

File No: STD/1387

April 2011

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME
(NICNAS)**

FULL PUBLIC REPORT

Organometallic Compound in BMC-200-AI

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (Cwlth) (the Act) and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by the Department of Health and Ageing, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of Sustainability, Environment, Water, Population and Communities.

For the purposes of subsection 78(1) of the Act, this Full Public Report may be inspected at our NICNAS office by appointment only at Level 7, 260 Elizabeth Street, Surry Hills NSW 2010.

This Full Public Report is also available for viewing and downloading from the NICNAS website or available on request, free of charge, by contacting NICNAS. For requests and enquiries please contact the NICNAS Administration Coordinator at:

Street Address:	Level 7, 260 Elizabeth Street, SURRY HILLS NSW 2010, AUSTRALIA.
Postal Address:	GPO Box 58, SYDNEY NSW 2001, AUSTRALIA.
TEL:	+ 61 2 8577 8800
FAX	+ 61 2 8577 8888
Website:	www.nicnas.gov.au

**Director
NICNAS**

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FULL PUBLIC REPORT**Organometallic Compound in BMC-200-AI****1. APPLICANT AND NOTIFICATION DETAILS**

APPLICANT(S)

Qenos Pty Ltd (ABN: 62 054 196 771)
231-238 Maidstone Street
Altona, VIC 3018

NOTIFICATION CATEGORY

Standard: Chemical other than polymer (more than 1 tonne per year).

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication: chemical name, other names, CAS number, molecular and structural formulae, molecular weight, analytical data, degree of purity, impurities, additives/adjuvants, use details and import volume.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows: All physico-chemical and toxicological endpoints.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

PRODIGY(TM) Bimodal Catalyst BMC-200-X4 (<10% notified chemical)
PRODIGY(TM) BMC-200-X4 Bimodal Catalyst
PRODIGY(TM) Bimodal Catalyst BMC-200
PRODIGY(TM) BMC-200 Bimodal Catalyst

MOLECULAR WEIGHT

>350 Da

3. COMPOSITION

DEGREE OF PURITY >90%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20°C AND 101.3 kPa: The notified chemical is a solid. It is supplied by the manufacturer as a solution in toluene and is not isolated.

Property	Value	Data Source/Justification
Melting Point/Freezing Point	Not determined	Chemical not isolated and high reactivity precludes study from being conducted.
Boiling Point	Not determined	Chemical not isolated and high reactivity precludes study from being conducted.
Density	920 g/L	MSDS for notified chemical at ≤30% in toluene
Viscosity	200-800 cP at 25 °C	Determined for the imported product using a Brookfield viscometer. Study report was not provided.
Vapour Pressure	Not determined	Chemical not isolated and high reactivity precludes study from being conducted.

Water Solubility	Not determined	Chemical not isolated and high reactivity precludes study from being conducted
Hydrolysis as a Function of pH	Not determined	Chemical not isolated and high reactivity precludes study from being conducted
Partition Coefficient (n-octanol/water)	Not determined	Chemical not isolated and high reactivity precludes study from being conducted
Adsorption/Desorption	Not determined	Chemical not isolated and high reactivity precludes study from being conducted
Dissociation Constant	Not determined	Chemical not isolated and high reactivity precludes study from being conducted
Particle Size	Average = 24 micron	Determined for the imported product using light scattering. Study report was not provided.
Flash Point	-23 °C	MSDS for notified chemical ≤30% in toluene
Flammability	Pyrophoric	The notified chemical will spontaneously ignite when exposed to air.
Autoignition Temperature	Not determined	Chemical not isolated and high reactivity precludes study from being conducted.
Explosive Properties	Not determined	Chemical not isolated and high reactivity precludes study from being conducted.
Stability Testing	Thermally stable up to 200 °C	Determined for the imported product (solvent free), under a nitrogen atmosphere, using differential scanning calorimetry.

DISCUSSION OF PROPERTIES

Reactivity

The notified chemical is pyrophoric and highly reactive with water. It will degrade upon reaction with air, water and during end-use.

