CGA G-16—2010
(AIGA 050/08)
(JIMGA T-S/36/08)

ARSINE

FIRST EDITION

COMPRESSED GAS ASSOCIATION, INC.
4221 Walney Road, 5th Floor
Chantilly, VA 20151
Phone: 703-788-2700
Fax: 703-961-1831
E-mail: cga@cganet.com

PREFACE

As part of a program of harmonization of industry standards, the Compressed Gas Association (CGA) has adopted the *Code of Practice Arsine* jointly produced by the Asia Industrial Gases Association (AIGA 050/08) and the Japan Industrial and Medical Gases Association (JIMGA T-S/36/08).

This standard is intended as an international harmonized publication for the worldwide use and application by all members of AIGA, CGA, the European Industrial Gases Association (EIGA), and JIMGA. The CGA edition has the same technical content as the AIGA/JIMGA edition, however, there are editorial changes primarily in formatting, units used and spelling. Also, any references to regional regulatory requirements have been replaced with the relevant North American requirements

PLEASE NOTE:

The information contained in this document was obtained from sources believed to be reliable and is based on technical information and experience currently available from members of the Compressed Gas Association, Inc. and others. However, the Association or its members, jointly or severally, make no guarantee of the results and assume no liability or responsibility in connection with the information or suggestions herein contained. Moreover, it should not be assumed that every acceptable commodity grade, test or safety procedure or method, precaution, equipment or device is contained within, or that abnormal or unusual circumstances may not warrant or suggest further requirements or additional procedure.

This document is subject to periodic review, and users are cautioned to obtain the latest edition. The Association invites comments and suggestions for consideration. In connection with such review, any such comments or suggestions will be fully reviewed by the Association after giving the party, upon request, a reasonable opportunity to be heard. Proposed changes may be submitted via the Internet at our web site, www.cganet.com.

This document should not be confused with federal, state, provincial, or municipal specifications or regulations; insurance requirements; or national safety codes. While the Association recommends reference to or use of this document by government agencies and others, this document is purely voluntary and not binding unless adopted by reference in regulations.

A listing of all publications, audiovisual programs, safety and technical bulletins, and safety posters is available via the Internet at our website at www.cganet.com. For more information contact CGA at Phone: 703-788-2700, ext. 799. E-mail: customerservice@cganet.com.

Work Item 06-202
Specialty Gases Committee

FIRST EDITION: 2010

Contents **Page**

Tables

Figures

1 Introduction

Arsine is a toxic, colorless gas with a garlic-like odor at room temperature and atmospheric pressure. It is shipped as a liquefied compressed gas under its own vapor pressure of 220 psia (1.515 MPa, abs).[1] It is also supplied in a gaseous state, diluted with other gases under pressure. It is flammable and highly toxic.

The use of arsine has constantly been growing and this usage is expected to continue to escalate throughout the world. The issue of the safe handling of arsine is a very important and relevant topic to the compressed gas industry as well as the user community of this electronic specialty gas.

Arsine is used as a doping agent for silicon-based solid-state electronic devices. It is thermally diffused into the silicon layer using furnaces or by an ion implantation system (n-type dopant). It is also used to manufacture compound semiconductors such as light-emitting diodes by reaction with a metal organic, such as tri-methyl gallium forming a gallium arsenide layer. Arsine can be inadvertently generated in mining and manufacturing processes involving arsenic compounds and paints and herbicides containing arsenic compounds.

Arsine can be safely handled if equipment is properly designed, maintained and employees are properly trained. As a minimum, all personnel should have access to the arsine material safety data sheet (MSDS) and training in the use of the MSDS and other reference material.

NOTE—In this publication, arsine is understood to be in the gaseous phase unless otherwise stated.

2 Scope and Purpose

2.1 Scope

This publication is intended for the suppliers, distributors, and users of arsine and its handling equipment. This publication includes guidance for design of equipment, cylinders and valve usage, handling controls and safety. Guidelines on the operational steps associated with the use of arsine and arsine mixtures as well as fire protection, gas detection, ventilation, and related safeguards are also included. The manufacture, purification, and analysis of arsine are beyond the scope of this document, although the general guidance given is also relevant to these processes.

2.2 Purpose

In view of the high toxicity and flammability of arsine where the consequences of improperly handling of arsine, could cause injury, death, and/or facility damage, this publication has been written. This publication will provide a good understanding of the potential hazards involved in handling arsine and the guidelines to be taken to minimize risk potential.

3 Definitions [2]

Absolute pressure: is based on a zero reference point, the perfect vacuum. Measured from this reference, the standard atmospheric pressure at sea level is 14.7 psia (1.013 bars [101.325 kPa, abs]); however, local atmospheric pressure may deviate from this standard value because of weather conditions and the distance above or below sea level.

Apparatus: Accessory equipment, such as valves, pressure relief devices, regulators, nonreturn valves (check valves) used with compressed gas.

ADR/RID: European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR) and Rail (RID).

[1] MPa shall indicate gauge pressure unless otherwise noted as (MPa, abs) for absolute pressure or (MPa, differential) for differential pressure. All kPa values are rounded off per CGA P-11, *Metric Practice Guide for the Compressed Gas Industry* [1].