

CGA P-45—2011

**FIRE HAZARDS OF
OXYGEN AND
OXYGEN-ENRICHED
ATMOSPHERES**

FIRST EDITION



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PREFACE

As a part of a program of harmonization of industry standards, the Compressed Gas Association (CGA) has adopted the original European Industrial Gases Association (EIGA) Document 04/09, *Fire hazards of oxygen and oxygen enriched atmospheres*. This document is an internationally harmonized standard for the worldwide use and application by all members of the Asia Industrial Gases Association (AIGA), CGA, EIGA, and the Japan Industrial and Medical Gases Association (JIMGA). The CGA edition, P-45—2011, *Fire Hazards of Oxygen and Oxygen-Enriched Atmospheres*, has the same technical content as the EIGA edition. However, there are editorial changes primarily in formatting and spelling and references to regional regulatory requirements. Additionally, technical references are listed chronologically rather than to the section to which they apply.

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Work Item 08-123
Safety and Health Committee

FIRST EDITION: 2011

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Contents

1	Introduction.....	1
2	Scope and purpose	1
3	Definitions.....	1
4	General properties.....	1
4.1	Oxygen supports and accelerates combustion.....	1
4.2	Oxygen gives no warning	1
4.3	Oxygen is heavier than air.....	1
5	Fire hazards with oxygen	2
5.1	Necessary conditions for a fire	2
5.2	Oxygen	2
5.3	Combustible material.....	5
5.4	Ignition sources	6
6	Prevention of fires in oxygen systems.....	6
6.1	Information/training.....	6
6.2	Proper design	7
6.3	Prevention of oxygen enrichment.....	7
6.4	Oxygen cleanliness	8
6.5	Control of hot work	8
7	Methods of oxygen detection	8
8	Protection of personnel	8
8.1	Clothes	8
8.2	Analysis	9
8.3	Firefighting equipment.....	9
8.4	Smoking.....	9
8.5	Emergency response and rescue.....	9
9	Summary of recommendations	9
10	References	10
11	Additional references.....	11

Figures

Figure 1—Fire triangle	2
Figure 2—Reactivity for fire exposed cotton in increasing oxygen levels	5

Appendices

Appendix A—Pamphlet for daily operations involving oxygen.....	12
Appendix B—Examples of the hazards of oxygen and oxygen-enriched atmospheres.....	18

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1 Introduction

This publication explains the fire hazards resulting from handling oxygen and the relevant protective measures that should be taken.

2 Scope and purpose

The intent of this publication is to provide personnel working with oxygen, or potentially in or near oxygen-enriched atmospheres, a high level of awareness of the fire and explosion hazards associated with these conditions.

Appendix A is a summary of the information in this publication suitable to be produced as a pamphlet to be handed to those involved in daily operations involving oxygen or used as a supplement to safety presentations.

Appendix B lists some incidents that have taken place in recent years that can be used as examples underlining the hazards of oxygen and oxygen-enriched atmospheres.

3 Definitions

3.1 Oxygen-enriched atmosphere

Air and gas mixtures in which the oxygen concentration by volume exceeds 23.5% at sea level or whose partial pressure of oxygen exceeds 175 torr (mm Hg) [1].¹

3.2 Pressure

In this publication, “bar” shall indicate gauge pressure unless otherwise noted, i.e., “bar, abs” for absolute pressure and “bar, dif” for differential pressure.

4 General properties

Oxygen, which is essential to life, is not flammable in itself, but supports and accelerates combustion. The normal concentration in the air we breathe is approximately 21% by volume.

4.1 Oxygen supports and accelerates combustion

Most materials burn fiercely in oxygen; the reaction can even be explosive.

As the oxygen concentration in air increases the potential fire risk increases.

4.2 Oxygen gives no warning

Oxygen is colorless, odorless and has no taste hence the presence of an oxygen-enriched atmosphere cannot be detected by normal human senses. Oxygen also does not give any obvious physiological effects that could alert personnel to the presence of oxygen enrichment.

Increasing the oxygen concentration of the air at atmospheric pressure does not constitute a significant health hazard.

4.3 Oxygen is heavier than air

Being heavier than air, oxygen can accumulate in low lying areas such as pits, trenches, or underground rooms. This is particularly relevant when liquid oxygen is spilled. In this case, the generated cold gaseous oxygen is three times heavier than air.

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