食物安全焦點
Food Safety Focus

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食物環境衞生署 Food and Environmental Hygiene Department

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解讀食物中的二氧化硫
A Closer Look at Sulphur Dioxide in Foods

食物安全中心風險評估組
科學主任黃詩雯女士報告

Reported by Ms. Sosanna WONG, Scientific Officer,
Risk Assessment Section, Centre for Food Safety

在最近進行的食物監測行動中，食物安全中心(食安中心)檢出兩個預先包裝蜜棗樣本分別含有超過法例標準的二氧化硫及食物標籤未有標明使用了二氧化硫。食安中心隨後發出食物警報，並指示經銷商展開回收。本文會闡釋二氧化硫如何應用於食品生產中。

為什麼在食物中添加二氧化硫？

二氧化硫用途廣泛，應用於食品生產中已有悠久歷史，因此聽來可能並不陌生，但你知道箇中原理嗎？

二氧化硫可用作防腐劑，廣泛應用於各種食物及飲品中，例如乾果、蔬菜乾、醃菜、果汁及葡萄酒。二氧化硫能穿過酵母菌、細菌及霉菌等微生物的細胞壁並破壞其正常功能，抑制微生物的生長，故可以遏止微生物所引致的腐壞，延長食品的保質期。

除了抗菌的特性外，二氧化硫亦是一種抗氧化劑，可防止食物(尤其是乾果及蔬菜乾)因氧化而變成褐色，有助保持產品的外觀與顏色。如果沒有添加二氧化硫，杏脯等淺色乾果在接觸空氣後便會迅速變為深色。

二氧化硫也常用於釀製葡萄酒，可防止葡萄酒變質和氧化，保持其品質及新鮮度。

二氧化硫可安全用作食物添加劑嗎？

與其他食物添加劑一樣，二氧化硫已通過嚴格的安全評估，才獲評定為可安全使用於食物中。國際食物安全機構聯合國糧食及農業組織/世界衞生組織食品添加劑聯合專家委員會已評估二氧化硫的安全性。在食物

Recently, food surveillance conducted by the Centre for Food Safety (CFS) identified two prepackaged date samples that contained sulphur dioxide at a level exceeding the legal limit and had not declared its usage on the food label, respectively. The CFS then issued food alerts and prompted the distributors to initiate recalls. This article discusses the use of sulphur dioxide in food production.

Why is Sulphur Dioxide Added to Foods?

Sulphur dioxide may not sound new to you due to its long history of use in food production for its versatile properties, but do you know how it works?

Sulphur dioxide can act as a preservative in a variety of foods and beverages such as dried fruits and vegetables, pickled vegetables, fruit juices and grape wines. It inhibits growth of microbes such as yeasts, bacteria and moulds by crossing the cell walls of microbes and disrupting the normal functioning of microbes. Sulphur dioxide can inhibit spoilage caused by microbes and extend the shelf life of food products.

圖1：二氧化硫廣泛應用於各種食物及飲品中。
Figure 1: Sulphur dioxide is used in a variety of foods and beverages.

Other than its antimicrobial properties, sulphur dioxide is also an antioxidant that prevents browning associated with oxidation in foods, particularly dried fruits and vegetables. This helps maintain the appearance and colour of the products. Without sulphur dioxide, light-coloured fruits such as dried apricots can darken quickly upon exposure to air.

Sulphur dioxide is also commonly used in wine making that prevents spoilage and oxidation in wines to preserve the quality and freshness.

Is Sulphur Dioxide Safe for Use as a Food Additive?

Same as other food additives, sulphur dioxide has gone through rigorous safety assessments before it is ascertained as safe for food use. The Joint Food and Agriculture Organization / World Health Organization Expert Committee on Food Additives (JECFA), an international food safety authority, has evaluated the safety of sulphur dioxide. When sulphur dioxide is used in foods in accordance with the Good Manufacturing Practice (GMP) in which only the minimum amount is added to achieve the

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中使用二氧化硫時，只要奉行優良製造規範，確保僅添加最低分量來達到預期技術效用，在正常食用情況下是安全的。

