAC) or Canadian Food Inspection Agency (CFIA) permits.

This form must be updated at least every 3 years or when there are changes to the biological agents being used.

Containment Levels will be established in accordance with Laboratory Biosafety Guidelines, 3rd edition, 2004, Public Health Agency of Canada (PHAC) or Containment Standards for Veterinary Facilities, 1st edition 1996, Canadian Food Inspection Agency (CFIA).

Completed forms are to be returned to Occupational Health and Safety, (OHS), (Support Services Building, Room 4190) for distribution to the Biohazards Subcommittee. For questions regarding this form, please contact the Biosafety Officer at extension 81135 or biosafety@uwo.ca. If there are changes to the information on this form (excluding grant title and funding agencies), contact Occupational Health and Safety for a modification form. See website: www.uwo.ca/humanresources/biosafety

PRINCIPAL INVESTIGATOR	Hong Ling
DEPARTMENT	Biochemsitry
ADDRESS	MSB 1M
PHONE NUMBER	ext. 83557
EMERGENCY PHONE NUMBER(S)	519-663-5008
EMAIL	hling@uwo.ca

Location of experimental work to be carried out: Building(s) MSB_____MBL_____Room(s)__335____303

*For work being performed at Institutions affiliated with the University of Western Ontario, the Safety Officer for the Institution where experiments will take place must sign the form prior to its being sent to the University of Western Ontario Biosafety Officer (See Section 15.0, Approvals).

FUNDING AGENCY/AGENCIES: CIHR
GRANT TITLE(S): Y family polymerase and cofactors in translesion replication and mutagenesis

List all personnel working under Principal Investigators supervision in this location:

Name	UWO E-mail Address	Date of Biosafety Training
Kevin Kirouac	KKirouac@uwo.ca	June, 2005
Magda Szczepanowska	mszczep@uwo.ca	Sept. 2008
Guangxin Xing	gxing@uwo.ca	Feb. 2004

Please explain the biological agents and/or biohazardous substances used and how they will be stored, used and disposed of. Projects without this description will not be reviewed.

XL1-Blue E. coli cells are used for plasmid cloning. The cell stocks are stored at - 80 °C. Clone selections are done with LB plate with appropriate antibiotics. Liquid cultures are grown in LB plus antibiotics. BL21(DE3) E. coli cells are used for recombinant protein expression. Cell stocks are stored at - 80 °C. LB plates and LB culture media waste after growing cells are autoclaved before being disposed of.

CIHR grant title :

Y-family polymerase and co-factors in translesion replication and mutagenesis

Please include a one page research summary or teaching protocol.

Research Summary

Maintenance of genomic stability is a challenge to every cell in the presence of genotoxic agents. Translesion DNA replication or translesion synthesis (TLS), the replication of DNA across damaged DNA, is essential for a cell to survive DNA damage. Numerous cellular and environmental agents continuously damage DNA. DNA damage or lesions blocks or slows down DNA replication, threatening the survival of cells. DNA polymerases (pol) are the molecules responsible to replicate DNA in cells. Only specialized DNA polymerases are able to replicate through damaged DNA. These Translesional polymerases (pol) are mutational, introducing errors as they replicate DNA. Consequently, the specialized DNA polymerases mainly determine the mutagenic potential of DNA lesions. These errors in DNA are associated with aging and human diseases, including various forms of cancer. Due to their mutagenic potential, Y-family polymerase activities must be tightly regulated. The regulation is carried by certain protein cofactors. One of these protein-partners is the sliding clamp protein, named PCNAs. This study focuses on structure-function studies of translesion and error-prone DNA polymerases, and their functionally related proteins PCNAs. The goal is to understand why the specialized DNA polymerases make errors and how their function being controlled by the protein-partners. The main technique we use is X-ray crystallography to determine 3-dimensional structures of Y-polymerases, PCNAs and Pol-PCNA complexes. The studies will help us to learn how DNA damage can result in mutations in the human genes, and the role of these events in the onset of diseases.

1.0 Microorganisms

1.1 Does your work involve the use of biological agents? ● YES O NO
(non-pathogenic and pathogenic biological agents including but not limited to bacteria and other microorganisms, viruses, prions, parasites or pathogens of plant or animal origin)? If no, please proceed to Section 2.0

Do you use microorganisms that require a permit from the CFIA? O YES ● NO
If YES, please give the name of the species. _____
What is the origin of the microorganism(s)? _____
Please describe the risk (if any) of escape and how this will be mitigated:

_____
_____
_____

Please attach the CFIA permit.
Please describe any CFIA permit conditions:

_____
_____
_____

1.2 Please complete the table below:

Name of Biological agent(s)*	Is it known to be a human pathogen? YES/NO	Is it known to be an animal pathogen? YES/NO	Is it known to be a zoonotic agent? YES/NO	Maximum quantity to be cultured at one time? (in Litres)	Source/ Supplier	PHAC or CFIA Containment Level
XL1-Blue E.coli	O Yes ● No	O Yes ● No	O Yes ● No	0.005	Strat-Novagene	O 1 O 2 O 2+ O 3
BL21(DE3) E.coli	O Yes ● No	O Yes ● No	O Yes ● No	1 L.	Novagene	O 1 O 2 O 2+ O 3
	O Yes O No	O Yes O No	O Yes O No			O 1 O 2 O 2+ O 3
	O Yes O No	O Yes O No	O Yes O No			O 1 O 2 O 2+ O 3

*Please attach a Material Safety Data Sheet or equivalent from the supplier.

2.0 Cell Culture

2.1 Does your work involve the use of cell cultures? O YES ● NO
If no, please proceed to Section 3.0

2.2 Please indicate the type of primary cells (i.e. derived from fresh tissue) that will be grown in culture:

Cell Type	Is this cell type used in your work?	Source of Primary Cell Culture Tissue	AUS Protocol Number
Human	O Yes O No		Not applicable
Rodent	O Yes O No		

Non-human primate	O Yes ● No		
Other (specify)	O Yes ● No		

2.3 Please indicate the type of established cells that will be grown in culture in:

Cell Type	Is this cell type used in your work?	Specific cell line(s)*	Supplier / Source
Human	O Yes O No		
Rodent	O Yes O No		
Non-human primate	O Yes O No		
Other (specify)	O Yes O No		

*Please attach a Material Safety Data Sheet or equivalent from the supplier. (For more information, see www.atcc.org)

2.4 For above named cell types(s) indicate PHAC or CFIA containment level required O 1 O 2 O 2+ O 3

3.0 Use of Human Source Materials

3.1 Does your work involve the use of human source materials? O YES ◉ NO
If no, please proceed to Section 4.0

3.2 Indicate in the table below the Human Source Material to be used.

Human Source Material	**Source/Supplier /Company Name**	**Is Human Source Material Infected With An Infectious Agent? YES/NO**	**Name of Infectious Agent (If applicable)**	**PHAC or CFIA Containment Level (Select one)**
Human Blood (whole) or other Body Fluid		O Yes O Unknown		O 1 O 2 O 2+ O 3
Human Blood (fraction) or other Body Fluid		O Yes O Unknown		O 1 O 2 O 2+ O 3
Human Organs or Tissues (unpreserved)		O Yes O Unknown		O 1 O 2 O 2+ O 3
Human Organs or Tissues (preserved)		Not Applicable		Not Applicable

4.0 Genetically Modified Organisms and Cell lines

4.1 Will genetic modifications be made to the microorganisms, biological agents, or cells described in Sections 1.0 and 2.0? ◉ YES O NO If no, please proceed to Section 5.0

4.2 Will genetic modification(s) involving plasmids be done? ◉ YES, complete table below O NO

Bacteria Used for Cloning *	Plasmid(s) **	Source of Plasmid	Gene Transfected	Describe the change that results from transformation or tranfection
XL1-Blue	pMCSG7	PSI	yPoleta	expressing yeast DNA polymerase eta when Induced with IPTG. Ampicillin resistant

* Please attach a Material Data Sheet or equivalent if available.
** Please attach a plasmid map.

