Summary

This application is for the purpose of amending the Australia New Zealand Food Standards Code to permit the use of Ammonium bisulphite as a processing aid for use in wine production. Ammonium bisulphite belongs to the functional class microbial nutrients and microbial nutrient adjuncts. Ammonium bisulphite is listed in the Codex Alimentarius Commission Inventory of Processing aids for use in Food Category No. 14.2.3 (Grape wines). Ammonium bisulphite is permitted for use in wines produced in Australia for export to the European Union under Part A of Annex 1 of the European Union – Australia Agreement on Trade in Wine (the Wine Agreement). Point 7 permits

> *Addition of culture of micro organisms including yeast ghosts with or without one of the following substances to encourage the growth in yeasts:*
>
> - *Ammonium sulphite or ammonium bisulphite*

Ammonium bisulphite is permitted for use in wines produced in the European Union and sold in Australia under Part B of Annex 1 of the Wine Agreement-Point 9 permits:

> *Addition of one or more of the following substances to encourage the growth in yeasts:*
>
> - *ammonium sulphite or ammonium bisulphite up to 0.2 grams per litre*

For consistency it is requested to amend the table to clause 18 Permitted microbial nutrients and microbial nutrient adjuncts of Standard 1.3.3 of the (current) Food Standards Code to include Ammonium bisulphite. Under the revised Food Standards Code this would require an amendment to section S18-5 of Schedule 18.

It is also requested to amend Standard 4.5.1 Wine Production Requirements (Australia only). There are two possible alternatives to amending Standard 4.5.1:

First amend the table to clause 4 to include ammonium bisulphite, or;

To amend 4 (2):

> In this clause – cultures of microrganisms means yeasts or bacteria (including yeast ghosts) used in wine manufacture with or without the addition of any one or more of thiamine hydrochloride, niacin, pyridoxine, panthenic acid, biotin and inositol, ***or Permitted microbial nutrients and microbial nutrient adjuncts in the Table to clause 18 of Standard 1.3.3 (Section S18-5 of Schedule 18 of the revised Code)***.

WFA believes that the second option is more appropriate and would support this approach.

Ammonium bisulphite is used exclusively for fermentation operations. It makes available sulfur dioxide and ammonium ions, which can be directly assimilated by the yeast. It is used as a processing aid to assist fermentation. Nitrogenous compounds play an important role in winemaking. They serve as nutrients for the growth and metabolic activity of the yeast during fermentation; and as proteins, they also influence wine stability, particularly in white wine. Quantitatively, next to sugars, nitrogenous compounds are the most important nutrient substances found in grape must. Ammonia, which exists as ammonium (NH4+) ions in must, and amino acids are the predominant nitrogen-containing compounds that are utilized by

yeast. Ammonium bisulfite breaks down to provide ammonium that acts as a yeast nutrient and SO_2.

Sulphites have been associated with the full range of food intolerance symptoms and label declarations are required on wine. Wine already has limits for SO_2 in the Food Standards Code, so this application will have no impact on dietary intake.

PART C: APPLICATION TO AMEND THE AUSTRALIA AND NEW ZEALAND FOOD STANDARD CODE FOR THE USE OF AMMONIUM HYDROGEN SULPHITE (AMMONIUM BISULPHITE) AS A PROCESSING AID FOR WINE

Prepared for: Food Standards Australia New Zealand
PO Box 786
CANBERRA BC ACT 2610

Prepared by: Winemakers Federation of Australia

31 January 2016

Table of Contents

Summary

This application is for the purpose of amending the Australia New Zealand Food Standards Code to permit the use of Ammonium bisulphite as a processing aid for use in wine production. Ammonium bisulphite belongs to the functional class microbial nutrients and microbial nutrient adjuncts. Ammonium bisulphite is listed in the Codex Alimentarius Commission Inventory of Processing aids for use in Food Category No. 14.2.3 (Grape wines). Ammonium bisulphite is permitted for use in wines produced in Australia for export to the European Union under Part A of Annex 1 of the European Union – Australia Agreement on Trade in Wine (the Wine Agreement). Point 7 permits

> *Addition of culture of micro organisms including yeast ghosts with or without one of the following substances to encourage the growth in yeasts:*
>
> - *Ammonium sulphite or ammonium bisulphite*

Ammonium bisulphite is permitted for use in wines produced in the European Union and sold in Australia under Part B of Annex 1 of the Wine Agreement-Point 9 permits:

> *Addition of one or more of the following substances to encourage the growth in yeasts:*
>
> - *ammonium sulphite or ammonium bisulphite up to 0.2 grams per litre*

For consistency it is requested to amend the table to clause 18 Permitted microbial nutrients and microbial nutrient adjuncts of Standard 1.3.3 of the (current) Food Standards Code to include Ammonium bisulphite. Under the revised Food Standards Code this would require an amendment to section S18-5 of Schedule 18.

It is also requested to amend Standard 4.5.1 Wine Production Requirements (Australia only). There are two possible alternatives to amending Standard 4.5.1:

First amend the table to clause 4 to include ammonium bisulphite, or;

To amend 4 (2):

> In this clause – cultures of microrganisms means yeasts or bacteria (including yeast ghosts) used in wine manufacture with or without the addition of any one or more of thiamine hydrochloride, niacin, pyridoxine, panthenic acid, biotin and inositol, ***or Permitted microbial nutrients and microbial nutrient adjuncts in the Table to clause 18 of Standard 1.3.3 (Section S18-5 of Schedule 18 of the revised Code)***.

WFA believes that the second option is more appropriate and would support this approach.

Ammonium bisulphite is used exclusively for fermentation operations. It makes available sulfur dioxide and ammonium ions, which can be directly assimilated by the yeast. It is used as a processing aid to assist fermentation. Nitrogenous compounds play an important role in winemaking. They serve

as nutrients for the growth and metabolic activity of the yeast during fermentation; and as proteins, they also influence wine stability, particularly in white wine. Quantitatively, next to sugars, nitrogenous compounds are the most important nutrient substances found in grape must. Ammonia, which exists as ammonium (NH4+) ions in must, and amino acids are the predominant nitrogen-containing compounds that are utilized by yeast. Ammonium bisulfite breaks down to provide ammonium that acts as a yeast nutrient and SO_2.

