REGULATION FOR SULFITES IN FOOD:
Food Additive or Allergen?

Nuri Andarwulan
SEAFAST Center, IPB
Southeast Asian Food & Agr. Sci & Tech Center
Department of Food Science and Technology, IPB

Learning Outcomes
Could describe, understand and apply the regulation for sulfite in foods

Agenda
- Sulfite Compounds
- Sulfites in Food
- Functional Properties of Sulfites
- Codex Stan 1-1985 and Codex Stan 192-1995
- Technological function of Food Additives
What are sulfites containing food additives and how are they used?

SULFITES

ADI: 0 – 0.7 mg/kg bw express as SO₂
# Common Sulfites Additives

- sulfur dioxide
- sodium metabisulfite
- sodium bisulfite
- sodium sulfite
- potassium metabisulfite
- potassium bisulfite

<table>
<thead>
<tr>
<th>GSFA Provisions for SULFITES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number</strong></td>
</tr>
<tr>
<td>14.2.7</td>
</tr>
<tr>
<td>14.2.1</td>
</tr>
<tr>
<td>11.2</td>
</tr>
<tr>
<td>04.1.2.7</td>
</tr>
<tr>
<td>04.2.2.4</td>
</tr>
<tr>
<td>14.2.2</td>
</tr>
<tr>
<td>14.1.2.3</td>
</tr>
<tr>
<td>14.1.3.3</td>
</tr>
<tr>
<td>14.1.2.4</td>
</tr>
<tr>
<td>14.1.3.4</td>
</tr>
<tr>
<td>09.2.4.2</td>
</tr>
<tr>
<td>14.2.6</td>
</tr>
<tr>
<td>04.1.2.2</td>
</tr>
</tbody>
</table>
What are sulfites used for?

- Freeze dried, diced green bell peppers: 5,819 ppm
- Mixed dried fruits: 1,827 ppm
- Golden raisins: 1,555 ppm
- Treated lettuce (0.5 oz sodium metabisulphate/gallon for 1 min): 536 ppm
- Instant mashed potatoes: 488 ppm
- Hashed brown potatoes: 347 ppm
- Freeze dried peas: 345 ppm
- Spicy peppers in vinegar: 307 ppm
- Lemon juice: 278 ppm
- Treated shrimp (1.25 % sodium metabisulfite for 1 min): 268 ppm
- Lime juice: 218 ppm
- High sulfite wine: 250 - 300 ppm
- Red wine (Brand A): 163 ppm
- Red wine (Brand B): 156 ppm
- Low sulfite wine: < 20 ppm
- Cocktail Onions: 64 ppm
- Wine vinegar: 48 ppm
- Coconut flakes: 10 ppm
- Beer: < 0.5 ppm

Functional Properties of Sulfites:

- **Preservative**
- **Antioxidant**
- **Firming agent**
- **Bleaching agent**
- **Flour treatment agent**
- **Sequestrant**

### SULFITES

<table>
<thead>
<tr>
<th>INS</th>
<th>Compound</th>
<th>Functional Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>220</td>
<td>Sulfur dioxide</td>
<td>Antioxidant, Bleaching agent, Flour treatment agent,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preservative</td>
</tr>
<tr>
<td>221</td>
<td>Sodium sulfite</td>
<td>Antioxidant, Bleaching agent, Flour treatment agent,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preservative</td>
</tr>
<tr>
<td>222</td>
<td>Sodium hydrogen sulfite</td>
<td>Antioxidant, Preservative</td>
</tr>
<tr>
<td>223</td>
<td>Sodium metabisulfite</td>
<td>Antioxidant, Bleaching agent, Flour treatment agent,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preservative</td>
</tr>
<tr>
<td>224</td>
<td>Potassium metabisulfite</td>
<td>Antioxidant, Bleaching agent, Flour treatment agent,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preservative</td>
</tr>
<tr>
<td>225</td>
<td>Potassium sulfite</td>
<td>Antioxidant, Preservative</td>
</tr>
<tr>
<td>227</td>
<td>Calcium hydrogen sulfite</td>
<td>Antioxidant, Preservative</td>
</tr>
<tr>
<td>228</td>
<td>Potassium bisulfite</td>
<td>Antioxidant, Preservative</td>
</tr>
<tr>
<td>539</td>
<td>Sodium thiosulfate</td>
<td>Antioxidant, Sequestrant</td>
</tr>
</tbody>
</table>
Regulation for sulfites in foods: **Labelling**

SULFITES

---

### GENERAL STANDARD FOR THE LABELLING OF PREPACKAGED FOODS

**CODEX STAN 1-1985**

4.2 **List of ingredients**

4.2.1 Except for single ingredient foods, a list of ingredients shall be declared on the label.

4.2.1.1 The list of ingredients shall be headed or preceded by an appropriate title which consists of or includes the term ‘ingredient’.

