

**THE UNIVERSITY OF WESTERN ONTARIO
BIOLOGICAL AGENTS REGISTRY FORM**
Approved Biohazards Subcommittee: October 14, 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	<u>Derek McLachlin</u>
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Location of experimental work to be carried out: Building(s) MSB Room(s) 117,120,126,127,130,131,132

*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: Not applicable – educational lab work is funded by the Department of Biochemistry

GRANT TITLE(S): Not applicable – lab work is carried out during and in preparation for the course Biochemistry 3380G _____

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

<u>Name</u>	<u>UWO E-mail Address</u>	<u>Date of Biosafety Training</u>
Graduate teaching assistants for Biochemistry 3380G (different every year)	_____	_____
Undergraduate students in Biochemistry 3380G (different every year)	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

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.

Escherichia coli DH5-alpha, strains JM103 and BL21.

Stocks are stored in an unlocked -80°C freezer in MSB 132, a room that is usually locked.

The bacteria are used for routine cloning and protein expression tasks in the course Biochemistry 3380G – Biochemistry Laboratory.

Liquid bacterial waste is treated with bleach and disposed of down the sink. Solid waste contaminated with bacteria is autoclaved on the third floor of MSB before disposal.

Please include a one page research summary or teaching protocol.

Protein purification lab

The PI streaks *E. coli* cells containing an expression vector onto agar plates containing antibiotic. Small cultures are grown and used to inoculate 1-L cultures. Protein expression is induced with IPTG, and the cells are centrifuged, resuspended in a smaller volume of buffer, and stored at -80°C.

When needed, undergraduate students thaw the cells and break them open by treating them with lysozyme followed by a freeze-thaw cycle and shearing with a syringe. Cell debris is removed by centrifugation. DNA is precipitated using Polymin P, followed by another centrifugation. The samples are then stored at -80°C.

The following week, students thaw the cell extract and pass it over an affinity column which binds the protein of interest. After washing the column, students specifically elute the protein of interest using an appropriate ligand. Samples from different stages of the protocol are analyzed by SDS-PAGE.

DNA cloning lab

The PI streaks *E. coli* cells containing a plasmid onto agar plates containing antibiotic. Small cultures are grown.

Undergraduate students collect cells from the cultures by centrifugation and make plasmid DNA mini-preps using the alkaline lysis method.

After ligation of a DNA insert into the plasmid, undergraduate students transform competent *E. coli* cells with the newly made plasmid. They plate the cells onto agar medium containing antibiotic. The PI stores the grown colonies at 4°C, and when appropriate streaks selected colonies onto agar plates containing antibiotic. These streaks are used to inoculate small cultures.

Undergraduate students collect cells from the cultures by centrifugation and make plasmid DNA mini-preps using the alkaline lysis method. The plasmid preps are analyzed by restriction endonuclease digestion.

The PI grows small cultures and induces protein overexpression using IPTG. Undergraduate students collect cells by centrifugation, resuspend them in SDS-PAGE sample buffer, and analyze them by gel electrophoresis.

1.0 Microorganisms

1.1 Does your work involve the use of biological agents? YES 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? 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)* (Be specific)	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
<i>Escherichia coli</i> DH5 α strain JM103	<input type="radio"/> Yes <input checked="" type="radio"/> No	<input type="radio"/> Yes <input checked="" type="radio"/> No	<input type="radio"/> Yes <input checked="" type="radio"/> No	2	Stanley D Dunn	X 1 <input type="radio"/> 2 <input type="radio"/> 2+ <input type="radio"/> 3
<i>Escherichia coli</i> DH5 α strain BL21	<input type="radio"/> Yes <input checked="" type="radio"/> No	<input type="radio"/> Yes <input checked="" type="radio"/> No	<input type="radio"/> Yes <input checked="" type="radio"/> No	2	Agilent Technologies	X 1 <input type="radio"/> 2 <input type="radio"/> 2+ <input type="radio"/> 3
	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No			<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 2+ <input type="radio"/> 3
	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No			<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 2+ <input type="radio"/> 3

*Please attach a Material Safety Data Sheet or equivalent from the supplier. **MSDS not available for strain JM103.**