Sulphites have been associated with the full range of food intolerance symptoms and label declarations are required on wine. Wine already has limits for SO_2 in the Food Standards Code, so this application will have no impact on dietary intake.

3.1 GENERAL REQUIREMENTS

3.1.2 Applicant details

Winemakers' Federation Australia
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Person Responsible

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Barton ACT 2600 AUSTRALIA

Postal Address

PO Box 3891
Manuka ACT 2603 AUSTRALIA

[redacted]

3.1.3 PURPOSE OF THE APPLICATION

This application is for the purpose of amending the Australia New Zealand Food Standards Code to permit the use of Ammonium bisulphite as a processing aid for use in wine production. Ammonium bisulphite belongs to the functional class microbial nutrients and microbial nutrient adjuncts. Ammonium bisulphite is listed in the Codex Alimentarius Commission Inventory of Processing aids for use in Food Category No. 14.2.3 (Grape wines). Ammonium bisulphite is permitted for use in wines produced in Australia for export to the European Union under Part A of Annex 1 of the European Union – Australia Agreement on Trade in Wine (the Wine Agreement). Point 7 permits

> *Addition of culture of micro-organisms including yeast ghosts with or without one of the following substances to encourage the growth in yeasts:*
>
> - *Ammonium sulphite or ammonium bisulphite*

Ammonium bisulphite is permitted for use in wines produced in the European Union and sold in Australia under Part B of Annex 1 of the Wine Agreement-Point 9 permits:

> *Addition of one or more of the following substances to encourage the growth in yeasts:*
>
> - *ammonium sulphite or ammonium bisulphite up to 0.2 grams per litre*

For consistency it is requested to amend the table to clause 18 Permitted microbial nutrients and microbial nutrient adjuncts of Standard 1.3.3 of the (current) Food Standards Code to include Ammonium bisulphite. Under the revised Food Standards Code this would require an amendment to section S18-5 of Schedule 18.

It is also requested to amend Standard 4.5.1 Wine Production Requirements (Australia only). There are two possible alternatives to amending Standard 4.5.1:

First amend the table to clause 4 to include ammonium bisulphite, or;

To amend 4 (2):

> In this clause – cultures of microorganisms means yeasts or bacteria (including yeast ghosts) used in wine manufacture with or without the addition of any one or more of thiamine hydrochloride, niacin, pyridoxine, panthenic acid, biotin and inositol, ***or Permitted microbial nutrients and microbial nutrient adjuncts in the Table to clause 18 of Standard 1.3.3 (Section S18-5 of Schedule 18 of the revised Code)***.

WFA believes that the second option is more appropriate and would support this approach.

Ammonium bisulphite is used exclusively for fermentation operations. It makes available sulphur dioxide and ammonium ions, which can be directly assimilated by the yeast. It is used as a processing aid to assist fermentation. Nitrogenous compounds play an important role in winemaking. They serve as nutrients for the growth and metabolic activity of the yeast during fermentation; and as proteins, they also influence wine stability, particularly in white wine. Quantitatively, next to sugars, nitrogenous compounds are the most important nutrient substances found in grape must. Ammonia, which exists as

ammonium (NH4+) ions in must, and amino acids are the predominant nitrogen-containing compounds that are utilized by yeast. Ammonium bisulfite breaks down to provide ammonium that acts as a yeast nutrient and SO_2.
Sulphites have been associated with the full range of food intolerance symptoms and label declarations are required on wine. Wine already has limits for SO_2 in the Food Standards Code, so this application will have no impact on dietary intake.

3.1.4 JUSTIFICATION FOR THE APPLICATION

a) Need for the Proposed Change.

Ammonium bisulphite is permitted for use in wines produced in Australia for export to the European Union under Part A of Annex 1 of the European Union – Australia Agreement on Trade in Wine (the Wine Agreement). Point 7 permits

Addition of culture of microorganisms including yeast ghosts with or without one of the following substances to encourage the growth in yeasts:

- *Ammonium sulphite or ammonium bisulphite*

Ammonium bisulphite is permitted for use in wines produced in the European Union and sold in Australia under Part B of Annex 1 of the Wine Agreement-Point 9 permits:

Addition of one or more of the following substances to encourage the growth in yeasts:

- *ammonium sulphite or ammonium bisulphite up to 0.2 grams per litre*

For consistency it is requested to amend the table to clause 18 Permitted microbial nutrients and microbial nutrient adjuncts of Standard 1.3.3 of the (current) Food Standards Code to include Ammonium bisulphite. Under the revised Food Standards Code this would require an amendment to section S18-5 of Schedule 18.

It is also requested to amend Standard 4.5.1 Wine Production Requirements (Australia only). There are two possible alternatives to amending Standard 4.5.1:

First amend the table to clause 4 to include ammonium bisulphite, or;

To amend 4 (2):

In this clause – cultures of microorganisms means yeasts or bacteria (including yeast ghosts) used in wine manufacture with or without the addition of any one or more of thiamine hydrochloride, niacin, pyridoxine, panthenic acid, biotin and inositol, ***or Permitted microbial nutrients and microbial nutrient adjuncts in the Table to clause 18 of Standard 1.3.3 (Section S18-5 of Schedule 18 of the revised Code)***.

WFA believes that the second option is more appropriate and would support this approach.

b) Advantages of the Proposed Change Over the Status Quo

The change will correct the oversight that did not amend the Food Standards Code following the signing of the Wine Agreement.

c) Status of Similar Application made in other Countries

No applications are being made by the applicant to other national jurisdictions.

A. REGULATORY IMPACT INFORMATION

1. Costs and benefits

a) Costs and benefits to the consumers

Consumers will have no change to their costs and benefits.

b) Costs and Benefits to Industry and Business in General.

The amendment will permit the use of ammonium bisulphite as a processing aid for wines used for export to other countries apart from the European Union.

c) Costs and Benefits to Government.

There will be no increased regulatory or enforcement costs for the government.

2. Impact on International Trade

It will provide other countries other than the European Union the ability to export wine to Australia that has been produced using ammonium bisulphite as a processing aid, consistent with our World Trade Organisation obligations.