4.3 Will genetic modification(s) involving viral vectors be made? O YES, complete table below ◉ NO

Virus Used for Vector Construction	Vector(s) *	Source of Vector	Gene(s) Transduced	Describe the change that results from transduction

* Please attach a Material Safety Data Sheet or equivalent.

4.4 Will genetic sequences from the following be involved?

- HIV O YES, please specify _____ ◉ NO
- HTLV 1 or 2 or genes from any Level 1 or Level 2 pathogens O YES, specify _____ ◉ NO
- SV 40 Large T antigen O YES ◉ NO
- E1A oncogene O YES ◉ NO
- Known oncogenes O YES, please specify _____ ◉ NO
- Other human or animal pathogen and or their toxins O YES, please specify _____ ◉ NO

4.5 Will virus be replication defective? O YES ◉ NO

4.6 Will virus be infectious to humans or animals? O YES ◉ NO

4.7 Will this be expected to increase the containment level required? O YES ◉ NO

5.0 Human Gene Therapy Trials

5.1 Will human clinical trials be conducted involving a biological agent? O YES ◉ NO
(including but not limited to microorganisms, viruses, prions, parasites or pathogens of plant or animal origin)
If no, please proceed to Section 6.0

5.2 If YES, please specify which biological agent will be used: _____
Please attach a full description of the biological agent.

5.2 Will the biological agent be able to replicate in the host? O YES ◉ NO

5.3 How will the biological agent be administered? _____

5.4 Please give the Health Care Facility where the clinical trial will be conducted:_____

5.5 Has human ethics approval been obtained? O YES, number: _____ ◉ NO ○ PENDING

6.0 Animal Experiments

6.1 Will live animals be used? O YES ◉ NO If no, please proceed to section 7.0

6.2 Name of animal species to be used_____

6.3 AUS protocol # _____

6.4 Will any of the agents listed in section 4.0 be used in live animals O YES, specify: _____ O NO

6.5 Will the agent(s) be shed by the animal: O YES O NO, please justify:

_____

_____

7.0 Use of Animal species with Zoonotic Hazards

7.1 Will any animals with zoonotic hazards or their organs, tissues, lavages or other body fluids including blood be used (see list below)? O YES ◉ No If no, please proceed to section 8.0

7.2 Please specify the animal(s) used:

- Pound source dogs O YES O NO
- Pound source cats O YES O NO
- Cattle, sheep or goats O YES, please specify species _____ O NO
- Non-human primates O YES, please specify species _____ O NO
- Wild caught animals O YES, please specify species & colony # _____ O NO
- Birds O YES, please specify species _____ O NO
- Others (wild or domestic) O YES, please specify _____ O NO

8.0 Biological Toxins

8.1 Will toxins of biological origin be used? O YES ◉ NO If no, please proceed to Section 9.0

8.2 If YES, please name the toxin(s)_____
Please attach information, such as a Material Safety Data Sheet, for the toxin(s) used.

8.3 What is the LD_{50} (specify species) of the toxin_____

8.4 How much of the toxin is handled at one time*? _____

8.5 How much of the toxin is stored*? _____

8.6 Will any biological toxins be used in five animals? O YES, Please provide details:_____ O NO

*For information on biosecurity requirements, please see:
http://www.uwo.ca/humanresources/docandform/docs/healthandsafety/biosafety/Biosecurity_Requirements.pdf

9.0 Insects

9.1 Do you use insects? O YES ◉ NO If no, please proceed to Section 10.0

9.2 If YES, please give the name of the species. _____

9.3 What is the origin of the insect? _____

9.4 What is the life stage of the insect? _____

9.5 What is your intention? O Initiate and maintain colony, give location: _____
O "One-time" use, give location: _____

9.6 Please describe the risk (if any) of escape and how this will be mitigated:

_____

_____

9.7 Do you use insects that require a permit from the CFIA permit? O YES O NO
If YES, Please attach the CFIA permit & describe any CFIA permit conditions:

_____

_____

10.0 Plants

10.1 Do you use plants? O YES ⊘ NO If no, please proceed to Section 11.0

10.2 If YES, please give the name of the species. _____

10.3 What is the origin of the plant? _____

10.4 What is the form of the plant (seed, seedling, plant, tree…)? _____

10.5 What is your intention? O Grow and maintain a crop O "One-time" use

10.6 Do you do any modifications to the plant? O YES O NO
If yes, please describe: _____
_____

10.7 Please describe the risk (if any) of loss of the material from the lab and how this will be mitigated:
_____
_____
_____

10.8 Is the CFIA permit attached? O YES O NO
If YES, Please attach the CFIA permit & describe any CFIA permit conditions:
_____
_____

11.0 Import Requirements

11.1 Will any of the above agents be imported? O YES, please give country of origin_____ ⊘ NO
If no, please proceed to Section 12.0

11.2 Has an Import Permit been obtained from HC for human pathogens? O YES ⊘ NO

11.3 Has an import permit been obtained from CFIA for animal or plant pathogens? O YES ⊘ NO

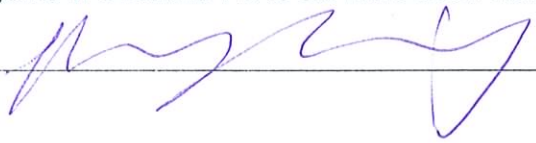
11.4 Has the import permit been sent to OHS? O YES, please provide permit # _____ ⊘ NO

12.0 Training Requirements for Personnel Named on Form

All personnel named on the above form who will be using any of the above named agents are required to attend the following training courses given by OHS:

- Biosafety
- Laboratory and Environmental/Waste Management Safety
- WHMIS (Western or equivalent)
- Employee Health and Safety Orientation

As the Principal Investigator, I have ensured that all of the personnel named on the form who will be using any of the biological agents in Sections 1.0 to 9.0 have been trained.

SIGNATURE 

13.0 Containment Levels

13.1 For the work described in sections 1.0 to 9.0, please indicate the highest HC or CFIA Containment Level required. ◉ 1 ○ 2 ○ 2+ ○ 3

13.2 Has the facility been certified by OHS for this level of containment?

○ YES, permit # if on-campus_____
○ NO, please certify
◉ NOT REQUIRED for Level 1 containment

14.0 Procedures to be Followed

14.1 As the Principal Investigator, I will ensure that this project will follow the Western Biosafety Guidelines and Procedures Manual for Containment Level 1 & 2 Laboratories (and the Level 3 Facilities Manual for Level 3 projects). I will ensure that UWO faculty, staff and students working in my laboratory have an up-to-date Hazard Communication Form, found at http://www.wph.uwo.ca/

SIGNATURE _____ Date: Aug. 10, 2020

14.2 Please describe additional risk reduction measures will be taken beyond containment level 1, 2, 2+ or 3 measures, that are unique to this agent.

