

09/03/2003

## Kit components

| Product code | Description |
|--------------|-------------|
|--------------|-------------|

|               |                     |
|---------------|---------------------|
| <b>556405</b> | <b>APO-BRDU Kit</b> |
|---------------|---------------------|

Components:

|         |  |
|---------|--|
| 556405a | Positive Control Cells (51-6577LZ)     |
| 556405b | Negative Control Cells (51-6578LZ)     |
| 556405c | PI RNase Staining Buffer (51-6585AZ)   |
| 556405d | Wash Buffer (51-6579AZ)                |
| 556405e | Reaction Buffer (51-6580AZ)            |
| 556405f | Tdt Enzyme (51-6581EZ)                 |
| 556405g | Br-dutp (51-6582EZ)                    |
| 556405h | Rinsing Buffer (51-6583AZ)             |
| 556405i | FITC Labeled Anti-BRDU mAb (51-6584AZ) |

### 1 Identification of substance:

- **Product details:**
- **Product name:** Positive Control Cells (51-6577LZ)  
(APO-BRDU Kit)
- **Catalog number:** 556405
- **Manufacturer/Supplier:**  
BD Biosciences, Pharmingen  
10975 Torreyana Road  
San Diego, CA 92121-1106  
Tel. (877)232-8995
- **Information department:** Technical Services
- **Emergency information:**  
In case of a chemical emergency, spill, fire, exposure, or accident please call ChemTrec at (800)424-9300 or 911

### 2 Composition/Data on components:

- **Chemical characterization**
- **Description:** Mixture consisting of the following components.

· **Dangerous components:**

|                 |       |
|-----------------|-------|
| 64-17-5 ethanol | 70.0% |
|-----------------|-------|

### 3 Hazards identification

· **Hazard description:**



Xn Harmful  
F Highly flammable

· **Information pertaining to particular dangers for man and environment**

R 11 Highly flammable.  
R 40 Limited evidence of a carcinogenic effect.

· **Classification system**

The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.

· **NFPA ratings (scale 0-4)**



Health = 3  
Fire = 3  
Reactivity = 0

### 4 First aid measures

- **General information** No special measures required.
- **After inhalation** Supply fresh air; consult doctor in case of complaints.
- **After skin contact** Immediately wash with water and soap and rinse thoroughly.
- **After eye contact** Rinse opened eye for 15 minutes under running water. Then consult a doctor.
- **After swallowing** If symptoms persist consult doctor.

(Contd. on page 2)

**Product name: Positive Control Cells (51-6577LZ)**  
(APO-BRDU Kit)

· **Information for doctor** Show this label.

(Contd. of page 1)

### 5 Fire fighting measures

- **Suitable extinguishing agents**  
CO<sub>2</sub>, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Protective equipment:** No special measures required.

### 6 Accidental release measures

- **Person-related safety precautions:** Not required.
- **Measures for environmental protection:** Wipe up with damp sponge or mop.
- **Measures for cleaning/collecting:**  
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders).  
Dispose contaminated material as waste according to item 13.  
Ensure adequate ventilation.
- **Additional information:**  
See Section 7 for information on safe handling.  
See Section 8 for information on personal protection equipment.  
See Section 13 for disposal information.

### 7 Handling and storage

- **Handling**
- **Information for safe handling:**  
Ensure good ventilation/exhaustion at the workplace.  
Prevent formation of aerosols.
- **Information about protection against explosions and fires:**  
Keep ignition sources away - Do not smoke.  
Protect against electrostatic charges.
- **Storage**
- **Requirements to be met by storerooms and receptacles:** - 20 C
- **Information about storage in one common storage facility:** Store away from oxidizing agents.
- **Further information about storage conditions:** Store in cool, dry conditions in well sealed containers.

### 8 Exposure controls and personal protection

- **Additional information about design of technical systems:** No further data; see item 7.

- **Components with limit values that require monitoring at the workplace:**

#### 64-17-5 ethanol

|     |                                   |
|-----|-----------------------------------|
| PEL | 1900 mg/m <sup>3</sup> , 1000 ppm |
| REL | 1900 mg/m <sup>3</sup> , 1000 ppm |
| TLV | 1880 mg/m <sup>3</sup> , 1000 ppm |

- **Additional information:** The lists that were valid during the creation were used as basis.

(Contd. on page 3)

**Product name: Positive Control Cells (51-6577LZ)**  
**(APO-BRDU Kit)**

(Contd. of page 2)

- **Personal Protective Equipment**
- **General protective and hygienic measures**  
Keep away from foodstuffs, beverages and feed.  
Wash hands before breaks and at the end of work.
- **Breathing equipment:**  
In case of brief exposure, use a chemical fume hood or a NIOSH/MSHA-approved respirator.
- **Protection of hands:**



Chemical resistant gloves (i.e. latex, nitrile, or equivalent).

- **Eye protection:**  
Safety glasses  
Tightly sealed goggles.
- **Body protection:** Protective work clothing (lab coat).

### 9 Physical and chemical properties:

· **General Information**

**Form:** Liquid  
**Color:** Clear  
**Odor:** Characteristic

· **Change in condition**

**Melting point/Melting range:** Not determined  
**Boiling point/Boiling range:** 78°C (172°F)

· **Flash point:** 13°C (55°F)

· **Ignition temperature:** 425.0°C (797°F)

· **Auto igniting:** Product is not self igniting.

· **Danger of explosion:** Product is not explosive. However, formation of explosive air/vapor mixtures are possible.

· **Explosion limits:**

**Lower:** 3.5 Vol %  
**Upper:** 15.0 Vol %

· **Density at 20°C (68°F):** 0.853 g/cm<sup>3</sup>

· **Solubility in / Miscibility with**

**Water:** Soluble

· **pH-value:** Not applicable

· **Solvent content:**

**Organic solvents:** 70.0 %  
**Water:** 30.0 %



Printing date 09/03/2003

Reviewed on 09/03/2003

**Product name: Positive Control Cells (51-6577LZ)**  
**(APO-BRDU Kit)**

(Contd. of page 3)

### 10 Stability and reactivity

- **Thermal decomposition / conditions to be avoided:**  
No decomposition if used according to specifications.
- **Materials to be avoided:** Incompatible material: strong oxidizers.
- **Dangerous reactions** No dangerous reactions known
- **Dangerous products of decomposition:** No dangerous decomposition products known

### 11 Toxicological information

- **Acute toxicity:**
- **LD/LC50 values that are relevant for classification:**

#### 64-17-5 ethanol

|            |         |                                      |
|------------|---------|--------------------------------------|
| Oral       | LD50    | 3450 mg/kg (MOU)<br>7060 mg/kg (rat) |
| Inhalative | LC50/4h | 20000 mg/l (rat)                     |

- **Primary irritant effect:**
- **on the skin:** No irritating effect.
- **on the eye:** No irritating effect.
- **Sensitization:** No sensitizing effects known.
- **Subacute to chronic toxicity:** Target organs: thyroid, kidney, ureter or bladder tumors.
- **Additional toxicological information:**  
The product shows the following dangers according to internally approved calculation methods for preparations:

### 12 Ecological information:

- **Ecotoxicological effects:**
- **Other information:**  
The ecological effects have not been thoroughly investigated, but currently none have been identified.
- **General notes:** Water hazard class 1 (Self-assessment): slightly hazardous for water.

### 13 Disposal considerations

- **Product:**
- **Recommendation**  
Must adhere to state and federal regulations.  
Must not be disposed of with solid waste.  
Disposal must be made according to the regulations found in 40 CFR 261.  
This product is not considered a RCRA hazardous waste.
- **Uncleaned packagings:**
- **Recommendation:** Disposal must be made according to state and federal regulations.
- **Recommended cleansing agent:** Water, if necessary with cleansing agents.

USA

(Contd. on page 5)

**Product name: Positive Control Cells (51-6577LZ)**  
**(APO-BRDU Kit)**

(Contd. of page 4)

**14 Transport information**· **DOT regulations:**

- **Hazard class:** 3
- **Identification number:** UN1993
- **Packing group:** II
- **Proper shipping name (technical name):** FLAMMABLE LIQUID, N.O.S. (ethanol)
- **Label:** 3

· **Land transport ADR/RID (cross-border)**

- **ADR/RID class:** 3 (F1) Flammable liquids
- **Danger code (Kemler):** 33
- **UN-Number:** 1170
- **Packaging group:** II
- **Description of goods:** 1170 ETHANOL (ETHYL ALCOHOL)

· **Maritime transport IMDG:**

- **IMDG Class:** 3
- **UN Number:** 1170
- **Label:** 3
- **Packaging group:** II
- **EMS Number:** F-E,S-D
- **Marine pollutant:** No
- **Proper shipping name:** ETHANOL (ETHYL ALCOHOL)

· **Air transport ICAO-TI and IATA-DGR:**

- **ICAO/IATA Class:** 3
- **UN/ID Number:** 1170
- **Label:** 3
- **Packaging group:** II
- **Proper shipping name:** ETHANOL (ETHYL ALCOHOL)

(Contd. on page 6)

**Product name: Positive Control Cells (51-6577LZ)**  
**(APO-BRDU Kit)**

(Contd. of page 5)

**· Transport/Additional information:**

\*\*\* Note if a dashed line appears the Hazard Class section for each mode of transportation, this indicates the product is non-regulated for transportation. If a Hazard Class number is listed the product is regulated for transportation.