3.1.5 INFORMATION TO SUPPORT THE APPLICATION

1. General

(a) There are no negative public health implications. The application is consistent with Australia's World Trade Organisation obligations to provide equal treatment.

(b) Consumer Choice Issues

There are no consumer choice issues.

(c) Evidence of General Food Industry or Specific Company Support

The Wine Agreement has provided considerable benefits to the Australian wine sector. The amendment to the Food Standards Code is supported by the Winemakers Federation of Australia.

The New Zealand Wine Industry supports these changes to the Code.

A. Technical Information on the Processing Aid

1. Information on the type of processing aid

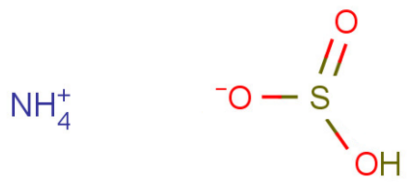
Ammonium bisulphite produces sulphur dioxide ($SO_{2)}$ and ammonium 2 + ions (Nh_4^+). When applied to musts, it protects them throughout the winemaking process. Correct use of SO_2 decreases oxidation, improves colour and aroma and lowers volatile acidity. SO_2 has the following 2 properties: Antioxidant: reductive effect. Captures oxygen and prevents oxidation. Antioxidant: destroys oxidases and prevents casse. Antimicrobial: inhibits the action of yeasts and lactic and acetic bacteria.

Ammonium bisulphite falls into Clause 18 permitted microbial nutrients and microbial nutrient adjuncts. Under the revised Code this would require an amendment to section S18-5 of Schedule 18.

2. Information on the identity of the processing aid

CAS No.	**10192-30-0**
Chemical Name:	**Ammonium bisulfite**
Synonyms:	AMMONIUM BISULFITE;monoammoniumsulfite;ammoniummonosulfite;ammoni Ammonium acid sulfite; ammonium bisulfite,solid ;ammonium sulfite, hydrogen; ammonium hydrogen sulphite; AMMONIUM HYDROGEN SULFITE; ammonium bisulfite, solution, ammonium bisulphite
Molecular Formula:	H5NO3S
Formula Weight:	99.11

3. Information on the chemical and physical properties of the processing aid



mp :	147°C
density :	2.03g/cm3
Water Solubility :	soluble
CAS Database Reference:	10192-30-0(CAS Database Reference)
EPA Substance Registry System:	Sulfurous acid, monoammonium salt(10192-30-0)

4. Manufacturing process

It is commonly collected as a byproduct of the "acetone cyanohydrin route" to the commodity chemical **methyl methacrylate**.

It can also be obtained by hydrolysis of sulfamic acid in aqueous solution, which produces the salt in high purity:

$H_3NSO_3 + H_2O \rightarrow [NH_4]^+[HSO_4]^-$

It also arises by the thermal decomposition of ammonium sulfate:

$(NH_4)_2SO_4 \rightarrow (NH_4)HSO_4 + NH_3$

5. Specification for identity and purity

Specifications are also given in the INTERNATIONAL ŒNOLOGICAL CODEX Ammonium Hydrogen sulfite COEI-1-AMMHYD: 2007 (attached). Ammonium bisulphite meets the OIV specification which is one of the secondary references for specifications in Standard 1.3.4 (Identity and Purity). Therefore, no new specification is required for the Code.

CENTESIMAL COMPOSITION

NH_3 17.16
SO_2 64.67

PROPERTIES
Ammonium hydrogen sulphite always takes an aqueous solution form.
This solution emits a piquant sulphur dioxide odor.

SOLUBILITY
Water at 60 °C 847 g/l
Alcohol, 95% by vol. Slightly soluble

IDENTIFYING CHARACTERISTICS
Aqueous solutions of ammonium hydrogen sulfite produce reactions
of ammonium (release of ammonia in the presence of sodium hydroxide
when heated) and sulfur dioxide (filter paper soaked in potassium iodate and starch turns blue).

6. Analytical method of detection

Tests are identified by the OIV in the International Oenological Codex (Oeno 14/2000 modified by Oeno 3/2007 (Attached).

Identifying characteristics are: Aqueous solutions of ammonium hydrogen sulphite produce reactions of ammonium (release of ammonia in the presence of sodium hydroxide when heated) and sulphur dioxide (filter paper soaked in potassium iodate and starch turns blue).

B. Information Related to the safety of a chemical processing aid

1. General Information on the Industrial use of this chemical

Nitrogenous compounds play an important role in winemaking. They serve as nutrients for the growth and metabolic activity of the yeast during fermentation; and as proteins, they also influence wine stability, particularly in white wine. Quantitatively, next to sugars, nitrogenous compounds are the most important nutrient substances found in grape must. Ammonia, which exists as ammonium (NH4+) ions in must, and amino acids are the predominant nitrogen-containing compounds that are utilized by yeast. Ammonium bisulfite breaks down to provide ammonium that acts as a yeast nutrient and SO2.

Industrial use of ammonium bisulfite

Ammonium bisulphite has a number of industrial uses. It can be further neutralized with ammonia to form ammonium sulfate, a valuable fertilizer. It can be used as a weaker alternative to sulfuric acid, although sodium bisulfate is much more common.

In winemaking, Ammonium bisulfite produces sulphur dioxide (So) and ammonium 2+ ions (Nh). When applied to musts, it protects them throughout the winemaking process. Correct use of SO decreases oxidation, improves colour and aroma and lowers volatile acidity. SO has the following properties:

- **Antioxidant**: reductive effect. Captures oxygen and prevents oxidation.
- **Antioxidase**: destroys oxidases and prevents casse.
- **Antimicrobial**: inhibits the action of yeasts and lactic and acetic bacteria (Attachment xx)

2. *General information on the use of the chemical as a food processing aid in other countries*

Ammonium bisulfite is a legally permitted processing aid in the European Union and for sale in countries it has wine agreements with: Chile, Australia, Canada, United States, Switzerland and South Africa.

