

Guidelines on the Use of Aluminium- containing Food Additives

Purpose

The Guidelines set out principles for the use of aluminium-containing food additives in food production and provide recommendations to the trade for reducing aluminium content in food products. The Guidelines are applicable to all manufacturers and producers (including restaurants and bakeries).

Background

2. The Joint Food and Agriculture Organization / World Health Organization Expert Committee on Food Additives (JECFA) re-evaluated the safety of aluminium in 2006 and concluded to lower the provisional tolerable weekly intake (PTWI) from 7 mg/kg body weight (bw) to 1 mg/kg bw for aluminium (including additives). Subject to the availability of new scientific data including bioavailability data, JECFA might re-evaluate the safety of aluminium in near future.

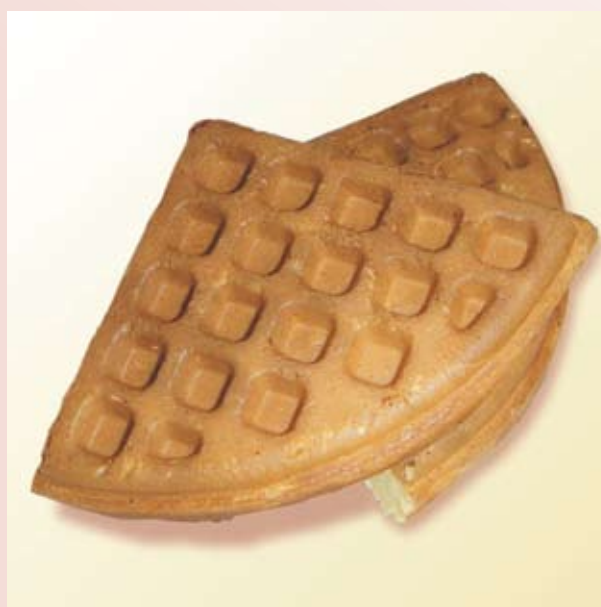
3. In view of the latest safety evaluation of aluminium, public concern and a lack of local data on the situation of food containing aluminium-containing food additives, the Centre for Food Safety (CFS) has conducted a study on “Aluminium in Food” aiming to examine the levels of aluminium in various food products in relation to the use of aluminium-containing food additives, to estimate the potential dietary exposure to aluminium of the population in Hong Kong and to assess the associated health risk. The study revealed that aluminium-containing food additives are widely used in the production of steamed bread/bun/cake, some bakery products such as muffin, pancake, waffle, coconut tart and jellyfish. On the other hand, the study also revealed that certain bakery products generally contain low levels of aluminium, and they are white bread, wheat bread and rolls. Although the results indicated that it is unlikely to cause adverse health effect of aluminium for the general population, the adverse health effect of aluminium for some population who regularly consume foods added with aluminium-containing food additive such as steamed bread/bun/cake, bakery products and jellyfish cannot be ruled out. To protect public health, efforts should be made to reduce exposure to aluminium for the population.

4. Examples of food items that were found with high levels of aluminium are listed below:

- Steamed bread (without filling) such as steamed bread (饅頭)
- Steamed bun (with filling) such as barbecue pork bun
- Steamed cake such as “Mai Lai” cake (馬拉糕)
- Bakery products such as muffin, pancake, waffle and coconut tart
- Jellyfish

5. The study report can be found at the webpage of CFS <www.cfs.gov.hk/english/programme/programme_rafs/programme_rafs_fa_01.html>.

6. To address the problem, a Working Group was set up by the CFS, comprising representatives from the trade and academia, to advise the trade in the principles of using aluminium-containing food additives and reducing the aluminium content in products.



7. Members of the trade should share the responsibility to protect public health and make efforts to reduce exposure to aluminium for the population. Hence, members of the trade should adopt the Guidelines where appropriate to reduce the aluminium content of their products. The Government will continue to keep in view the international development on standard setting in this aspect. The Guidelines will be reviewed in consultation with the local food trade and other relevant parties as appropriate.

About Aluminium-containing Food Additives

8. Aluminium-containing food additives have been used in food processing for over a century, e.g. as firming agent, raising agent, stabiliser, anticaking agent and colouring matter.

9. Baking powder is commonly used as raising agent in the production of bakery products such as cake and muffin, and steamed floury products such as steamed cake, steamed bun and steamed bread, and its application and use levels may vary among products, as well as, among manufacturers. However, certain products such as white bread, wheat bread and some rolls are commonly produced by other means such as yeast fermentation. Baking powder typically has three components namely acid, alkaline and filler. Sodium hydrogen carbonate (INS* no. 500(ii)), also known as baking soda, is commonly used as the alkaline component in baking powder. It is readily soluble in water and reacts with the acidic component to form carbon dioxide, which then raises the baking products. The rate of reaction largely depends on the rate of dissolution of the acidic component in the baking powder. An acid in a baking powder can generally be categorised into “fast acting” or “slow acting” ones. Generally speaking, a fast acting acid reacts with dissolved sodium hydrogen carbonate at room temperature while a slow acting acid will react until the temperature is raised to certain degree e.g. when baking in the oven. The combinations of the slow and fast acting acids give rise to the double acting baking powder. Some aluminium-containing food additive e.g. aluminium sodium sulphate (INS no. 521) and sodium aluminium phosphate (acidic) (INS no. 541(i)) can be used as the slow acting acid in baking powder and their use levels can be ranged from 21% to 26%. Owing to the use of aluminium-containing food additives, high levels of aluminium would be expected in the final product, but the residual levels of aluminium may vary, depending on the levels used.

10. Aluminium potassium sulphate (INS no. 522), also known as alum, is a common additive used to produce salted jellyfish. Salted jellyfish is produced from fresh jellyfish after caught by traditional processing involving a multi-phase procedure using a mixture of salt and alum to reduce the water content and firm the texture. Jellyfish dish is prepared from salted jellyfish by desalting and rehydrating in water. Extremely high levels of aluminium would still be remained in the jellyfish dish.



* “INS” in full is “International Numbering System for Food Additives” adopted by Codex Alimentarius Commission (Codex).

11. Some aluminium-containing food additives are generally permitted to be used in food in many countries such as the US, the EU, Australia, New Zealand, Japan and Mainland China, etc. Examples of common aluminium-containing food additives are listed in Annex 1. In Mainland China, “Hygienic standards for uses of food additives (GB 2760 – 2007)” includes provisions for some aluminium-containing food additives, in which a maximum aluminium residual level of 100 mg/kg in dry weight is established for some aluminium-containing food additives in various food. Examples of provisions are listed in Annex 2. On the other hand, according to the aquatic industrial standard for “Salted jellyfish and salted jellyfish head” (SC/T 3210 – 2001), the standard for alum in these products is set at 1.2 – 2.2%. It should be noted that these are not recommended local standards, but merely serve as reference for the trade. These levels might be high, with reference to the newly established PTWI, and these standards might be subject to change in the future.

12. In the international arena, some aluminium-containing food additives have been included in the Codex General Standard for Food Additives (GSFA) and some of them are still in the drafting stage. However, Codex noted that some of the proposed levels seemed high, which might result in the safety reference being exceeded. Hence, Codex is currently reviewing the standards for aluminium-containing food additives in the GSFA. The trade is advised to observe the latest development on the standards.

13. In Hong Kong, according to the Colouring Matter in Food Regulations (the Regulation), the aluminium salts (lakes) of any of the permitted water-soluble colours stipulated in the Regulation and aluminium in leaf or powder form solely for external colouring of dragees and decoration of sugar-coated flour confectionery are permitted colouring matters. As for other aluminium-containing food additives, there is no specific subsidiary legislation to govern their uses. However, the Public Health and Municipal Services Ordinance stipulates that all food on sale in Hong Kong must be fit for human consumption. If a prepackaged food contains a food additive including aluminium-containing food additive, such additive should be specified on the label accurately in the prescribed manner stipulated in the Food and Drugs (Composition and Labelling) Regulations.

Basic Principles

14. In order to reduce exposure to aluminium of the population, the guidelines embody the following principles:

Principle 1:

The use of aluminium-containing food additives should be reduced or replaced with other alternatives in preparing food as far as possible.

Principle 2:

Alternative techniques for food processing should be developed to reduce the use of aluminium-containing food additives.



Advice to the Trade

15. The trade is advised to make reference to the following points in the production of food products and modification of the production of existing food products:



Product Development

- i. Limit the application of aluminium-containing food additives in food products.
- ii. Limit the quantities of aluminium-containing food additives added to the lowest possible level necessary to accomplish its desired effect. The quantities added should present no appreciable health risk to consumers. The corresponding aluminium level owing to the use of aluminium-containing food additives could be estimated, based on the use level and the molecular weight of the aluminium-containing food additives. For example, if a product is added with aluminium sodium sulphate (molecular weight: 458.29) at 0.1% w/w (i.e. 1000 mg/kg), the corresponding aluminium level is about 59 mg/kg ($26.98/458.29 \times 1000$). It should be noted that the corresponding aluminium level does not represent the residual level of aluminium in the final product.
- iii. Obtain information or specification of all ingredients from the suppliers about their components and check the components of each ingredient used carefully to see if they contain aluminium-containing food additives. For example, some baking powder commonly available in the market contains aluminium sodium sulphate as raising agent.
- iv. Consider to use other alternatives, as far as possible, to replace aluminium-containing food additives in preparing food although there may be cost implication by using alternatives.
- v. Develop alternative techniques to reduce the use of aluminium-containing food additives, such as alum, during the production of salted jellyfish.

Food Production

- i. Check the identity of ingredients added in accordance with the recipe.
- ii. Add the required amount of food additives accurately.

Food Labelling

- i. Ensure to provide accurate information on prepackaged food label including specific food additives used.

Annex 1

Examples of common aluminium-containing food additives

INS [†] No.	Food Additive	Technological purpose
520	Aluminium sulphate (硫酸鋁)	Firming agent
521	Aluminium sodium sulphate (硫酸鋁鈉)	Firming agent
522	Aluminium potassium sulphate (硫酸鋁鉀)	Acidity regulator, stabiliser
523	Aluminium ammonium sulphate (硫酸鋁銨)	Stabiliser, firming agent
541	Sodium aluminium phosphate (磷酸鋁鈉)	Acidity regulator, emulsifier
541(i)	Sodium aluminium phosphate (acidic) (酸性的磷酸鋁鈉)	Acidity regulator, emulsifier, raising agent
541(ii)	Sodium aluminium phosphate (basic) (鹼性的磷酸鋁鈉)	Acidity regulator, emulsifier
554	Sodium aluminosilicate (硅酸鋁鈉)	Anticaking agent
555	Potassium aluminium silicate (硅酸鋁鉀)	Anticaking agent
556	Calcium aluminium silicate (硅酸鋁鈣)	Anticaking agent
559	Aluminium silicate (硅酸鋁)	Anticaking agent

Annex 2

Examples of some provisions for aluminium-containing food additives in “Hygienic standards for uses of food additives (GB 2760 – 2007)” in the Mainland[‡]

Food Additive	Examples of Food Categories	Maximum Level
Aluminium potassium sulphate (INS no. 522), aluminium ammonium sulphate (INS no. 523)	Wheat flour and its products, bakery products, aquatic products, deep fried products, and leavening products	In accordance with Good Manufacturing Practice; Maximum aluminium residual level: 100 mg/kg (in dry weight)
Sodium aluminosilicate (INS no. 554)	Other fat or oil and their products (limited to non-dairy creamer)	5 g/kg

[†] “INS” in full is “International Numbering System for Food Additives” adopted by Codex Alimentarius Commission (Codex).

[‡] Examples listed are not exhaustive or complete. It should be noted that these are not recommended local standards, but merely serve as reference for the trade.