然而，對二氧化硫敏感的人士在攝入後可能會出現呼吸困難、頭痛及噁心等過敏症狀。

香港如何規管二氧化硫？

在本港，使用二氧化硫作防腐劑及抗氧化劑受《食物內防腐劑規例》(第132BD章)所規管，當中訂明可用於指明食物中的指明分量。

根據《食物及藥物(成分組合及標籤)規例》(第132W章)的規定，預先包裝食品如使用了二氧化硫，必須在配料表中標明其作用類別(即防腐劑)及其本身所用名稱(即二氧化硫、亞硫酸鹽及亞硫酸鹽衍生物)或其在國際編碼系統中的識別編號(即220至228及539)。

此外，由於二氧化硫對敏感人士有可能是致敏物，《食物及藥物(成分組合及標籤)規例》亦訂明，所有預先包裝食品如含有濃度達到或超過百萬分之十的亞硫酸鹽，均應在配料表中列明其作用類別及名稱。

在一些情況下，較大包裝的食品會重新分裝為小型包裝以供零售。如食品含有二氧化硫，應分別在較大及小型包裝的標籤上都加以標明。如有疑問，應向供應商查詢成分詳情。

注意事項

1. 二氧化硫是廣泛應用於乾果等各種食物中的防腐劑及抗氧化劑，可延長食物的保質期，防止變食物成褐色。
2. 在本港，使用二氧化硫受《食物內防腐劑規例》所規管。
3. 《食物及藥物(成分組合及標籤)規例》規定，二氧化硫必須加以適當標明。

給市民的建議

- 二氧化硫在多個國家已通過嚴格的安全評估，用作食物添加劑已有悠久歷史。
- 敏感人士在購買食品前應查看食物標籤，避免選購含二氧化硫的食品。

給業界的建議

- 使用二氧化硫時，必須遵從《食物內防腐劑規例》和奉行優良製造規範。
- 按照《食物及藥物(成分組合及標籤)規例》的規定，在標籤上清楚及適當地標明食品含有二氧化硫。
- 含有二氧化硫的食品應分別在較大及小型包裝的標籤上都加以標明。

desired technological effect, it should be safe upon normal consumption.

However, susceptible individuals who are hypersensitive to sulphur dioxide may experience allergic symptoms including breathing difficulties, headaches and nausea after consumption.

How is Sulphur Dioxide Regulated in Hong Kong?

In Hong Kong, the use of sulphur dioxide as preservative and antioxidant is regulated under the Preservatives in Food Regulation (Cap. 132BD) that stipulates its use in specified foods within specified levels.

According to the requirements under the Food and Drugs (Composition and Labelling) Regulations (Cap. 132W), if sulphur dioxide is used in a prepackaged food, its functional class (i.e. preservative) together with its specific name (i.e. sulphur dioxide, sulphites and sulphite derivatives) or identification number under the International Numbering System (INS) (i.e. 220-228 and 539) must declared in the ingredient list.

In addition, since sulphur dioxide is a potential allergen for susceptible individuals, the Food and Drugs (Composition and Labelling) Regulations also stipulate that for all prepackaged foods containing sulphite in a concentration of 10 parts per million or more, the functional class and name of the sulphite should be specified in the ingredient list as well.

In some cases, foods in bulk packages are re-packaged into smaller packages for retail sale. The presence of sulphur dioxide, if any, should be declared on the label for both bulk and smaller packages. When in doubt, check with your suppliers for the ingredient details.

Key Points to Note

1. Sulphur dioxide is used as preservative and antioxidant in a variety of foods, such as dried fruits, to extend the shelf life and prevent browning of foods.
2. In Hong Kong, the use of sulphur dioxide is regulated under the Preservatives in Food Regulation.
3. Proper labelling of sulphur dioxide is required according to the Food and Drugs (Composition and Labelling) Regulations.

Advice to the Public

- Sulphur dioxide has gone through rigorous safety evaluation and has a long history of use as a food additive in many countries.
- Susceptible individuals should check the food label before purchase, and avoid food products containing sulphur dioxide.

Advice to the Trade

- Use sulphur dioxide in compliance with the Preservatives in Food Regulation and in accordance with the GMP.
- Declare the presence of sulphur dioxide on the label clearly and properly according to the Food and Drugs (Composition and Labelling) Regulations.
- The presence of sulphur dioxide should always be declared on the label for both bulk and smaller packages.