_____
_____
_____

14.3 Please outline what will be done if there is an exposure to the biological agents listed, such as a needlestick injury:

_____
_____

See attached e-mail

15.0 Approvals

1) UWO Biohazards Subcommittee: SIGNATURE: _____
Date: _____

2) Safety Officer for the University of Western Ontario
SIGNATURE:_____
Date:_____

3) Safety Officer for Institution where experiments will take place (if not UWO):
SIGNATURE:_____
Date:_____

Approval Number: _____ Expiry Date (3 years from Approval): _____

Special Conditions of Approval:

Subject: Re: Biological Agents Registry Form: Ling lab
From: Hong Ling <hling4@uwo.ca>
Date: Thu, 12 Aug 2010 14:29:52 -0400
To: Jennifer Stanley <jstanle2@uwo.ca>

Hi Jennifer,

Attached please find the MSDS sheets.

In case of exposure to the non-pathogenic E. coli, the exposed site must be washing immediately with soap and water. For the such as, a needlestick, cut and scratch, wash with soap and water after allowing the wound be bleed freely.

Section 14.3

Thanks,

Hong

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http://www.biochem.uwo.ca/fac/ling/ling.html

XL-1_Blue_MSDS.pdf	**Content-Type:**	binary/png
	Content-Encoding:	base64

BL21DE2_MSDSpdf.pdf

BL21DE2_MSDSpdf.pdf	**Content-Type:**	binary/png
	Content-Encoding:	base64

Conforms to ANSI Z400.5-2004 Standard (United States).

Material Safety Data Sheet

Agilent Technologies

Stratagene XL1-Blue Competent Cells, Catalog #200249

1 . Product and company identification

Product name : **Stratagene XL1-Blue Competent Cells, Catalog #200249**

Part No. : pUC18 Control Plasmid DNA 200231-42
1.42 M 2-Mercaptoethanol 210200-43
XL1-Blue Competent Cells 200236-41

Manufacturer / Supplier : Agilent Technologies, Inc.
1834 State Highway 71 West
Cedar Creek, TX 78612

Material Safety Data sheet(s)

Emergency telephone number : 1-800-894-1304

Use of the substance/preparation : Chemical Kit

Validation date : 01/09/2009

2 . Hazards identification

Physical state :
pUC18 Control Plasmid DNA: Liquid.
1.42 M 2-Mercaptoethanol: Liquid.
XL1-Blue Competent Cells: Liquid.

Odor :
pUC18 Control Plasmid DNA: Not available.
1.42 M 2-Mercaptoethanol: Not available.
XL1-Blue Competent Cells: Not available.

OSHA/HCS status :
pUC18 Control Plasmid DNA: While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.
1.42 M 2-Mercaptoethanol: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
XL1-Blue Competent Cells: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview-Signal Word : WARNING !

Emergency overview-Label Statement :
pUC18 Control Plasmid DNA: NOT EXPECTED TO PRODUCE SIGNIFICANT ADVERSE HEALTH EFFECTS WHEN THE RECOMMENDED INSTRUCTIONS FOR USE ARE FOLLOWED.
1.42 M 2-Mercaptoethanol: HARMFUL IF SWALLOWED. CAUSES EYE AND SKIN IRRITATION. MAY CAUSE ALLERGIC SKIN REACTION.
XL1-Blue Competent Cells: HARMFUL IF SWALLOWED. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

2 . Hazards identification

	pUC18 Control Plasmid DNA	No known significant effects or critical hazards. Avoid prolonged contact with eyes, skin and clothing.
	1.42 M 2-Mercaptoethanol	Toxic if swallowed. Irritating to eyes and skin. May cause sensitization by skin contact. Do not breathe vapor or mist. Do not ingest. Do not get on skin or clothing. Avoid contact with eyes. Wash thoroughly after handling.
	XL1-Blue Competent Cells	Toxic if swallowed. Avoid exposure - obtain special instructions before use. Do not breathe vapor or mist. Do not ingest. Avoid contact with eyes, skin and clothing. Contains material that may cause target organ damage, based on animal data. Wash thoroughly after handling.
	pUC18 Control Plasmid DNA	Not available.
	1.42 M 2-Mercaptoethanol	Not available.
	XL1-Blue Competent Cells	Contains material which may cause damage to the following organs: blood, kidneys, gastrointestinal tract, upper respiratory tract, skin, central nervous system (CNS), eye, lens or cornea.
Routes of entry :	pUC18 Control Plasmid DNA	Eye contact. Ingestion.
	1.42 M 2-Mercaptoethanol	Dermal contact. Eye contact. Inhalation. Ingestion.
	XL1-Blue Competent Cells	Eye contact. Inhalation. Ingestion.
Potential acute health effects		
Eyes :	pUC18 Control Plasmid DNA	No known significant effects or critical hazards.
	1.42 M 2-Mercaptoethanol	Irritating to eyes.
	XL1-Blue Competent Cells	No known significant effects or critical hazards.
Skin :	pUC18 Control Plasmid DNA	No known significant effects or critical hazards.
	1.42 M 2-Mercaptoethanol	Irritating to skin. May cause sensitization by skin contact.
	XL1-Blue Competent Cells	No known significant effects or critical hazards.
Inhalation :	pUC18 Control Plasmid DNA	No known significant effects or critical hazards.
	1.42 M 2-Mercaptoethanol	No known significant effects or critical hazards.
	XL1-Blue Competent Cells	No known significant effects or critical hazards.
Ingestion :	pUC18 Control Plasmid DNA	No known significant effects or critical hazards.
	1.42 M 2-Mercaptoethanol	Toxic if swallowed.
	XL1-Blue Competent Cells	Toxic if swallowed.
Medical conditions aggravated by over-exposure :	pUC18 Control Plasmid DNA	Not applicable.
	1.42 M 2-Mercaptoethanol	Repeated skin exposure can produce local skin destruction or dermatitis. Repeated or prolonged contact with spray or mist may produce chronic eye irritation and severe skin irritation.
	XL1-Blue Competent Cells	Repeated or prolonged exposure to the substance can produce target organs damage.
Over-exposure signs/symptoms :	pUC18 Control Plasmid DNA	Not applicable.
	1.42 M 2-Mercaptoethanol	Not applicable.
	XL1-Blue Competent Cells	Not applicable.

