MINIMUM SPECIFICATIONS FOR FOOD GAS APPLICATIONS

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Amendments from 126/18

Section	Change
Appendix 1	Correction of errors

NOTE Technical changes from the previous edition are underlined

1 Introduction

Food gases are used as ingredients, additives and processing aids and include:

- carbonation of beverages;
- modified atmosphere packaging;
- packaging (for example bread, meat etc.);
- storage (for example controlled atmospheres for fruit and vegetables); and
- processing (for example cooling, chilling, temperature controlling freezing, pH control etc.).

The minimum specifications for food additive gases from the Joint FAO/WHO Expert Committee on Food Additives (JECFA) and the European Union (EU) legislation are listed and this publication summarizes these standards (as applicable at the date of publication) [1].[1]

2 Scope

Specifications of all gases approved for use as food additives and / or used in other food applications.

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

Indicate 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 Assay

Purity of the gas.

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

3.2.2 Component / impurity

Specified characteristic of the product.

3.2.3 E xxx

E - number for the product of the European Food Additive Regulations.

4 Application of food gases

The applications for gases in the food and beverage sectors fall into one of the three following categories:

4.1 Food additives

For gases to be used as a food additive, for example as a propellant or as a packaging gas, they shall be approved under EU law and are given E numbers, for example E941 for nitrogen. The EU also sets minimum purity criteria for gases when used as a food additive. In addition to the purity criteria set down under EU Food Additive regulations, minimum specifications for gases are also published by JECFA [1].

4.2 Food processing aids

Food processing aids are legally defined as “Any substance not consumed as a food by itself, intentionally used in the processing of raw materials, foods or their ingredients to fulfil a certain technological purpose during treatment or processing, and that can result in the unintentional but technically unavoidable presence of residues of the substance or its derivatives in the final product, provided that these residues do not present any health risk and do not have any technological effect on the finished product”, see Regulation EC 1333/2008 *of the European Parliament and of the Council of 16 December 2008 on food additives* [2]. Gases are processing aids when used during the processing of a food, for example liquid nitrogen or carbon dioxide for freezing, chilling and temperature control or inerting of bulk materials during processing but they are not themselves consumed as part of the food. In this case the only legal requirement is that the gas should not leave residues in the product that would present a risk to health.

NOTE Although food law requirements are generally applicable no purity criteria are set under EU law for use of gases as a processing aid. However national legislation can require a purity criteria alignment with those applied to food additives.

4.3 Food ingredients

A gas is described as an ingredient when it is used in the preparation of a food and is still present in the final product, even in an altered form, for example in the carbonation of beverages. Although food law requirements are generally applicable, no specific purity criteria are set under EU law for use of gases as an ingredient. Though any food additive criteria set for the gas could be relevant together with general food safety and hygiene legislation.

5 Specifications

See Appendix 1.

6 References

Unless otherwise specified the latest edition shall apply.

[1] JECFA – *Joint FAO/WHO Expert Committee on Food Additives, (FAO - Food and Agricultural Organisation of the United Nations and WHO - World Health Organisation),* www.fao.org

[2] Regulation EC 1333/2008, *of the European Parliament and of the Council of 16 December 2008 on food additives,* www.europa.eu

[3] Commission Regulation (EU) No 231/2012 *of 9 March 2012 laying down specifications for food additives listed in Annexes II and III to Regulation (EC) No 1333/2008 of the European Parliament and of the Council Text with EEA relevance*, www.europa.eu

7 Additional references

EC Directive 2000/63/EC *amending Directive 96/77/EC laying down specific purity criteria on food additives other than colours and sweeteners*; www.europa.eu

EC Directive 2008/84/EC of 27 August 2008 laying down specific purity criteria on food additives other than colours and sweeteners, www.europa.eu

EC Council Directive 98/83/EC *of 3 November 1998 on the quality of water intended for human consumption,* www.europa.eu

EIGA Doc 70, *Carbon Dioxide Source Certification, Quality Standards and Verification,* www.eiga.eu

Appendix 1 - Summary of current food additives gases specifications in EU legislation and JECFA [1]

Component / Impurity	Standard	Carbon dioxide E 290	Nitrogen E 941	Oxygen E 948	Argon E 938	Helium E 939	Nitrous oxide E 942	n-/iso-Butane E 943 a/b	Propane E 944	Hydrogen E 949	Sulfur dioxide E 220
Assay (v/v)	EC	>99%	>99%	>99%	>99%	>99%	>99%	>96% / >94%	>95%	>99.9%	>99%
	JECFA	>99%	>99%	>99%	>99%	>99%	>97%				>99.9%
Odour	EC										
	JECFA			free	free	free					
Moisture	EC		<0.05%	<0.05%	<0.05%	<0.05%	<0.05%	<50vppm	<50vppm	<0.005%	<0.05%
	JECFA	<52 vppm									<0.05%
CO_2	EC										
	JECFA			<300 vppm							
CO	EC	<10 vppm	<10 vppm				<30 vppm				
	JECFA	<10 vppm	<10 vppm	<10 vppm		<10 vppm	<10 vppm				
NO/NO_2	EC		<10 vppm				<10 vppm				
	JECFA						<5 vppm				
Total hydrocarbons	EC		<100 vppm	<100 vppm	<100 vppm	<100 vppm		see Note 1 and Note 2	see Note 3		
	JECFA	<50 vppm									
Residual Gases (O_2, N_2, H_2)	EC		<1% O_2							<0.07% N_2, <0.001% O_2	
	JECFA				<1%						
Oil	EC	<5 mg/kg									
	JECFA	<10 vppm									
Acidity & Reducing Substances	EC	pass test									
	JECFA	pass test									
Halogens & H_2S	EC										
	JECFA						<5 vppm				
Other components & Heavy metals	EC										See Note 4
	JECFA										See Note 5

Note1 According to EU Regulation 231/2012 [3]
For E943a the maximum limit of hydrocarbons are:
Methane: not more than 0.15%
Ethane: not more than 0.5%
Propane: not more than 1.5%
Isobutane: not more than 3.0%
1,3-butadiene: not more than 0.1%

Note 2 According to EU Regulation 231/2012 [3]
For E943b the maximum limit of hydrocarbons are:
Methane: not more than 0.15%
Ethane: not more than 0.5%
Propane: not more than 2.0%
n-Butane: not more than 4.0%
1,3- butadiene: not more than 0.1%

Note3 According to EU Regulation 231/2012 [3]
For E 944 the limits for hydrocarbons are:
Methane: not more than 0.15% v/v
Ethane: not more than 1.5% v/v
Isobutane: not more than 2.0% v/v
n-Butane: not more than 1.0% v/v
1,3-butadiene: not more than 0.1% v/v

Note 4 According to EU Regulation 231/2012 [3]
Non-volatile residue: not more than 0.01%
Sulphur trioxide: not more than 0.1%
Selenium: not more than 10 mg/kg
Other gases not normally present in the air: no trace
Arsenic: not more than 3 mg/kg
Lead: not more than 5 mg/kg
Mercury: not more than 1 mg/kg

Note 5 JECFA (1998) [1]:
Non-volatile residue < 0.05%
Selenium < 20 mg/kg
Lead < 5mg/kg
Other gases not present in air: no trace