**15 Regulations**

**· SARA Section 355 (extremely hazardous substances)**

None of the ingredients is listed.

**· SARA Section 313 (specific toxic chemical listings)**

None of the ingredients is listed.

**· TSCA (Toxic Substances Control Act)**

64-17-5 ethanol

**· California Proposition 65 - Chemicals known to cause cancer**

None of the ingredients is listed.

**· California Proposition 65 - Chemicals known to cause reproductive toxicity**

None of the ingredients is listed.

**· Carcinogenicity categories**

**· IARC (International Agency for Research on Cancer)**

None of the ingredients is listed.

**· NTP (National Toxicology Program)**

None of the ingredients is listed.

**· TLV (Threshold Limit Value established by ACGIH)**

64-17-5 ethanol A4

**· MAK (German Maximum Workplace Concentration)**

64-17-5 ethanol 5

**· Product related hazard informations:**

The product has been classified and marked in accordance with regulations on hazardous materials.

**· Hazard symbols:**

Xn Harmful  
F Highly flammable

**· Hazard-determining components of labelling:**

ethanol

**· Risk phrases:**

11 Highly flammable.  
40 Limited evidence of a carcinogenic effect.

**· Safety phrases:**

2 Keep out of the reach of children.  
7/9 Keep container tightly closed and in a well-ventilated place.  
13 Keep away from food, drink and animal feedingstuffs.  
36/37 Wear suitable protective clothing and gloves.  
46 If swallowed, seek medical advice immediately and show this container or label.  
56 Dispose of this material and its container at hazardous or special waste collection point

(Contd. on page 7)



Printing date 09/03/2003

Reviewed on 09/03/2003

**Product name: Positive Control Cells (51-6577LZ)**  
**(APO-BRDU Kit)**

(Contd. of page 6)

- *National regulations*
- *Technical instructions (air):*

| Class | Share in % |
|-------|------------|
| Water | 30.0       |
| III   | 70.0       |

- **Water hazard class:** *Water hazard class 1 (Self-assessment): slightly hazardous for water.*

**16 Other information:**

*To the best of our knowledge, the information contained herein is accurate. However, neither BD or any of its subsidiaries assumes any liabilities whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.*

- **Department issuing MSDS:** *Safety and Environment Department*
- **Contact:** *Technical Service Representative*

### 1 Identification of substance:

- **Product details:**
- **Product name:** Negative Control Cells (51-6578LZ)  
(APO-BRDU Kit)
- **Catalog number:** 556405
- **Manufacturer/Supplier:**  
BD Biosciences, Pharmingen  
10975 Torreyana Road  
San Diego, CA 92121-1106  
Tel. (877)232-8995
- **Information department:** Technical Services
- **Emergency information:**  
In case of a chemical emergency, spill, fire, exposure, or accident please call ChemTrec at (800)424-9300 or 911

### 2 Composition/Data on components:

- **Chemical characterization**
- **Description:** Mixture consisting of the following components.

· **Dangerous components:**

|                 |       |
|-----------------|-------|
| 64-17-5 ethanol | 70.0% |
|-----------------|-------|

### 3 Hazards identification

· **Hazard description:**



Xn Harmful  
F Highly flammable

· **Information pertaining to particular dangers for man and environment**

R 11 Highly flammable.

R 40 Limited evidence of a carcinogenic effect.

· **Classification system**

The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.

· **NFPA ratings (scale 0-4)**



Health = 3  
Fire = 3  
Reactivity = 0

### 4 First aid measures

- **General information** No special measures required.
- **After inhalation** Supply fresh air; consult doctor in case of complaints.
- **After skin contact** Immediately wash with water and soap and rinse thoroughly.
- **After eye contact** Rinse opened eye for 15 minutes under running water. Then consult a doctor.
- **After swallowing** If symptoms persist consult doctor.

(Contd. on page 2)

**Product name: Negative Control Cells (51-6578LZ)**  
**(APO-BRDU Kit)**

(Contd. of page 1)

· **Information for doctor** Show this label.

### 5 Fire fighting measures

- **Suitable extinguishing agents**  
CO<sub>2</sub>, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Protective equipment:** No special measures required.

### 6 Accidental release measures

- **Person-related safety precautions:** Not required.
- **Measures for environmental protection:** Wipe up with damp sponge or mop.
- **Measures for cleaning/collecting:**  
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders).  
Dispose contaminated material as waste according to item 13.  
Ensure adequate ventilation.
- **Additional information:**  
See Section 7 for information on safe handling.  
See Section 8 for information on personal protection equipment.  
See Section 13 for disposal information.

### 7 Handling and storage

- **Handling**
- **Information for safe handling:**  
Ensure good ventilation/exhaustion at the workplace.  
Prevent formation of aerosols.
- **Information about protection against explosions and fires:**  
Keep ignition sources away - Do not smoke.  
Protect against electrostatic charges.
- **Storage**
- **Requirements to be met by storerooms and receptacles:** - 20 C
- **Information about storage in one common storage facility:** Store away from oxidizing agents.
- **Further information about storage conditions:** Store in cool, dry conditions in well sealed containers.

### 8 Exposure controls and personal protection

- **Additional information about design of technical systems:** No further data; see item 7.

- **Components with limit values that require monitoring at the workplace:**

**64-17-5 ethanol**

|     |                                   |
|-----|-----------------------------------|
| PEL | 1900 mg/m <sup>3</sup> , 1000 ppm |
| REL | 1900 mg/m <sup>3</sup> , 1000 ppm |
| TLV | 1880 mg/m <sup>3</sup> , 1000 ppm |

- **Additional information:** The lists that were valid during the creation were used as basis.

(Contd. on page 3)

**Product name: Negative Control Cells (51-6578LZ)**  
(APO-BRDU Kit)

(Contd. of page 2)

- **Personal Protective Equipment**
- **General protective and hygienic measures**  
Keep away from foodstuffs, beverages and feed.  
Wash hands before breaks and at the end of work.
- **Breathing equipment:**  
In case of brief exposure, use a chemical fume hood or a NIOSH/MSHA-approved respirator.
- **Protection of hands:**



Chemical resistant gloves (i.e. latex, nitrile, or equivalent).

- **Eye protection:**  
Safety glasses  
Tightly sealed goggles.
- **Body protection:** Protective work clothing (lab coat).

### 9 Physical and chemical properties:

· **General Information**

**Form:** Liquid  
**Color:** Clear  
**Odor:** Characteristic

· **Change in condition**

**Melting point/Melting range:** Not determined  
**Boiling point/Boiling range:** 78°C (172°F)

· **Flash point:** 13°C (55°F)

· **Ignition temperature:** 425.0°C (797°F)

· **Auto igniting:** Product is not self igniting.

· **Danger of explosion:** Product is not explosive. However, formation of explosive air/vapor mixtures are possible.

· **Explosion limits:**

**Lower:** 3.5 Vol %  
**Upper:** 15.0 Vol %

· **Density at 20°C (68°F):** 0.853 g/cm<sup>3</sup>

· **Solubility in / Miscibility with**

**Water:** Soluble

· **pH-value:** Not applicable

· **Solvent content:**

**Organic solvents:** 70.0 %  
**Water:** 30.0 %



Printing date 09/03/2003

Reviewed on 09/03/2003

**Product name: Negative Control Cells (51-6578LZ)**  
**(APO-BRDU Kit)**

(Contd. of page 3)

### 10 Stability and reactivity

- **Thermal decomposition / conditions to be avoided:**  
No decomposition if used according to specifications.
- **Materials to be avoided:** Incompatible material: strong oxidizers.
- **Dangerous reactions** No dangerous reactions known
- **Dangerous products of decomposition:** No dangerous decomposition products known

### 11 Toxicological information

· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

**64-17-5 ethanol**

|            |         |                                      |
|------------|---------|--------------------------------------|
| Oral       | LD50    | 3450 mg/kg (MOU)<br>7060 mg/kg (rat) |
| Inhalative | LC50/4h | 20000 mg/l (rat)                     |

· **Primary irritant effect:**

- **on the skin:** No irritating effect.
- **on the eye:** No irritating effect.
- **Sensitization:** No sensitizing effects known.
- **Subacute to chronic toxicity:** Target organs: thyroid, kidney, ureter or bladder tumors.
- **Additional toxicological information:**  
The product shows the following dangers according to internally approved calculation methods for preparations:

### 12 Ecological information:

· **Ecotoxicological effects:**

· **Other information:**

- The ecological effects have not been thoroughly investigated, but currently none have been identified.
- **General notes:** Water hazard class 1 (Self-assessment): slightly hazardous for water.