食物安全平台 Food Safety Platform

破解如何消除食物中的「部分氫化油」
Cracking the Codes of Eliminating Partially Hydrogenated Oils (PHOs) in Food

食物安全中心風險傳達組
科學主任林伏波博士報告

Reported by Dr. Violette LIN, Scientific Officer,
Risk Assessment Section, Centre for Food Safety

長久以來，「部分氫化油」一直用於生產人造牛油、塗抹醬、植物起酥油及乳化劑，也會用來煎炸食物，並用作許多食品的配料，例如麵包餡料、蛋糕及烘焙食品中的酥皮。然而，「部分氫化油」是工業生產的反式脂肪的主要來源，危害心臟健康，故亦因此而惡名昭彰。這樣問題便來了：我們如何才可消除膳食中的「部分氫化油」及工業生產的反式脂肪呢？本文將解讀「部分氫化油」的相關用語，並為消費者及業界揭示尋找不含「部分氫化油」的食品有何竅門。

圖2：為了得知食品是否含有「部分氫化油」，業界可(1)參閱配料表或(2)取得產品規格資料，並以較健康的替代品來取代「部分氫化油」成分，例如(3)使用含豐富不飽和脂肪的油及(4)採購不經氫化的工業過程生產的特定油脂產品。

Figure 2: Traders can identify PHOs in food products by (1) reading the ingredient list or (2) obtaining product specifications, and replace PHOs ingredients with healthier alternatives, such as (3) using oils high in unsaturated fats and (4) procuring specific oil/fat products with industrial processes other than hydrogenation.

工業生產的反式脂肪源自「部分氫化油」

植物油經過氫化過程後，其製成品的質感、穩定性及保質期有所改變。油經過不完全氫化會產生半固體或固體狀的「部分氫化油」，而完全氫化則會產生在室溫下呈蠟質脂肪狀的完全氫化油。前者可形成大量工業生產的反式脂肪，佔總脂肪酸的25%至50%。

破解一：「部分氫化油」可能隱藏在許多食物之中。為了避免製造含「部分氫化油」成分的食品，業界可要求供應商提供不含「部分氫化油」的配料，或按世界衛生組織所建議使用較健康的替代品。

如何避免「部分氫化油」或工業生產的反式脂肪？查閱反式脂肪含量

反式脂肪屬於不飽和脂肪酸，在結構上含有至少一個反式雙鍵。大部分反式脂肪(最高可佔產品總脂肪含量約50%)是人工製成用以製造食品的脂肪，亦即工業生產的反式脂肪。反式脂肪會對心臟健康造成雙重禍害，使血液內的「好」膽固醇減少，又同時增加「壞」膽固醇的水平，因而提高患上冠心病的風險。

破解二：在營養標籤上所示的反式脂肪佔總脂肪的含量如果偏高，表示食品中很可能添加了工業生產的反式脂肪或「部分氫化油」，特別是以植物油製作的食品。為了避免含「部分氫化油」成分的食品，應選擇或採購含有較少或不含反式脂肪的食品。

較健康的替代品是可以找到的

食品製造商使用油脂作各種不同用途。油脂可起傳熱、脫模、潤滑及防潮作用，亦可用於做出稠度及質感以增添口感及化口度、帶出和釋放味道、黏結油分、打發忌廉和製作千層酥皮。在了解食品中的油脂有何作用及來源後，業界可參考《取代食物中工業生產反式脂肪的指引》，以便取代含有「部分氫化油」的配料。

較健康的替代品應含有最少的飽和脂肪及最多的不飽和脂肪，其飽和脂肪

For long, partially hydrogenated oils (PHOs) have been used for producing margarines, spreads, vegetable shortenings and emulsifiers, as well as for frying foods and acting as ingredients of many foods, such as bread fillings, cakes and puff pastries in bakery products. However, PHOs are also notorious for being the main culprit of industrially-produced trans fatty acids (IP-TFAs) that cause harm to heart health. This poses a question: How do we get rid of PHOs and IP-TFAs in our diet? This article will decipher the terminologies related to PHOs and reveal the tricks for consumers and traders to find foods free from PHOs.