Dangerous Goods classification

Based on the submitted physical-chemical data in the above table the notified chemical is classified as follows according to the Australian Dangerous Goods Code (NTC, 2007).

Class 4.2 – Substances liable to spontaneous combustion (Packing Group 1)

The data above do not address all Dangerous Goods endpoints. Therefore, consideration of all endpoints should be undertaken before a final decision on the Dangerous Goods classification is made by the introducer of the chemical.

5. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

The notified chemical will be imported as a solvent solution at <10% concentration.

MAXIMUM INTRODUCTION VOLUME OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Tonnes</i>	<10	<10	<10	<10	<10

PORT OF ENTRY

Melbourne

IDENTITY OF MANUFACTURER/RECIPIENTS

Qenos Australia Pty Ltd

TRANSPORTATION AND PACKAGING

The notified chemical (at <10% concentration) will be supplied in 119 gallon metal containers and transported to the recipient by road. The notified chemical will be stored in the original unopened containers under an inert atmosphere.

USE

The notified chemical will be used as a component of a catalyst for polyethylene production.

OPERATION DESCRIPTION

Upon delivery of the notified chemical (at <10% concentration) to polyethylene production sites, it will be transferred, via a strainer (to remove agglomerated material), to a feed vessel, using closed system transfer and nitrogen pressure. It will then be pumped into the polymerization reactor. The notified chemical will be encapsulated into the polyethylene and will be removed from the reactor as part of the polyethylene. The product polyethylene will be transferred to a storage bin for packaging and shipment.

Due to the reactive nature of the notified chemical, closed system transfers will be necessary. Prior to line disconnection, the system will be flushed and the residue collected as hazardous waste. As necessary, the catalyst strainer is removed from its housing and the contents emptied into a hazardous waste collection container. Emptied product containers will be returned to the international supplier for cleaning.

The polyethylene production unit will be contained in an outdoor environment, i.e. in an unconfined area that is subject to outside ambient conditions and open to the atmosphere.

6. HUMAN HEALTH IMPLICATIONS

6.1 Exposure Assessment

6.1.1 Occupational Exposure

NUMBER AND CATEGORY OF WORKERS

<i>Category of Worker</i>	<i>Number</i>	<i>Exposure Duration (hours/day)</i>	<i>Exposure Frequency (days/year)</i>
Transport Worker (transfer from storage to process areas)	1	Unspecified	~70
Operator (Connection/disconnection of lines)	1	0.25	~70
Operator (Cleaning strainer in feed line)	1	1	~180
Maintenance (pump maintenance)	1	1	~12
Operator (disconnection and transport of waste collection container)	1	1	~12

EXPOSURE DETAILS

Transport and storage workers are unlikely to be exposed to the notified chemical (at <10% concentration) except in the event of an accident.

Due to the closed-system operation at the polyethylene production site, exposure of workers to the notified chemical is expected to be minimal. Dermal or ocular exposure to the notified chemical may occur whilst connecting and disconnecting transfer lines, whilst emptying/cleaning the strainer and during pump maintenance. However, exposure should be mitigated through the flushing of the system prior to hose disconnection and through the use of personal protective equipment (PPE: goggles, impervious gloves, protective clothing).

6.1.2 Public Exposure

The notified chemical is intended for industrial use only, therefore the public may be exposed to the notified chemical (at <10% concentration) only in the event of a transport accident. The public may come into contact with the manufactured polyethylene. However, as the notified chemical will have reacted and become encapsulated into the polyethylene, it will be unavailable for exposure.

6.2 Human Health Effects Assessment

No toxicity data were submitted. The generation of such data is precluded by the high reactivity of the notified chemical.

The notified chemical will spontaneously ignite when exposed to air. Therefore, any exposure is expected to be to the degradation products, including metal oxides and hydroxides and oxides of carbon.

Based on the expected negligible lipophilicity of the inorganic degradation products of the notified chemical,

passive diffusion across the gastrointestinal (GI) tract and dermal absorption is unlikely to occur.

The notified chemical and its degradation products do not contain any structural alerts for toxic effects. However, given the high reactivity of the notified chemical, the notifier has classified the chemical as corrosive and as harmful in contact with skin and if swallowed.