### 13 Disposal considerations

· **Product:**

· **Recommendation**

- Must adhere to state and federal regulations.
- Must not be disposed of with solid waste.
- Disposal must be made according to the regulations found in 40 CFR 261.
- This product is not considered a RCRA hazardous waste.

· **Uncleaned packagings:**

- **Recommendation:** Disposal must be made according to state and federal regulations.
- **Recommended cleansing agent:** Water, if necessary with cleansing agents.

USA

(Contd. on page 5)

**Product name: Negative Control Cells (51-6578LZ)**  
(APO-BRDU Kit)

(Contd. of page 4)

**14 Transport information**

## · DOT regulations:



- Hazard class: 3
- Identification number: UN1170
- Packing group: II
- Proper shipping name (technical name): ETHANOL (ETHYL ALCOHOL)
- Label: 3

## · Land transport ADR/RID (cross-border)



- ADR/RID class: 3 (F1) Flammable liquids
- Danger code (Kemler): 33
- UN-Number: 1170
- Packaging group: II
- Description of goods: 1170 ETHANOL (ETHYL ALCOHOL)

## · Maritime transport IMDG:



- IMDG Class: 3
- UN Number: 1170
- Label: 3
- Packaging group: II
- EMS Number: F-E,S-D
- Marine pollutant: No
- Proper shipping name: ETHANOL (ETHYL ALCOHOL)

## · Air transport ICAO-TI and IATA-DGR:



- ICAO/IATA Class: 3
- UN/ID Number: 1170
- Label: 3
- Packaging group: II
- Proper shipping name: ETHANOL (ETHYL ALCOHOL)

(Contd. on page 6)

**Product name: Negative Control Cells (51-6578LZ)**  
**(APO-BRDU Kit)**

(Contd. of page 5)

**· Transport/Additional information:**

\*\*\* Note if a dashed line appears the Hazard Class section for each mode of transportation, this indicates the product is non-regulated for transportation. If a Hazard Class number is listed the product is regulated for transportation.

**15 Regulations**

**· SARA Section 355 (extremely hazardous substances)**

None of the ingredients is listed.

**· SARA Section 313 (specific toxic chemical listings)**

None of the ingredients is listed.

**· TSCA (Toxic Substances Control Act)**

64-17-5 ethanol

**· California Proposition 65 - Chemicals known to cause cancer**

None of the ingredients is listed.

**· California Proposition 65 - Chemicals known to cause reproductive toxicity**

None of the ingredients is listed.

**· Carcinogenicity categories**

**· IARC (International Agency for Research on Cancer)**

None of the ingredients is listed.

**· NTP (National Toxicology Program)**

None of the ingredients is listed.

**· TLV (Threshold Limit Value established by ACGIH)**

64-17-5 ethanol A4

**· MAK (German Maximum Workplace Concentration)**

64-17-5 ethanol 5

**· Product related hazard informations:**

The product has been classified and marked in accordance with regulations on hazardous materials.

**· Hazard symbols:**

Xn Harmful  
F Highly flammable

**· Hazard-determining components of labelling:**

ethanol

**· Risk phrases:**

11 Highly flammable.  
40 Limited evidence of a carcinogenic effect.

**· Safety phrases:**

2 Keep out of the reach of children.  
7/9 Keep container tightly closed and in a well-ventilated place.  
13 Keep away from food, drink and animal feedingstuffs.  
36/37 Wear suitable protective clothing and gloves.  
46 If swallowed, seek medical advice immediately and show this container or label.  
56 Dispose of this material and its container at hazardous or special waste collection point

(Contd. on page 7)



Printing date 09/03/2003

Reviewed on 09/03/2003

**Product name: Negative Control Cells (51-6578LZ)**  
**(APO-BRDU Kit)**

(Contd. of page 6)

- *National regulations*
- *Technical instructions (air):*

| Class | Share in % |
|-------|------------|
| Water | 30.0       |
| III   | 70.0       |

- **Water hazard class:** *Water hazard class 1 (Self-assessment): slightly hazardous for water.*

**16 Other information:**

*To the best of our knowledge, the information contained herein is accurate. However, neither BD or any of its subsidiaries assumes any liabilities whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.*

- **Department issuing MSDS:** *Safety and Environment Department*
- **Contact:** *Technical Service Representative*

USA

### 1 Identification of substance:

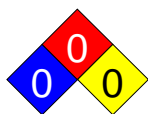
- **Product details:**
- **Product name:** *PI RNase Staining Buffer (51-6585AZ)*  
*(APO-BRDU Kit)*
- **Catalog number:** 556405
- **Manufacturer/Supplier:**  
BD Biosciences, Pharmingen  
10975 Torreyana Road  
San Diego, CA 92121-1106  
Tel. (877)232-8995
- **Information department:** Technical Services
- **Emergency information:**  
In case of a chemical emergency, spill, fire, exposure, or accident please call ChemTrec at (800)424-9300 or 911

### 2 Composition/Data on components:

- **Chemical characterization**
- **Description:** Mixture consisting of the following components.
- **Dangerous components:** Void

### 3 Hazards identification

- **Hazard description:**  
This product contains no hazardous constituents, or the concentration of all chemical constituents are below the regulatory threshold limits described by Occupational Safety Health Administration Hazard Communication Standard 29 CFR 1910.1200 and the European Directive 91/155/EEC, and 93/112/EC.
- **Classification system**  
The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.
- **NFPA ratings (scale 0-4)**



Health = 0  
Fire = 0  
Reactivity = 0

### 4 First aid measures

- **General information** No special measures required.
- **After inhalation** Seek medical treatment in case of complaints.
- **After skin contact** Immediately wash with water and soap and rinse thoroughly.
- **After eye contact**  
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
- **After swallowing** If symptoms persist consult doctor.
- **Information for doctor** Show this label.

**Product name: PI RNase Staining Buffer (51-6585AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 1)

### 5 Fire fighting measures

- **Suitable extinguishing agents**  
CO<sub>2</sub>, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards caused by the material, its products of combustion or resulting gases:**  
Nitrogen oxides (NO<sub>x</sub>)
- **Protective equipment:** No special measures required.

### 6 Accidental release measures

- **Person-related safety precautions:** Not required.
- **Measures for environmental protection:** Wipe up with damp sponge or mop.
- **Measures for cleaning/collecting:** No special measures required.
- **Additional information:** No dangerous substances are released.

### 7 Handling and storage

- **Handling**
- **Information for safe handling:** No special measures required.
- **Information about protection against explosions and fires:** No special measures required.
- **Storage**
- **Requirements to be met by storerooms and receptacles:** 4 C
- **Information about storage in one common storage facility:**  
Do not store together with oxidizing and acidic materials as well as heavy-metal compounds.
- **Further information about storage conditions:** Store in cool, dry conditions in well sealed containers.

### 8 Exposure controls and personal protection

- **Additional information about design of technical systems:** No further data; see item 7.
- **Components with limit values that require monitoring at the workplace:**  
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
- **Additional information:** The lists that were valid during the creation were used as basis.
- **Personal Protective Equipment**
- **General protective and hygienic measures**  
The usual precautionary measures for handling chemicals should be followed.
- **Breathing equipment:** Not required.
- **Protection of hands:**



Chemical resistant gloves (i.e. latex, nitrile, or equivalent).

- **Eye protection:** Safety glasses
- **Body protection:** Protective work clothing (lab coat).

**Product name: PI RNase Staining Buffer (51-6585AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 2)

### 9 Physical and chemical properties:

#### · General Information

**Form:** Liquid  
**Color:** Pink  
**Odor:** Odorless

· **Change in condition** Undetermined  
· **Melting point/Melting range:** Not determined  
· **Boiling point/Boiling range:** Not determined

· **Flash point:** Not applicable

· **Auto igniting:** Product is not self igniting.

· **Danger of explosion:** Product does not present an explosion hazard.

· **Vapor pressure:** Not applicable

· **Density:** Not determined

· **Solubility in / Miscibility with Water:** Soluble

· **pH-value:** Not applicable

### 10 Stability and reactivity

#### · Thermal decomposition / conditions to be avoided:

No decomposition if used according to specifications.

#### · Materials to be avoided:

Incompatible material: strong oxidizers.

Incompatible materials: acidic material and metals

· **Dangerous reactions** No dangerous reactions known

· **Dangerous products of decomposition:** No dangerous decomposition products known

#### · Additional information:

Sodium azide is present in this product. Contact with acidic solutions and metal compounds over time may form potentially explosive metal azides. Should any of this material be introduced into a sanitary sewer system, flush with copious amounts of water.