PHOs: the Root of IP-TFAs

Vegetable oils undergo hydrogenation to alter the texture, stability and shelf life of the final product. Incomplete hydrogenation of oils produces semi-solid or solid PHOs, whereas complete hydrogenation produces a waxy fat, fully hydrogenated oil at room temperature. The former process can result in large amounts of IP-TFAs, ranging from 25% to 50% of the total fatty acids.

Code One: PHOs can hide in many foods. To avoid manufacturing foods with PHO-containing ingredients, traders can ask suppliers to provide PHO-free ingredients or use the World Health Organization (WHO)'s recommended healthier replacers.

Avoiding PHOs or IP-TFAs? Read the TFA level

TFAs are unsaturated fatty acids consisting of at least one trans double bond. Most TFAs, amounting to about 50% of a product's fat content, are synthetic fats used in the manufacture of foods, i.e. IP-TFAs. TFAs will doubly jeopardise our heart's health by lowering the 'good' cholesterol and increasing the 'bad' cholesterol in our blood, thus increasing the risk of coronary heart diseases.

Code Two: On a nutrition label, high TFAs of total fat indicate a high chance that IP-TFAs or PHOs have been added to the food especially for food made with vegetable oils. To avoid foods with ingredients containing PHOs, choose or procure foods with low or no TFAs.

Healthier Replacers are Around the Corner

Food manufacturers use oils and fats for different reasons. They can be used as a heat transfer medium, release agent, lubricant and moisture barrier. They can also be used to create body and texture for enhancing mouthfeel and melt, as a flavour carrier and release, for oil binding, and for creaming and lamination. After ascertaining the functions and sources of oils and fats in the food products, traders can replace those ingredients containing PHOs by making reference to the Guidance to Replace Industrially-produced Trans Fats in Food.

The healthier replacers shall have the lowest saturated fats and highest unsaturated fats. Their contents of saturated fats should also be less than the sum of saturated fats and trans fats in the PHO-containing products being in use. When fats are only needed as a heat transfer medium, release agent or lubricant (e.g. for frying), use liquid oils that do not oxidise quickly, such as high oleic canola oil. For other products that need 'body' or other functionalities of saturated fats, combinations of technologies (e.g. blending) are well suited to formulate products.

含量亦應少於原先所使用含「部分氫化油」產品中的飽和脂肪及反式脂肪總含量。如脂肪只用於起傳熱、脫模或潤滑作用(例如煎炸)，應使用不會迅速氧化的液態油，例如高油酸芥花籽油。如選用的油脂產品需有飽和脂肪的稠度或其他作用，可因應產品配方，結合各種技術(例如混和法)使用。

破解三：由於需要特定的工業程序，本地油脂製造商並無生產「部分氫化油」，而不少油類進口商、餐飲及烘焙業界已經進口不含「部分氫化油」的配料以供製作食品。如需改良食品配方，業界可按需要向供應商查詢產品的成分詳情。

只要消費者、業界與政府三方共同努力，便有望消除膳食中的「部分氫化油」。消費者可選擇反式脂肪含量低的食品，製造商可取代食品中的「部分氫化油」/改良食品配方，而政府則致力從食品供應鏈源頭消除「部分氫化油」，提出了《食物內有害物質規例》(第132AF章)的修訂建議，把「部分氫化油」列為食物中的違禁物質，並就氫化油訂明標示要求。為期三個月的公眾諮詢期將於二零二一年三月十五日結束，歡迎各界支持，提供意見。

Code Three: PHOs are not produced by local oil/fat manufacturers as they require specific industrial processes and many oil importers and traders in catering and baking industries have been importing PHO-free ingredients for manufacturing their foods. If product reformulation is required, traders can check with suppliers for the ingredient details of the products according to needs.

PHOs can be eliminated from our diet with tripartite efforts of consumers, traders and the government. While consumers choose food low in TFAs and manufacturers replace PHOs in foods/reformulate foods, to effectively eliminate the presence of PHOs from the source of the food supply chain, we solicit your support on the Proposed Amendments to the Harmful Substances in Food Regulations (Cap. 132AF). This proposal regards PHOs as prohibited substances in food and stipulates the labelling requirement for hydrogenated oils. The three-month public consultation will end on 15 March 2021.