4.2.1.2 All ingredients shall be listed in descending order of ingoing weight (m/m) at the time of the manufacture of the food.

4.2.1.3 Where an ingredient is itself the product of two or more ingredients, such a compound ingredient may be declared, as such, in the list of ingredients, provided that it is immediately accompanied by a list, in brackets, of its ingredients in descending order of proportion (m/m). Where a compound ingredient (for which a name has been established in a Codex standard or in national legislation) constitutes less than 5% of the food, the ingredients, other than food additives which serve a technological function in the finished product, need not be declared.
4.2.1.4 The following foods and ingredients are known to cause hypersensitivity and shall always be declared:

- Cereals containing gluten; i.e., wheat, rye, barley, oats, spelt or their hybridized strains and products of these;
- Crustacea and products of these;
- Eggs and egg products;
- Fish and fish products;
- Peanuts, soybeans and products of these;
- Milk and milk products (lactose included);
- Tree nuts and nut products; and
- Sulphite in concentrations of 10 mg/kg or more.
### GENERAL STANDARD FOR THE LABELLING OF PREPACKAGED FOODS

**CODEX STAN 1-1985**

#### 4.2.3.3 For food additives falling in the respective classes and appearing in lists of food additives permitted for use in foods, the following functional classes shall be used together with the specific name or recognized numerical identification such as the Codex International Numbering System (CAC/GL 36-1989) as required by national legislation.

- Acidity Regulator
- Anticaking Agent
- Antifoaming Agent
- Antioxidant
- Bleaching Agent
- Bulking Agent
- Carbonating Agent
- Colour
- Colour Retention Agent
- Emulsifier
- Emulsifying Salt
- Firming Agent
- Flavour Enhancer
- Flour Treatment Agent
- Foaming Agent
- Gelling Agent
- Glazing Agent
- Humectant
- Preservative
- Propellant
- Raising Agent
- Sequestrant
- Stabilizer
- Sweetener
- Thickener

---

### GENERAL STANDARD FOR THE LABELLING OF PREPACKAGED FOODS

**CODEX STAN 1-1985**

#### 4.2.4 Processing aids and carry-over of food additives

**4.2.4.1** A food additive carried over into a food in a significant quantity or in an amount sufficient to perform a technological function in that food as a result of the use of raw materials or other ingredients in which the additive was used shall be included in the list of ingredients.

**4.2.4.2** A food additive carried over into foods at a level less than that required to achieve a technological function, and processing aids, are exempted from declaration in the list of ingredients. The exemption does not apply to food additives and processing aids listed in section 4.2.1.4.
Carry-over Principle for Food Additives

**PRINCIPLE**

- **Carry-Over:** Additive authorised in ingredient can be carried over to compound foodstuff
- **Reverse Carry-Over:** Additive authorised in compound foodstuff can be brought into the foodstuff via an ingredient

**CODEX ALIMENTARIUS**

**GENERAL STANDARD FOR FOOD ADDITIVES**

**CODEX STAN 192-1995**

4. CARRY-OVER OF FOOD ADDITIVES INTO FOODS

4.1 Conditions Applying to Carry-Over of Food Additives from ingredients and raw materials into foods

Other than by direct addition, an additive may be present in a food as a result of carry-over from a raw material or ingredient used to produce the food, provided that:

a) The additive is acceptable for use in the raw materials or other ingredients (including food additives) according to this Standard;

b) The amount of the additive in the raw materials or other ingredients (including food additives) does not exceed the maximum use level specified in this Standard;

c) The food into which the additive is carried over does not contain the additive in greater quantity than would be introduced by the use of raw materials, or ingredients under proper technological conditions or manufacturing practice, consistent with the provisions of this standard.

4.2 Special conditions applying to the use of food additives not directly authorised in food ingredients and raw materials

An additive may be used in or added to a raw material or other ingredient if the raw material or ingredient is used exclusively in the preparation of a food that is in conformity with the provisions of this standard, including that any maximum level applying to the food is not exceeded.

Reverse carry-over
4.3 Foods for Which the Carry-over of Food Additives is Unacceptable

Carry-over of a food additive from a raw material or ingredient is unacceptable for foods belonging to the following food categories, unless a food additive provision in the specified category is listed in Tables 1 and 2 of this standard.

a) 13.1 - Infant formulae, follow-up formulae, and formulae for special medical purposes for infants.

b) 13.2 - Complementary foods for infants and young children.

---

**Carry-over rule (Article 18)**

22. “Carry-over” provisions apply to most foods permitted to contain food additives, but not to those specially prepared for infants and young children. These provisions permit the presence of a permitted food additive in a compound food, to the extent that the food additive is allowed by the provisions of Annex II of Regulation 1333/2008 in one of the ingredients of the compound food (Article 18.1 (a) refers).

23. Recital 16 of Regulation 1333/2008 should be taken into account when considering applying the carry-over rule – this states that the level of the additive in the final food should be no greater than would be introduced by the use of the ingredient under proper technological conditions and good manufacturing practice, thus preventing misuse of carry-over.
Example of carry-over are given below:

a) A fruit yoghurt consisting of plain (unflavoured) yoghurt and a fruit preparation would be permitted to contain sorbates, are permitted in fruit preparations, even though they are not permitted in plain yoghurts. The level used must not exceed the maximum level for the fruit preparation element of the yoghurt.

b) If a non-heat treated meat product is used as an ingredient in a compound food (e.g. the cooked bacon in a bacon lettuce and tomato (BLT) sandwich), the presence of nitrate would be permitted in the BLT sandwich up to the limit permitted for the cooked bacon.

Example of the authorised presence of additives in a pizza consisting of 50% bread, 20% sauce, 15% meat and 15% cheese

<table>
<thead>
<tr>
<th>Additive (mg/kg)</th>
<th>Bread (50%)</th>
<th>Sauce (20%)</th>
<th>Meat (15%)</th>
<th>Cheese (15%)</th>
<th>Expected level in the compound food according this recipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>E 210</td>
<td>1000 (200)</td>
<td></td>
<td></td>
<td></td>
<td>200</td>
</tr>
<tr>
<td>E 251</td>
<td></td>
<td>150 (22.5)</td>
<td>150 (22.5)</td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>E 338-452</td>
<td>12000 (6000)</td>
<td>5000 (750)</td>
<td></td>
<td></td>
<td>6750</td>
</tr>
<tr>
<td>E 620-625</td>
<td></td>
<td>5000 (1000)</td>
<td>5000 (1000)</td>
<td></td>
<td>1750</td>
</tr>
</tbody>
</table>
24. The carry-over rule also provides for permitted food additives to be present in foods (such as intermediary products) in which they would not otherwise be permitted, provided that those foods are to be used solely in the preparation of a compound food that will conform to the provisions of Annex II. The latter is commonly referred to as “reverse carry-over” (Article 18 (c) refers).

• Example of reverse carry-over are:

a) Annatto (not normally permitted to be used in seasonings) could be added to a seasoning that is intended solely for use in a snack food, provided the level of annatto does not result in the maximum level of annatto permitted for the snack food being exceeded. The annatto would not be permitted to be added to a seasoning that was intended to be used in a food that is not permitted to contain annatto, such as a minced meat preparation.

b) Sodium bicarbonate (E 500, a Group 1 additive not normally permitted to be used in self raising flour) could be added to self raising flour that is intended solely for use in bread or fine bakery wares, as Group 1 additives are permitted to be used in these foods.
12. BTP Ikutan (*carry over*) adalah BTP yang berasal dari semua bahan baku baik yang dicampurkan maupun yang dikemas secara terpisah tetapi masih merupakan satu kesatuan produk.

Pasal 8

(1) Jenis dan Batas Maksimum BTP Pemanis Ikutan (*carry over*) mengikuti ketentuan jenis dan Batas Maksimum BTP seperti tercantum pada Lampiran I sebagaimana dimaksud dalam Pasal 4.

(2) Dalam hal BTP Pemanis Ikutan sebagaimana dimaksud pada ayat (1) tidak tercantum pada Lampiran I, maka harus terlebih dahulu mendapat persetujuan tertulis dari Kepala Badan.

(3) Untuk mendapatkan persetujuan sebagaimana dimaksud pada ayat (2), pemohon harus mengajukan permohonan tertulis kepada Kepala Badan disertai kelengkapan data dengan menggunakan formulir sebagaimana tercantum dalam Lampiran V yang merupakan bagian tidak terpisahkan dari Peraturan ini.