See toxicological information (section 11)

3 . Composition/information on ingredients

Name	CAS number	%
1.42 M 2-Mercaptoethanol		
2-Mercaptoethanol	60-24-2	10
XL1-Blue Competent Cells		
Glycerol	56-81-5	5 - 10
Manganese dichloride	7773-01-5	5 - 10
Sucrose	57-50-1	5 - 10
Dimethyl sulfoxide	67-68-5	5 - 10
Potassium chloride	7447-40-7	1 - 5

There are no ingredients or additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4 . First aid measures

Eye contact	:	pUC18 Control Plasmid DNA	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if adverse health effects persist or are severe.
		1.42 M 2-Mercaptoethanol	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if adverse health effects persist or are severe.
		XL1-Blue Competent Cells	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if adverse health effects persist or are severe.
Skin contact	:	pUC18 Control Plasmid DNA	In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention if adverse health effects persist or are severe.
		1.42 M 2-Mercaptoethanol	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention if adverse health effects persist or are severe.
		XL1-Blue Competent Cells	In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention if adverse health effects persist or are severe.
Inhalation	:	pUC18 Control Plasmid DNA	If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention if adverse health effects persist or are severe.
		1.42 M 2-Mercaptoethanol	If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention if adverse health effects persist or are severe.
		XL1-Blue Competent Cells	If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention if adverse health effects persist or are severe.

4 . First aid measures

Ingestion :

pUC18 Control Plasmid DNA	Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention if adverse health effects persist or are severe.
1.42 M 2-Mercaptoethanol	Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention if adverse health effects persist or are severe.
XL1-Blue Competent Cells	Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention if adverse health effects persist or are severe.

Protection of first-aiders :

pUC18 Control Plasmid DNA	Not applicable.
1.42 M 2-Mercaptoethanol	Not applicable.
XL1-Blue Competent Cells	Not applicable.

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5 . Fire-fighting measures

Flammability of the product :

pUC18 Control Plasmid DNA	Non-flammable.
1.42 M 2-Mercaptoethanol	Non-flammable.
XL1-Blue Competent Cells	Non-flammable.

Products of combustion :

pUC18 Control Plasmid DNA	No specific data.
1.42 M 2-Mercaptoethanol	Decomposition products may include the following materials: carbon oxides sulfur oxides
XL1-Blue Competent Cells	Decomposition products may include the following materials: carbon oxides sulfur oxides halogenated compounds metal oxide/oxides

Extinguishing media

Suitable :

pUC18 Control Plasmid DNA	Use an extinguishing agent suitable for the surrounding fire.
1.42 M 2-Mercaptoethanol	Use an extinguishing agent suitable for the surrounding fire.
XL1-Blue Competent Cells	Use an extinguishing agent suitable for the surrounding fire.

Not suitable :

pUC18 Control Plasmid DNA	Not applicable.
1.42 M 2-Mercaptoethanol	Not applicable.
XL1-Blue Competent Cells	Not applicable.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Special remarks on fire hazards :

pUC18 Control Plasmid DNA	Not available.
1.42 M 2-Mercaptoethanol	Not available.
XL1-Blue Competent Cells	Not available.

Special remarks on explosion hazards : Not available.

6 . Accidental release measures

Personal precautions	: pUC18 Control Plasmid DNA	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
	1.42 M 2-Mercaptoethanol	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
	XL1-Blue Competent Cells	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
Environmental precautions	: pUC18 Control Plasmid DNA	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
	1.42 M 2-Mercaptoethanol	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
	XL1-Blue Competent Cells	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
Methods for cleaning up		
Small spill	: pUC18 Control Plasmid DNA	Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
	1.42 M 2-Mercaptoethanol	Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
	XL1-Blue Competent Cells	Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

7 . Handling and storage

Handling	: pUC18 Control Plasmid DNA	Wash thoroughly after handling.
	1.42 M 2-Mercaptoethanol	Do not ingest. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.
	XL1-Blue Competent Cells	Do not ingest. Wash thoroughly after handling.

7 . Handling and storage

Storage : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

8 . Exposure controls/personal protection

Product name	Exposure limits
United States	
1.42 M 2-Mercaptoethanol	
2-Mercaptoethanol	**AIHA WEEL (United States, 1/2008).** TWA: 0.2 ppm 8 hour(s).
XL1-Blue Competent Cells	
Glycerol	**ACGIH TLV (United States, 1/2008).** TWA: 10 mg/m³ 8 hour(s). Form: Mist **OSHA PEL (United States, 11/2006).** TWA: 5 mg/m³ 8 hour(s). Form: Respirable fraction TWA: 15 mg/m³ 8 hour(s). Form: Total dust **OSHA PEL 1989 (United States, 3/1989).** TWA: 5 mg/m³ 8 hour(s). Form: Respirable fraction TWA: 10 mg/m³ 8 hour(s). Form: Total dust
Manganese dichloride	**ACGIH TLV (United States, 1/2008).** TWA: 0.2 mg/m³, (as Mn) 8 hour(s). **OSHA PEL 1989 (United States, 3/1989).** CEIL: 5 mg/m³, (as Mn) **NIOSH REL (United States, 12/2001).** TWA: 1 mg/m³, (as Mn) 10 hour(s). STEL: 3 mg/m³, (as Mn) 15 minute(s). **OSHA PEL (United States, 11/2006).** CEIL: 5 mg/m³, (as Mn)
Sucrose	**ACGIH TLV (United States, 1/2008).** TWA: 10 mg/m³ 8 hour(s). **OSHA PEL 1989 (United States, 3/1989).** TWA: 15 mg/m³ 8 hour(s). Form: Total dust TWA: 5 mg/m³ 8 hour(s). Form: Respirable fraction **NIOSH REL (United States, 12/2001).** TWA: 10 mg/m³ 10 hour(s). Form: Total TWA: 5 mg/m³ 10 hour(s). Form: Respirable fraction **OSHA PEL (United States, 11/2006).** TWA: 15 mg/m³ 8 hour(s). Form: Total dust TWA: 5 mg/m³ 8 hour(s). Form: Respirable fraction
Dimethyl sulfoxide	**AIHA WEEL (United States, 1/2008).** TWA: 250 ppm 8 hour(s).

Consult local authorities for acceptable exposure limits.

Engineering measures : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts.

8 . Exposure controls/personal protection

Skin : Chemical resistant protective gloves and clothing are recommended. The choice of protective gloves or clothing must be based on chemical resistance and other use requirements. Generally, BUNA-N offers acceptable chemical resistance. Individuals who are acutely and specifically sensitive to this chemical may require additional protective clothing.

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Other protection : Not available.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

9 . Physical and chemical properties

Physical state	: pUC18 Control Plasmid DNA	Liquid.
	1.42 M 2-Mercaptoethanol	Liquid.
	XL1-Blue Competent Cells	Liquid.
Flash point	: pUC18 Control Plasmid DNA	Not applicable.
	1.42 M 2-Mercaptoethanol	Not applicable.
	XL1-Blue Competent Cells	Not applicable.
Color	: pUC18 Control Plasmid DNA	Not available.
	1.42 M 2-Mercaptoethanol	Not available.
	XL1-Blue Competent Cells	Not available.
Odor	: pUC18 Control Plasmid DNA	Not available.
	1.42 M 2-Mercaptoethanol	Not available.
	XL1-Blue Competent Cells	Not available.
pH	: pUC18 Control Plasmid DNA	Neutral.
	1.42 M 2-Mercaptoethanol	Neutral.
	XL1-Blue Competent Cells	Neutral.
Boiling/condensation point	: pUC18 Control Plasmid DNA	Lowest known value: 100°C (212°F) (Water).
	1.42 M 2-Mercaptoethanol	Lowest known value: 100°C (212°F) (Water). Weighted average: 105.7°C (222.3°F)
	XL1-Blue Competent Cells	Lowest known value: 100°C (212°F) (Water). Weighted average: 122.01°C (251.6°F)
Melting/freezing point	: pUC18 Control Plasmid DNA	May start to solidify at the following temperature: 0°C (32°F) This is based on data for the following ingredient: Water.
	1.42 M 2-Mercaptoethanol	May start to solidify at the following temperature: 0°C (32°F) This is based on data for the following ingredient: Water.
	XL1-Blue Competent Cells	May start to solidify at the following temperature: 19.8°C (67.6°F) This is based on data for the following ingredient: Glycerol. Weighted average: 3.02°C (37.4°F)

