

CARBON DIOXIDE USAGE IN BEVERAGE INDUSTRY

BACKGROUND

Many of the most popular beverages industries use gases in their product to maintain its consistent taste & colour. These gases are also used to prevent oxidation in the package headspace that can affect product taste and colour. The process usually involves dissolving of high pressure and / or low temperature gaseous carbon dioxide in the product or packing with CO₂ or an inert gas.

In the case of carbon dioxide, when the pressure is reduced, the carbon dioxide is released from the solution as small bubbles, which causes the solution to become effervescent. This gaseous carbon dioxide reacts with the product to form carbonic acid. This carbonic acid exists in equilibrium with the carbon dioxide and participates in the flavour of the product.

PURPOSE

The objective of this document is as under:

- a. To outline minimum standards that every manufacturer must adhere to produce food-grade beverage gases, to prevent undesirable flavours from being introduced into the product and to ensure its consistency.
- b. To enhance understanding through the sharing of best practice and regulatory requirements involving beverage gases.

CARBON DIOXIDE

Carbon dioxide is the essential ingredient for effervescence in the carbonated beverages. Carbon dioxide is used as a sole gas or in different ratios depending on type of beverages. It is a natural anti-microbial. Carbon dioxide is also used to increase the shelf life of juice and dairy products — protecting taste and texture and reducing the need for preservatives. There is no specific purity criteria set for use of Carbon dioxide as an ingredient for beverages gases. However, MEGA shall refer to ISBT standards (International Society of Beverage Technologists) which are the current gases specifications that are adopted by various beverages industries:

Component	Guideline limit
CO ₂ Purity	99.9% v/v min.
Moisture (H ₂ O)	20 ppm v/v max.
Ammonia (NH ₃)	2.5 ppm v/v max.
Oxygen (O ₂)	30 ppm v/v max.
Nitrogen Monoxide (NO)	2.5 ppm v/v max.
Nitrogen Dioxide (NO ₂)	2.5 ppm v/v max.
Non-volatile Residue (NVR)	10 ppm w/w max.
Non-volatile Organic Residue (NVOR) - (Oil & Grease)	5 ppm w/w max.
Phosphine ***	0.3 ppm v/v max.
Total Volatile Hydrocarbons (THC) (as Methane)	50 ppm v/v max. (including 20 ppm v/v max as total non-methane hydrocarbons (TNMHC))
Acetaldehyde (AA)	0.2 ppm v/v max.
Carbon monoxide (CO)	10 ppm v/v max.
Methanol (MeOH)	10 ppm v/v max.
Aromatic Hydrocarbons (AHC)	20 ppb v/v max.
Hydrogen Cyanide *	0.5 ppm v/v max.
Total Sulphur (excluding SO ₂) **	0.1 ppm v/v max.
Sulfur Dioxide (SO ₂)	1 ppm v/v max.
Odor & taste in water	No foreign taste or odor

*Analysis necessary only for Carbon dioxide from coal gasification sources.

**If the total sulphur content exceeds 0.1 ppm v/v as sulphur then the species must be determined separately and following limits apply.

Carbonyl Sulphide 0.1 ppm v/v max.

Hydrogen Sulphide 0.1 ppm v/v max.

Sulphur Dioxide 1.0 ppm v/v max.

*** Analysis necessary only for carbon dioxide from phosphate rock sources.

REFERENCES

- Documents of ISBT (quality guideline for beverage grade CO₂-2010)
- EIGA DOC 70 / 08 / E – “EIGA limiting Characteristics for CO₂ for Foods and Beverages”
- MEGA Doc TN 10 /18 / E – “Nitrogen Usage in Beverage Industry”

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