

CGA G-7—2014

**COMPRESSED AIR FOR
HUMAN RESPIRATION**

SEVENTH EDITION

CGA

Compressed Gas Association

The Standard For Safety Since 1913

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NOTE—Technical changes from the previous edition are underlined.

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1 Introduction

This publication is intended to present general information regarding the characteristics and use of compressed air. To accomplish its purpose of supplying the answers to as broad a cross-section of inquiries as possible, it covers material of a general nature only. CGA has additional publications on compressed air, which can be found at www.cganet.com. In Canada, CSA Z180.1, *Compressed Breathing Air and Systems* and CSA Z7396.1, *Medical Gas Pipeline Systems - Part 1: Pipelines for Medical Gases, Medical Vacuum, Medical Support Gases, and Anaesthetic Gas Scavenging Systems*, should be consulted [1, 2].¹

2 Scope

This publication provides information relative to the preparation, transportation, handling, storage, and use of compressed air. While it deals with compressed air used for human respiration, much of the information is equally applicable to compressed air for other purposes. It should be used in conjunction with CGA G-7.1, *Commodity Specification for Air*, which describes the specification requirements and lists the grades for air and prescribes methods of sampling and analysis [3].

3 What is air?

Air is not an element; it is a mixture of elements and compounds. At atmospheric temperature and pressure, air exists as a colorless, odorless, and tasteless gas.

The composition of dry air under normal conditions at sea level is shown in Table 1. Trace impurity levels can vary with geographic locations or with proximity to industrial areas or highways carrying dense traffic. This composition remains relatively constant at altitudes up to approximately 70 000 ft (21 300 m). Accurate data on the change in composition, if any, at higher altitudes is not available.

Table 1—Composition of air (dry) [4, 5]

Component	Chemical symbol	Mole percent	Accuracy
Nitrogen	N ₂	78.084	±0.004%
Oxygen	O ₂	20.946	±0.002%
Argon	Ar	0.934	±0.001%
Carbon dioxide	CO ₂	0.0335 ¹⁾	±0.001%
Neon	Ne	0.001818	±0.04 ppm
Helium	He	0.000524	±0.004 ppm
Methane	CH ₄	0.0002 ¹⁾	±0.05 ppm
Krypton	Kr	0.000114	±0.01 ppm
Nitrous oxide	N ₂ O	0.00003 ¹⁾	
Xenon	Xe	0.0000087	±0.001 ppm
NOTE—Nitrogen and oxygen together comprise more than 99% of atmospheric air. The other atmospheric trace gases together comprise less than 1%.			
¹⁾ Variable.			

Synthetic air, which is also produced by the compressed gas industry, contains not less than 19.5% and not greater than 23.5% oxygen with nitrogen as the balance gas. In Canada, CSA Z180.1 requires that compressed air contains not less than 20% and not greater than 22% oxygen [1]. A major portion of the trace impurities normally contained in air is thereby eliminated.

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