Alternatives to Hazardous Materials

Ethidium Bromide: Is it really so dangerous?

Dr. Dalia Seger
Head, Safety Unit
Material Safety Data Sheet
Ethidium bromide MSDS

Section 1: Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Product Name: Ethidium bromide</th>
<th>Catalog Codes: SLE1144</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS#: 1239-45-8</td>
<td>Contact Information:</td>
</tr>
<tr>
<td></td>
<td>Sciencelab.com, Inc.</td>
</tr>
<tr>
<td></td>
<td>14025 Smith Rd.</td>
</tr>
<tr>
<td></td>
<td>Houston, Texas 77396</td>
</tr>
</tbody>
</table>

Section 2: Composition and Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethidium bromide</td>
<td>1239-45-8</td>
<td>100</td>
</tr>
</tbody>
</table>
## ETHIDIUM BROMIDE

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethidium Bromide</td>
<td>90 - 100%</td>
</tr>
</tbody>
</table>

**Health Rating:** 4 - Extreme (Poison)

- Flammability Rating: 1 - Slight
- Reactivity Rating: 1 - Slight
- Contact Rating: 3 - Severe (Life)

### Emergency Overview

**WARNING! MAY BE FATAL IF INHALED. HARMFUL IF SWALLOWED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY CAUSE HERITABLE GENETIC DAMAGE.**

**Lab Protective Equip:**

- GOGGLES
- LAB COAT
- VENT HOOD
- PROPER GLOVES
### Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>99</td>
</tr>
<tr>
<td>Ethidium bromide</td>
<td>1</td>
</tr>
</tbody>
</table>

### Section 5 - Fire Fighting Measures

**NFPA Rating:**

(estimated) Health: 2; Flammability: 0; Instability: 0
Material Safety Data Sheet

ETHIDIUM BROMIDE, 1UG/ML

Revised: 07/13/2010
Replaces: 05/09/2010
Printed: 08/02/2010

Section 1 - Product Description

Product Name: Ethidium Bromide, 1ug/mL
Product Code(s): 21-7422
Size: 250 mL
Chemical Name: 3,8-diamino-5-ethyl-6-phenylphenanthridinium bromide
CAS Number: 1239-45-8
Formula: C21H20BrN3
Synonyms: Homidium bromide
Distributor: Carolina Biological Supply Company, 2700 York Road, Burlington, NC 27215
Chemical Information: 800-227-1150 (8am-5pm (ET) M-F) Chemtrec 800-424-9300 (Transportation Spill Response 24 hours)
**Oral; rat: LD50 = 1.503 g/kg**

**Inhalation; rat LC50 = 0.118-0.1340 mg/liter (ppm)**

**Subcutaneous; mouse: LD50 = 110 mg/kg**

**Intraperitoneal; mouse: LDLo = 20 mg/kg**

<table>
<thead>
<tr>
<th>Descriptive Term</th>
<th>LD50 wt/kg oral dose in rats</th>
<th>LC50 4-hr inhalation dose in rats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Toxic</td>
<td>&lt;1mg</td>
<td></td>
</tr>
<tr>
<td>Highlly Toxic</td>
<td>1-50 mg</td>
<td>10-100 ppm</td>
</tr>
<tr>
<td>Moderately Toxic</td>
<td>50-500 mg</td>
<td>100-1,000 ppm</td>
</tr>
<tr>
<td>Slighty Toxic</td>
<td>0.5-5 g</td>
<td>1,000-10,000 ppm</td>
</tr>
<tr>
<td>Practically Nontoxic</td>
<td>5-15 g</td>
<td>10,000-100,000 ppm</td>
</tr>
<tr>
<td>Relatively Harmless</td>
<td>&gt; 15 g</td>
<td>&gt; 100,000 ppm</td>
</tr>
</tbody>
</table>
Vapor pressure: Pa at 25°C: Negligible
EtBr in gels  0.2 - 0.5 \( \mu g/ml \)
EtBr in buffer  0.02 - 0.05\( \mu g/ml \)
Reused 10 times  0.2 - 0.5\( \mu g/ml \)

National Environment office
Do not dispose to sewage - without purification
Alternatives…
Safe view
SYBR Green
Gel Red
Nancy- 520
Red safe
Gel star
SafeView

Subcutaneous, mouse:

SafeView
LD50 = 250 mg/kg

EtBr
LD50 = 110 mg/kg
Detection

Ethidium Bromide
30 μg per gel

1-4: 10kB plasmid 1, 0.1, 0.05 and 0.01 μg respectively
5-6: 5kB plasmid 1, 0.1, 0.05 and 0.01 μg respectively
9: 1kB ladder Phermentas

Safeview
30 μg per gel

1-4: 10kB plasmid 1, 0.1, 0.05 and 0.01 μg respectively
5-6: 5kB plasmid 1, 0.1, 0.05 and 0.01 μg respectively
9: 1kB ladder Phermentas
His dependent Bacteria

Add a Suspected Mutagen

Mix with Top Agar

Seed on His minus plates and count the revertants colonies (black)

RESULTS

Control (random mutations)

Low Mutagen

Medium Mutagen

High Mutagen
Ames test results for EtBr using Salmonella strain TA1537

With or Without S9 Metabolic Activation

(tests performed by litron laboratories inc, Rochester, NY)
Ethidium Bromide

10mg/ml

In Gels 0.2 - 0.5 μg/ml

0.625mg/ml

✓ Tips, gloves, paper - to regular waste
Results from Ames Test Using *Salmonella* Strain TA1537 with S9 Metabolic Activation

(Tests performed by Litron Laboratories Inc., Rochester, NY)
Results from Ames Test Using *Salmonella* Strain TA98 without S9 Metabolic Activation

(Tests performed by Litron Laboratories Inc., Rochester, NY)
National Toxicology Program (NTP)

Report in Genetic Toxicity, August 15, 2005

Classifies EtBr as **nonmutagenic in rats and mice**

The panic of using this chemical is unjustified.

Obviously, EtBr powder is extremely hazardous and we should take all measures to prevent using it in this physical state.
National Environment office

Up to $1 \mu g/ ml$

Do not dilute large quantities of old stocks of EtBr and dispose into the sink.
The “Tea-Bag”
A. Not-Destain
B. Destain by DDW
C. Destain by 2L destroyer bag
D. Destain by 3L destroyer bag

Destain for 30 mins
Take pictures in UV box
What is the most concerned part using ETBR?
**Propidium Iodide (PI)**

solid - Hood

Sol. (50ug/ml) nitrile gloves, lab coat, safety glasses

**DAPI**

solid - Hood

Sol. 3-10ug/ml (usually at WIS 0.5ug/ml)

Engineering Controls- Use in well ventilated areas

Skin Protection - Latex or equivalent protective gloves
Alternative to powders

- Sigma 441244 PFA Prilled
- 1 L PFA 4% sol in PBS (SC-281692)
- PFA 16% or 32% SOL. EM GRADE, 10x10ml/pack
- SDS 20% - 020018702
- 1 L SDS (Genaxis) GX12677 Mol Bio. Grade
- SDS Granulated, Baker, 1 kg - 020020839
Western Blot without Methanol

**Final concentration 1X**

- Tris 15mM
- Glycine 120mM

**Run:** 200mA **constant** for 1.5 hours

for staining SDS-PAGE

Instant blue

Simple blue
GLP