



CGA P-36—2014
THE SAFE PREPARATION
OF GAS MIXTURES

SECOND EDITION

PREFACE:

As part of a program of harmonization of industry standards, the Compressed Gas Association (CGA) has issued CGA P-36, *Safe Preparation of Gas Mixtures*, jointly produced by members of the International Harmonization Council and originally published by the European Industrial Gases Association (EIGA) as EIGA Doc 39, *Safe Preparation of Gas Mixtures*.

This publication is intended as an international harmonized standard for the worldwide use and application of all members of the Asia Industrial Gases Association (AIGA), Compressed Gas Association (CGA), European Industrial Gases Association (EIGA), and Japan Industrial and Medical Gases Association (JIMGA). Each association's technical content is identical, except for regional regulatory requirements and minor changes in formatting and spelling.

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NOTE—Technical changes from the previous edition are underlined.

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1 Introduction

For many years, the gas industry has produced a wide range of gas mixtures. All gas mixing operations require the normal safety procedures, practices, and controls that are followed when filling standard industrial gases. Additional controls are required when mixing potentially incompatible gases. For this reason, great care is necessary during the preparation of such mixtures to ensure that no uncontrolled reactions take place.

Regulations and procedures for gas mixing vary in some details from one manufacturer to another; however, they should always be based on the same safety principles. Details concerning the safe manufacture of oxidant-fuel mixtures are described in CGA P-58, *Safe Preparation of Compressed Oxidant-Fuel Gas Mixtures in Cylinders* [1].¹

Manufacturers of gas mixtures for medical use should also refer to Title 21 of the U.S. Code of Federal Regulations (21 CFR) and Health Canada's *Good Manufacturing Practices (GMP) for Medical Gases* [2, 3].

2 Scope and purpose

This publication is not intended to be a manual on how to manufacture gas mixtures. The sole aim of this publication is to set out the basic requirements to ensure that gas mixtures are manufactured safely.

3 Definitions

For the purpose of this publication, the following definitions apply.

3.1 Publication terminology

3.1.1 Shall

Indicates that the procedure is mandatory. Shall is used wherever the criterion for conformance to specific recommendations allows no deviation.

3.1.2 Should

Indicates that a procedure is recommended.

3.1.3 May

Indicates that the procedure is optional.

3.1.4 Will

Is used only to indicate the future, not a degree of requirement.

3.1.5 Can

Indicates a possibility or ability.

3.2 Technical definitions

3.2.1 Cylinder

Any transportable receptacle that can be filled with gas under pressure.

3.2.2 Filling ratio (also known as filling degree or filling density)

Mass of a liquefied gas that can safely be filled into a cylinder without overpressurization of the cylinder at 149 °F (65 °C). The filling ratio (f) (see 49 CFR 173.304b) is expressed as the ratio[4]: (M / C)

Where:

M = mass of gas filled (kg)

C = cylinder water capacity (liters)

¹ References are shown by the bracketed numbers and are listed in order of appearance in the reference section.