(4) Keputusan persetujuan/penolakan dari Kepala Badan diberikan paling lama 180 (seratus delapan puluh) hari kerja sejak diterimanya permohonan secara lengkap.
Codex Stan 1-1986 and Codex Stan 192-1995

- Sulfiting agents are food additives permitted for use as preservatives in food → Permenkes No. 033/2012 and PerKa BPOM.

- Sulfiting agents must be declared in the ingredient statement if it is added for functional purposes or present at detectable levels (greater than 10 parts per million or ppm).

What is and how to measure technological function of food additives?
GENERAL STANDARD FOR FOOD ADDITIVES

CODEX STAN 192-1995

2. DEFINITIONS

a) **Food additive** means any substance not normally consumed as a food by itself and not normally used as a typical ingredient of the food, whether or not it has nutritive value, the intentional addition of which to food for a technological (including organoleptic) purpose in the manufacture, processing, preparation, treatment, packing, packaging, transport or holding of such food results, or may be reasonably expected to result (directly or indirectly), in it or its by-products becoming a component of or otherwise affecting the characteristics of such foods. The term does not include contaminants or substances added to food for maintaining or improving nutritional qualities.  

GENERAL STANDARD FOR THE LABELLING OF PREPACKAGED FOODS

CODEX STAN 1-1985

4.2.4 Processing aids and carry-over of food additives

4.2.4.1 A food additive carried over into a food in a significant quantity or in an amount sufficient to perform a technological function in that food as a result of the use of raw materials or other ingredients in which the additive was used shall be included in the list of ingredients.

4.2.4.2 A food additive carried over into foods at a level less than that required to achieve a technological function, and processing aids, are exempted from declaration in the list of ingredients. The exemption does not apply to food additives and processing aids listed in section 4.2.1.4.
Tartrazine Exposure Assessment by Using Food Frequency Method in North Jakarta, Indonesia

Anisyah Anisyah, Nuri Andarwulan, Purwiyatno Hariyadi

1Directorate of Food Standardization, National Agency for Drug and Food Control, Jakarta, Indonesia; 2Department of Food Science and Technology, Faculty of Agricultural Technology, Bogor Agricultural University, Bogor, Indonesia; 3Southeast Asian Food and Agricultural Science and Technology Center (SEAFAST Center), Bogor Agricultural University, Bogor, Indonesia. Email: nuri@seafast.org

Food Products containing tartrazine (BPOM, 2001-2006)

N = 2887

- mi instan 19.50%
- Kembang gula 19.15%
- Minuman ringan 14.96%
- Produk bakeri 12.71%
- Makanan ringan 8.42%
- Buah Olahan 6.37%
- es krim 3.98%
- Minuman beralkohol 3.57%
- Pangan khusus 2.01%
- Susu fermentasi 1.35%
- N = 2887
## Tartrazine Level in Food Products

<table>
<thead>
<tr>
<th>No.</th>
<th>Food product</th>
<th>Tartrazine level in food product</th>
<th>Maximum limit of tartrazine in food product according to regulation (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean (mg/kg)</td>
<td>Indonesia</td>
</tr>
<tr>
<td>1</td>
<td>Instant noodle:</td>
<td></td>
<td>- Max</td>
</tr>
<tr>
<td></td>
<td>- Before processed</td>
<td>22.50</td>
<td>- 100</td>
</tr>
<tr>
<td></td>
<td>- After processed</td>
<td>16.77</td>
<td>- 27.25</td>
</tr>
<tr>
<td>2</td>
<td>Candies</td>
<td>90.53</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Carbonated drink</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Non carbonated drink</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Powdered drink</td>
<td>13.30</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Fruity drink, squash</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Syrup</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Layer cake</td>
<td>200</td>
<td>- 200</td>
</tr>
<tr>
<td>9</td>
<td>Biscuit</td>
<td>72.86</td>
<td>- 10</td>
</tr>
<tr>
<td>10</td>
<td>Bread</td>
<td>11</td>
<td>- 11</td>
</tr>
<tr>
<td>11</td>
<td>Snacks</td>
<td>88.57</td>
<td>- 200</td>
</tr>
<tr>
<td>12</td>
<td>Jelly</td>
<td>25.95</td>
<td>- 84.35</td>
</tr>
<tr>
<td>13</td>
<td>Jam and jelly</td>
<td>213</td>
<td>- 226</td>
</tr>
<tr>
<td>14</td>
<td>Ice cream</td>
<td>76</td>
<td>- 200</td>
</tr>
<tr>
<td>15</td>
<td>Fermented milk</td>
<td>50.50</td>
<td>- 100</td>
</tr>
</tbody>
</table>

Minimum level that shows technological function

Thank You