2.0 Cell Culture

2.1 Does your work involve the use of cell cultures? 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	<input type="radio"/> Yes <input type="radio"/> No		Not applicable
Rodent	<input type="radio"/> Yes <input type="radio"/> No		
Non-human primate	<input type="radio"/> Yes <input type="radio"/> No		
Other (specify)	<input type="radio"/> Yes <input type="radio"/> 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)*	Containment Level of each cell line	Supplier / Source of cell line(s)
Human	<input type="radio"/> Yes <input type="radio"/> No			
Rodent	<input type="radio"/> Yes <input type="radio"/> No			
Non-human primate	<input type="radio"/> Yes <input type="radio"/> No			
Other (specify)	<input type="radio"/> Yes <input type="radio"/> 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 1 2 2+ 3

3.0 Use of Human Source Materials

3.1 Does your work involve the use of human source materials? 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/UNKNOWN	Name of Infectious Agent (If applicable)	PHAC or CFIA Containment Level (Select one)
Human Blood (whole) or other Body Fluid		<input type="radio"/> Yes <input type="radio"/> Unknown		<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 2+ <input type="radio"/> 3
Human Blood (fraction) or other Body Fluid		<input type="radio"/> Yes <input type="radio"/> Unknown		<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 2+ <input type="radio"/> 3
Human Organs or Tissues (unpreserved)		<input type="radio"/> Yes <input type="radio"/> Unknown		<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 2+ <input type="radio"/> 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 NO If no, please proceed to Section 5.0

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

Bacteria Used for Cloning *	Plasmid(s) **	Source of Plasmid	Gene Transfected	Describe the change that results from transformation or tranfection
<i>E. coli</i> JM103	pDM3T, a pUC8-derived plasmid	PI created in the lab of Stanley D Dunn	A section of <i>uncF</i> from <i>E. coli</i>	Overexpression of gene product when treated with IPTG
<i>E. coli</i> BL21	pDR3	Paul del Rizzo formerly of Dunn lab	Gene encoding modified green fluorescent protein	Overexpression of gene product when treated with IPTG

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

** Please attach a plasmid map.

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)? YES No If no, please proceed to section 8.0

7.2 Will live animals be used? YES No

7.3 If yes, please specify the animal(s) used:

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

7.4 If no live animals are used, please specify the source of the specimens:

8.0 Biological Toxins

8.1 Will toxins of biological origin be used? 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 LD₅₀ (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 live animals? YES, Please provide details: _____ 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? 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? Initiate and maintain colony, give location: _____
 "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? YES NO

If YES, Please attach the CFIA permit & describe any CFIA permit conditions:

10.0 Plants

10.1 Do you use plants? 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? Grow and maintain a crop "One-time" use

10.6 Do you do any modifications to the plant? YES 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? YES 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? 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? YES NO

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

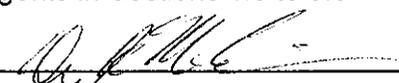
11.4 Has the import permit been sent to OHS? YES, please provide permit # _____ NO

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 ***with the exception of undergraduate students*** 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. X 1 O 2 O 2+ O 3

13.2 Has the facility been certified by OHS for this level of containment?
 YES, date of most recent biosafety inspection: _____
 NO, please certify
 NOT REQUIRED for Level 1 containment

13.3 Please indicate permit number (not applicable for first time applicants): _____

14.0 Procedures to be Followed

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

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

An accident report form will be completed. Injured person will be told to go to ER or doctor if swelling or other reaction occurs.

14.3 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: Feb 2, 2011

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:

Material Safety Data Sheet



Stratagene BL21 Competent Cells, Catalog # 200133

1. Product and company identification

Product name
Part No. : Stratagene BL21 Competent Cells, Catalog # 200133
: BL21 competent cells 200133-41
pUC18 Control Plasmid 200231-42
DNA
1.42 M 2-Mercaptoethanol 210200-43

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

Emergency telephone number
: 1-800-894-1304

Use of the substance/preparation
: Chemical Kit

Validation date
: 11/21/2008

2. Hazards identification

Physical state
: BL21 competent cells Liquid
pUC18 Control Plasmid Liquid
DNA
1.42 M 2-Mercaptoethanol Liquid
: BL21 competent cells Not available.
pUC18 Control Plasmid Not available.
DNA
1.42 M 2-Mercaptoethanol Not available.

Odor
: BL21 competent cells This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200). 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.

OSHA/HCS status
: BL21 competent cells This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
pUC18 Control Plasmid
DNA
1.42 M 2-Mercaptoethanol

Emergency overview-Signal Word
: WARNING !