9 . Physical and chemical properties

Relative density	:	pUC18 Control Plasmid DNA	Not available.
		1.42 M 2-Mercaptoethanol	Only known value: 1.1 (Water = 1) (2-Mercaptoethanol).
		XL1-Blue Competent Cells	Weighted average: 1.29 (Water = 1)
Vapor pressure	:	pUC18 Control Plasmid DNA	Highest known value: 2.3 kPa (17.5 mm Hg) (at 20°C) (Water).
		1.42 M 2-Mercaptoethanol	Highest known value: 2.3 kPa (17.5 mm Hg) (at 20°C) (Water). Weighted average: 2.08 kPa (15.6 mm Hg) (at 20°C)
		XL1-Blue Competent Cells	Highest known value: 2.3 kPa (17.5 mm Hg) (at 20°C) (Water). Weighted average: 2.11 kPa (15.83 mm Hg) (at 20°C)
Vapor density	:	pUC18 Control Plasmid DNA	Highest known value: 0.62 (Air = 1) (Water).
		1.42 M 2-Mercaptoethanol	Highest known value: 2.7 (Air = 1) (2-Mercaptoethanol). Weighted average: 0.83 (Air = 1)
		XL1-Blue Competent Cells	Highest known value: 3.1 (Air = 1) (Glycerol). Weighted average: 0.98 (Air = 1)
Evaporation rate	:	pUC18 Control Plasmid DNA	Not available.
		1.42 M 2-Mercaptoethanol	Not available.
		XL1-Blue Competent Cells	0.026 (Dimethyl sulfoxide) compared with Butyl acetate.

10 . Stability and reactivity

Stability and reactivity	:	The product is stable.
Incompatibility with various substances	:	Highly reactive or incompatible with the following materials: oxidizing materials and organic materials. Reactive or incompatible with the following materials: acids.

Hazardous decomposition products	:	pUC18 Control Plasmid DNA	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
		1.42 M 2-Mercaptoethanol	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
		XL1-Blue Competent Cells	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Conditions of reactivity - Flammability	:	Flammable in the presence of the following materials or conditions: open flames, sparks and static discharge.	

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Dimethyl sulfoxide	LD50 Dermal	Rat	40 gm/kg	-
	LD50 Oral	Rat	14500 mg/kg	-
Sucrose	LD50 Oral	Rat	29700 mg/kg	-
Manganese dichloride	LD50 Oral	Rat	250 mg/kg	-
Glycerol	LD50 Dermal	Rabbit	>10 gm/kg	-
	LD50 Oral	Rat	12600 mg/kg	-
Potassium chloride	LD50 Oral	Rat	2600 mg/kg	-

Eyes	:	pUC18 Control Plasmid DNA	No known significant effects or critical hazards.
		1.42 M 2-Mercaptoethanol	Irritating to eyes.
		XL1-Blue Competent Cells	No known significant effects or critical hazards.

11 . Toxicological information

Skin	:	pUC18 Control Plasmid DNA	No known significant effects or critical hazards.
		1.42 M 2-Mercaptoethanol	Irritating to skin. May cause sensitization by skin contact.
		XL1-Blue Competent Cells	No known significant effects or critical hazards.
Inhalation	:	pUC18 Control Plasmid DNA	No known significant effects or critical hazards.
		1.42 M 2-Mercaptoethanol	No known significant effects or critical hazards.
		XL1-Blue Competent Cells	No known significant effects or critical hazards.
Ingestion	:	pUC18 Control Plasmid DNA	No known significant effects or critical hazards.
		1.42 M 2-Mercaptoethanol	Toxic if swallowed.
		XL1-Blue Competent Cells	Toxic if swallowed.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
XL1-Blue Competent Cells						
Sucrose	A4	-	-	-	-	-

Potential chronic health effects

Chronic effects	:	Contains material that may cause target organ damage, based on animal data.
Carcinogenicity	:	No known significant effects or critical hazards.
Mutagenicity	:	No known significant effects or critical hazards.
Teratogenicity	:	No known significant effects or critical hazards.
Developmental effects	:	No known significant effects or critical hazards.
Fertility effects	:	No known significant effects or critical hazards.

Over-exposure signs/symptoms

Inhalation	:	No specific data.
Ingestion	:	No specific data.
Skin	:	No specific data.
Eyes	:	No specific data.

Target organs	:	pUC18 Control Plasmid DNA	Not available.
		1.42 M 2-Mercaptoethanol	Not available.
		XL1-Blue Competent Cells	Contains material which may cause damage to the following organs: blood, kidneys, gastrointestinal tract, upper respiratory tract, skin, central nervous system (CNS), eye, lens or cornea.
Other adverse effects	:	pUC18 Control Plasmid DNA	Not available.
		1.42 M 2-Mercaptoethanol	Not available.
		XL1-Blue Competent Cells	Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

12 . Ecological information

Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
Dimethyl sulfoxide	-	Acute LC50 35 to 37 ml/L Fresh water	Fish	96 hours
	-	Acute LC50 34000000 ug/L Fresh water	Fish	96 hours
Manganese dichloride	-	Acute EC50 4700 ug/L Fresh water	Daphnia	48 hours
Glycerol	-	Acute LC50 54 to 57 ml/L Fresh water	Fish	96 hours
Potassium chloride	-	Acute EC50 83000 ug/L Fresh water	Daphnia	48 hours
	-	Acute LC50 337 mg/L Fresh water	Daphnia	48 hours
	-	Acute LC50 435000 ug/L Fresh water	Fish	96 hours

Other adverse effects : No known significant effects or critical hazards.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

The information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information

DOT / IMDG / IATA : Not regulated.

