Technical Data Sheet

ZBEC

Zinc dibenzyl dithiocarbamate
CAS Number: 14727-36-4
Molecular weight: 610.18
Molecular formula: C_{30}H_{28}N_{2}S_{4}Zn

PRODUCT INFORMATION

<table>
<thead>
<tr>
<th>PRODUCT SPECIFICATIONS</th>
<th>GRANULES</th>
<th>OIL POWDER</th>
<th>POWDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>White granules</td>
<td>White oil powder</td>
<td>White powder</td>
</tr>
<tr>
<td>Initial Melting Point</td>
<td>°C min</td>
<td>180.0</td>
<td>180.0</td>
</tr>
<tr>
<td>Zinc content</td>
<td>%</td>
<td>10.0-12.0</td>
<td>10.0-12.0</td>
</tr>
<tr>
<td>Loss on drying</td>
<td>% max</td>
<td>0.30</td>
<td>0.40</td>
</tr>
<tr>
<td>Residue on sieve (63 µm)</td>
<td>% max</td>
<td>-</td>
<td>0.50</td>
</tr>
<tr>
<td>Residue on sieve (150µm)</td>
<td>% max</td>
<td>-</td>
<td>0.10</td>
</tr>
<tr>
<td>Oil content</td>
<td>%</td>
<td>-</td>
<td>0.0-2.0</td>
</tr>
<tr>
<td>Typical properties</td>
<td>Density</td>
<td>g/cm³</td>
<td>1.42</td>
</tr>
<tr>
<td>Packaging</td>
<td>Bag</td>
<td>25kg (55 lbs)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pallet</td>
<td>500kg or 600kg (1102 lbs or 1323 lbs)</td>
<td></td>
</tr>
</tbody>
</table>

FUNCTION

ZBEC is a safe-processing secondary accelerator and can be used as a primary accelerator in latex.
APPLIEDS AND PROPERTIES

- ZBEC is used as a primary or secondary ultra-accelerator in NR, IR, BR, SBR, NBR, HR, EPDM and their latexes.
- Product has less accelerating effects than ZDMC and ZDEC.
- Effectively used in both natural and synthetic latexes for faster curing under normal (low) temperatures than ZDMC and ZDEC, with less scorching and blooming.
- ZBEC has a high resistance to hydrolysis and low solubility in rubbers.
- Recognized to have low nitrosamine potential.
- Used in sheeting, extrusions and latex.
- Soluble in CS$_2$, benzene, chloroform, alcohol, diethyl ether.
- Insoluble in water and low concentration alkali.
- ZBEC is regulated for use under the following sections of FDA 21 CFR:
  175.105 – Components of Adhesives.
  177.2600 – Rubber Articles Intended for Repeated Use in Food Contact.

STORAGE

Material should be stored in a tightly closed container in a cool, dry, well ventilated area. Avoid exposure to direct sunlight. The maximum recommended storage life is 2 years when stored under normal conditions.

HANDLING PRECAUTIONS

For detailed information on toxicological properties and handling precautions, please refer to the current Safety Data Sheet. This information is available by request from SunBoss Chemicals Corp.

[Revised: November 6, 2014 by kk]
Safety Data Sheet

ZBEC

1. IDENTIFICATION OF SUBSTANCE / COMPANY INFORMATION

Chemical Name: Zinc dibenzyl dithiocarbamate
Synonyms: Accelerator ZBEC, Bis(Dibenzyldithiocarbamato)zinc; Zinc bis[bis(phenylmethyl)carbamodithioato-kappa S, kappa S
CAS #: 14727-36-4
Formula: C_{30}H_{28}N_{2}S_{4}Zn
Chemical Family: Accelerator
Supplier: SunBoss Chemicals Corp.
Address: 8-110 West Beaver Creek Road
Richmond Hill, ON L4B 1J9
Telephone: 905-707-3433
Fax: 905-707-7393

Emergency Information: After normal hours call Chemtrec at 1-800-424-9300

2. COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
<th>UN No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc Dibenzyl dithiocarbamate</td>
<td>14726-36-4</td>
<td>&gt; 96</td>
<td>238-778-0</td>
</tr>
<tr>
<td>White Mineral Oil (powder only)</td>
<td>8042-47-5</td>
<td>1 - 2</td>
<td>232-455-8</td>
</tr>
</tbody>
</table>

Symbol(s): Xn, N
Risk Phrase(s): R22, R43, R36/37/38, R50

3. HEALTH HAZARDS INFORMATION

EMERGENCY OVERVIEW

Signal Word: WARNING!
Harmful if swallowed!
May cause sensitization by skin contact.
Irritating to skin, eye and respiratory system.
Very toxic to aquatic organisms.