### 11 Toxicological information

#### · Acute toxicity:

#### · Primary irritant effect:

· **on the skin:** No irritating effect.

· **on the eye:** No irritating effect.

· **Sensitization:** No sensitizing effects known.

#### · Additional toxicological information:

The product is not subject to OSHA classification according to internally approved calculation methods for preparations.

When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to us.



Printing date 09/03/2003

Reviewed on 09/03/2003

**Product name: PI RNase Staining Buffer (51-6585AZ)**  
(APO-BRDU Kit)

(Contd. of page 3)

**12 Ecological information:**

- **Ecotoxicological effects:**
- **Other information:**  
The ecological effects have not been thoroughly investigated, but currently none have been identified.
- **General notes:** Generally not hazardous for water.

**13 Disposal considerations**

- **Product:**
- **Recommendation**  
Must adhere to state and federal regulations.  
Smaller quantities can be disposed of with solid waste.  
This product is not considered a RCRA hazardous waste.  
Disposal must be made according to the regulations found in 40 CFR 261.
- **Uncleaned packagings:**
- **Recommendation:** Disposal must be made according to state and federal regulations.
- **Recommended cleansing agent:** Water, if necessary with cleansing agents.

**14 Transport information**

- **DOT regulations:**
- **Hazard class:** -
- **Land transport ADR/RID (cross-border)**
- **ADR/RID class:** -
- **Maritime transport IMDG:**
- **IMDG Class:** -
- **Marine pollutant:** No
- **Air transport ICAO-TI and IATA-DGR:**
- **ICAO/IATA Class:** -
- **Transport/Additional information:**  
\*\*\* Note if a dashed line appears the Hazard Class section for each mode of transportation, this indicates the product is non-regulated for transportation. If a Hazard Class number is listed the product is regulated for transportation.

**15 Regulations**

- **SARA Section 355 (extremely hazardous substances)**  
None of the ingredients is listed.
- **SARA Section 313 (specific toxic chemical listings)**  
None of the ingredients is listed.
- **TSCA (Toxic Substances Control Act)**
- 7558-80-7 sodium phosphate, monobasic
- 26628-22-8 sodium azide

(Contd. on page 5)



Printing date 09/03/2003

Reviewed on 09/03/2003

Product name: **PI RNase Staining Buffer (51-6585AZ)**  
(APO-BRDU Kit)

(Contd. of page 4)

· **California Proposition 65 - Chemicals known to cause cancer**

None of the ingredients is listed.

· **California Proposition 65 - Chemicals known to cause reproductive toxicity**

None of the ingredients is listed.

· **Carcinogenicity categories**

· **IARC (International Agency for Research on Cancer)**

None of the ingredients is listed.

· **NTP (National Toxicology Program)**

None of the ingredients is listed.

· **TLV (Threshold Limit Value established by ACGIH)**

26628-22-8 | sodium azide | A4

· **MAK (German Maximum Workplace Concentration)**

None of the ingredients is listed.

· **Product related hazard informations:**

Observe the general safety regulations when handling chemicals  
The product is not subject to identification regulations pertaining to regulations on hazardous materials.

· **National regulations**

· **Water hazard class:** Generally not hazardous for water.

**16 Other information:**

To the best of our knowledge, the information contained herein is accurate. However, neither BD or any of its subsidiaries assumes any liabilities whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

· **Department issuing MSDS:** Safety and Environment Department

· **Contact:** Technical Service Representative

### 1 Identification of substance:

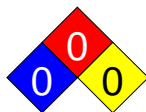
- **Product details:**
- **Product name:** Wash Buffer (51-6579AZ)  
(APO-BRDU Kit)
- **Catalog number:** 556405
- **Manufacturer/Supplier:**  
BD Biosciences, Pharmingen  
10975 Torreyana Road  
San Diego, CA 92121-1106  
Tel. (877)232-8995
- **Information department:** Technical Services
- **Emergency information:**  
In case of a chemical emergency, spill, fire, exposure, or accident please call ChemTrec at (800)424-9300 or 911

### 2 Composition/Data on components:

- **Chemical characterization**
- **Description:** Mixture consisting of the following components.
- **Dangerous components:** Void

### 3 Hazards identification

- **Hazard description:**  
This product contains no hazardous constituents, or the concentration of all chemical constituents are below the regulatory threshold limits described by Occupational Safety Health Administration Hazard Communication Standard 29 CFR 1910.1200 and the European Directive 91/155/EEC, and 93/112/EC.
- **Classification system**  
The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.
- **NFPA ratings (scale 0-4)**



Health = 0  
Fire = 0  
Reactivity = 0

### 4 First aid measures

- **General information** No special measures required.
- **After inhalation** Seek medical treatment in case of complaints.
- **After skin contact** Immediately wash with water and soap and rinse thoroughly.
- **After eye contact**  
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
- **After swallowing** If symptoms persist consult doctor.
- **Information for doctor** Show this label.

**Product name: Wash Buffer (51-6579AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 1)

### 5 Fire fighting measures

- **Suitable extinguishing agents**  
CO<sub>2</sub>, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards caused by the material, its products of combustion or resulting gases:**  
Nitrogen oxides (NO<sub>x</sub>)
- **Protective equipment:** No special measures required.

### 6 Accidental release measures

- **Person-related safety precautions:** Not required.
- **Measures for environmental protection:** Wipe up with damp sponge or mop.
- **Measures for cleaning/collecting:** No special measures required.
- **Additional information:** No dangerous substances are released.

### 7 Handling and storage

- **Handling**
  - **Information for safe handling:** No special measures required.
  - **Information about protection against explosions and fires:** No special measures required.
- **Storage**
  - **Requirements to be met by storerooms and receptacles:** 4 C
  - **Information about storage in one common storage facility:**  
Do not store together with oxidizing and acidic materials as well as heavy-metal compounds.
  - **Further information about storage conditions:** Store in cool, dry conditions in well sealed containers.

### 8 Exposure controls and personal protection

- **Additional information about design of technical systems:** No further data; see item 7.
- **Components with limit values that require monitoring at the workplace:**  
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
- **Additional information:** The lists that were valid during the creation were used as basis.
- **Personal Protective Equipment**
  - **General protective and hygienic measures**  
The usual precautionary measures for handling chemicals should be followed.
  - **Breathing equipment:** Not required.
  - **Protection of hands:**



Chemical resistant gloves (i.e. latex, nitrile, or equivalent).

- **Eye protection:** Safety glasses
- **Body protection:** Protective work clothing (lab coat).

**Product name: Wash Buffer (51-6579AZ)**  
(APO-BRDU Kit)

(Contd. of page 2)

### 9 Physical and chemical properties:

#### · General Information

**Form:** Liquid  
**Color:** Pink  
**Odor:** Odorless

· **Change in condition** Undetermined  
· **Melting point/Melting range:** Not determined  
· **Boiling point/Boiling range:** Not determined

· **Flash point:** Not applicable

· **Auto igniting:** Product is not self igniting.

· **Danger of explosion:** Product does not present an explosion hazard.

· **Density:** Not determined

· **Solubility in / Miscibility with**  
**Water:** Soluble

· **pH-value:** Not applicable

· **Solvent content:**  
**Water:** 89.8 %

### 10 Stability and reactivity

#### · **Thermal decomposition / conditions to be avoided:**

No decomposition if used according to specifications.

#### · **Materials to be avoided:**

Incompatible material: strong oxidizers.

Incompatible materials: acidic material and metals

· **Dangerous reactions** No dangerous reactions known

· **Dangerous products of decomposition:** No dangerous decomposition products known

#### · **Additional information:**

Sodium azide is present in this product. Contact with acidic solutions and metal compounds over time may form potentially explosive metal azides. Should any of this material be introduced into a sanitary sewer system, flush with copious amounts of water.

### 11 Toxicological information

#### · **Acute toxicity:**

#### · **Primary irritant effect:**

· **on the skin:** No irritating effect.

· **on the eye:** No irritating effect.

· **Sensitization:** No sensitizing effects known.

#### · **Additional toxicological information:**

The product is not subject to OSHA classification according to internally approved calculation methods for preparations.

(Contd. on page 4)



Printing date 09/03/2003

Reviewed on 09/03/2003

Product name: Wash Buffer (51-6579AZ)  
(APO-BRDU Kit)

(Contd. of page 3)

When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to us.

### 12 Ecological information:

- **Ecotoxicological effects:**
- **Other information:**  
The ecological effects have not been thoroughly investigated, but currently none have been identified.
- **General notes:** Generally not hazardous for water.

### 13 Disposal considerations

- **Product:**
- **Recommendation**  
Must adhere to state and federal regulations.  
Smaller quantities can be disposed of with solid waste.  
This product is not considered a RCRA hazardous waste.  
Disposal must be made according to the regulations found in 40 CFR 261.
- **Uncleaned packagings:**
- **Recommendation:** Disposal must be made according to state and federal regulations.
- **Recommended cleansing agent:** Water, if necessary with cleansing agents.