3. *Data on the toxicokinetics and metabolism of the chemical processing aid, and if necessary its metabolites*

Following its addition to wine or must, ammonium bisulfite will form So2 and NH4. Therefore, limits on these metabolites in the final product may apply. See for example the data sheet for SULFAMOL (attached). Under Standard 1.3.1 of the Food Standards Code, wine has a limit for sulphites of 250 mg/kg or 400 mg/kg (>35grams/litre of residual sugar).

5. *Safety assessment reports prepared by international agencies or other national government agencies if available*

Food safety of ammonium bisulfite

JECFA last evaluated sulphites in 2008 (http://apps.who.int/iris/bitstream/10665/44062/1/WHO_TRS_952_eng.pdf). The main contributors to total dietary exposure to sulfites differ between countries owing to differing patterns of use of sulfites in foods and of consumption of foods to which sulfites may be added. Thus dried fruit, sausages and nonalcoholic beverages were the main contributors of sulfites in some countries, while in other countries these foods are generally produced without the use of sulfites. In countries where wine is regularly consumed, it was one of the main contributors to dietary exposure in adults. Dietary exposure in high regular consumers of wine (97.5th Summary and conclusions of the sixty-ninth meeting of the Joint FAO/WHO Expert Committee on Food Additives (JECFA) Page 4 of 21 issued 4 July 2008 percentile) was shown to exceed the ADI for sulfites (0-0.7 mg/kg bw) based either on MLs in Codex GSFA, on MLs in national legislation or on the average concentration determined analytically (about 100 mg/l). In children and teenagers, a significant contribution to mean exposure to sulfites could come from fruit juices and soft drinks (including cordial), sausages, various forms of processed potatoes, dried fruit and nuts. Other significant contributions to dietary exposure in the adult population come from dried fruit, sausages and beer.

Safety Assessment of ammonium bisulfite as a food additive in other countries

The International Organisation of Wine and the Vine approves the Addition of ammonium sulfite or ammonium hydrogen sulfite to grapes.

- Use: Obtain microbiological control of grapes by limiting and/or preventing the propagation of yeasts and bacteria and technologically undesirable microorganisms. Implement an antioxidant.

- Prescriptions: Product used must comply with the prescriptions of the International Oenological Codex.

Source: International Code of Oenological Practices (OIV), Part II, Section 1.12: Sulfiting

F. Information Related to the Dietary Exposure to the Processing Aid.

4. A list of foods or food groups likely to contain the processing aid or its metabolites.

Sulfites occur in a wide range of foods. However, as wine has a maximum limit for sulfites, this will not affect the dietary exposure.

5. The levels of residues of the processing aid or its metabolites for each food group.

Under Standard 1.3.1 of the Food Standards Code , wine has a limit for sulphites of 250 mg/kg or 400 mg/kg (>35grams/litre of residual sugar).

6. For food or food groups not currently listed in the most recent Australian or New Zealand national Nutrition Surveys (NNSs), information on the likely consumption.

See above.

7. The percentage of the food group in which the processing aid is likely to be found or the percentage of the market likely to use the processing aid.

See above

8. Information relating to the levels of residues in foods in other countries.

The main contributors to total dietary exposure to sulfites differ between countries owing to differing patterns of use of sulfites in foods and of consumption of foods to which sulfites may be added. However, total sulphate levels are regulated across the world and ammonium sulphate will not have any impact on the ADI.

9. For foods where consumption has changed in recent years, information on likely food consumption.

n/a

3.1.6 Assessment Procedure

This application seeks approval through the appropriate assessment procedureof **General Procedure Level 1.** The application seeks to permit the use of a processing aid in wine to give force to the EU-Australia Wine Agreement. The break down products of ammonium bisulfite are well understood and there are no perceived health risks from its approval

3.1.7 CONFIDENTIAL COMMERCIAL INFORMATION

No confidential or commercial information is incorporated in this application.

3.1.8 EXCLUSIVE CAPTURABLE BENEFIT.

There is no exclusive capturable benefit to the applicant.

3.1.9 INTERNATIONAL AND OTHER STANDARDS

A. JECFA

Dietary exposure to sulfites was evaluated by JECFA in its Sixty-ninth report of the Joint FAO/WHO Expert Committee on Food Additives at the request of CCFA at its Thirty-ninth Session. The Committee was asked to consider all data necessary for the assessment of dietary exposure from all foods, including use levels, owing to concern that the ADI might be exceeded. Sulfites have a number of technological functions, including antioxidant, bleaching agent, flour treatment agent and preservative, and are used in a wide variety of applications in the food industry. The terms “sulfites” and “sulfiting agents” usually refer to the gas sulfur dioxide and sodium, potassium and calcium sulfites, hydrogen sulfites and metabisulfites. Throughout section 3.1.9 of the present report, the concentration of sulfites in food is expressed as sulfur dioxide. The additives listed under sulfites in the current Codex GSFA are sulfur dioxide (International Numbering System [INS] 220), sodium sulfite (INS 221), sodium hydrogen sulfite (INS 222), sodium metabisulfite (INS 223), potassium metabisulfite (INS 224), potassium sulfite (INS 225), calcium hydrogen sulfite (INS 227), potassium bisulfite (INS 228) and sodium thiosulfate (INS 539).

B. Other National Standards

See above.

