MINIMUM SPECIFICATIONS FOR FOOD GAS APPLICATIONS

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MINIMUM SPECIFICATIONS FOR FOOD GAS APPLICATIONS

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1. Introduction

Food gases are used for consumption (e.g. carbonation of beverages), packaging (e.g. bread, meat etc.), storage and ripening (e.g. controlled atmospheres for fruit and vegetables) and processing (cooling, freezing etc.).

The minimum specifications for food gases in JECFA[1], European Union (EU) legislation and European Pharmacopeia are listed and the document summarizes these standards (as applicable at the date of publication).

2. Scope

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

3. Definitions

Assay – Purity of the gas

Component – Impurity - residual ingredient in the main product

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 (Joint FAO/WHO Expert Committee on Food Additives) and, for medicinal applications, in the European Pharmacopoeia.

4.2 Food processing aids

Gases are processing aids when used during the processing of a food, for example liquid nitrogen for freezing or carbon dioxide for freezing and chilling, 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: No purity criteria are set under EU law for use of gases as a processing aid. However National legislation may 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. No specific purity criteria are set under EU law for use of gases as an ingredient although any food additive criteria set for the gas could be relevant together with general food safety and hygiene legislation.

5. Specifications

See Appendix 1.

[1] See 6.2 for explanation of “JECFA”

6. References

6.1 Food additives legislation

European Regulation 1333/2008 on Food Additives

European Directive 2008/84/EC laying down specific purity criteria on food additives other than colours and sweeteners

6.2 JECFA

Joint FAO/WHO Expert Committee on Food Additives

FAO - Food and Agricultural Organisation of the United Nations

WHO - World Health Organisation

6.3 European Pharmacopoeia

European Directorate for the Quality of Medicines and Healthcare

Council of Europe

7 allée Kastner, CS 30026 F-67081 Strasbourg, France

6.4 CGA Compressed Gas Association

G-4.3 Commodity Specification for Oxygen

G-5.3 Commodity Specification for Hydrogen

G-6.2 Commodity Specification for Carbon Dioxide

G-8.2 Commodity Specification for Nitrous Oxide

G-9.1 Commodity Specification for Helium

G-10.1 Commodity Specification for Nitrogen

G-11.1 Commodity Specification for Argon

6.5 EIGA European Industrial Gases Association

Document 70 Carbon Dioxide Source Certification, Quality Standards and Verification

Appendix 1 - Summary of Current Gases Specifications in EU Legislation, JECFA and European Pharmacopoeia

Component / Impurity	Standard	CO_2 E 290	N_2 E 941	O_2 E 948	Ar E 938	He E 939	N_2O E 942	n-/iso-Butane E 943 a/b	Propane E 944	Hydrogen E 949	SO_2 E 220
Assay (v/v)	EC	>99%	>99%	>99%	>99%	>99%	>99%	>96%/>94%	>95%	>99,9%	>99 %
	Ph. Eur.	>99,5%	>99,5%	>99,5%			>98%				
	JECFA	>99%	>99%	>99%	>99%	>99%	>97%				>99,9 %
Odour	EC										
	Ph. Eur.										
	JECFA			Free	free	free					
Moisture	EC		<0,05%	<0,05%	<0,05%	<0,05%	<0,05%	<50vppm	<50vppm	<50vppm	<0,05%
	Ph. Eur.	<67 vppm	<67 vppm	<67 vppm			<67 vppm				
	JECFA	<52 vppm									<0,05%
CO_2	EC										
	Ph. Eur.			<300 vppm			<300 vppm				
	JECFA			<300 vppm							
CO	EC	<10 vppm	<10 vppm				<30 vppm				
	Ph. Eur.	<5 vppm	<5 vppm	<5 vppm			<5 vppm				
	JECFA	<10 vppm	<10 vppm	<10 vppm		<10 vppm	<10 vppm				
NO/NO_2	EC		<10 vppm				<10 vppm				
	Ph. Eur.	<2 vppm					<2 vppm				
	JECFA						<5 vppm				
Total Hydrocarbon	EC		<100 vppm	<100 vppm	<100 vppm	<100 vppm		see *	see **		
	Ph. Eur.										
	JECFA	<50vppm									
Residual Gases (O_2, N_2, H_2)	EC		< 1 % (O2)							<0.07%	
	Ph. Eur.		< 50 vppm (O2)								
	JECFA				<1%						
Sulphur	EC										
	Ph. Eur.	<1 vppm									
	JECFA										
Oil	EC	<5mg/kg									
	Ph. Eur.										
	JECFA	<10 ppmw									
Acidity & Red. Subst.	EC	pass test									
	Ph. Eur.										
	JECFA	pass test									
Halogens & H_2S	EC										
	Ph. Eur.										
	JECFA						<5 vppm				
Arsine & Phosphate	EC										
	Ph. Eur.										
	JECFA										
Other comp. & Heavy metals	EC										see***
	Ph. Eur.										
	JECFA										see****

* Methane < 0,15%, other HC < 5,1%. For E943a the max. limit of HC are: C_2H_6 < 0,5%; C_3H_8<1,5%; i-C_4H_{10}<3%, 1.3-C_4H_6<0,1%

** Methane < 0,15%, other HC < 6,6%. For E943b the max. limit of HC are: C_2H_6 < 0,5%; C_3H_8<2,0%; i-C_4H_{10}<4%, 1.3-C_4H_6<0,1%

*** EC Directive 2008/84 : Non volatile residue <0.001 %, Sulphur trioxide < 0,1 %, Selenium < 10 mg/kg, Arsenic <3mg/kg, Lead <5mg/kg, Mercury <1mg/kg, Heavy metals (as Pb) <10 mg/kg

**** JECFA (1998) : Non volatile residue <0,05%, Selenium <20 mg/kg, Lead <5mg/kg , Other gases not present in air : No trace