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ECBC memo dtd 27 Aug 2014
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A Memorandum Report

CYANOCYANIDE

LC 50 FOR GOATS: 2 MIN EXPOSURE

By

F. P. McGrath

H. A. Sober

S. D. Silver

UNCLASSIFIED

26 March 1944
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T.R.L.R. 26
Project A 10.2
Copy No. 1

by authority of the
Chief, Medical Division,
O-C, C.W.S.

CYANOGEN CHLORIDE

LC 50 for Goats: 2 Min. Exposure

by

F. P. McGrath
H. A. Sober
S. D. Silver

DECLASSIFIED

COD DIR 5296

Forwarded to Chief, Chemical Warfare Service

CANCELED

MAR 29, 1944

By authority of
ABSTRACT

OBJECT:

The object of project A 10.2 is to determine the toxicities of standard and proposed chemical warfare agents.

The object of the work described in this report was to determine the LC 50 of cyanogen chloride for goats exposed for 2 min. and observed for 15 days.

RESULTS:

Thirty goats were exposed for 2 min. to various concentrations of cyanogen chloride. Results are tabulated below:

<table>
<thead>
<tr>
<th>Anal. Conc. mg./l.</th>
<th>Mortality %</th>
<th>Time of Death* min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>1/6 17</td>
<td>35</td>
</tr>
<tr>
<td>1.3</td>
<td>0/4 0</td>
<td>-</td>
</tr>
<tr>
<td>1.6</td>
<td>0/2 0</td>
<td>-</td>
</tr>
<tr>
<td>1.7</td>
<td>1/2 50</td>
<td>5</td>
</tr>
<tr>
<td>1.9</td>
<td>1/2 50</td>
<td>10</td>
</tr>
<tr>
<td>2.2</td>
<td>7/8 88</td>
<td>7,8,9,9,10,10,10</td>
</tr>
<tr>
<td>2.7</td>
<td>2/2 100</td>
<td>10,20</td>
</tr>
<tr>
<td>2.8</td>
<td>1/2 50</td>
<td>1</td>
</tr>
<tr>
<td>5.1</td>
<td>2/2 100</td>
<td>1,2</td>
</tr>
</tbody>
</table>

*Time after end of exposure.

CONCLUSIONS:

The LC 50 of cyanogen chloride for goats exposed 2 min. and observed 15 days is approximately 1.8 mg./l.

RECOMMENDATIONS:

None.
TABLE OF CONTENTS

I. INTRODUCTION .................................................................................. 1
   A. Object .................................................................................. 1
   B. Authority .............................................................................. 1

II. HISTORICAL ...................................................................................... 1

III. EXPERIMENTAL ............................................................................... 1
   A. Materials and Equipment ...................................................... 1
   B. Procedure ................................................................................ 1
   C. Results ..................................................................................... 2
      1. Toxicity ............................................................................. 2
      2. Symptoms .......................................................................... 2

IV. DISCUSSION ...................................................................................... 3

V. CONCLUSIONS .................................................................................. 3

VI. RECOMMENDATIONS ........................................................................ 3
I. INTRODUCTION.

A. Object.

The object of project A 10.2 is to determine the toxicities of standard and proposed chemical warfare agents.

The object of the work described in this report was to determine the LC 50 of cyanogen chloride for goats exposed for 2 min. and observed for 15 days.

B. Authority.

Work was done by authority of Chief, C.W.S., under project A 10.2.

II. HISTORICAL.

No reliable data are available for short time exposures (less than 5 min.) of goats to cyanogen chloride.

III. EXPERIMENTAL.

A. Materials and Equipment.

Cyanogen chloride of specification grade (98% pure) was obtained from the Protective Development Division, Tech. Command, Edgewood Arsenal.

Goats used as test animals were apparently healthy, and weighed from 35 to 81 lbs., averaging 51.5 lbs. They were selected by Lt. J. F. Brown, V.C.

The 2000 l. goat gassing chamber has been described in T.R.L.R. 20.

B. Procedure.

The gassing procedure was identical with that outlined in T.R.L.R. 23. The animals were observed for 15 days after gassing in order to note any delayed deaths.
Gas-air samples were collected in two bubblers in series containing an alcoholic (70%) solution of 3% sodium hydroxide. The solution was then acidified with 1:1 nitric acid and chloride determined by the Volhard method. Collection was practically complete in the first of the two bubblers.

C. Results.

1. Toxicity.

The results of gassing 30 goats with cyanogen chloride are shown in Table 1.

Table 1

Toxicity of Cyanogen Chloride to Goats: Exposure 2 Min.

<table>
<thead>
<tr>
<th>Anal. Conc. mg./l.</th>
<th>Mortality</th>
<th>Time of Death* min.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fraction</td>
<td>%</td>
</tr>
<tr>
<td>1.2</td>
<td>1/6</td>
<td>17</td>
</tr>
<tr>
<td>1.3</td>
<td>0/4</td>
<td>0</td>
</tr>
<tr>
<td>1.6</td>
<td>0/2</td>
<td>0</td>
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<tr>
<td>1.7</td>
<td>1/2</td>
<td>50</td>
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<tr>
<td>1.9</td>
<td>1/2</td>
<td>50</td>
</tr>
<tr>
<td>2.2</td>
<td>7/8</td>
<td>88</td>
</tr>
<tr>
<td>2.7</td>
<td>2/2</td>
<td>100</td>
</tr>
<tr>
<td>2.8</td>
<td>1/2</td>
<td>50</td>
</tr>
<tr>
<td>5.1</td>
<td>2/2</td>
<td>100</td>
</tr>
</tbody>
</table>

*Time after end of exposure

Essential data from Table 1 are plotted in Chart 1. The LC 50 of cyanogen chloride for goats exposed 2 min. is estimated to be about 1.8 mg./l.

2. Symptoms.

The symptoms exhibited by the gassed animals were primarily those caused by extreme irritation, and were evident almost immediately after the start of exposure. Symptoms appeared in the following order: blinking, eye irritation, lacrimation, violent exhalation, coughing, sneezing, attempts at escape, and finally collapse, accompanied by tonic convulsions. Respiration appeared to be stimulated during exposure. All deaths may be classed as immediate, none having occurred later than 35 minutes after gassing. A thin, frothy, sometimes bloody, fluid was observed to exude from the nostrils and mouths of the goats dying after exposure to CC.
CHART I.

Median Lethal Concentration of Cyanogen Chloride for Goats Exposed 2 Minutes

Concentration, mg/l.

Percent Deaths.
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CYANOCYANIDE

LC 50 for Goats: 2 Min. Exposure

Project A 10.2

Notebook No. 1827

Experimental Work:

Began: 4 February 1944
Completed: 14 March 1944

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Typed - 14 March - drk

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FOR Defense Technical Information Center, 8725 John J. Kingman Road, Ft Belvoir, VA 22060

SUBJECT: Internal Request for Change in Distribution

1. This action is in response to an Edgewood Chemical Biological Center (ECBC) Internal Request for a Change in Distribution on documents related to cyanogen chloride.

2. The listed documents in the attachment have been reviewed by ECBC Subject Matter Experts and deemed suitable for the change in distribution to read “Approved for Public Release; distribution unlimited.”

3. The point of contact is Adana L. Eilo, ECBC Security Specialist, (410) 436-2063, adana.l.eilo.civ@mail.mil.

Encl

[Signature]

MATTHEW A. SPAULDING
Security Manager
Cyanogen Chloride References