Emergency overview-Label Statement
: BL21 competent cells HARMFUL IF SWALLOWED. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
pUC18 Control Plasmid NOT EXPECTED TO PRODUCE SIGNIFICANT ADVERSE HEALTH EFFECTS WHEN THE RECOMMENDED INSTRUCTIONS FOR USE ARE FOLLOWED.
DNA HARMFUL IF SWALLOWED. CAUSES EYE AND SKIN IRRITATION.
1.42 M 2-Mercaptoethanol 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, prolonged contact with eyes, skin and clothing.
BL21 competent cells No known significant effects or critical hazards. Avoid prolonged contact with eyes, skin and clothing.
pUC18 Control Plasmid Toxic if swallowed. Irritating to eyes and skin. Do not breathe vapor or mist. Do not ingest. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.
1.42 M 2-Mercaptoethanol

Stratagene BL21 Competent Cells, Catalog # 200133

2. Hazards identification

Routes of entry
: BL21 competent cells Eye contact, Inhalation, Ingestion.
pUC18 Control Plasmid Eye contact, Ingestion.
DNA
1.42 M 2-Mercaptoethanol Eye contact, Ingestion.

Potential acute health effects

Eyes
: BL21 competent cells No known significant effects or critical hazards.
pUC18 Control Plasmid No known significant effects or critical hazards.
DNA
1.42 M 2-Mercaptoethanol Irritating to eyes.

Skin
: BL21 competent cells No known significant effects or critical hazards.
pUC18 Control Plasmid No known significant effects or critical hazards.
DNA
1.42 M 2-Mercaptoethanol Irritating to skin.

Inhalation
: BL21 competent cells No known significant effects or critical hazards.
pUC18 Control Plasmid No known significant effects or critical hazards.
DNA
1.42 M 2-Mercaptoethanol No known significant effects or critical hazards.

Ingestion
: BL21 competent cells Toxic if swallowed.
pUC18 Control Plasmid No known significant effects or critical hazards.
DNA
1.42 M 2-Mercaptoethanol Toxic if swallowed.

Medical conditions aggravated by over-exposure
: BL21 competent cells Repeated or prolonged exposure to the substance can produce target organs damage.
pUC18 Control Plasmid Not applicable.
DNA
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.

Over-exposure signs/symptoms

: BL21 competent cells Not applicable.
pUC18 Control Plasmid Not applicable.
DNA
1.42 M 2-Mercaptoethanol Not applicable.

See toxicological information (section 11)

3. Composition/information on ingredients

Name	CAS number	%
BL21 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
1.42 M 2-Mercaptoethanol		
2-Mercaptoethanol	60-24-2	10

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



4. First aid measures

Eye contact

: BL21 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.
 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.

Skin contact

: BL21 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.
 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.

Inhalation

: BL21 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.
 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.

Ingestion

: BL21 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.
 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.

Protection of first-aiders

: BL21 competent cells
 Not applicable.
 DNA
 Not applicable.
 1.42 M 2-Mercaptoethanol
 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 : BL21 competent cells Non-flammable.
 pUC18 Control Plasmid Non-flammable.
 DNA
 1.42 M 2-Mercaptoethanol Non-flammable.

Products of combustion : BL21 competent cells
 Decomposition products may include the following materials:
 carbon oxides
 halogenated compounds
 metal oxide/oxides
 No specific data.

pUC18 Control Plasmid
 DNA
 1.42 M 2-Mercaptoethanol
 Decomposition products may include the following materials:
 carbon oxides
 sulfur oxides

Extinguishing media

Suitable : BL21 competent cells Use an extinguishing agent suitable for the surrounding fire.
 pUC18 Control Plasmid Use an extinguishing agent suitable for the surrounding fire.
 DNA

Not suitable

: 1.42 M 2-Mercaptoethanol Use an extinguishing agent suitable for the surrounding fire.
 : BL21 competent cells Not applicable.
 pUC18 Control Plasmid Not applicable.
 DNA

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

: BL21 competent cells Not available.
 pUC18 Control Plasmid Not available.
 DNA
 1.42 M 2-Mercaptoethanol Not available.

Special remarks on explosion hazards

: Not available.

6. Accidental release measures

Personal precautions

: BL21 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).
 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).

6. Accidental release measures

Environmental precautions : BL21 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).

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).

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

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.

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.

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

Do not ingest. Wash thoroughly after handling. Wash thoroughly after handling.

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

United States

BL21 competent cells

Glycerol

Exposure limits

ACGIH TLV (United States, 1/2008).