Potential Health Effects
Inhalation: May cause irritation of the respiratory tract. May cause alcohol intolerance.
Ingestion: Harmful if swallowed! May cause alcohol intolerance (Antabuse Effect). May cause headache, dizziness, nausea, vomiting and gastrointestinal irritation.
Skin contact: May cause an allergic skin reaction. May cause a rash and itching of the skin. May cause skin defatting with prolonged exposure.

Eye Contact: May cause eye irritation. Signs/symptoms can include redness, swelling, pain and tearing.

4. EMERGENCY FIRST AID PROCEDURES

Inhalation: Remove person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, get immediate medical attention.

Ingestion: If swallowed, call a physician immediately. Only induce vomiting at the instruction of a physician. Never give anything by mouth to an unconscious person.

Skin: Remove contaminated clothing, wash skin with water, using soap if available. Remove contaminated clothing and launder before reuse. Seek medical attention if irritation persists or toxicity occurs.

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Note to Physician: Provide symptomatic/supportive care as necessary. Exposure by ingestion, inhalation or skin absorption may cause alcohol intolerance (Antabuse Effect).

5. FIRE AND EXPLOSION HAZARD MEASURES

Flammability: Not determined

Flash Point: 392°F / 200°C

Flash Point Method: Tag Closed Cup (TCC)

DOT Category: Not regulated

Extinguishing Media: Water fog, carbon dioxide, foam, dry chemical.

Auto Ignition Temperature: 896°F / 480°C

Flammable Limits: Not determined

Special Fire Fighting Procedures: Fight fire from a safe distance and from a protected location. Use water spray to cool fire exposed surfaces. Decomposition in fire may produce toxic gases. Decomposition in fire may produce toxic gases. Do not allow runoff to enter waterways.

Special Protective Equipment: Fire fighters should wear full protective clothing, including self-contained breathing equipment.

Unusual Fire and Explosion Hazards: Toxic emissions may result if product is involved in a fire. May form flammable air/dust mixtures. Kst=168 bar.m/s. Minimum Ignition Energy (MIE) = <3 mJ.
6. ACCIDENTAL RELEASE MEASURES

Procedures
Wear protective equipment specified. Avoid the generation of dust. Sweep, vacuum, or shovel and place into closable container for disposal.

Clean up Methods
Isolate area and remove sources of friction, impact, heat, low level electrical current, and RF energy. Isolate spill and stop leak where safe. Scoop up and remove solids. Do NOT spread spilled product with water.

7. HANDLING AND STORAGE

Handling
Good hygienic practices should be observed. Work clothes should be washed separately at the end of each work day. Disposable clothing should be discarded with material. Avoid generating or breathing dust. Avoid contact with eyes, skin and clothing. Close containers of unused product. Wash hands before eating, drinking, and chewing gum, using tobacco or using the toilet. Do not reuse this container.

Storage
Store closed containers in a cool, dry, well-ventilated area. Store away from strong oxidizing materials. Avoid exposure to direct sunlight.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls
Avoid dust generation. Ensure good ventilation and local exhaustion of the working area as necessary to control any air contaminants to within their exposure limit. Adequate ventilation should be provided to keep dust concentrations below acceptable exposure limits. Discharge from the ventilation system should comply with the applicable air pollutions control regulations. Eliminate ignition sources.

Exposure Limits

<table>
<thead>
<tr>
<th>Substance</th>
<th>ACGIH (TLV/8Hr)</th>
<th>OSHA (PEL/8Hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc dibenzyl dithiocarbamate</td>
<td>10 mg/m^3 (TWA)</td>
<td>5 mg/m^3 (respirable dust)</td>
</tr>
<tr>
<td>White Mineral oil</td>
<td>5 mg/m^3</td>
<td>15 mg/m^3 (total dust)</td>
</tr>
</tbody>
</table>

Respiratory
Use in well-ventilated area. Use approved NIOSH respiratory protection if TLV exceeded or if overexposure is likely. Appropriate respiratory protection shall be worn when applied engineering controls are not adequate to protect against inhalation exposure.