15 . Regulatory information

HCS Classification :

pUC18 Control Plasmid DNA	Not regulated.
1.42 M 2-Mercaptoethanol	Toxic material Irritating material Sensitizing material
XL1-Blue Competent Cells	Toxic material Target organ effects

15 . Regulatory information

	pUC18 Control Plasmid DNA	Not available.
	1.42 M 2-Mercaptoethanol	Not available.
	XL1-Blue Competent Cells	Contains material which may cause damage to the following organs: blood, kidneys, gastrointestinal tract, upper respiratory tract, skin, central nervous system (CNS), eye, lens or cornea.
U.S. Federal regulations :	pUC18 Control Plasmid DNA	**United States inventory (TSCA 8b):** All components are listed or exempted.
	1.42 M 2-Mercaptoethanol	**United States inventory (TSCA 8b):** All components are listed or exempted.
	XL1-Blue Competent Cells	**United States inventory (TSCA 8b):** All components are listed or exempted.
	pUC18 Control Plasmid DNA	**SARA 302/304/311/312 extremely hazardous substances**: No products were found. **SARA 302/304 emergency planning and notification**: No products were found. **SARA 302/304/311/312 hazardous chemicals**: No products were found. **SARA 311/312 MSDS distribution - chemical inventory - hazard identification**: No products were found.
	1.42 M 2-Mercaptoethanol	**SARA 302/304/311/312 extremely hazardous substances**: No products were found. **SARA 302/304 emergency planning and notification**: No products were found. **SARA 302/304/311/312 hazardous chemicals**: 2-Mercaptoethanol **SARA 311/312 MSDS distribution - chemical inventory - hazard identification**: 2-Mercaptoethanol: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard
	XL1-Blue Competent Cells	**SARA 302/304/311/312 extremely hazardous substances**: No products were found. **SARA 302/304 emergency planning and notification**: No products were found. **SARA 302/304/311/312 hazardous chemicals**: Potassium chloride; Glycerol; Manganese dichloride; Sucrose; Dimethyl sulfoxide **SARA 311/312 MSDS distribution - chemical inventory - hazard identification**: Potassium chloride: Immediate (acute) health hazard, Delayed (chronic) health hazard; Glycerol: Immediate (acute) health hazard, Delayed (chronic) health hazard; Manganese dichloride: Delayed (chronic) health hazard; Sucrose: Delayed (chronic) health hazard; Dimethyl sulfoxide: Immediate (acute) health hazard, Delayed (chronic) health hazard
	pUC18 Control Plasmid DNA	**Clean Water Act (CWA) 307**: No products were found.
	1.42 M 2-Mercaptoethanol	**Clean Water Act (CWA) 307**: No products were found.
	XL1-Blue Competent Cells	**Clean Water Act (CWA) 307**: No products were found.
	pUC18 Control Plasmid DNA	**Clean Water Act (CWA) 311**: Edetic acid
	1.42 M 2-Mercaptoethanol	**Clean Water Act (CWA) 311**: No products were found.
	XL1-Blue Competent Cells	**Clean Water Act (CWA) 311**: No products were found.

15 . Regulatory information

pUC18 Control Plasmid DNA	**Clean Air Act (CAA) 112 accidental release prevention**: No products were found.
1.42 M 2-Mercaptoethanol	**Clean Air Act (CAA) 112 accidental release prevention**: No products were found.
XL1-Blue Competent Cells	**Clean Air Act (CAA) 112 accidental release prevention**: No products were found.
pUC18 Control Plasmid DNA	**Clean Air Act (CAA) 112 regulated flammable substances**: No products were found.
1.42 M 2-Mercaptoethanol	**Clean Air Act (CAA) 112 regulated flammable substances**: No products were found.
XL1-Blue Competent Cells	**Clean Air Act (CAA) 112 regulated flammable substances**: No products were found.
pUC18 Control Plasmid DNA	**Clean Air Act (CAA) 112 regulated toxic substances**: No products were found.
1.42 M 2-Mercaptoethanol	**Clean Air Act (CAA) 112 regulated toxic substances**: No products were found.
XL1-Blue Competent Cells	**Clean Air Act (CAA) 112 regulated toxic substances**: No products were found.

SARA 313

Form R - Reporting requirements :

Product name	CAS number	Concentration
XL1-Blue Competent Cells		
Manganese dichloride	7773-01-5	5 - 10
Hexaamminecobalt trichloride	10534-89-1	0.1 - 1

Supplier notification :

Product name	CAS number	Concentration
XL1-Blue Competent Cells		
Manganese dichloride	7773-01-5	5 - 10
Hexaamminecobalt trichloride	10534-89-1	0.1 - 1

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations : pUC18 Control Plasmid DNA

Connecticut Carcinogen Reporting: None of the components are listed.
Connecticut Hazardous Material Survey: None of the components are listed.
Florida substances: None of the components are listed.
Illinois Chemical Safety Act: None of the components are listed.
Illinois Toxic Substances Disclosure to Employee Act: None of the components are listed.
Louisiana Reporting: None of the components are listed.
Louisiana Spill: None of the components are listed.
Massachusetts Spill: None of the components are listed.
Massachusetts Substances: None of the components are listed.
Michigan Critical Material: None of the components are listed.
Minnesota Hazardous Substances: None of the components are listed.
New Jersey Hazardous Substances: None of the components are listed.
New Jersey Spill: None of the components are listed.
New Jersey Toxic Catastrophe Prevention Act: None of the components are listed.
New York Acutely Hazardous Substances: None of the components are listed.
New York Toxic Chemical Release Reporting: None of the components are listed.
Pennsylvania RTK Hazardous Substances: None of the

15 . Regulatory information

components are listed.
Rhode Island Hazardous Substances: None of the components are listed.

1.42 M 2-Mercaptoethanol

Connecticut Carcinogen Reporting: None of the components are listed.
Connecticut Hazardous Material Survey: None of the components are listed.
Florida substances: None of the components are listed.
Illinois Chemical Safety Act: None of the components are listed.
Illinois Toxic Substances Disclosure to Employee Act: None of the components are listed.
Louisiana Reporting: None of the components are listed.
Louisiana Spill: None of the components are listed.
Massachusetts Spill: None of the components are listed.
Massachusetts Substances: The following components are listed: 2-Mercaptoethanol
Michigan Critical Material: None of the components are listed.
Minnesota Hazardous Substances: None of the components are listed.
New Jersey Hazardous Substances: None of the components are listed.
New Jersey Spill: None of the components are listed.
New Jersey Toxic Catastrophe Prevention Act: None of the components are listed.
New York Acutely Hazardous Substances: None of the components are listed.
New York Toxic Chemical Release Reporting: None of the components are listed.
Pennsylvania RTK Hazardous Substances: The following components are listed: 2-Mercaptoethanol
Rhode Island Hazardous Substances: None of the components are listed.

XL1-Blue Competent Cells

Connecticut Carcinogen Reporting: None of the components are listed.
Connecticut Hazardous Material Survey: None of the components are listed.
Florida substances: None of the components are listed.
Illinois Chemical Safety Act: None of the components are listed.
Illinois Toxic Substances Disclosure to Employee Act: None of the components are listed.
Louisiana Reporting: None of the components are listed.
Louisiana Spill: None of the components are listed.
Massachusetts Spill: None of the components are listed.
Massachusetts Substances: The following components are listed: Glycerol;Sucrose
Michigan Critical Material: None of the components are listed.
Minnesota Hazardous Substances: None of the components are listed.
New Jersey Hazardous Substances: The following components are listed: Manganese dichloride
New Jersey Spill: None of the components are listed.
New Jersey Toxic Catastrophe Prevention Act: None of the components are listed.
New York Acutely Hazardous Substances: None of the components are listed.
New York Toxic Chemical Release Reporting: None of the

15 . Regulatory information

components are listed.
Pennsylvania RTK Hazardous Substances: The following components are listed: Glycerol; Manganese dichloride;Sucrose
Rhode Island Hazardous Substances: None of the components are listed.

State regulations - California Prop. 65 : No products were found.

