

# Safety Data Sheet

According to Regulation (EC)  
No. 1907/2006 (REACH)

## Protactinium Generator R01192

### SECTION 1: Identification of the substance/mixture and of the company/undertaking

#### 1.1 Product identifier

**Product name:** Protactinium Generator

**Product No.:** R01192

**SDS No.:** 906000

**CAS No.:** Not applicable.

**EC No.:** Not applicable.

**Index No.:** Not applicable.

#### 1.2 Relevant identified uses of the substance or mixture and uses advised against

**Identified use(s):** Protactinium generator for use in educational science experiments. Professional use only. Use only as described in the Protactinium Generator User Notes and Protactinium Generator Safe Handling Instructions.

**Uses advised against:** Follow supplier's recommendations on correct use of the product.

#### 1.3 Details of the supplier of the safety data sheet

**Supplier:** Philip Harris Manufacturing Ltd.  
Unit 72, Gazelle Road  
Weston Industrial Estate  
Weston-super-Mare  
BS24 9BJ

**Telephone:** +44 (0)1934 413 606

**Fax:** +44 (0)1934 626 421

**E-mail:** [sdsinfo@philipharrismanufacturing.co.uk](mailto:sdsinfo@philipharrismanufacturing.co.uk)

#### 1.4 Emergency telephone number

**In case of emergency, call:** +44 (0)1934 413 606  
Monday – Thursday: 08:30 – 17:00 UK time  
Friday: 08:30 – 13:00 UK time

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## SECTION 2: Hazard Identification

### 2.1 Classification of the substance or mixture

#### 2.1.1. Classification according to Regulation (EC) No. 1272/2008 (CLP)

Flam. Liq. 3; H226  
Met. Corr. 1; H290  
Acute Tox. 3; H301  
Skin Corr. 1B; H314  
Acute Tox. 4; H332  
STOT SE 3; H335  
Aquatic Chronic 3; H412

#### 2.1.2. Classification according to Directive 67/548/EEC & Directive 1999/45/EC

R10  
Toxic; T; R23/25  
R33  
Corrosive; C; R34  
Irritant; Xi; R37  
R52/53

### 2.2 Label elements

#### 2.2.1. Label according to Regulation (EC) No. 1272/2008 (CLP)

Hazard pictogram(s):



Signal Word: Danger.

Hazard Statement(s):  
H226: Flammable liquid and vapour.  
H290: May be corrosive to metals.  
H301: Toxic if swallowed.  
H314: Causes severe skin burns and eye damage.  
H332: Harmful if inhaled.  
H335: May cause respiratory irritation.  
H412: Harmful to aquatic life with long lasting effects.

Precautionary Statement(s):  
P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.  
P264: Wash thoroughly after handling.  
P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.  
P303 + P361 + P353: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.

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P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P310: Immediately call a POISON CENTER or doctor.  
P405: Store locked up.  
P501: Dispose of contents/container to hazardous waste collection point for disposal in accordance with local, regional, national or international regulations.

## Supplemental Hazard information (EU):

None.

### 2.3 Other hazards

The product does not meet the criteria for PBT or vPvB substances.

The product contains uranium-238 and is a low level source of alpha and beta radiation.



## SECTION 3: Composition/information on ingredients

### 3.2 Mixtures

Product consists of two immiscible liquids supplied in a fluorinated polyethylene (FEP).

Upper layer (ca. 10 mL): hexyl acetate with added dye.

Lower layer (ca. 30 mL): solution of uranyl nitrate in hydrochloric acid.

Chemical name	% w/w	CAS No.	EC No.	Index No.	Classification (Regulation (EC) No. 1272/2008 (CLP))	Classification (Directive 67/548/EEC)
Hydrochloric acid (36% w/w)	60-80	7647-01-0	231-595-7	017-002-01-X	Met. Corr. 1; H290 Skin Corr 1B; H314 STOT SE 3; H335	C; R34 Xi; R37
Hexyl acetate	10-15	142-92-7	205-572-7	-	Flam Liq. 3; H226	R10
<i>Bis</i> -(Nitrato-O) dioxo-uranium	3-5	10102-06-4	233-266-3	-	Acute Tox. 2; H300 Acute Tox. 2; H330 STOT RE 2; H373 Aquatic Chronic 2; H411	T+; R26/28 R33 N; R51/53

See Section 16 for full description of R phrases and H statements.