TWA: 10 mg/m³ 8 hour(s). Form: Mist

OSHA PEL (United States, 1/12006).

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

ACGIH TLV (United States, 1/2008).

TWA: 0.2 mg/m³; (as Mn) 8 hour(s).

OSHA PEL 1989 (United States, 3/1989).

CEL: 5 mg/m³. (as Mn)

NIOSH REL (United States, 12/2001).

Date of issue : 11/21/2008

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8. Exposure controls/personal protection

TWA: 1 mg/m³ (as Mn) 10 hour(s)

STEL: 3 mg/m³ (as Mn) 15 minute(s).

OSHA PEL (United States, 11/2006).

CEL: 5 mg/m³. (as Mn)

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

AIHA WEEL (United States, 1/2008).

TWA: 250 ppm 8 hour(s).

1.42 M 2-Mercaptoethanol

2-Mercaptoethanol

Dimethyl sulfoxide

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

: Safely 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.

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, BUJANA-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

: Handle as biohazard material (Biosafety level 1). 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

: BL21 competent cells Liquid

PUC18 Control Plasmid Liquid

DNA Liquid

1.42 M 2-Mercaptoethanol Liquid

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12. Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
Dimethyl sulfoxide	-	Acute LC50 35 to 37 mL 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 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

: BL21 competent cells
 Toxic material
 Target organ effects
 PUC18 Control Plasmid
 DNA
 Not regulated.
 1.42 M 2-Mercaptoethanol
 Toxic material
 Irritating material

15. Regulatory information

U.S. Federal regulations

U.S. Federal regulations	BL21 competent cells	United States inventory (TSCA 8b): All components are listed or exempted
	PUC18 Control Plasmid DNA 1.42 M 2-Mercaptoethanol	United States inventory (TSCA 8b): All components are listed or exempted
	BL21 competent cells	United States inventory (TSCA 8b): All components are listed or exempted
		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
		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
	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.
	1.42 M 2-Mercaptoethanol	SARA 311/312 MSDS distribution - chemical inventory - hazard identification: No products were found.
		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: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard
	BL21 competent cells PUC18 Control Plasmid DNA	Clean Water Act (CWA) 307: No products were found. Clean Water Act (CWA) 307: No products were found.
	1.42 M 2-Mercaptoethanol	Clean Water Act (CWA) 307: No products were found.
	BL21 competent cells	Clean Water Act (CWA) 311: No products were found.
	PUC18 Control Plasmid DNA	Clean Water Act (CWA) 311: No products were found.
	1.42 M 2-Mercaptoethanol	Clean Water Act (CWA) 311: No products were found.
	BL21 competent cells	Clean Air Act (CAA) 112 accidental release prevention: No products were found.
	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.
	BL21 competent cells	Clean Air Act (CAA) 112 regulated flammable substances : 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.

15 . Regulatory information

BL21 competent cells
 PUC18 Control Plasmid
 DNA
 1, 42 M 2-Mercaptoethanol
 Clean Air Act (CAA) 112 regulated toxic substances: No products were found.
 Clean Air Act (CAA) 112 regulated toxic substances: No products were found.
 Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

SARA 313

Form R - Reporting requirements

Product name
 : BL21 competent cells
 Manganese dichloride
 Hexaamminecobalt trichloride
BL21 competent cells
 Manganese dichloride
 Hexaamminecobalt trichloride
Supplier notification
 : BL21 competent cells

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

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 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.
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.

15 . Regulatory information

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 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.

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

16. Other information

Label requirements
: BL21 competent cells HARMFUL IF SWALLOWED. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
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.

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Notice to reader

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Hosts

ATCC® Number: **39403** [Order this Item](#) Price: **\$190.00**

Organism: *Escherichia coli* (Migula) Castellani and Chalmers

Designations: JM103

Depositors: JC Grosch

Genotype: F' traD36 proA+ proB+ lacIq delta(lacZ)M15 delta(pro-lac) supE hsdR endA1 sbcB15 thi-1 rpsL lambda-

Growth Conditions: [ATCC medium 1065](#); LB medium
Temperature: 37.0°C

Biosafety Level: 1

Shipped: frozen

Permits/Forms: In addition to the [MTA](#) mentioned above, other [ATCC and/or regulatory permits](#) may be required for the transfer of this ATCC material. Anyone purchasing ATCC material is ultimately responsible for obtaining the permits. Please [click here](#) for information regarding the specific requirements for shipment to your location.