Eyes
Wear safety glasses or goggles to protect against exposure. Eye protection is not required during typical product use conditions.

Skin
Normal work coveralls. Launder contaminated clothing before reuse.

Gloves
Use gloves as a standard industrial handling procedure. All cleanable impervious glove types are acceptable.
9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
White powder or granules

Odour
Slight

Specific Gravity
1.42 @ 20°C

Density
1420 kg/m³ @20°C

Bulk Density
210-250 kg/m³ ZBEC (powder)

Solubility in water
INSOLUBLE

pH
Not applicable

Other Solubility
Soluble in CS₂, benzene, chloroform, alcohol and diethyl ether.

Boiling point
Not determined

Melting Point
180°C

Molecular Weight
610.18

Molecular Formula
C₃₀H₂₈N₂S₄Zn

10. STABILITY AND REACTIVITY

Chemical Stability
Stable when stored at room temperature in closed, original container. Stable under normal conditions of handling, use and transportation.

Conditions to avoid
Keep away from heat, sparks and flame. Avoid contact with strong oxidants such as liquid chlorine and concentrated oxygen.

Incompatibility
Strong oxidizing agents. Acids.

Hazardous Polymerization
Will not occur

Hazardous Decomposition Products
Carbon monoxide, Oxides of nitrogen and sulphur, toxic zinc metal fumes.

Additional Guidelines
None

11. TOXICOLOGICAL INFORMATION

Acute oral LD 50 (mg/kg)
>5300 mg/kg - Rat

Acute Dermal LD 50 (mg/kg)
Not determined

Acute Inhalation LC50 (mg/l)
Not determined

Principle routes of Exposure
Inhalation. Dermal - skin.

Ingestion
May cause alcohol intolerance (Antabuse Effect). May cause headache, dizziness, nausea, vomiting and gastrointestinal irritation.
Skin contact  May cause an allergic skin reaction. May be absorbed through the skin and produce effects similar to those caused by inhalation and/or ingestion. May cause skin defatting with prolonged exposure.

Inhalation  Exposure to dust particles may cause irritation of the respiratory tract. May cause alcohol intolerance.

Eye Contact  Causes mild eye irritation. Signs/symptoms can include redness, swelling, pain and tearing.

Aggravated Conditions  Alcohol consumption products. Pulmonary disorders. This material or its emissions may cause an allergic or sensitization reaction and thereby aggravate systemic disease.

Carcinogenicity  Negative in Ames tests using bacteria cells. This product or one of its ingredients present 0.1% or more is NOT listed as a carcinogen or suspected carcinogen by NTP, IARC, or OSHA. NOTE: may react with nitrosating agents during rubber vulcanization to form nitrosamines. Some nitrosamines are suspect human carcinogens.

Primary Irritation Effect  Practically non-irritating.

Genotoxicity  None.

Reproductive/Developmental Toxicity  Not determined. Similar compounds show no effects in animal studies.

12. ECOLOGICAL INFORMATION

Acute Fish Toxicity  96Hr LC50 Zebra Fish = >10 mg/l

Acute Crustacean Toxicity  Not determined. Similar compounds show at least moderate toxicity to daphnids.

Octonal/Water Coefficient  Not determined

Chemical Fate Information  Not determined. Similar compounds show low to moderate biodegradability.

Other Information  Similar compounds exhibit at least moderate toxicity to aquatic species.

13. DISPOSAL CONSIDERATIONS

Waste Disposal  This material is a non-hazardous waste. Bury in a licensed landfill or burn in an approved incinerator according to federal, state, and local regulations. Disposal requirements are dependent on the hazard classification and will vary by location and the type of disposal selected.

Contaminated Packaging  If empty container retains product residues, all label precautions must be observed. Transport with all closures in place. Return for reuse or dispose according to national or local regulations. Dispose of container according to national or local regulations. Do NOT reuse container.