3.1.10 STATUTORY DECLARATION

Attached

3.1.11 CHECKLIST

Attached

References

1. Agravin (undated), Sulfamol data sheet
2. Dolmar (undated), **Ammonium Bisulphite 400**, MSDS.
3. IOC, (undated), Ammonium bisulfite, Data Sheet, Produced by Institut Oenologique de Champagne.
4. JECFA (2008), **EVALUATION OF CERTAIN FOOD ADDITIVES**, Sixty-ninth report of the Joint FAO/WHO Expert Committee on Food Additives, http://apps.who.int/iris/bitstream/10665/44062/1/WHO_TRS_952_eng.pdf
5. Jiranek, V., Langridge, P. and Nenscheke, P. (1995), **Regulation of Hydrogen sulfide liberalization in Wine Producing Saccaromy*ces cerevisae* Strains by Assimilable Nitrogen**, Applied and Environmental Microbiology, Feb, 1995, p. 461-467.
6. Nair B, Elmore AR (2003, **Final report on the safety assessment of sodium sulfite, potassium sulfite, ammonium sulfite, sodium bisulfite, ammonium bisulfite, sodium metabisulfite and potassium metabisulfite,** Cosmetic Ingredients Review Expert Panel; Int J Toxicol. 2003;22 Suppl 2:63-88.
7. NICNAS (undated), **Human Health tier II Assessment for sulphites**, Inventory Multi-tiered Assessment and Prioritisation (IMAP).
8. OIV (2007)INTERNATIONAL ŒNOLOGICAL CODEX (2007), Ammonium Hydrogen sulfite COEI-1-AMMHYD: 2007.
9. OIV (2014), International Code of Oenological Practice.
10. SCCNFP (2003), **Opinion concerning Inorganic Sulfites and Bisulfites**, COLIPA no. P51, adopted by the Scientific Committee on Cosmetic Products and Non-Food Products Intended for Consumers, 23rd Plenary Meeting, 18th March 2003.
11. South Africa (undated) Annex 1, Oenological practices and processes authorized for wines originating in the Republic of South Africa.

Attachments

1. Statutory Declaration
2. Checklist
3. OIV (2014), International Code of Oenological Practice.
4. Agravin (undated), Sulfamol data sheet
5. Jiranek, V., Langridge, P. and Nenscheke, P. (1995), **Regulation of Hydrogen sulfide liberalization in Wine Producing Saccaromy*ces cerevisae* Strains by Assimilable Nitorgen**, Applied and Environmental Microbiology, Feb, 1995, p. 461-467
6. NICNAS (undated), **Human Health tier II Assessment for sulphites**, Inventory Multi-tiered Assessment and Prioritisation (IMAP).
7. SCCNFP (2003), **Opinion concerning Inorganic Sulfites and Bisulfites**, COLIPA no. P51, adopted by the Scientific Committee on Cosmetic Products and Non-Food Products Intended for Consumers, 23rd Plenary Meeting, 18th March 2003.
8. IOC, (undated), Ammonium bisulfite, Data Sheet, Produced by Institut Oenologique de Champagne.
9. INTERNATIONAL ŒNOLOGICAL CODEX (2007), Ammonium Hydrogen sulfite COEI-1-AMMHYD: 2007.
10. Annex 1, Oenological practices and processes authorized for wines originating in the Republic of South Africa.
11. Dolmar (undated), **Ammonium Bisulphite 400**, MSDS.
12. Nair B, Elmore AR (2003, **Final report on the safety assessment of sodium sulfite, potassium sulfite, ammonium sulfite, sodium bisulfite, ammonium bisulfite, sodium metabisulfite and potassium metabisulfite,** Cosmetic Ingredients Review Expert Panel; Int J Toxicol. 2003;22 Suppl 2:63-88

1. GRAPES

1.12. SULFITING (OENO 3/04)

Definition:

Addition of, solution of sulfur dioxide, or potassium hydrogen sulfite, potassium anhydrous sulfite, ammonium sulfite or ammonium hydrogen sulfite to grapes.

Objectives:

Obtain microbiological control of grapes by limiting and/or preventing the propagation of yeasts and bacteria and technologically undesirable microorganisms.
Implement an antioxidant.

Prescriptions:

a) The addition of sulfur dioxide prior to alcoholic fermentation should be limited as much as possible because the combining with acetaldehyde will render the solution with no antiseptic or antioxidant effects in resulting wine.
b) The total sulfur dioxide contents when marketed must at least comply with the limits set by Annex C of the Compendium of International Methods of Analysis of wine and musts.
c) The products used must comply with the prescriptions of the International Oenological Codex.

Recommendation of OIV:

Accepted.

2. MUSTS

2.1.2 SULPHITING (5/87)

Definition :

Addition to crushed grapes or to must of gaseous sulphur dioxide, aqueous sulphur dioxide solution, or potassium disulphite*, ammonium sulphite or ammonium disulphite.

Objectives :

a) Put into action :
   - An antiseptic against problems due to the growth of microorganisms,
   - An antioxidant,
   - A selective factor for yeasts,
   - A product facilitating settling,
   - A product favouring the extraction of anthocyanins.

b) To regulate and control the fermentation.
c) To produce preserved musts.

Prescriptions :

a) Sulphiting should take place during crushing or immediately after.
b) Distribute the product evenly in the crushed grapes or the must.
c) Ammonium sulphite and disulphite also introduce in the must ammonium ions that constitute growth activators for yeasts (see *Activation of alcoholic fermentation*).
d) Products used shall comply with the prescriptions of the *International Oenological Codex* .

Recommendation of OIV :

Accepted.

* Potassium disulphite is synonymous with potassium metabisulphite

4 SPECIAL WINES : SPARKLING WINES

4.1 DEFINITIONS COMMON TO ALL SPARKLING WINES

4.1.7 PROMOTING SECONDARY FERMENTATION BY THE USE OF NUTRITIVE SALTS AND OF YEAST GROWTH FACTORS (OENO 7/95)

Definition :

Addition of ammonium salts and of thiamin to base wines destined for secondary fermentation.

Objective :

To facilitate the multiplication of yeasts during secondary fermentation in a bottle or in a closed tank still containing grape sugars or with the addition of a tirage liqueur.

Prescriptions :

Nutrititive salts and other growth factors added shall be:

a) For nutritive salts, diammonium phosphate, or ammonium sulphate to a maximum dose of 0.3 g/l (expressed as the salt).
b) For growth factors, thiamin in the form of thiamin hydrochloride to a maximum dose of 0.6 mg/l. (expressed as thiamin).
c) These substances shall comply with the prescriptions of the International Oenological Codex .

Recommendation of OIV :

Accepted

SULFAMOL

Ammonium hydrogen sulphite in an aqueous solution

CHARACTERISTICS

Sulfamol produces sulphur dioxide (So_2) and ammonium ions (Nh_4^+). When applied to musts, it protects them throughout the winemaking process.

