Compressed Gas Association
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CGA G-6.10—2021

FLAMMABLE GASES AND/OR OXYGEN CONTAMINATION IN CARBON DIOXIDE FEED GAS

SECOND EDITION

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Work Item 19-027
Carbon Dioxide Committee

NOTE—Technical changes from the previous edition are underlined.

SECOND EDITION: 2021
FIRST EDITION: 2006

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1 Introduction

Most merchant liquid carbon dioxide sold in North America is a by-product recovered from sources such as ammonia fertilizer plants, ethanol fermentation, petroleum refinery hydrogen reformers, a variety of petrochemical processes, and natural wells. The by-product gas typically is transported by pipeline from the source to adjacent carbon dioxide purification and liquefaction plants.

Typical by-product carbon dioxide contains 95% to 99.9% carbon dioxide on a dry basis, although some lower purity sources also are used. Depending on the source, the by-product gas also contains a variety of impurities. During process upsets at the source plants, the quantity of impurities can increase significantly and relative concentrations can vary. A number of energy releases at by-product carbon dioxide plants have been attributed to the presence of high levels of hydrogen, hydrocarbons, oxygen, or a combination of these contaminants in the carbon dioxide plant feed gas.

2 Scope

This publication alerts carbon dioxide producers and plant operators to potential risks related to changing carbon dioxide feed gas composition. It also discusses the dangers related to excess oxygen or hydrocarbon levels in catalytic oxidation and sulfur and hydrocarbon removal systems used to purify carbon dioxide. In addition, potential fire hazards that can be encountered when spent adsorbent media is exposed to air during periodic replacement are reviewed. Finally, this publication provides recommendations to prevent fire and explosions related to these causes in by-product carbon dioxide plants.

This publication does not cover the physical and chemical properties, manufacturing process, or physiological effects of carbon dioxide. For more information on these topics see CGA G-6, *Carbon Dioxide* [1].[1]

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. It 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 Carbon dioxide
Chemical compound consisting of one atom of carbon bonded to two atoms of oxygen, expressed by the chemical formula CO_2.

NOTE—The shipping name for carbon dioxide in uninsulated cylinders in the United States and Canada is “Carbon Dioxide.”

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