14. TRANSPORT INFORMATION

DOT  Not regulated

IATA  UN/IN No.  3077
Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S., (Zinc dibenzyl dithiocarbamate)

Hazard Class: 9
Packing Group: III

IMDG
UN/IN No.: 3077
Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S., (Zinc dibenzyl dithiocarbamate)

Hazard Class: 9
Packing Group: III
Marine Pollutant: Yes
Special Markings: Symbol (fish and tree)

TDG (Canada): Not regulated

15. REGULATORY INFORMATION

LABELLING ACCORDING TO DIR 67/548 EEC

EC Number: Classification based on: TESTS

HARMFUL (Xn) DANGEROUS FOR THE ENVIRONMENT (N)

CLASSIFIED ACCORDING TO DIRECTIVE 199/45/EC

Risk Phrases: R22 - Harmful if swallowed.
R36/37/38 – Irritating to skin, eyes and respiratory system.
R43 – May cause sensitisation by skin contact.
R50 – Very toxic to aquatic organisms.

Safety Phrases: S24/25 – Avoid contact with skin and eyes.
S36/37 – Wear suitable protective clothing and gloves.
S60 – This material and its container must be disposed of as a hazardous waste.
S61 – Avoid release to the environment. Refer to Special Instructions/Safety Data Sheet.

FDA Status 21 CFR: Regulated for use under the following sections of 21 CFR:
177.2600 Rubber Articles intended for Repeated Use in Food Contact.
175.105 Components of Adhesives

TSCA: Listed
Canadian DSL: Listed
EINECS/ELINCS: Listed

US Regulations
SARA Section 302: Not Applicable
SARA 311/312 Hazard Categories: Immediate
Canadian Regulations
WHMIS Hazard Class

D2B TOXIC MATERIALS/Materials Causing other Toxic Effects

NPRI
Listed under the category “Zinc and its Compounds”, NPRI, Part 1, Group 1, ID#231 [Canada]. Minimum concentration to report = 1%

16. HAZARD RATING SYSTEM

NFPA Rating (Scale 0-4)

<table>
<thead>
<tr>
<th>Hazard Level</th>
<th>HEALTH</th>
<th>FIRE</th>
<th>REACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2</td>
<td>1</td>
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<tr>
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</tr>
<tr>
<td>4</td>
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</table>

HMIS Classification (Scale 0-4)

<table>
<thead>
<tr>
<th>Hazard Level</th>
<th>HEALTH</th>
<th>FIRE</th>
<th>REACTIVITY</th>
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</thead>
<tbody>
<tr>
<td>0</td>
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<tr>
<td>4</td>
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</tbody>
</table>

17. OTHER INFORMATION

Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. SunBoss Chemicals Corp. extends no warranty and assumes no responsibility for the accuracy or sufficiency of the content and expressly disclaims all liability for reliance thereon. This material safety data sheet provides guidelines for the safe handling of this product; it does not and cannot advise on all possible situations, therefore, your specific use of this product should be evaluated to determine if additional precautions are required. It is the responsibility of the user to comply with all Federal, State and local laws and regulations. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.

ACGIH: American Conference of Governmental Industrial Hygienists Inc.
CAS: Chemical Abstracts Service (Division of American Chemical Society)
DOT: Department of Transportation (USA)
EINECS: European Inventory of Existing Commercial Chemical Substances
HMIS: Hazardous Materials Identification System (USA)
IARC: International Agency for Research on Cancer
IATA: International Air Transport Association
IMDG: International Marine Code for Dangerous Goods
LD50: Lethal Dose Medium
LC50: Lethal Concentration Medium
EC50: Effective Concentration Medium
NIOSH: National Institute for Occupational Safety and Health
NFPA: National Fire Protection Association (USA)
NPRI: National Pollutant Release Inventory (Canada)
NTP: National Toxicology Program
Revision number: 5
Date of Issue: September 3, 2014
Changes: Number and format of headings changed; Updates to Sections 1: Identification of Substance - EC information added; 2: Health Hazards Information; 8: Specific Personal Protection Equipment - pictograms added; 14: Transport information - pictograms added; 15: Regulatory information - EC information added; 16: Hazard Rating System - table added; 17: Abbreviations and Acronyms added