16 . Other information

Label requirements	: pUC18 Control Plasmid DNA	NOT EXPECTED TO PRODUCE SIGNIFICANT ADVERSE HEALTH EFFECTS WHEN THE RECOMMENDED INSTRUCTIONS FOR USE ARE FOLLOWED.
	1.42 M 2-Mercaptoethanol	HARMFUL IF SWALLOWED. CAUSES EYE AND SKIN IRRITATION. MAY CAUSE ALLERGIC SKIN REACTION.
	XL1-Blue Competent Cells	HARMFUL IF SWALLOWED. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

Date of issue : 01/09/2009
Version : 1

Notice to reader

DISCLAIMER: This Material Safety Data Sheet is offered without charge to the clients of Agilent Technologies. Data is the most current available to Agilent Technologies at the time of preparation and is issued as a matter of information only, no warranty as to its accuracy or completeness is expressed or implied.

Indicates information that has changed from previously issued version.

Novagen®

Material Safety Data Sheet

Order Number **Customer Number**

1. Product and Company Identification

Supplier

Manufactured by EMD Biosciences, Inc.
441 Charmany Drive
Madison, WI 53719
(608)238-6110
(800)207-0144
FAX: (608)238-1388

P.O. Box 12087
La Jolla, CA 92039-2087
(858)450-5558
(800)854-3417
FAX: (858)453-3552

Catalog # 69410

In Case of Emergency Call Chemtrec®
(800)424-9300 (within U.S.A.)
(703)527-3887 (outside U.S.A.)

Product name pET System 3 + Competent Cells

2. Composition and Information on Ingredients

Ingredient Name	CAS No.	Product No.	EU Symbol	R-Phrases
Calcium Chloride	10043-52-4	RC0030	Xi	R36
Dimethyl Sulfoxide	67-68-5	RC1120	Xi	R36/38

Note: See section 8 for occupational exposure limits and section 11 for LC50/LD50 information.

3. Hazards Identification

Primary Hazards and Critical Effects :

RC0030: CAUTION! MAY BE HARMFUL IF SWALLOWED. MAY CAUSE EYE IRRITATION. Avoid contact with eyes. Do not ingest. Wash thoroughly after handling.

RC1120: CAUTION! MAY CAUSE EYE AND SKIN IRRITATION. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.

Physical/Chemical hazards : Not applicable.

Human Health Hazards :
RC0030: Irritating to eyes.
RC1120: Irritating to eyes and skin.

Environmental Hazards : Not applicable.

4. First Aid Measures

Inhalation : RC0030, RC1120: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion :
RC0030: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately.
RC1120: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention if symptoms appear.

Skin Contact : RC0030, RC1120: In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Eye Contact : RC0030, RC1120: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Notes to Medical Doctor : Not available.

5. Fire-Fighting Measures

Extinguishing Media : Use foam or all purpose dry chemicals to extinguish.

Fire-Fighting Procedures : Fire fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear.

Fire/Explosion Hazards : Not applicable.

Hazardous Decomposition Products : These products are carbon oxides (CO, CO2), sulfur oxides (SO2, SO3...).

6. Accidental Release Measures

Personal Precautions : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (Section 8). Follow all fire fighting procedures (Section 5).

Environmental Precautions and Clean-up Methods : If emergency personnel are unavailable, contain spilled material. For small spills add absorbent (soil may be used in the absence of other suitable materials) scoop up material and place in a sealed, liquid-proof container for disposal. For large spills dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal. Minimize contact of spilled material with soils to prevent runoff to surface waterways.

Note: See section 1 for emergency contact information and section 13 for waste disposal.

7. Handling and Storage

Handling :

RC0030	Avoid contact with eyes. Do not ingest. Wash thoroughly after handling.
RC1120	Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.

Storage : Keep container tightly closed. Keep container in a cool, well-ventilated area.

Packaging Materials : Use original container.

8. Exposure Controls and Personal Protection

Occupational Exposure Limits

Ingredient Name	Occupational Exposure Limits
RC0030	Not available.
RC1120	Not available.

Engineering Controls : RC0030, RC1120 — No special containment is required. Local exhaust ventilation should be provided.

Personal Protective Equipment

Respiratory System :	RC0030	Use an approved, properly fitted, HEPA filter cartridge respirator, or a respirator of greater protection if there is the potential to exceed the exposure limit(s).
	RC1120	Use appropriate respiratory protection if there is the potential to exceed the exposure limit(s).
Skin and Body :	RC0030, RC1120	Work uniform or laboratory coat.
Hands :	RC0030	Use chemical resistant, impervious gloves. Additional body garments should be used based upon the task being performed (e.g., sleevelets, apron, gauntlets, disposable suits). Appropriate techniques should be used to remove potentially contaminated clothing.
	RC1120	Use chemical resistant, impervious gloves. Additional body garments should be used based upon the task being performed (e.g., sleevelets, apron, gauntlets, disposable suits).
Eyes :	RC0030	Safety glasses. Goggles, face shield, or other full-face protection if potential exists for direct exposure to dust.
	RC1120	Safety glasses. Goggles, face shield, or other full-face protection if potential exists for direct exposure to aerosols or splashes.

9. Physical and Chemical Properties

Kit Components

69318: 1 x 10 ul Test Plasmid
69319: 1 x 2 ml SOC Medium
69386: 1 x 0.2 ml BL21 glycerol stock
69387: 1 x 0.2 ml BL21(DE3) glycerol stock
69388: 1 x 0.2 ml BL21(DE3)pLysS glycerol stock
69418: 1 x 10 ug pET-3a DNA
69419: 1 x 10 ug pET-3b DNA
69420: 1 x 10 ug pET-3c DNA
69421: 1 x 10 ug pET-3d DNA
69450: 1 x 0.2 ml BL21(DE3) competent cells, containing Calcium Chloride (RC0030)
69451: 1 x 0.2 ml BL21(DE3)pLysS competent cells, containing Calcium Chloride (RC0030)
69674: 1 x 0.2 ml Induction Control A
69825: 1 x 0.2 ml NovaBlue competent cells, containing Dimethyl Sulfoxide (RC1120)

Flash Point

Not available.

10. Stability and Reactivity

Stability	:	RC0030, RC1120	The product is stable.
Conditions and Materials to Avoid	:	RC0030	Reactive with acids.
		RC1120	Reactive with oxidizing agents, reducing agents, acids.
Hazardous Decomposition Products	:		Not available.

11. Toxicological Information

Toxicity Data

Ingredient Name	Test	Result	Route	Species
RC0030	LD50	1000 mg/kg	Oral	Rat
	LD50	1940 mg/kg	Oral	Mouse
RC1120	LD50	14500 mg/kg	Oral	Rat
	LD50	7920 mg/kg	Oral	Mouse
	LD50	>10000 mg/kg	Oral	Dog
	LD50	40000 mg/kg	Dermal	Rat
	LD50	50000 mg/kg	Dermal	Mouse
	LDLo	>11000 mg/kg	Oral	Guinea pig

Routes of Entry : Absorbed through skin. Dermal contact. Eye contact.

Acute Effects

Inhalation	:		Not available.
Ingestion	:	RC0030 RC1120	Harmful if swallowed Practically non-toxic if swallowed.
Skin Contact	:	RC1120	Moderately irritating to the skin. Practically non-toxic in contact with skin.
Eye Contact	:	RC0030, RC1120	Moderately irritating to the eyes.

