COEI-1-CARAME Caramel

N° SIN : 150

1. **Object, origin and field of application**

Caramel can be found in liquid form or solid form ranging in colour from dark brown to black. Colouring wine in the *stricto sensu* is not allowed but caramel is used as a colouring agent in certain liquor wines, spirit beverages of vitivinicultural origin and wine-based beverages.

2. **Definitions**

Caramel (or ordinary caramel) (Class I) (SIN: 150a)

- Caramel (or ordinary caramel) is prepared by controlled heating of carbohydrates made up of glucose and fructose monomers and/or their respective polymers (for example, glucose syrup, saccharose and/or inverted sugars syrups). To favour caramelisation, acids, bases and salts excluding ammonium compounds can be used.

Caustic sulphite caramel (Class II) (SIN:150b)

- Caustic sulphite caramel is prepared by controlled heating of carbohydrates as defined for ordinary caramel, with or without acids or bases, in the presence of sulphite compounds (sulphuric acid, potassium sulphite, potassium hydrogen sulphite, sodium sulphite and sodium hydrogen sulphite). No ammonium compounds are used.

Ammonia caramel (Class III) (SIN:150c)

- Ammonia caramel is prepared by controlled heating of carbohydrates as defined for ordinary caramel, with or without acids or bases, in the presence of ammonium compounds (ammonium hydroxide, ammonium carbonate, ammonium hydrogen carbonate, and ammonium phosphate). No sulphite compounds are used.

Ammonium sulphite caramel (Class IV) (SIN: 150d)

- Ammonia sulphite caramel is prepared by controlled heating of carbohydrates as defined for ordinary caramel, with or without acids or bases, in the presence of sulphite and ammonium compounds (sulphuric acid, potassium sulphite, potassium hydrogen sulphite, sodium sulphite, sodium hydrogen sulphite, ammonium hydroxide, ammonium carbonate, ammonium hydrogen carbonate, ammonium phosphate, ammonium sulphate, ammonium sulphite and ammonium hydrogen sulphite.

3. Labelling

The concentration of the product and whether it was mixed, must be indicated on the label in addition to the storage conditions.

4. Test trials

4.1. Intensity of the colouring

The intensity of the colouring is defined as the absorbance of a liquid solution of 0.1% (m/v) concentrated caramel measured in a 1 cm space of optical pathway with light waves of 610 nm.

4.2. Total Nitrogen

Apply the method described in Chapter II of the International Oenological Codex to 2 g of exactly measured caramel.

4.3. Preparation of the solution for the test trials

- Place 2 g of caramel in a capsule; put in heat chamber at 105°C for 4 hours than incinerate carefully without going beyond 550°C.
- Take the cinders and put in 10 ml of 10% hydrochloric acid (R). Heat a little and transfer to a graduated 50 ml flask and rinse the capsule with water and fill up to the indicator.

4.4. Heavy metals

- Take 10 ml of the solution prepared for the trial tests as in point 4.3, and add 2 ml of 3.5 pH buffer solution (R) and 1.2 ml of thioacetamide reagent (R).
- If the solution turns brown, it must be less brown than the control sample, as indicated in Chapter II of the International Oenological Codex.

4.5. Lead

Using the solution for test trials as prepared in the point 4.3, measure out the lead as indicated in Chapter II of the International Oenological Codex. Please refer to point 5 for maximum contents.

4.6. Mercury

Measure out the mercury using the method described in Chapter II of the International Oenological Codex.

Please refer to point 5 for maximum contents.

4.7. Cadmium

- Test solution prepared according to point 4.3;
- Measure out the cadmium using the method described in Chapter II of the International Oenological Codex.

Please refer to point 5 for maximum contents.

4.8. Arsenic

- Test solution prepared according to point 4.3;
- Measure out the arsenic using the method described in Chapter II of the International Oenological Codex.

Please refer to point 5 for maximum contents.

4.9. Colouring matter retained on DEAE cellulose

See method as described by JECFA published in the Compendium of food additive specifications, FAO Food and Nutrition Paper 52 Add. 8.

4.10. Colouring matter retained on phosphorylcellulose

See method as described by JECFA published in the Compendium of food additive specifications, FAO Food and Nutrition Paper 52 Add. 8.

4.11. 4-Methylimidazole

See method as described by JECFA published in the Compendium of food additive specifications, FAO Food and Nutrition Paper 52 Add. 8.

4.12. 2-Acetyl-4-tetrahydroxybutylimidazole

See method as described by JECFA published in the Compendium of food additive specifications, FAO Food and Nutrition Paper 52 Add. 8.

4.13. Total sulphur

See method as described by JECFA published in the Compendium of food additive specifications, FAO Food and Nutrition Paper 52 Add. 8.

4.14. Sulphur dioxide

The method used can be found in the O.I.V. Compendium of International Methods of Analysis of Wine and Musts.