### 14 Transport information

- **DOT regulations:**
- **Hazard class:** -
- **Land transport ADR/RID (cross-border)**
- **ADR/RID class:** -
- **Maritime transport IMDG:**
- **IMDG Class:** -
- **Marine pollutant:** No
- **Air transport ICAO-TI and IATA-DGR:**
- **ICAO/IATA Class:** -

· **Transport/Additional information:**  
\*\*\* Note if a dashed line appears the Hazard Class section for each mode of transportation, this indicates the product is non-regulated for transportation. If a Hazard Class number is listed the product is regulated for transportation.

### 15 Regulations

- **SARA Section 355 (extremely hazardous substances)**  
None of the ingredients is listed.
- **SARA Section 313 (specific toxic chemical listings)**  
None of the ingredients is listed.

(Contd. on page 5)



**Material Safety Data Sheet**  
acc. to ISO/DIS 11014

Printing date 09/03/2003

Reviewed on 09/03/2003

**Product name: Wash Buffer (51-6579AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 4)

**· TSCA (Toxic Substances Control Act)**

|            |                             |
|------------|-----------------------------|
| 7558-80-7  | sodium phosphate, monobasic |
| 26628-22-8 | sodium azide                |

**· California Proposition 65 - Chemicals known to cause cancer**

None of the ingredients is listed.

**· California Proposition 65 - Chemicals known to cause reproductive toxicity**

None of the ingredients is listed.

**· Carcinogenicity categories**

**· IARC (International Agency for Research on Cancer)**

None of the ingredients is listed.

**· NTP (National Toxicology Program)**

None of the ingredients is listed.

**· TLV (Threshold Limit Value established by ACGIH)**

|            |              |    |
|------------|--------------|----|
| 26628-22-8 | sodium azide | A4 |
|------------|--------------|----|

**· MAK (German Maximum Workplace Concentration)**

None of the ingredients is listed.

**· Product related hazard informations:**

Observe the general safety regulations when handling chemicals  
The product is not subject to identification regulations pertaining to regulations on hazardous materials.

**· National regulations**

**· Water hazard class:** Generally not hazardous for water.

**16 Other information:**

To the best of our knowledge, the information contained herein is accurate. However, neither BD or any of its subsidiaries assumes any liabilities whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

**· Department issuing MSDS:** Safety and Environment Department

**· Contact:** Technical Service Representative

### 1 Identification of substance:

- **Product details:**
- **Product name:** Reaction Buffer (51-6580AZ)  
(APO-BRDU Kit)
- **Catalog number:** 556405
- **Manufacturer/Supplier:**  
BD Biosciences, Pharmingen  
10975 Torreyana Road  
San Diego, CA 92121-1106  
Tel. (877)232-8995
- **Information department:** Technical Services
- **Emergency information:**  
In case of a chemical emergency, spill, fire, exposure, or accident please call ChemTrec at (800)424-9300 or 911

### 2 Composition/Data on components:

- **Chemical characterization**
- **Description:** Mixture consisting of the following components.

· **Dangerous components:**

|         |                |      |
|---------|----------------|------|
| 75-60-5 | cacodylic acid | 0.2% |
|---------|----------------|------|

### 3 Hazards identification

- **Hazard description:**



Xn Harmful

- **Information pertaining to particular dangers for man and environment**  
R 20/21/22 Harmful by inhalation, in contact with skin and if swallowed.
- **Classification system**  
The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.
- **NFPA ratings (scale 0-4)**



Health = 2  
Fire = 0  
Reactivity = 0

### 4 First aid measures

- **General information**  
Symptoms of poisoning may even occur after several hours; therefore provide medical observation for at least 48 hours after the accident.
- **After inhalation**  
Supply fresh air. If required, provide artificial respiration. Keep patient warm. Seek medical advice.  
In case of unconsciousness place patient on side position for transportation.
- **After skin contact** Immediately wash with water and soap and rinse thoroughly.

(Contd. on page 2)

**Product name: Reaction Buffer (51-6580AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 1)

- **After eye contact** Rinse opened eye for 15 minutes under running water. Then consult a doctor.
- **After swallowing** If symptoms persist consult doctor.
- **Information for doctor** Show this label.

### 5 Fire fighting measures

- **Suitable extinguishing agents**  
CO<sub>2</sub>, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards caused by the material, its products of combustion or resulting gases:**  
Formation of toxic gases is possible during heating or in case of fire.
- **Protective equipment:** No special measures required.

### 6 Accidental release measures

- **Person-related safety precautions:** Not required.
- **Measures for environmental protection:** Wipe up with damp sponge or mop.
- **Measures for cleaning/collecting:**  
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders).  
Dispose contaminated material as waste according to item 13.  
Ensure adequate ventilation.
- **Additional information:**  
See Section 7 for information on safe handling.  
See Section 8 for information on personal protection equipment.  
See Section 13 for disposal information.

### 7 Handling and storage

- **Handling**
- **Information for safe handling:**  
Ensure good ventilation/exhaustion at the workplace.  
Prevent formation of aerosols.
- **Information about protection against explosions and fires:** No special measures required.
- **Storage**
- **Requirements to be met by storerooms and receptacles:** 4 C
- **Information about storage in one common storage facility:** Store away from oxidizing agents.
- **Further information about storage conditions:** Store in cool, dry conditions in well sealed containers.

### 8 Exposure controls and personal protection

- **Additional information about design of technical systems:** No further data; see item 7.

- **Components with limit values that require monitoring at the workplace:**

75-60-5 cacodylic acid

|     |                                       |
|-----|---------------------------------------|
| PEL | Short-term value: 5 mg/m <sup>3</sup> |
|     | Long-term value: 5 mg/m <sup>3</sup>  |
|     | TWA 0.5 MG (As)/M3                    |

- **Additional information:** The lists that were valid during the creation were used as basis.

(Contd. on page 3)

**Product name: Reaction Buffer (51-6580AZ)**  
(APO-BRDU Kit)

(Contd. of page 2)

- **Personal Protective Equipment**
- **General protective and hygienic measures**  
Keep away from foodstuffs, beverages and feed.  
Wash hands before breaks and at the end of work.  
Avoid contact with the eyes and skin.
- **Breathing equipment:**  
In case of brief exposure, use a chemical fume hood or a NIOSH/MSHA-approved respirator.
- **Protection of hands:**



Chemical resistant gloves (i.e. latex, nitrile, or equivalent).

- **Eye protection:** Safety glasses
- **Body protection:** Protective work clothing (lab coat).

### 9 Physical and chemical properties:

· **General Information**

|               |                |
|---------------|----------------|
| <b>Form:</b>  | Liquid         |
| <b>Color:</b> | Pale<br>Pink   |
| <b>Odor:</b>  | Characteristic |

· **Change in condition**

**Melting point/Melting range:** Not determined  
**Boiling point/Boiling range:** Not determined

· **Flash point:** Not applicable

· **Auto igniting:** Product is not self igniting.

· **Danger of explosion:** Product does not present an explosion hazard.

· **Density at 20°C (68°F):** 1 g/cm<sup>3</sup>

· **Solubility in / Miscibility with**

**Water:** Not miscible or difficult to mix

· **pH-value:** Not applicable

· **Solvent content:**

**Water:** 99.8 %

### 10 Stability and reactivity

- **Thermal decomposition / conditions to be avoided:**  
No decomposition if used according to specifications.
- **Materials to be avoided:** Incompatible material: strong oxidizers.
- **Dangerous reactions** No dangerous reactions known
- **Dangerous products of decomposition:**  
Carbon monoxide (CO) and carbon dioxide (CO<sub>2</sub>)

(Contd. on page 4)

**Product name: Reaction Buffer (51-6580AZ)**  
**(APO-BRDU Kit)**

Arsenic compounds

(Contd. of page 3)

### 11 Toxicological information

· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

**75-60-5 cacodylic acid**

|      |      |                 |
|------|------|-----------------|
| Oral | LD50 | 644 mg/kg (rat) |
|------|------|-----------------|

· **Primary irritant effect:**

· **on the skin:** No irritating effect.

· **on the eye:** No irritating effect.

· **Sensitization:** No sensitizing effects known.

· **Subacute to chronic toxicity:** Target organs: kidneys, heart, brain, skin, bone marrow, liver, and nerves.

· **Additional toxicological information:**

The product shows the following dangers according to internally approved calculation methods for preparations:

Harmful

### 12 Ecological information:

· **Ecotoxicological effects:**

· **Other information:**

The ecological effects have not been thoroughly investigated, but currently none have been identified.

· **General notes:** Water hazard class 2 (Self-assessment): hazardous for water.

### 13 Disposal considerations

· **Product:**

· **Recommendation**

Must adhere to state and federal regulations.