Chronic Effects

Adverse Effects	:		Not available.
Target Organs	:		Not available.
Carcinogenic Effects	:		Not available.
Mutagenic Effects	:		Not available.
Developmental and Teratogenic Effects	:		Not available.
Reproductive Effects	:		Not available.
Other Information	:	RC0030, RC1120	Repeated or prolonged exposure is not known to aggravate medical condition.

12. Ecological Information

Ecotoxicity Data

Ingredient Name	Species	Period	Result
RC0030	Not available.	Not available.	Not available.
RC1120	Not available.	Not available.	Not available.

13. Disposal Consideration

Waste Handling and Disposal : Waste must be disposed of in accordance with federal, state and local environmental control regulations.

14. Transport Information

Air

IATA-DGR Class : Not controlled under IATA.

Packing Group

15. Regulatory Information

EU Regulations

Hazard Symbol(s)	:	Xi
Risk Phrases	:	R36/38- Irritating to eyes and skin.
Safety Phrases	:	S24- Avoid contact with skin. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

US Regulations

Haz-Com Standard	:	Not controlled under the HCS (United States).
EPA	:	Not available.
State	:	Not available.

Canadian Regulations

WHMIS	:	Not controlled under WHMIS (Canada).
CEPA	:	No products were found.
Provincial	:	No products were found.

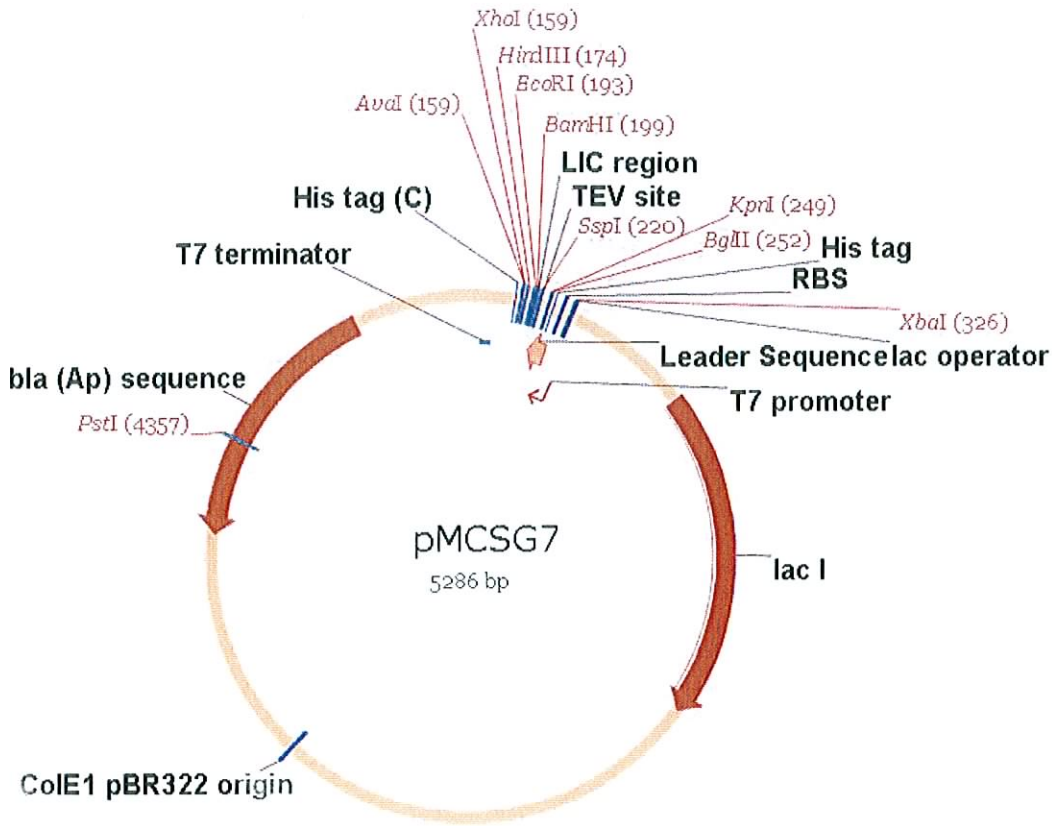
16. Other Information

Validated by map on 7/25/2003.

Version	:	1.0
Date of Printing	:	**7/25/2003.**

Notice to Reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
*Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. **This product is intended for research use only.***


XhoI (159)
HindIII (174)
EcoRI (193)
AvaI (159)
BamHI (199)
LIC region
TEV site
His tag (C)
KpnI (249)
SspI (220)
BglII (252)
His tag
T7 terminator
RBS
XbaI (326)
Leader Sequence
lac operator
bla (Ap) sequence
T7 promoter
PstI (4357)
pMCSG7
5286 bp
lac I
ColE1 pBR322 origin

Detailed Information

Clone: EvNO00084271

Explanation of Terms

Add To Cart

Bottom of Form

Clone ID:	EvNO00084271	**Type:**	No insert
Is Verified:	N	**Verification Method:**	
Status:	AVAILABLE	**Distribution:**	No restriction
Source:	M. Donnelly	**Special MTA:**	PSI
Description:	Bacterial expresson vector with T7 promoter, adds N-terminal His tag and TEV protease site; amp resistance; ligation independent cloning (LIC).		
Comments:			
Map:	pMCSG7circ.jpg		

Additional Annotations:

Please note that clicking on the HIP Clone ID will link to additional sequencing information including the linker sequences (the sequences immediately flanking the insert).

Collection/Protein Expression Information:

Collection	Argonne National Laboratory
Collection	Midwest Center for Structural Genomics
Collection	PSI

Insert Information:

Insert	Size (bp)	Species	Mutation	Discrepancy	Format	Tissue Source	Species Specific ID	Gene Symbol	Gene Name	Target Genbank	Keyword

Insert Sequence:

Vector Information:

Vector Name:	pMCSG7	**Size (bp):**	0
Type:	bacterial plasmid	**Form:**	dsDNA
Description:	Bacterial expresson vector with T7 promoter, adds N-terminal His tag and TEV protease site; amp resistance; ligation independent cloning (LIC).		
Properties:	bacterial expression, in vitro transcription, ligation independent cloning (LIC), with tag/fusion/marker		
Comments:	pET21 derivative; for routine HTP purification		
Map:	pMCSG7circ.jpg		
Sequence:	pMCSG7.gb		

Host Information:

Host Strain	Is Used In Distribution	Description
DH5-alpha T1 phage resistant	Y	phage-resistant E. coli DH5-alpha strain used by HIP

Antibiotic Selections:

Host Type	Marker
bacterial	ampicillin

Recommended Growth Condition:

Host Type	Selection Condition	Growth Condition	Comments
bacterial	100 ug/mL ampicillin	Growth with the single antibiotic in LB at 37 degrees is recommended.	Commonly used conditions for ampicillin resistant plasmid clones.

Authors:

Author Name	Author Type
PSI	Initiative
MCSG, Argonne National Laboratory	National Laboratory
M.Donnelly	Academic Researcher, clone PI
Midwest Center for Structural Genomics	Consortium

Publications:

PMID	Title