The results of studies conducted on the inorganic degradation products suggest that the chemicals are of low acute oral toxicity in rats (LD50 >5000 mg/kg bw), non-irritating to the skin and eyes of rabbits and non-mutagenic to bacteria (IUCLID, 2000a and IUCLID, 2000b).

Health hazard classification

In the absence of toxicity data, the notified chemical cannot be classified according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004). However, the notifier has classified the chemical with the following risk phrases:

R34 Causes burns

R21/22 Harmful in contact with skin and if swallowed

6.3 Human Health Risk Characterisation

6.3.1 Occupational Health and Safety

The notified chemical will be handled (at <10%) by trained workers. The notified chemical itself is classified as a Class 4.2 Dangerous Good according to the Australian Dangerous Goods Code (NTC, 2007), i.e. it is liable to spontaneous combustion. Transport, storage and handling of products containing the notified chemical in accordance with the above code and the *NOHSC National Code of Practice for the Storage and Handling of Workplace dangerous Goods* (NOHSC, 2001) should minimise the risk involved for transport and storage workers.

The primary risks associated with use of the notified chemical will be due to the abovementioned high reactivity. While the reactivity of the chemical precludes toxicological studies from being conducted, the potential for corrosive effects following skin contact cannot be excluded. However, given its high reactivity, exposure to the notified chemical itself is expected to be minimal. In addition, while the notifier has classified the chemical as harmful to human health via the oral route, ingestion is unlikely under the occupational settings described.

Due to the reactive nature of the chemical, closed-system operations will be necessary. Therefore, provided that control measures are in place to minimise worker exposure, including the use of enclosed/automated processes and PPE, and transport, storage and handling are in accordance with the Dangerous Goods Codes, the risk to the health of workers from use of the notified chemical is not considered to be unacceptable.

6.3.2 Public Health

The notified chemical is intended for use in industrial settings by trained workers. The public may be exposed to the manufactured polyethylene. However, the notified chemical will have reacted and become encapsulated into the polyethylene and will be unavailable for exposure. Therefore, when used in the proposed manner, the risk to public health from the notified chemical is not considered to be unacceptable.

7. ENVIRONMENTAL IMPLICATIONS

7.1 Environmental Exposure & Fate Assessment

7.1.1 Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified chemical will be imported into Australia as a component of a finished product in pressure rated metal containers. Accidental spills and leaks during transport are unlikely. However, in the case of an accidental release the notified chemical is expected to be disposed of by a licensed waste contractor.

RELEASE OF CHEMICAL FROM USE

Empty containers containing residues of the notified chemical will be exported to be cleaned, refurbished and reused. Due to its reactive nature and use in a closed system, release of the notified chemical to the environment during use is expected to be negligible. Agglomerated product, line flushes and drainings

containing the residues of the notified chemical will be collected and disposed of by a licensed waste contractor. The majority of imported notified chemical will be consumed during the polymerisation process and encapsulated in the manufactured polyethylene.

RELEASE OF CHEMICAL FROM DISPOSAL

The reacted notified chemical will share the fate of the polyethylene in which it is encapsulated and is expected to be disposed of to landfill.

7.1.2 Environmental Fate

No environmental fate data were submitted. Aquatic exposure to the notified chemical is not expected when it is used as proposed in the industrial manufacture of polyethylene. However, if the notified chemical is released to the aquatic environment it will rapidly react to form water, refractory insoluble metal oxides and hydroxides, and oxides of carbon. In landfill, the notified chemical will have reacted and be encapsulated in polyethylene and therefore will not be exposed to the environment. The reacted notified chemical in the polyethylene articles is not likely to be bioavailable nor bioaccumulative and is expected to decompose to form the same products as formed on contact with water.

7.1.3 Predicted Environmental Concentration (PEC)

A PEC was not determined because very little of the notified chemical is expected to be released to the aquatic compartment when the chemical is used as proposed in the manufacture of polyethylene. Moreover, the notified chemical is not expected to persist in water due to its reactivity.