Correct use of SO_2 decreases oxidation, improves colour and aroma and lowers volatile acidity. SO_2 has the following properties:

- **Antioxidant**: reductive effect. Captures oxygen and prevents oxidation.
- **Antioxidase**: destroys oxidases and prevents casse.
- **Antimicrobial**: inhibits the action of yeasts and lactic and acetic bacteria.

APPLICATIONS

With grapes and musts.

DOSAGE

Standard dose

Sulfamol 150	**20 - 53 ml/hl**
Sulfamol 200	**15 - 40 ml/hl**
Sulfamol 400	**8 - 20 ml/hl**
Sulfamol 640	**5 - 13 ml/hl**

The dose will depend on the quality of the grapes and the acidity of the must.

It should be borne in mind that 1 litre of:
Sulfamol 150 produces 150 g of SO_2 and 39,8 g of Nh_4^+ ions.
Sulfamol 200 produces 200 g of SO_2 and 59 g of Nh_4^+ ions.
Sulfamol 400 produces 400 g of SO_2 and 118 g of Nh_4^+ ions.
Sulfamol 640 produces 640 g of SO_2 and 177 g of Nh_4^+ ions.

Note: A 10 ml/hl dose of **Sulfamol 640** produces 17,7 mg/l of YAN (Yeast-Assimilable Nitrogen).

Current EU legislation establishes that ammonium bisulphite (NH_4HSO_3) may only be used in alcoholic fermentation and must not exceed 0,2 g/l.

Total sulphur dioxide content may not exceed 150 mg/l for red wines or 200 mg/l for white and rosé wines. If the amount of residual sugar (expressed as glucose plus fructose) equals or exceeds 5 g/l, the permitted values are 200 mg/l for red wines and 250 mg/l for white and rosé wines.

COMPOSITION

Sulfamol 150: ammonium hydrogen sulphite in a 23% aqueous solution.
Sulfamol 200: ammonium hydrogen sulphite in a 31% aqueous solution.
Sulfamol 400: ammonium hydrogen sulphite in a 50% aqueous solution.
Sulfamol 640: ammonium hydrogen sulphite in a 70% aqueous solution.

ORGANOLEPTIC QUALITIES

In very high doses, an undesired odour may be produced by the sulphur dioxide or its derivatives.

INSTRUCTIONS FOR USE

This product may be added directly to the must.

To ensure thorough mixing, users are recommended to utilize a metering pump to provide precise and even dosing.

Precautions for use:

Sulfamol is a toxic product and all due care should be taken when handling it. Avoid contact with eyes and mucus membranes. This product should only be used by trained staff.

PHYSICO-CHEMICAL PROPERTIES

Sulfamol	150	200	400	640
NH_4HSO_3 [%]	21-25	29-33	48-52	68-72
SO_2 [g/L]	130-170	170-230	370-430	595-655
pH	4,7-5,6	4,7-5,6	4,7-5,6	4,7-5,6
Density [g/ml]	1,05-1,13	1,09-1,15	1,20-1,30	1,36-1,43
Sulphated ash [%]	< 0,2	< 0,2	< 0,2	< 0,2
Fe [mg/kg]	< 50	< 50	< 50	< 50
Pb [mg/kg]	< 5	< 5	< 5	< 5
Hg [mg/kg]	< 1	< 1	< 1	< 1
As [mg/kg]	< 3	< 3	< 3	< 3

PHYSICAL APPEARANCE

Transparent, slightly yellowy liquid with a slight odour of ammonium.

PACKAGING

Sulfamol 150: 12, 23 and 1.200 kg containers.
Sulfamol 200: 12, 24 and 1.200 kg containers.
Sulfamol 400: 12, 25 and 1.300 kg containers.
Sulfamol 640: 14, 26 and 1.400 kg containers.

STORAGE

Store in the original packaging in a cool, dry place.

REGISTRATION: R.G.S.A: 31.00391/CR
This product complies with the International Oenological Codex and EC Regulation No606/2009.

AH 8

INSTITUT ŒNOLOGIQUE
DE CHAMPAGNE

DATA SHEET

AMMONIUM BISULFITE 150 g/L

SULFUROUS PRODUCTS

Always take into consideration the legal maxima for sulphur dioxide (SO_2) in wine :

- 210 mg/L for still white and rose wine
- 160 mg/L for red wine
- 185 mg/L for sparkling wine

OENOLOGICAL APPLICATIONS

The three main properties of **AMMONIUM BISULFITE AT 150 g/L** are :

- an antiseptic against yeast and bacteria
- antioxidant activity
- a role in increasing solubility of polyphenols

INSTRUCTIONS FOR USE

Homogenize properly after addition in wine or must.

Avoid contact with metallic items (iron, copper or aluminium).

DOSE RATE

Consult your oenologist or laboratory.

PACKAGING AND STORAGE

- 1 L, 5 L and 10 L cans.
- 1000 L. container.

Store in a dry environment which is well ventilated at a temperature between 10 and 20 °C.

The recommended use by date is marked on the packaging.

AMMONIUM BISULFITE AT 150 g/L rapidly loses its effectiveness once the package has been opened.

Safety rules :

Xi : Irritating
R 31 : Liberates a toxic gas if in contact with an acid.
R 36/37 : Irritant for eyes and respiratory system.
S 26 : In case of contact with eyes, rinse abundantly with a lot of cold water and consult a specialist.
S 44 : In case of sickness, consult a doctor.

version 22-04-10/A

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AMMONIUM HYDROGEN SULFITE
Ammonium bisulfite
NH_4HSO_3 = 99.07
(Oeno 14/2000 modified by Oeno 3/2007)

1. OBJECTIVE, ORIGIN AND SCOPE OF APPLICATION

This product falls in the category of preservatives and is used exclusively for fermentation operations. It makes available sulfur dioxide and ammonium ions, which can be directly assimilated by the yeast. There are regulatory restrictions on the amount of ammonium that can be added and on sulfur dioxide content.

2. LABELING

The concentration of this product, as well as the safety and storage conditions, should be indicated on the label.

3. CENTESIMAL COMPOSITION

NH_3	17.16
SO_2	64.67

4. PROPERTIES

Ammonium hydrogen sulfite always takes an aqueous solution form. This solution emits a piquant sulfur dioxide odor.