Must not be disposed of with solid waste.

Disposal must be made according to the regulations found in 40 CFR 261.

This product is not considered a RCRA hazardous waste.

RCRA hazardous waste - RCRA # D004 (Arsenic)

· **Uncleaned packagings:**

· **Recommendation:** Disposal must be made according to state and federal regulations.

· **Recommended cleansing agent:** Water, if necessary with cleansing agents.

### 14 Transport information

· **DOT regulations:**

· **Hazard class:** -

· **Land transport ADR/RID (cross-border)**

· **ADR/RID class:** -

(Contd. on page 5)

**Product name: Reaction Buffer (51-6580AZ)**  
(APO-BRDU Kit)

(Contd. of page 4)

- **Maritime transport IMDG:**
- **IMDG Class:** -
- **Marine pollutant:** No

- **Air transport ICAO-TI and IATA-DGR:**
- **ICAO/IATA Class:** -

· **Transport/Additional information:**

\*\*\* Note if a dashed line appears the Hazard Class section for each mode of transportation, this indicates the product is non-regulated for transportation. If a Hazard Class number is listed the product is regulated for transportation.

### 15 Regulations

- **SARA Section 355 (extremely hazardous substances)**

None of the ingredients is listed.

- **SARA Section 313 (specific toxic chemical listings)**

75-60-5 | cacodylic acid

- **TSCA (Toxic Substances Control Act)**

75-60-5 | cacodylic acid

7646-79-9 | cobalt chloride

- **California Proposition 65 - Chemicals known to cause cancer**

75-60-5 | cacodylic acid

- **California Proposition 65 - Chemicals known to cause reproductive toxicity**

None of the ingredients is listed.

- **Carcinogenicity categories**

- **IARC (International Agency for Research on Cancer)**

75-60-5 | cacodylic acid | Group 1

- **NTP (National Toxicology Program)**

None of the ingredients is listed.

- **TLV (Threshold Limit Value established by ACGIH)**

None of the ingredients is listed.

- **MAK (German Maximum Workplace Concentration)**

None of the ingredients is listed.

- **Product related hazard informations:**

The product has been classified and marked in accordance with regulations on hazardous materials.

- **Hazard symbols:**

Xn Harmful

- **Hazard-determining components of labelling:**

cacodylic acid

- **Risk phrases:**

20/21/22 Harmful by inhalation, in contact with skin and if swallowed.

(Contd. on page 6)



**Material Safety Data Sheet**  
*acc. to ISO/DIS 11014*

Printing date 09/03/2003

Reviewed on 09/03/2003

**Product name: Reaction Buffer (51-6580AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 5)

· **Safety phrases:**

- 9 Keep container in a well-ventilated place.
- 23 Do not breathe gas/fumes/vapour/spray.
- 36/37 Wear suitable protective clothing and gloves.
- 60 This material and its container must be disposed of as hazardous waste.

· **National regulations**

- **Water hazard class:** Water hazard class 2 (Self-assessment): hazardous for water.

**16 Other information:**

*To the best of our knowledge, the information contained herein is accurate. However, neither BD or any of its subsidiaries assumes any liabilities whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.*

- **Department issuing MSDS:** Safety and Environment Department
- **Contact:** Technical Service Representative

USA

### 1 Identification of substance:

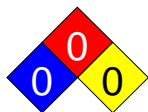
- **Product details:**
- **Product name:** *Tdt Enzyme (51-6581EZ)*  
*(APO-BRDU Kit)*
- **Catalog number:** 556405
- **Manufacturer/Supplier:**  
BD Biosciences, Pharmingen  
10975 Torreyana Road  
San Diego, CA 92121-1106  
Tel. (877)232-8995
- **Information department:** Technical Services
- **Emergency information:**  
In case of a chemical emergency, spill, fire, exposure, or accident please call ChemTrec at (800)424-9300 or 911

### 2 Composition/Data on components:

- **Chemical characterization**
- **Description:** Mixture consisting of the following components.
- **Dangerous components:** Void

### 3 Hazards identification

- **Hazard description:**  
This product contains no hazardous constituents, or the concentration of all chemical constituents are below the regulatory threshold limits described by Occupational Safety Health Administration Hazard Communication Standard 29 CFR 1910.1200 and the European Directive 91/155/EEC, and 93/112/EC.
- **Classification system**  
The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.
- **NFPA ratings (scale 0-4)**



Health = 0  
Fire = 0  
Reactivity = 0

### 4 First aid measures

- **General information** No special measures required.
- **After inhalation** Seek medical treatment in case of complaints.
- **After skin contact** Immediately wash with water and soap and rinse thoroughly.
- **After eye contact**  
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
- **After swallowing** If symptoms persist consult doctor.
- **Information for doctor** Show this label.

**Product name: Tdt Enzyme (51-6581EZ)**  
**(APO-BRDU Kit)**

(Contd. of page 1)

### 5 Fire fighting measures

- **Suitable extinguishing agents**  
CO<sub>2</sub>, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Protective equipment:** No special measures required.

### 6 Accidental release measures

- **Person-related safety precautions:** Not required.
- **Measures for environmental protection:** Wipe up with damp sponge or mop.
- **Measures for cleaning/collecting:** No special measures required.
- **Additional information:** No dangerous substances are released.

### 7 Handling and storage

- **Handling**
  - **Information for safe handling:** No special measures required.
  - **Information about protection against explosions and fires:** No special measures required.
- **Storage**
  - **Requirements to be met by storerooms and receptacles:** - 20 C
  - **Information about storage in one common storage facility:** Store away from oxidizing agents.
  - **Further information about storage conditions:** Store in cool, dry conditions in well sealed containers.

### 8 Exposure controls and personal protection

- **Additional information about design of technical systems:** No further data; see item 7.
- **Components with limit values that require monitoring at the workplace:**  
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
- **Additional information:** The lists that were valid during the creation were used as basis.
- **Personal Protective Equipment**
  - **General protective and hygienic measures**  
The usual precautionary measures for handling chemicals should be followed.
  - **Breathing equipment:** Not required.
  - **Protection of hands:**



Chemical resistant gloves (i.e. latex, nitrile, or equivalent).

- **Eye protection:** Safety glasses
- **Body protection:** Protective work clothing (lab coat).

USA

(Contd. on page 3)

**Product name: Tdt Enzyme (51-6581EZ)**  
**(APO-BRDU Kit)**

(Contd. of page 2)

### 9 Physical and chemical properties:

#### · General Information

**Form:** Liquid  
**Color:** Clear  
**Odor:** Characteristic

· **Change in condition** Undetermined  
· **Melting point/Melting range:** Not determined  
· **Boiling point/Boiling range:** Not determined

· **Flash point:** Not applicable

· **Auto igniting:** Product is not self igniting.

· **Danger of explosion:** Product does not present an explosion hazard.

· **Vapor pressure:** Not applicable

· **Density:** Not determined

· **Solubility in / Miscibility with**  
**Water:** Soluble

· **pH-value:** Not applicable

· **Solvent content:**  
**Water:** 50.0 %

### 10 Stability and reactivity

- **Thermal decomposition / conditions to be avoided:**  
No decomposition if used according to specifications.
- **Materials to be avoided:** Incompatible material: strong oxidizers.
- **Dangerous reactions** No dangerous reactions known
- **Dangerous products of decomposition:** No dangerous decomposition products known

### 11 Toxicological information

- **Acute toxicity:**
- **Primary irritant effect:**
  - **on the skin:** No irritating effect.
  - **on the eye:** No irritating effect.
- **Sensitization:** No sensitizing effects known.
- **Additional toxicological information:**  
The product is not subject to OSHA classification according to internally approved calculation methods for preparations.  
When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to us.



Printing date 09/03/2003

Reviewed on 09/03/2003

Product name: Tdt Enzyme (51-6581EZ)  
(APO-BRDU Kit)

(Contd. of page 3)

**12 Ecological information:**

- **Ecotoxic effects:**
- **Other information:**  
The ecological effects have not been thoroughly investigated, but currently none have been identified.
- **General notes:** Generally not hazardous for water.

**13 Disposal considerations**

- **Product:**
- **Recommendation**  
Must adhere to state and federal regulations.  
Smaller quantities can be disposed of with solid waste.  
This product is not considered a RCRA hazardous waste.  
Disposal must be made according to the regulations found in 40 CFR 261.
- **Uncleaned packagings:**
- **Recommendation:** Disposal must be made according to state and federal regulations.
- **Recommended cleansing agent:** Water, if necessary with cleansing agents.

**14 Transport information**

- **DOT regulations:**
- **Hazard class:** -
- **Land transport ADR/RID (cross-border)**
- **ADR/RID class:** -
- **Maritime transport IMDG:**
- **IMDG Class:** -
- **Marine pollutant:** No
- **Air transport ICAO-TI and IATA-DGR:**
- **ICAO/IATA Class:** -
- **Transport/Additional information:**  
\*\*\* Note if a dashed line appears the Hazard Class section for each mode of transportation, this indicates the product is non-regulated for transportation. If a Hazard Class number is listed the product is regulated for transportation.