5. Particular specifications

5.1. Ordinary caramel

Colouring matter retained on DEAE cellulose	Not more than 50%
Colouring matter retained on phosphorylcellulose	Not more than 50%
Colour intensity	0.01 – 0.12
Total nitrogen	Not more than 0.1%
Total sulphur	Not more than 0.3%
Arsenic	Not more than 1 mg/kg
Lead	Not more than 2 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (expressed in Pb)	Not more than 25 mg/kg

5.2. Caustic sulphite caramel

Colouring matter retained on DEAE cellulose	Not more than 50%
Colour intensity	0.06 – 0.10
Total Nitrogen	Not more than 0.2%[1]
Total sulphur dioxide	Not more than 0.2% [2]
Total sulphur	1.3 – 2.5%[3]
Sulphur retained on DEAE cellulose	Over 40%
Percentage of optical colour density retained on DEAE cellulose	19-34
OD 280/560 ratio	Over 50
Arsenic	Not more than 1 mg/kg

Lead	Not more than 2 mg/kg
Mercury	Not more than 1 mg/kg
Heavy metals (expressed in lead)	Not more than 25 mg/kg

5.3. Ammonia caramel

Colouring matter retained on DEAE cellulose	Not more than 50%
Colour matter retained on phosphorylcellulose	Not more than 50%
Colour intensity	0.08 – 0.36
Ammoniac nitrogen	Not more than 0.4%[4]
4-Methylimidazole	Not more than 250 mg/kg[5]
2-Acetyl-4-tetrahydroxybutylimidazole	Not more than 10 mg/kg[6]
Total sulphur	Not more than 0.3%[7]
Total nitrogen	1.3 – 6.8%[8]
Percentage of optical colour density retained on phosphorylcellulose	13-35
Arsenic	Not more than 1 mg/kg
Lead	Not more than 2 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (expressed in lead)	Not more than 25 mg/kg

5.4. Ammonium sulphite caramel

Colouring matter retained on DEAE cellulose	Not more than 50%
Colour intensity	0.10 – 0.60

Ammoniac nitrogen	Not more than 2.6%[9]
Sulphur dioxide	Not more than 0.5%[10]
4Methylimidazole	Not more than 250 mg/kg[11]
Total nitrogen	0.5 – 7.5%[12]
Total sulphur	1.4 – 10%[13]
Nitrogen/sulphur precipitation by alcohol ratio	0.7 – 2.7
OD precipitation by alcohol ratio[14]	8-14
OD 280/560 ratio[15]	Not more than 50
Arsenic	Not more than 1 mg/kg
Lead	Not more than 2 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (expressed in lead)	Not more than 25 mg/kg

6. Storage conditions

Caramel must be stored in a closed container.

7. References

- Directive 95/45/CE Journal officiel des Communautés européennes, L 226, 22 September 1995.
- Compendium of food additive specifications, Addendum 8, FAO Food and Nutrition Paper 52 Add.8.
- Joint FAO/WHO Expert Committee on Food Additives (JECFA) ISBN 92-5-104508-9.

[1] Expressed by the intensity of equivalent colouring; or compared to a product with a colour intensity of 0.1 unit of absorption.

[2] Expressed by the intensity of equivalent colouring; or compared to a product with a colour intensity of 0.1 unit of absorption.

[3] Expressed by the intensity of equivalent colouring; or compared to a product with a colour intensity of 0.1 unit of absorption.

[4] Expressed by the intensity of equivalent colouring; or compared to a product with a colour intensity of 0.1 unit of absorption.

[5] Expressed by the intensity of equivalent colouring; or compared to a product with a colour intensity of 0.1 unit of absorption

[6] Expressed by the intensity of equivalent colouring; or compared to a product with a colour intensity of 0.1 unit of absorption

[7] Expressed by the intensity of equivalent colouring; or compared to a product with a colour intensity of 0.1 unit of absorption

[8] Expressed by the intensity of equivalent colouring; or compared to a product with a colour intensity of 0.1 unit of absorption

[9] Expressed by the intensity of equivalent colouring; or compared to a product with a colour intensity of 0.1 unit of absorption.

[10] Expressed by the intensity of equivalent colouring; or compared to a product with a colour intensity of 0.1 unit of absorption.

[11] Expressed by the intensity of equivalent colouring; or compared to a product with a colour intensity of 0.1 unit of absorption.

[12] Expressed by the intensity of equivalent colouring; or compared to a product with a colour intensity of 0.1 unit of absorption.

[13] Expressed by the intensity of equivalent colouring; or compared to a product with a colour intensity of 0.1 unit of absorption.

[14] The optical densities of precipitation by alcohol is defined as the optical density of precipitation at 280 nm divided by the optical density at 560 nm (in a 1 cm space).

[15] The optical densities of precipitation by alcohol is defined as the optical density of

precipitation at 280 nm divided by the optical density at 560 nm (in a 1 cm space).