Applications: transformation host

Comments: Host strain E.coli JM103. Ten milliter of YT broth is inoculated with a single colony isolate. The overnight culture is diluted 1:10 into YT broth, and incubated for twelve hours and the supernatant is harvested.

References: 7339: Hanahan D. Studies on transformation of *Escherichia coli* with plasmids. *J. Mol. Biol.* 166: 557-580, 1983.
PubMed: [6345791](#)

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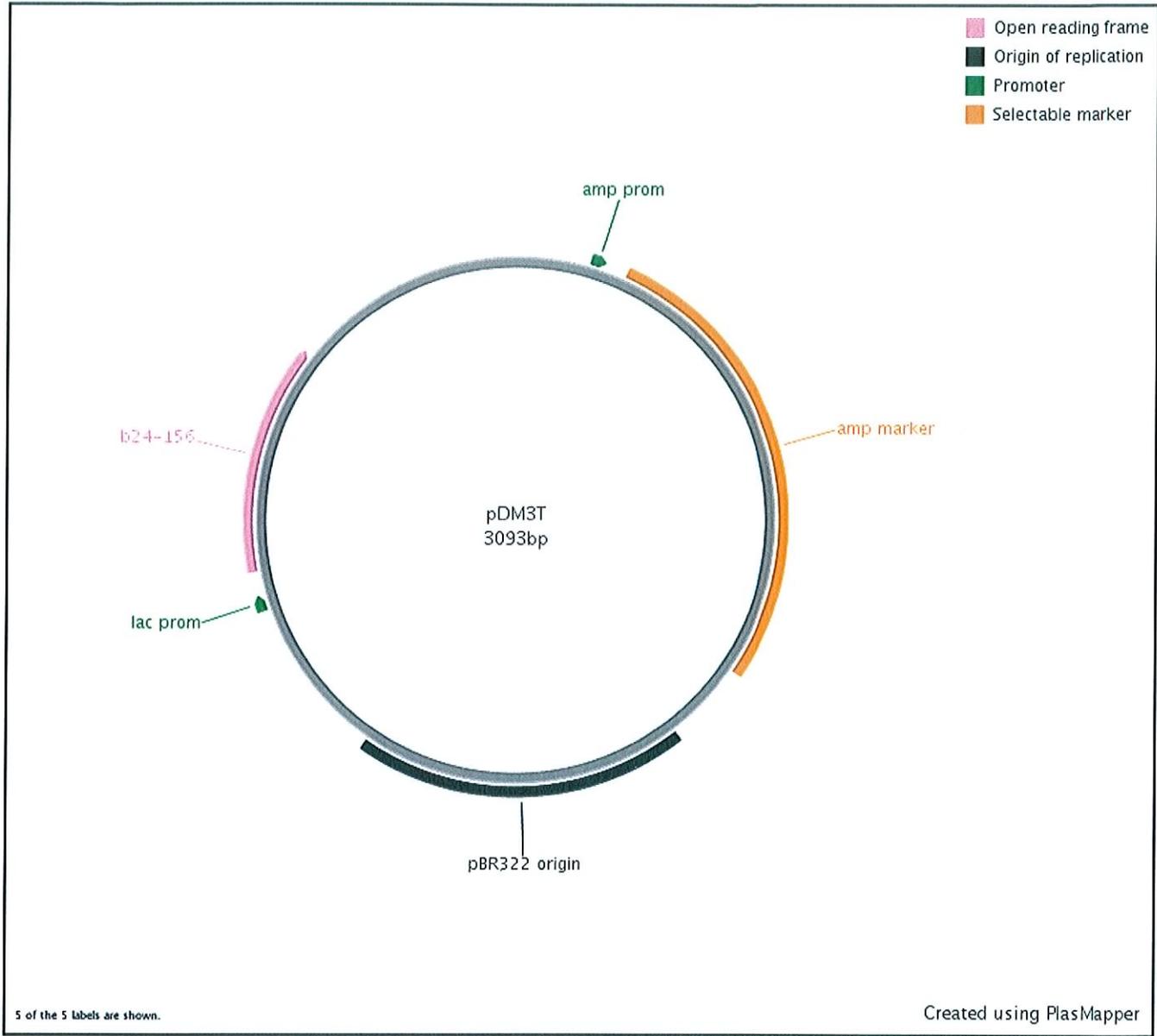
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Plasmid Map(s)