7.2 Environmental Effects Assessment

No ecotoxicity data for the notified chemical were submitted. On contact with air or water the notified chemical will rapidly react to form refractory insoluble metal oxides and hydroxides which will therefore be neither bioavailable nor bioaccumulative.

7.2.1 Predicted No-Effect Concentration (PNEC)

The PNEC was not calculated as no ecotoxicity data are available for the notified chemical and there is expected to be very little exposure of the notified chemical to the water compartment based on the proposed use pattern.

7.3 Environmental Risk Assessment

All spillages and waste containing the notified chemical are expected to be disposed of by licensed waste contractors according to State/Territory regulations. During use, the majority of the notified chemical will be consumed during the polymerisation process and immobilised within a cured inert polymerised polyethylene matrix rendering it unavailable to the environment. On contact with air or water the notified chemical will rapidly react to form refractory insoluble metal oxides and hydroxides which will therefore be neither bioavailable nor bioaccumulative. Since there is expected to be very limited exposure to aquatic organisms, the notified chemical is therefore not expected to pose an unacceptable risk to the environment based on its proposed use pattern.

8. CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

In the absence of toxicity data, the notified chemical cannot be classified according to the *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)]. However, the notifier has classified the chemical with the following risk phrases:

R34 Causes burns

R21/22 Harmful in contact with skin and if swallowed

Human health risk assessment

Under the conditions of the occupational settings described, the notified chemical is not considered to pose an unacceptable risk to the health of workers.

Environmental risk assessment

On the basis of the reported use pattern, the notified chemical is not considered to pose an unacceptable risk to the environment.

REGULATORY CONTROLS

Hazard Classification and Labelling

- The notified chemical should be classified as follows under the ADG Code:
 - Class 4.2 – Substances liable to spontaneous combustion (Packing Group 1)
- As the notified chemical is a dangerous good, the applicant should ensure that the MSDS and labels for products containing the notified chemical are acceptable to the relevant state authority.

CONTROL MEASURES

Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified chemical as introduced (<10%):
 - Enclosed, automated processes
 - Use under an inert atmosphere
- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified chemical as introduced (<10%):
 - Avoid contact with skin and eyes
 - Avoid spills and splashing during use
 - Prevent leaks and spills
 - A shower and eyewash station should be available
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified chemical as introduced (<10%):
 - Coveralls, gloves, goggles

Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- A copy of the MSDS should be easily accessible to employees.
- If products and mixtures containing the notified chemical are classified as hazardous to health in accordance with the *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)] workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Disposal

- The notified chemical should be disposed of to landfill.

Storage

- The following precautions should be taken by storage managers regarding storage of the notified chemical as introduced:
 - Store in original unopened container under an inert atmosphere.
 - The handling and storage of the notified chemical should be in accordance with the *NOHSC National Code of Practice for the Storage and Handling of Workplace dangerous Goods* [NOHSC:2017(2001)] or relevant State or Territory regulations.

Emergency procedures

- Spills or accidental release of the notified chemical should be handled by physical containment, collection and subsequent safe disposal.
- In the event of an emergency, unnecessary personnel should be evacuated and all ignition sources removed.

Transport and Packaging

- The transportation of the notified chemical should be in accordance with the *Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG code)* (NTC, 2007).

Regulatory Obligations

Secondary Notification

This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the chemical under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified chemical, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified chemical is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under Section 64(2) of the Act; if
 - the function or use of the chemical has changed from a component of a catalyst for polyethylene production, or is likely to change significantly;
 - the amount of chemical being introduced has increased from 10 tonnes per annum, or is likely to increase, significantly;
 - the chemical has begun to be manufactured in Australia;
 - additional information has become available to the person as to an adverse effect of the chemical on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

Material Safety Data Sheet

The MSDS of a product containing the notified chemical provided by the notifier was reviewed by NICNAS. The accuracy of the information on the MSDS remains the responsibility of the applicant.

BIBLIOGRAPHY

- IUCLID (International Uniform Chemical Information Database) (2000a) (Metal) hydroxide: Dataset. European Commission-European Chemicals Bureau, 18 February 2000.
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