食物事故點滴
Food Incident Highlight

預防及減少花生受黃曲霉毒素污染的指引
Guidance on Preventing and Reducing Aflatoxin Contamination in Peanuts

花生是一種較易受到產生黃曲霉毒素的霉菌侵害的農產品。黃曲霉毒素可增加患上肝癌(本港第三大致命癌症)的風險。受乙型肝炎病毒感染的人士如同時攝入黃曲霉毒素，其患上肝癌的風險據報比非乙型肝炎病毒感染者高出約30倍。食物安全中心已發出指引，以協助業界減低花生受黃曲霉毒素污染的風險。

在接收、篩選和貯存花生時，可採取各項控制措施：接收或採購花生時，應檢查外殼鬆散或受損的花生是否存有霉菌。如發現花生發霉、變色或有油腦味，應將之篩選出來棄掉。貯存花生的環境必須保持乾爽陰涼。從包裝溢出的花生易受污染，不應用於食用產品。

Peanut is a produce susceptible to the invasion of aflatoxin-producing moulds. Aflatoxins could increase the risk of liver cancer, the third leading cause of cancer deaths in Hong Kong. The risk of liver cancer in individuals exposed to both aflatoxins and hepatitis B virus (HBV) infection is reported to be about 30 times higher than that in non-HBV infected individuals. The Centre for Food Safety has issued a guidance to assist the trade to reduce the risk of aflatoxin contamination in peanuts.

Control measures can be taken when receiving, sorting and storing peanuts. Loose-shelled or damaged kernels should be examined for possible presence of mould upon receiving or purchase. Mouldy, discoloured or rancid kernels should be sorted out if spotted. When storing peanuts, it is important to maintain a dry and cool environment. Peanuts that have been spilled are vulnerable to contamination and should not be used for edible products.

「食安電影頻道」啟播
The Launch of the CFS Foodsafe Movie Channel

為了提高市民的食物安全意識，食物安全中心(食安中心)於二零二一年一月七日開展名為「食安電影頻道」的全新網上短片宣傳活動，請來食安中心的吉祥物食安仔與食安妹妹，透過重現熱門港產片的經典場面，向市民傳達重要的食物安全信息。藉著一系列耳熟能詳的影片，市民可從娛樂中輕鬆獲得實用的食物安全知識，從而掌握安全處理食物之道，並且能知所選擇。

「食安電影頻道」現已在食安中心的YouTube頻道啟播，並在食安中心的Facebook及Instagram專頁同步播放。我們將不時上載新作品，敬請期待，並介紹親友一同觀賞這系列影片。

圖3：「食安電影頻道」的第二部短片已於二零二一年二月二日推出。
Figure 3: The second video of the Foodsafe Movie Channel has been released on 2 February 2021.

To raise the public's awareness of food safety, the Centre for Food Safety (CFS) launched a new online video campaign called the 'Foodsafe Movie Channel' on 7 January 2021. The CFS' mascots, On and Mui, will go through important food safety messages with the public in this series through the remaking of classic scenes in popular Hong Kong movies. Through a few well-known favourites, the public can gain practical food safety knowledge in a fun and enjoyable way, and practise safer food handling and well-informed food choices as a result.

The 'Foodsafe Movie Channel' is now available on the CFS' YouTube channel, and co-streamed on the CFS' Facebook and Instagram pages. New movies will be uploaded from time to time. Please follow us and introduce the movie series to your friends and family!

風險傳達工作一覽（二零二一年一月）
Summary of Risk Communication Work (January 2021)

事故／食物安全個案 Incidents/ Food Safety Cases: 181	公眾查詢 Public Enquiries: 62	業界查詢 Trade Enquiries: 126	食物投訴 Food Complaints: 211	給業界的快速警報 Rapid Alerts to Trade: 5
給消費者的食物警報 Food Alerts to Consumers: 3	懷疑食物中毒個案通報 Suspected Food Poisoning Alerts: 0	教育研討會/ 演講/ 講座/ 輔導 Educational Seminars/ Lectures/Talks/ Counselling: 10	上載到食物安全中心網頁的新訊息 New Messages Put on the CFS Website: 25	