**15 Regulations**

- **SARA Section 355 (extremely hazardous substances)**  
None of the ingredients is listed.
- **SARA Section 313 (specific toxic chemical listings)**  
None of the ingredients is listed.
- **TSCA (Toxic Substances Control Act)**  
None of the ingredients is listed.

(Contd. on page 5)



Printing date 09/03/2003

Reviewed on 09/03/2003

**Product name: Tdt Enzyme (51-6581EZ)**  
**(APO-BRDU Kit)**

(Contd. of page 4)

**· California Proposition 65 - Chemicals known to cause cancer**

None of the ingredients is listed.

**· California Proposition 65 - Chemicals known to cause reproductive toxicity**

None of the ingredients is listed.

**· Carcinogenicity categories**

**· IARC (International Agency for Research on Cancer)**

None of the ingredients is listed.

**· NTP (National Toxicology Program)**

None of the ingredients is listed.

**· TLV (Threshold Limit Value established by ACGIH)**

None of the ingredients is listed.

**· MAK (German Maximum Workplace Concentration)**

None of the ingredients is listed.

**· Product related hazard informations:**

Observe the general safety regulations when handling chemicals

The product is not subject to identification regulations pertaining to regulations on hazardous materials.

**· National regulations**

**· Water hazard class:** Generally not hazardous for water.

**16 Other information:**

To the best of our knowledge, the information contained herein is accurate. However, neither BD or any of its subsidiaries assumes any liabilities whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

**· Department issuing MSDS:** Safety and Environment Department

**· Contact:** Technical Service Representative

### 1 Identification of substance:

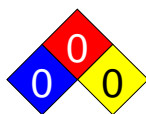
- **Product details:**
- **Product name:** Rinsing Buffer (51-6583AZ)  
(APO-BRDU Kit)
- **Catalog number:** 556405
- **Manufacturer/Supplier:**  
BD Biosciences, Pharmingen  
10975 Torreyana Road  
San Diego, CA 92121-1106  
Tel. (877)232-8995
- **Information department:** Technical Services
- **Emergency information:**  
In case of a chemical emergency, spill, fire, exposure, or accident please call ChemTrec at (800)424-9300 or 911

### 2 Composition/Data on components:

- **Chemical characterization**
- **Description:** Mixture consisting of the following components.
- **Dangerous components:** Void

### 3 Hazards identification

- **Hazard description:**  
This product contains no hazardous constituents, or the concentration of all chemical constituents are below the regulatory threshold limits described by Occupational Safety Health Administration Hazard Communication Standard 29 CFR 1910.1200 and the European Directive 91/155/EEC, and 93/112/EC.
- **Classification system**  
The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.
- **NFPA ratings (scale 0-4)**



Health = 0  
Fire = 0  
Reactivity = 0

### 4 First aid measures

- **General information** No special measures required.
- **After inhalation** Seek medical treatment in case of complaints.
- **After skin contact** Immediately wash with water and soap and rinse thoroughly.
- **After eye contact**  
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
- **After swallowing** If symptoms persist consult doctor.
- **Information for doctor** Show this label.

**Product name: Rinsing Buffer (51-6583AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 1)

### 5 Fire fighting measures

- **Suitable extinguishing agents**  
CO<sub>2</sub>, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards caused by the material, its products of combustion or resulting gases:**  
Nitrogen oxides (NO<sub>x</sub>)
- **Protective equipment:** No special measures required.

### 6 Accidental release measures

- **Person-related safety precautions:** Not required.
- **Measures for environmental protection:** Wipe up with damp sponge or mop.
- **Measures for cleaning/collecting:** No special measures required.
- **Additional information:** No dangerous substances are released.

### 7 Handling and storage

- **Handling**
- **Information for safe handling:** No special measures required.
- **Information about protection against explosions and fires:** No special measures required.
- **Storage**
- **Requirements to be met by storerooms and receptacles:** 4 C
- **Information about storage in one common storage facility:**  
Do not store together with oxidizing and acidic materials as well as heavy-metal compounds.
- **Further information about storage conditions:** Store in cool, dry conditions in well sealed containers.

### 8 Exposure controls and personal protection

- **Additional information about design of technical systems:** No further data; see item 7.
- **Components with limit values that require monitoring at the workplace:**  
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
- **Additional information:** The lists that were valid during the creation were used as basis.
- **Personal Protective Equipment**
- **General protective and hygienic measures**  
The usual precautionary measures for handling chemicals should be followed.
- **Breathing equipment:** Not required.
- **Protection of hands:**



Chemical resistant gloves (i.e. latex, nitrile, or equivalent).

- **Eye protection:** Safety glasses
- **Body protection:** Protective work clothing (lab coat).

USA

(Contd. on page 3)

**Product name: Rinsing Buffer (51-6583AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 2)

### 9 Physical and chemical properties:

#### · General Information

**Form:** Liquid  
**Color:** Clear  
**Odor:** Odorless

· **Change in condition** Undetermined  
· **Melting point/Melting range:** Not determined  
· **Boiling point/Boiling range:** Not determined

· **Flash point:** Not applicable

· **Auto igniting:** Product is not self igniting.

· **Danger of explosion:** Product does not present an explosion hazard.

· **Vapor pressure:** Not applicable

· **Density:** Not determined

· **Solubility in / Miscibility with**  
**Water:** Soluble

· **pH-value:** Not applicable

· **Solvent content:**  
**Water:** 89.8 %

### 10 Stability and reactivity

#### · **Thermal decomposition / conditions to be avoided:**

No decomposition if used according to specifications.

#### · **Materials to be avoided:**

Incompatible material: strong oxidizers.  
Incompatible materials: acidic material and metals

· **Dangerous reactions** No dangerous reactions known

· **Dangerous products of decomposition:** No dangerous decomposition products known

#### · **Additional information:**

Sodium azide is present in this product. Contact with acidic solutions and metal compounds over time may form potentially explosive metal azides. Should any of this material be introduced into a sanitary sewer system, flush with copious amounts of water.

### 11 Toxicological information

#### · **Acute toxicity:**

#### · **Primary irritant effect:**

· **on the skin:** No irritating effect.

· **on the eye:** No irritating effect.

· **Sensitization:** No sensitizing effects known.

#### · **Additional toxicological information:**

The product is not subject to OSHA classification according to internally approved calculation methods for preparations.

(Contd. on page 4)



Printing date 09/03/2003

Reviewed on 09/03/2003

**Product name: Rinsing Buffer (51-6583AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 3)

When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to us.

**12 Ecological information:**

- **Ecotoxicological effects:**
- **Other information:**  
The ecological effects have not been thoroughly investigated, but currently none have been identified.
- **General notes:** Generally not hazardous for water.

**13 Disposal considerations**

- **Product:**
- **Recommendation**  
Must adhere to state and federal regulations.  
Smaller quantities can be disposed of with solid waste.  
This product is not considered a RCRA hazardous waste.  
Disposal must be made according to the regulations found in 40 CFR 261.
- **Uncleaned packagings:**
- **Recommendation:** Disposal must be made according to state and federal regulations.
- **Recommended cleansing agent:** Water, if necessary with cleansing agents.

**14 Transport information**

- **DOT regulations:**
- **Hazard class:** -
- **Land transport ADR/RID (cross-border)**
- **ADR/RID class:** -
- **Maritime transport IMDG:**
- **IMDG Class:** -
- **Marine pollutant:** No
- **Air transport ICAO-TI and IATA-DGR:**
- **ICAO/IATA Class:** -

· **Transport/Additional information:**  
\*\*\* Note if a dashed line appears the Hazard Class section for each mode of transportation, this indicates the product is non-regulated for transportation. If a Hazard Class number is listed the product is regulated for transportation.

**15 Regulations**

- **SARA Section 355 (extremely hazardous substances)**  
None of the ingredients is listed.
- **SARA Section 313 (specific toxic chemical listings)**  
None of the ingredients is listed.

(Contd. on page 5)



Printing date 09/03/2003

Reviewed on 09/03/2003

**Product name: Rinsing Buffer (51-6583AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 4)

**· TSCA (Toxic Substances Control Act)**

|            |                             |
|------------|-----------------------------|
| 7558-80-7  | sodium phosphate, monobasic |
| 26628-22-8 | sodium azide                |

**· California Proposition 65 - Chemicals known to cause cancer**

None of the ingredients is listed.

**· California Proposition 65 - Chemicals known to cause reproductive toxicity**

None of the ingredients is listed.

**· Carcinogenicity categories**

**· IARC (International Agency for Research on Cancer)**

None of the ingredients is listed.

**· NTP (National Toxicology Program)**

None of the ingredients is listed.

**· TLV (Threshold Limit Value established by ACGIH)**

|            |              |    |
|------------|--------------|----|
| 26628-22-8 | sodium azide | A4 |
|------------|--------------|----|

**· MAK (German Maximum Workplace Concentration)**

None of the ingredients is listed.

**· Product related hazard informations:**

Observe the general safety regulations when handling chemicals  
The product is not subject to identification regulations pertaining to regulations on hazardous materials.

**· National regulations**

**· Water hazard class:** Generally not hazardous for water.

**16 Other information:**

To the best of our knowledge, the information contained herein is accurate. However, neither BD or any of its subsidiaries assumes any liabilities whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

- **Department issuing MSDS:** Safety and Environment Department
- **Contact:** Technical Service Representative

### 1 Identification of substance:

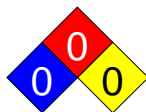
- **Product details:**
- **Product name:** FITC Labeled Anti-BRDU mAb (51-6584AZ)  
(APO-BRDU Kit)
- **Catalog number:** 556405
- **Manufacturer/Supplier:**  
BD Biosciences, Pharmingen  
10975 Torreyana Road  
San Diego, CA 92121-1106  
Tel. (877)232-8995
- **Information department:** Technical Services
- **Emergency information:**  
In case of a chemical emergency, spill, fire, exposure, or accident please call ChemTrec at (800)424-9300 or 911

### 2 Composition/Data on components:

- **Chemical characterization**
- **Description:** Mixture consisting of the following components.
- **Dangerous components:** Void

### 3 Hazards identification

- **Hazard description:**  
This product contains no hazardous constituents, or the concentration of all chemical constituents are below the regulatory threshold limits described by Occupational Safety Health Administration Hazard Communication Standard 29 CFR 1910.1200 and the European Directive 91/155/EEC, and 93/112/EC.
- **Classification system**  
The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.
- **NFPA ratings (scale 0-4)**



Health = 0  
Fire = 0  
Reactivity = 0

### 4 First aid measures

- **General information** No special measures required.
- **After inhalation** Seek medical treatment in case of complaints.
- **After skin contact** Immediately wash with water and soap and rinse thoroughly.
- **After eye contact**  
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
- **After swallowing** If symptoms persist consult doctor.
- **Information for doctor** Show this label.

**Product name: FITC Labeled Anti-BRDU mAb (51-6584AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 1)

### 5 Fire fighting measures

- **Suitable extinguishing agents**  
CO<sub>2</sub>, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards caused by the material, its products of combustion or resulting gases:**  
Nitrogen oxides (NO<sub>x</sub>)
- **Protective equipment:** No special measures required.

### 6 Accidental release measures

- **Person-related safety precautions:** Not required.
- **Measures for environmental protection:** Wipe up with damp sponge or mop.
- **Measures for cleaning/collecting:** No special measures required.
- **Additional information:** No dangerous substances are released.

### 7 Handling and storage

- **Handling**
  - **Information for safe handling:** No special measures required.
  - **Information about protection against explosions and fires:** No special measures required.
- **Storage**
  - **Requirements to be met by storerooms and receptacles:** 4 C
  - **Information about storage in one common storage facility:**  
Do not store together with oxidizing and acidic materials as well as heavy-metal compounds.
  - **Further information about storage conditions:** Store in cool, dry conditions in well sealed containers.

### 8 Exposure controls and personal protection

- **Additional information about design of technical systems:** No further data; see item 7.
- **Components with limit values that require monitoring at the workplace:**  
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
- **Additional information:** The lists that were valid during the creation were used as basis.
- **Personal Protective Equipment**
  - **General protective and hygienic measures**  
The usual precautionary measures for handling chemicals should be followed.
  - **Breathing equipment:** Not required.
  - **Protection of hands:**



Chemical resistant gloves (i.e. latex, nitrile, or equivalent).

- **Eye protection:** Safety glasses
- **Body protection:** Protective work clothing (lab coat).

**Product name: FITC Labeled Anti-BRDU mAb (51-6584AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 2)

### 9 Physical and chemical properties:

#### · General Information

**Form:** Liquid  
**Color:** Clear  
**Odor:** Odorless

· **Change in condition** Undetermined  
· **Melting point/Melting range:** Not determined  
· **Boiling point/Boiling range:** Not determined

· **Flash point:** Not applicable

· **Auto igniting:** Product is not self igniting.

· **Danger of explosion:** Product does not present an explosion hazard.

· **Vapor pressure:** Not applicable

· **Density:** Not determined

· **Solubility in / Miscibility with**  
**Water:** Soluble

· **pH-value:** Not applicable

· **Solvent content:**  
**Water:** 89.8 %

### 10 Stability and reactivity

#### · **Thermal decomposition / conditions to be avoided:**

No decomposition if used according to specifications.

#### · **Materials to be avoided:**

Incompatible material: strong oxidizers.  
Incompatible materials: acidic material and metals

· **Dangerous reactions** No dangerous reactions known

· **Dangerous products of decomposition:** No dangerous decomposition products known

#### · **Additional information:**

Sodium azide is present in this product. Contact with acidic solutions and metal compounds over time may form potentially explosive metal azides. Should any of this material be introduced into a sanitary sewer system, flush with copious amounts of water.

### 11 Toxicological information

#### · **Acute toxicity:**

#### · **Primary irritant effect:**

· **on the skin:** No irritating effect.

· **on the eye:** No irritating effect.

· **Sensitization:** No sensitizing effects known.

#### · **Additional toxicological information:**

The product is not subject to OSHA classification according to internally approved calculation methods for preparations.

(Contd. on page 4)



Printing date 09/03/2003

Reviewed on 09/03/2003

**Product name: FITC Labeled Anti-BRDU mAb (51-6584AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 3)

When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to us.

### 12 Ecological information:

- **Ecotoxicological effects:**
- **Other information:**  
The ecological effects have not been thoroughly investigated, but currently none have been identified.
- **General notes:** Generally not hazardous for water.

### 13 Disposal considerations

- **Product:**
- **Recommendation**  
Must adhere to state and federal regulations.  
Smaller quantities can be disposed of with solid waste.  
This product is not considered a RCRA hazardous waste.  
Disposal must be made according to the regulations found in 40 CFR 261.
- **Uncleaned packagings:**
- **Recommendation:** Disposal must be made according to state and federal regulations.
- **Recommended cleansing agent:** Water, if necessary with cleansing agents.

### 14 Transport information

- **DOT regulations:**
- **Hazard class:** -
- **Land transport ADR/RID (cross-border)**
- **ADR/RID class:** -
- **Maritime transport IMDG:**
- **IMDG Class:** -
- **Marine pollutant:** No
- **Air transport ICAO-TI and IATA-DGR:**
- **ICAO/IATA Class:** -

· **Transport/Additional information:**  
\*\*\* Note if a dashed line appears the Hazard Class section for each mode of transportation, this indicates the product is non-regulated for transportation. If a Hazard Class number is listed the product is regulated for transportation.

### 15 Regulations

- **SARA Section 355 (extremely hazardous substances)**  
None of the ingredients is listed.
- **SARA Section 313 (specific toxic chemical listings)**  
None of the ingredients is listed.

(Contd. on page 5)



**Material Safety Data Sheet**  
acc. to ISO/DIS 11014

Printing date 09/03/2003

Reviewed on 09/03/2003

**Product name: FITC Labeled Anti-BRDU mAb (51-6584AZ)**  
**(APO-BRDU Kit)**

(Contd. of page 4)

**· TSCA (Toxic Substances Control Act)**

|            |                             |
|------------|-----------------------------|
| 7558-80-7  | sodium phosphate, monobasic |
| 26628-22-8 | sodium azide                |

**· California Proposition 65 - Chemicals known to cause cancer**

None of the ingredients is listed.

**· California Proposition 65 - Chemicals known to cause reproductive toxicity**

None of the ingredients is listed.

**· Carcinogenicity categories**

**· IARC (International Agency for Research on Cancer)**

None of the ingredients is listed.

**· NTP (National Toxicology Program)**

None of the ingredients is listed.

**· TLV (Threshold Limit Value established by ACGIH)**

|            |              |    |
|------------|--------------|----|
| 26628-22-8 | sodium azide | A4 |
|------------|--------------|----|

**· MAK (German Maximum Workplace Concentration)**

None of the ingredients is listed.

**· Product related hazard informations:**

Observe the general safety regulations when handling chemicals  
The product is not subject to identification regulations pertaining to regulations on hazardous materials.

**· National regulations**

**· Water hazard class:** Generally not hazardous for water.

**16 Other information:**

To the best of our knowledge, the information contained herein is accurate. However, neither BD or any of its subsidiaries assumes any liabilities whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

- Department issuing MSDS:** Safety and Environment Department
- Contact:** Technical Service Representative