5. SOLUBILITY

Water at 60 °C	847 g/l
Alcohol, 95% by vol.	Slightly soluble

6. IDENTIFYING CHARACTERISTICS

Aqueous solutions of ammonium hydrogen sulfite produce reactions of ammonium (release of ammonia in the presence of sodium hydroxide when heated) and sulfur dioxide (filter paper soaked in potassium iodate and starch turns blue).

TESTS

7.1. Sulfur Ash

As quantified as indicated in the Annex, the proportion of ammonium hydrogen sulfite ash should not be greater than 0.2 per 100.

7.2. Preparing the Solution for Tests

Prepare a 10 pp 100 (m/v) solution.

7.3. Iron

To 5 ml of the solution prepared for testing under paragraph 2, add 1 ml of concentrated hydrochloric acid (R), one drop of 2 pp 100 potassium permanganate (R) and 2 ml of 5 pp 100 potassium thiocyanate (R).

If a red colorating appears, it should be less intense than that of a control prepared with 2.5 ml of an iron(III) solution of 0.01 g of iron per liter (R), 2.5 ml of water and the same quantities of the same reagents. (Iron content should be less than 50 mg/kg).

The iron may also be quantified by means of atomic absorption spectrometry, using the technique described in the Compendium.

7.4. Lead

Use the method detailed in the Compendium on the solution in a concentration of 10 pp 100 prepared for testing (under 7.2) and diluted to one one-twentieth.

7.5. Mercury

Test for mercury in the solution prepared for testing (under 7.2) using the technique detailed in the annex. (Mercury content should be less than 1 mg/kg.)

7.6. Arsenic

Using the method indicated in the Annex, test for arsenic in 2 ml of the test solution prepared for testing in accordance with paragraph 7.2. (Arsenic content should be less than 3 mg/kg).

7.7. Quantitative Ammonia Analysis

Dilute the solution prepared for testing under paragraph 7.2 to one-tenth strength, then place 10 ml of this dilute solution (0.10 g of ammonium hydrogen sulfite) in a steam distillation device (described in the annex). Add 10 ml of 30 pp 100 sodium hydroxide (R) and distill 100 ml. Quantify the distilled ammonia using 0.1 M hydrochloric acid. Let n be the number of milliliters used:

100 g of ammonium hydrogen sulfite contain 1.7 n g of ammonia (NH_3). Ammonia content should be greater than 16.5 pp 100 (m/m).

7.8. Quantitative Sulfur Dioxide Analysis

In a 200 ml conical flask, place 50 ml of cold water, then 5 ml of the freshly prepared ammonium hydrogen sulfite solution. Titrate with 0.05 M iodine in the presence of starch. Let n be the volume of iodine used.

SO_2 content per 100 g: 6.4n

Ammonium hydrogen sulfite should contain at least 62 pp 100 SO_2.

7. STORAGE

Ammonium hydrogen sulfite solutions should be stored in hermetically sealed containers away from heat and cold.

AH 10

ANNEX I

(referred to in Article 5)

1. List of oenological practices and processes authorised for wines originating in the Republic of South Africa with the following prescriptions or, in their absence, under the conditions laid down in South African rules:

(1) Aeration with argon, nitrogen or oxygen

(2) Heat treatment

(3) Use of fresh, sound and undiluted yeast from recently completed fermentation

(4)Centrifuging and filtration with or without filtering agents on condition that no undesirable residue is left in the end product

(5) Use of yeasts for wine production

(6) Use of preparations of yeast cell walls

(7) Addition of polyvinylpolypyrrolidone

(8) Use of lactic acid bacteria

(9) Addition of ammonium phosphate and di-ammonium phosphate

(10) Addition of ammonium sulphate

(11) Addition of ammonium sulphite or ammonium bisulphite

(12) Addition of thiamin hydrochloride

(13) Use of carbon dioxide, argon or nitrogen to create an inert atmosphere and to protect against oxidation

(14) Addition of potassium bisulphite or potassium meta-bisulphite

(15) Addition of sulphur dioxide

(16) Addition of sodium meta-bisulphite

(17) Addition of potassium sorbate and sorbic acid

(18) Addition of ascorbic acid

(19) Addition of tartaric acid, malic acid and citric acid for acidification purposes, provided that the initial acidity content is not raised by more than 4 grams per litre, expressed as tartaric acid

(20) Addition of potassium tartrate and potassium-bitartrate

(21) Addition of potassium carbonate

(22) Addition of calcium carbonate

(23) Addition of sodium carbonate

(24) Addition of potassium bicarbonate

(25) Clarification by means of one or more of the following substances:

- edible gelatine
- bentonite
- isinglass
- casein and potassium caseinate
- egg albumin, milk albumin
- kaolin
- pectolytic enzymes
- silicon dioxide

- tannin
- enzymatic preparations of betaglucanase.

(26) Addition of tannin

(27) Treatment with charcoal (activated carbon)

(28) Use of wood shavings

(29) Addition of potassium ferrocyanide provided that after the treatment the wine must be analysed and test free of any cyanides and cyanates

(30) Addition of acacia or arabic gum only after completion of alcoholic fermentation

(31) Addition of potassium, sodium and calcium alginate for bottle fermented sparkling wine

(32) Addition of copper sulphate

(33) Addition of caramel only for liqueur wine

(34) Addition of wine or dried grape distillate or of neutral alcohol of vinous origin for the manufacture of liqueur wines

(35) Addition of grape must or rectified concentrated grape must for the sweetening of wine

(36) Addition of calcium hydroxide

(37) Addition of sodium hydroxide

(38) Addition of lysozyme

(39) Electrodialysis to guarantee tartaric stabilisation of the wine

(40) Use of urease to reduce the urea content in the wine

2. List of oenological practices and processes authorised for wines originating in the Community with the following prescriptions or, in their absence, under the conditions laid down in Community rules:

(1) Aeration or bubbling using argon, nitrogen or oxygen

(2) Heat treatment

(3) Use in dry wines of fresh lees which are sound and undiluted and contain yeasts resulting from the recent vinification of dry wine

(4) Centrifuging and filtration, with or without an inert filtering agent, on condition that no undesirable residue is left in the products so treated