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## SECTION 4: First Aid Measures

### 4.1 Description of first aid measures

- INHALATION:** Remove person to fresh air and keep comfortable for breathing. Keep warm and at rest. If irritation persists or if you feel unwell, obtain immediate medical attention.
- SKIN CONTACT:** Take off immediately all contaminated clothing. Rinse skin with water/shower for at least 15 minutes. Obtain immediate medical attention. Contaminated clothing should be washed before reuse.
- EYE CONTACT:** Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing, making sure to rinse under eyelids. Obtain immediate medical attention.
- INGESTION:** Do not induce vomiting. Provided the patient is conscious, rinse mouth out with water and give 200-300 mL of water to drink. Never give anything by mouth to an unconscious person. Obtain immediate medical attention.

### 4.2 Most important symptoms and effects, both acute and delayed:

Skin contact causes burns, blistering, redness and pain. Eye contact causes severe damage, watering, redness and pain. Inhalation of vapours may cause respiratory irritation, coughing and shortness of breath. Ingestion will cause burns to the mouth and digestive tract.

### 4.3 Indication of any immediate medical attention and special treatments needed:

In case of accident or if you feel unwell, seek medical advice immediately. If breathing is laboured, oxygen should be administered by qualified personnel.

## SECTION 5: Fire-fighting Measures

### 5.1 Extinguishing Media

- Suitable extinguishing media:** Water spray, CO<sub>2</sub>, sand, dry powder.
- Unsuitable extinguishing media:** Do not use water jet.

### 5.2 Special hazards arising from the substance or mixture

Flammable liquid and vapour. Vapour may form explosive mixture with air. Vapour is heavier than air and may accumulate in confined spaces. The vapours will spread along the ground and may be re-ignited by remote sources of ignition. Containers exposed to fire may burst due to a build-up of pressure.

Combustion may liberate toxic fumes: Carbon monoxide, carbon dioxide, nitrogen oxides, hydrogen chloride, uranium oxides.

### 5.3 Advice for fire-fighters

A self-contained breathing apparatus and suitable protective clothing should be worn in fire conditions. Keep fire exposed containers cool by spraying with water. Do not allow to enter drains, sewers or watercourses.

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## SECTION 6: Accidental Release Measures

### 6.1 Personal precautions, protective equipment and emergency procedures

#### 6.1.1 For non-emergency personnel

Eliminate sources of ignition. Ensure adequate ventilation. Avoid contact with skin and eyes. Do not breathe vapours/spray. Wear suitable personal protective equipment. Wear appropriate respirator when ventilation is inadequate (See Section 8).

#### 6.1.2 For emergency responders

Keep unnecessary personnel away. Wear suitable protective clothing (See Section 8). Contaminated work clothing should not be allowed out of the workplace. Take off contaminated clothing and wash it before reuse.

### 6.2 Environmental precautions

Do not allow to enter drains, sewers or watercourses. Spillages or uncontrolled discharges into watercourses must be alerted to the Environment Agency or other appropriate regulatory body.

### 6.3 Methods and materials for containment and cleaning up

#### 6.3.1 For containment

Stop the leak if it is safe to do so. Contain the spillage with sand, earth or any suitable adsorbent material.

#### 6.3.2 For cleaning up

In case of spillage of entire contents: Use sand, earth or any suitable non-combustible adsorbent material to adsorb spillages. Transfer the contaminated adsorbent material and damaged generator into a sealed container for disposal. Dispose of contaminated material as waste according to Section 13.

In case of minor leak or seepage from container: Place leaking generator into sealed container for disposal. Wipe contaminated areas with damp tissues. Dispose of contaminated material as waste according to Section 13.

#### 6.3.3 Other advice

Do not re-use a leaking protactinium generator.

### 6.4 Reference to other sections

See Section 8 for personal protective equipment. See Section 13 for waste disposal.

## SECTION 7: Handling and Storage

### 7.1 Precautions for safe handling

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Use explosion-proof electrical and lighting equipment. Use only non-sparking tools. Use only outdoors or in a well-ventilated area. Conduct experiments over a tray or similar to contain any spillage.

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DO NOT ATTEMPT TO OPEN THE GENERATOR. Do not squeeze the generator. Do not remove the clear protective sleeve from the generator. Hold by the ends using thumb and forefinger, and apply moderate pressure only. Do not use the generator at high room temperatures. To minimise internal vapour pressure on hot days, cool in refrigerator before use. Restore the generator to an upright position (cap uppermost) following completion of experiment. Check the protactinium generator for damage or leaks before use. Dispose of a damaged or leaking generator as described in Section 13.

Do not breathe vapours. Do not allow contents to come into contact with skin, eyes or clothing. Wear suitable personal protective equipment (See Section 8).

Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Take off contaminated clothing and wash it before reuse.

## 7.2 Conditions for safe storage, including any incompatibilities

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Protect from direct sunlight. Store only in original container. Store the generator in the external container provided when not in use. Keep container tightly closed. Store locked up. Store in a well-ventilated place. Keep cool.

Keep away from: oxidising agents, strong alkalis.

## 7.3 Specific end use(s)

Protactinium generator for use in educational science experiments. Professional use only. Use only as described in the Protactinium Generator User Notes and Protactinium Generator Safe Handling Instructions. Further information on handling and storage can be found in CLEAPSS bulletin L93 'Managing Ionising Radiations and Radioactive Substances in Schools and Colleges' available at <http://www.cleapss.org.uk/download/L93.pdf>

## SECTION 8: Exposure Controls/Personal Protection

### 8.1 Control parameters

#### Workplace exposure limits

Source: EH40/2005, 2<sup>nd</sup> Ed., 2011.

Substance	CAS No.	LTEL (8 hr TWA)		STEL (15 min)		Comments
		ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>	
Hydrogen chloride (gas and aerosol mists)	7647-01-0	1	2	5	8	-

### 8.2 Exposure controls

#### 8.2.1 Appropriate engineering controls

Provide adequate ventilation to ensure that occupational exposure limits are not exceeded. The protactinium generator should not be opened if used correctly, in which case there should be no release of vapours.

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## 8.2.2 Personal protection

**Eye protection:** Goggles or safety glasses with side shields giving complete protection to eyes (EN 166).

**Skin protection:**

**Hand protection:** Chemical-resistant gloves conforming (EN 374). Nitrile rubber gloves are recommended for normal use. Butyl rubber gloves are recommended if the contents of the generator are released. Contact glove supplier to confirm suitable glove material, thickness and breakthrough times.

**Other:** Long sleeve protective clothing.

**Respiratory protection:** Not normally required. If contents of the generator are released and airborne levels below the exposure limits cannot be maintained, wear a positive pressure air-purifying respirator (EN 140) with a Type E filter or better suitable for acidic gases. (EN 14387).

**Thermal hazards:** Not applicable.

## 8.2.3 Environmental exposure controls

Inform environmental manager of all incidents involving this product.

## SECTION 9: Physical and Chemical Properties

### 9.1 Information on basic physical and chemical properties

<b>Appearance:</b>	2 immiscible liquids: dark yellow upper layer, pale yellow lower layer.
<b>Odour:</b>	Pungent.
<b>Odour threshold:</b>	Not available.
<b>pH:</b>	< 7
<b>Melting/freezing point:</b>	Upper layer: -80°C Lower layer: ca. -30°C
<b>Initial boiling point and boiling range:</b>	Upper layer: 171°C Lower layer: ca. 100°C
<b>Flash point:</b>	Upper layer: 45-58°C
<b>Evaporation rate:</b>	Not available.
<b>Flammability (solid; gas):</b>	Not applicable.
<b>Upper/lower flammability or explosive limits:</b>	Not available.
<b>Vapour pressure:</b>	Not available.
<b>Vapour density:</b>	Not available.
<b>Relative density:</b>	Upper layer: 0.88 (20°C) Lower layer: ca. 1 (Water = 1)
<b>Solubility(ies):</b>	Upper layer: immiscible in water.

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Partition coefficient: n-octanol/water:	Lower layer: miscible in water. Not available.
Auto-ignition temperature:	Not available.
Decomposition temperature:	Not available.
Viscosity:	Not available.
Explosive properties:	Not explosive. Vapour may form explosive mixture in air.
Oxidising properties:	Not oxidising.

## 9.2 Other information

None known.

## SECTION 10: Stability and Reactivity

10.1	Reactivity	Reacts with oxidising agents.
10.2	Chemical stability	Stable under normal conditions.
10.3	Possibility of hazardous reactions	No hazardous reactions expected during normal use.
10.4	Conditions to avoid	Keep away from sources of ignition, hot surfaces, direct sunlight. Keep away from incompatible materials.
10.5	Incompatible materials	Oxidising agents. Strong alkalis.
10.6	Hazardous decomposition products	Combustion may liberate toxic fumes: Carbon monoxide, carbon dioxide, nitrogen oxides, hydrogen chloride, uranium oxides.

## SECTION 11: Toxicological Information

11.1	Information on toxicological effects	
	Acute toxicity	Toxic if swallowed. Harmful if inhaled.
	Skin corrosion/irritation	Causes severe skin burns.
	Serious eye damage/irritation	Causes serious eye damage.
	Skin sensitisation	Not classified. The product does not contain substances classified as skin sensitisers above the classification thresholds.
	Respiratory sensitisation	Not classified. The product does not contain substances classified as respiratory sensitisers above the classification thresholds.
	Germ cell mutagenicity	Not classified. The product does not contain substances classified as mutagenic above the classification thresholds.
	Carcinogenicity	Not classified. The product does not contain substances classified as carcinogenic above the classification thresholds.
	Reproductive toxicity	Not classified. The product does not contain substances classified as toxic to reproduction above the classification thresholds.



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**Specific Target Organ Toxicity –  
single exposure**

May cause respiratory irritation.

**Specific Target Organ Toxicity –  
repeated exposure**

Not classified. The product does not contain substances classified for specific target organ toxicity following repeated exposure above the classification thresholds.

**Aspiration hazard**

Based on available data, the classification criteria are not met.

## Information on likely routes of exposure

**Inhalation**

Harmful if inhaled. May cause respiratory irritation.

**Skin contact**

Causes skin irritation. May cause an allergic skin reaction.

**Eye contact**

Causes serious eye damage.

**Ingestion**

Toxic if swallowed. Ingestion may cause burns to the mouth and digestive tract.

**Symptoms related to the physical, chemical and toxicological characteristics**

Skin contact causes burns, blistering, redness and pain. Eye contact causes severe damage, watering, redness and pain. Inhalation of vapours may cause respiratory irritation, coughing and shortness of breath. Ingestion will cause burns to the mouth and digestive tract.

**Mixture versus substance Information**

No data available.

**Other information**

None.

## SECTION 12: Ecological Information

**12.1 Toxicity**

Harmful to aquatic life with long lasting effects.

**12.2 Persistence and degradability**

No data available.

**12.3 Bioaccumulative potential**

No data available.

**12.4 Mobility in soil**

No data available.

**12.5 Results of PBT and vPvB  
assessment**

The product does not contain substances assessed to be PBT or vPvB.

**12.6 Other adverse effects**

None known.

## SECTION 13: Disposal Considerations

**13.1 Waste treatment methods**

To be disposed of as hazardous waste. Disposal should be in accordance with local, state or national legislation.

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## SECTION 14: Transport Information

### ADR

14.1	UN Number	2920
14.2	UN Proper shipping name	CORROSIVE LIQUID, FLAMMABLE, N.O.S. (contains hydrochloric acid, hexyl acetate), Radioactive material, excepted package - limited quantity of material
14.3	Transport hazard class(es)	8
14.4	Packing group	II
14.5	Environmental hazards	No
14.6	Special precautions for the user	Read SDS and supplier instructions on correct use of the product.

### ADN

14.1	UN Number	2920
14.2	UN Proper shipping name	CORROSIVE LIQUID, FLAMMABLE, N.O.S. (contains hydrochloric acid, hexyl acetate), Radioactive material, excepted package - limited quantity of material
14.3	Transport hazard class(es)	8
14.4	Packing group	II
14.5	Environmental hazards	No
14.6	Special precautions for the user	Read SDS and supplier instructions on correct use of the product.

### RID

14.1	UN Number	2920
14.2	UN Proper shipping name	CORROSIVE LIQUID, FLAMMABLE, N.O.S. (contains hydrochloric acid, hexyl acetate), Radioactive material, excepted package - limited quantity of material
14.3	Transport hazard class(es)	8
14.4	Packing group	II
14.5	Environmental hazards	No
14.6	Special precautions for the user	Read SDS and supplier instructions on correct use of the product.

### IATA/ICAO

14.1	UN Number	2920
14.2	UN Proper shipping name	CORROSIVE LIQUID, FLAMMABLE, N.O.S. (contains hydrochloric acid, hexyl acetate), Radioactive material, excepted package - limited quantity of material
14.3	Transport hazard class(es)	8
14.4	Packing group	II
14.5	Environmental hazards	No
14.6	Special precautions for the user	Read SDS and supplier instructions on correct use of the product.

### IMDG

14.1	UN Number	2920
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14.2	UN Proper shipping name	CORROSIVE LIQUID, FLAMMABLE, N.O.S. (contains hydrochloric acid, hexyl acetate), Radioactive material, excepted package - limited quantity of material
14.3	Transport hazard class(es)	8
14.4	Packing group	II
14.5	Environmental hazards	No
14.6	Special precautions for the user	Read SDS and supplier instructions on correct use of the product.
14.7	Transport in bulk according to Annex II of MARPOL 73/78 and the IBC code	The product is not intended to be transported in bulk.

## SECTION 15: Regulatory Information

### 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This Safety Data Sheet was prepared in accordance with EC Regulation (EC) No. 1907/2006 as amended. The product has been classified in accordance with Regulation (EC) No. 1272/2008 (CLP), Directive 67/548/EEC & Directive 1999/45/EC.

### 15.2 Chemical Safety Assessment

A chemical safety assessment is not required and has not been carried out.

## SECTION 16: Other Information

### Full text of relevant R-phrases and/or H-statements:

#### Hazard Statement(s):

H226: Flammable liquid and vapour.  
H290: May be corrosive to metals.  
H300: Fatal if swallowed.  
H301: Toxic if swallowed.  
H314: Causes severe skin burns and eye damage.  
H330: Fatal if inhaled.  
H332: Harmful if inhaled.  
H335: May cause respiratory irritation.  
H373: May cause damage to organs through prolonged or repeated exposure.  
H411: Toxic to aquatic life with long lasting effects.  
H412: Harmful to aquatic life with long lasting effects.

#### Supplemental Hazard information (EU):

None.

#### Risk phrase(s):

R10: Flammable.  
R23/25: Toxic by inhalation and if swallowed.  
R26/28: Very toxic by inhalation and if swallowed.  
R33: Danger of cumulative effects.  
R34: Causes burns.  
R51/53: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.  
R52/53: Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

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## Abbreviations:

CAS:	Chemical Abstracts Service;
EINECS:	European Inventory of Existing Commercial Chemical Substances
EC <sub>50</sub> :	Effective Concentration 50%
EL <sub>50</sub> :	Effective Loading rate 50%
IC <sub>50</sub> :	Inhibitory Concentration 50%
LC <sub>50</sub> :	Lethal Concentration 50%
LD <sub>50</sub> :	Lethal Dose 50%
LL <sub>50</sub> :	Lethal Loading rate 50%
LCLo:	Lowest lethal concentration
LOEL:	Lowest Observed Effect Level
NOEL:	No Observed Effect Level
PBT:	Persistent, Bioaccumulative and Toxic.
vPvB:	Very Persistent and Very Bioaccumulative.

## References:

Supplier's Safety Data Sheets for ingredients  
ECHA disseminated REACH dossiers  
ECHA Classification & Labelling Inventory  
Approved Classification and Labelling Guide (Sixth edition)  
The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 (CHIP)  
Regulation (EC) No. 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP)

## Disclaimer:

THE INFORMATION PRESENTED HEREIN IS BELIEVED TO BE ACCURATE, BUT IS NOT WARRANTED TO BE, WHETHER ORIGINATING WITH THE COMPANY OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM, IN ADVANCE OF NEED, THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE TO THEIR CIRCUMSTANCES.

## Version history:

SDS Number:	906000
Version:	1.0
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Previous Version:	-
Issue date of previous version:	-
Sections changed from previous version:	-