(5) Use of yeasts for wine production

(6) Use of preparations of yeast cell wall

(7) Use of polyvinylpolypyrrolidone

(8) Use of lactic acid bacteria in a vinous suspension

(9) Addition of one or more of the following substances to encourage the growth of yeasts:

(i) addition of:

- diammonium phosphate or ammonium sulphate
- ammonium sulphite or ammonium bisulphite

(ii) addition of thiamin hydrochloride

(10) Use of carbon dioxide, argon or nitrogen, either alone or combined, solely in order to create an inert atmosphere and to handle the product shielded from the air

(11) Addition of carbon dioxide

(12) Use of sulphur dioxide, potassium bisulphite or potassium metabisulphite, which may also be called potassium disulphite or potassium pyrosulphite

(13) Addition of sorbic acid or potassium sorbate

(14) Addition of L-ascorbic acid

(15) Addition of citric acid for wine stabilisation purposes, provided that the final content in the treated wine does not exceed 1 gram per litre

(16) Use of tartaric acid for acidification purposes, provided that the initial acidity content is not raised by more than 2,5 g/l expressed as tartaric acid

(17) Use of one or more of the following substances for deacidification purposes:

- neutral potassium tartrate
- potassium bicarbonate
- calcium carbonate, which may contain small quantities of the double calcium salt of L (+) tartaric and L (-) malic acids
- a homogenous preparation of tartaric acid and calcium carbonate in equivalent proportions and finely pulverised
- calcium tartrate or tartaric acid

(18) Clarification by means of one or more of the following substances for oenological use:

- edible gelatine
- bentonite
- isinglass
- casein and potassium caseinate
- egg albumin, milk albumin
- kaolin
- pectolytic enzymes
- silicon dioxide as a gel or colloidal solution
- tannin
- enzymatic preparations of betaglucanase

(19) Addition of tannin

(20) Treatment with charcoal for oenological use (activated carbon)

(21) Treatment of:

- white wines and rosé wines, with potassium ferrocyanide
- red wines, with potassium ferrocyanide or with calcium phytate,

provided that the wine so treated contains residual iron

(22) Addition of metatartaric acid

(23) Use of acacia after completion of fermentation

(24) Use of DL-tartaric acid, also called racemic acid, or of its neutral salt of potassium for precipitating excess calcium

(25) Use for the manufacture of sparkling wines obtained by fermentation in bottle and with the lees separated by disgorging:

- of calcium alginate, or
- of potassium alginate

(26) Use of copper sulphate

(27) Addition of potassium bitartrate to assist the precipitation of tartar

(28) Addition of caramel to reinforce the colour of liqueur wines

(29) Use of calcium sulphate for the production of certain quality liqueur wines p.s.r.

(30) Addition of lysozyme

(31) Addition of wine or dried grape distillate or of neutral alcohol of vinous origin for the manufacture of liqueur wines

(32) Addition of sucrose, concentrated grape must or rectified concentrated grape must to increase the natural alcoholic strength of grapes, grape must or wine

(33) Addition of grape must or rectified concentrated grape must for sweetening of wine

(34) Partial concentration by physical processes, including reverse osmosis, to increase the natural alcoholic strength of grape must or wine

(35) Electrodialysis to guarantee tartaric stabilisation of the wine

(36) Use of urease to reduce the urea content in the wine.

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AMMONIUM BISULPHITE 400

AMMONIUM BISULPHITE SOLUTION AT 400 G OF SO2 PER LITRE OF DISSOLUTION

CHARACTERISTICS

By applying this product in one only step correction of sulphur in musts is done and ammonia nitrogen is provided for nutrition of yeast under fermentation.

1 cc of DOLMAR AMMONIUM BISULPHITE 400 gives 112 mg of NH4 equivalent to 88 mg of nitrogen.

DOLMAR AMMONIUM BISULPHITE 400 provides the following actions: antioxidant protecting must from oxidations, antioxidasic acting against polyphenol oxidase enzymes (tyrosinase, laccase...) and antiseptic inhibiting the action of bacteria and apiculated yeasts.

LEGISLATION

This product is authorized in Regulation (EC) no. 1493/99 at the allowable dose of 0.2 g/l.

This corresponds to 50 cc/hl of DOLMAR AMMONIUM BISULPHITE 400 at a maximum permissible sulphite of 19.8 g of SO_2/hl.

The information previously indicated belongs to our present knowledge. It is indicated without any obligation or guarantee by us and its use it is not our responsibility.
This information does not exempt the user from fulfillment of the legislation and safety measures in force.

DOSAGE

DOLMAR AMMONIUM BISULPHITE 400 is to be added as soon as possible and before the starting of fermentations. Never add to wine (it contains nitrogen).
DOLMAR AMMONIUM BISULPHITE 400 contains 400 gr. of SO_2 per each litre of solution.

PACKAGING

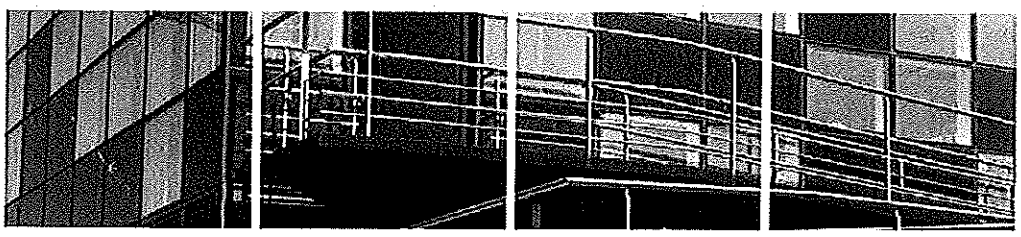
20 l jerrycan.

CONSERVATION

Keep the container filled with original sealed, in perfect condition, protected from light in a dry and odor free place.
Once opened or if vacuum breaks, use the product quickly.
At low temperatures this product can form crystals.

SAFETY CONDITIONS

DOLMAR AMMONIUM BISULPHITE 400 is classified Xi – irritant:
R31: Contact with acids liberates toxic gas.
R36/37: irritating to eyes and respiratory system.
S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.



FURTHER INFORMATION: