Application of Instrumental Analysis in the Detection of Food Chemical Hazardous Components

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Abstract: people pay more and more attention to food safety in the new period of social development, which is closely related to people's health. At present, China has begun to disclose the results of random inspection of food safety to the public, so many food quality problems have been exposed, which has gradually attracted people's attention to food safety. In recent years, in the process of testing food ingredients, China has found that food contains chemical hazardous ingredients, which makes people pay unprecedented attention to whether food contains chemical hazardous ingredients. China's food safety law clearly stipulates that hazardous chemicals are not allowed to be used in food. Therefore, It is of great significance to use detection methods to detect whether there are residual chemical hazardous components in food.

1. Introduction

people are paying unprecedented attention to food safety. In the process of food production, bad businesses will add chemicals to food in order to maintain the freshness of food, which will endanger people's health when eating. If people continue to eat food containing chemicals, it may lead to the accumulation of chemical toxins in the body, Finally, it becomes a poison harmful to human health. Therefore, strict detection methods must be used to strictly detect whether food contains chemical hazardous components, so as to avoid people eating food with chemical hazardous components and endangering human health. So far, the use of instrumental analysis can detect the chemical hazardous components in food, which improves the safety of food.

2. Overview of Instrumental Analysis

2.1 Using Instrumental Analysis in Food Safety Monitoring

If food can flow into the market safely, it is necessary to detect whether there are chemical hazardous components in food according to relevant detection regulations. In the process of food detection by instrumental analysis, appropriate instruments should be selected in combination with the actual situation of food, such as soy sauce, vinegar and other foods, It mainly tests whether the food contains metals; When testing dairy products, it is mainly to test whether the content of chemical substances in dairy products exceeds the standard; When testing puffed food, it is mainly to detect whether the food contains carcinogens. In other words, for different foods, the purpose of detection is different, and the instruments and methods used are also different.

2.2 The Role of Instrumental Analysis in Food Safety Testing

When using instrumental analysis to detect whether food contains chemical hazardous substances, we should adapt to the development of society and make continuous research and innovation on instrumental analysis in combination with new needs. On the one hand, it is necessary to continuously develop and innovate instrumental analysis methods to ensure that the requirements of food safety testing can be effectively met. On the other hand, based on the development of science and technology, the instrumental analysis method should be continuously improved to ensure more convenient analysis of chemical hazardous components contained in food,

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accurate and safe detection of food, food safety and personal safety of consumers.

3. Types of Chemical Hazardous Components in Food

3.1 Heavy Metal Pollution

Endogenous pollution is an important part of food heavy metal pollution. It means that in the process of food production, the heavy metal in the finished products exceeds the standard due to the heavy metal contained in the raw materials themselves, resulting in food heavy metal pollution. In addition, food heavy metal pollution also includes exogenous pollution, which means that in the process of food production, heavy metals are transferred to food in the process of food production, or when food is packaged and transported, because the atmosphere or water body of the processing environment contains heavy metals, or plants contain heavy metals in the process of breeding, Heavy metals are transferred to food through various ways, resulting in heavy metal pollution of food. When the human body ingests heavy metals for a long time, it will lead to the accumulation of heavy metals in the human body and endanger human health.

3.2 Pesticide Residues

In the process of agricultural development, pesticides will inevitably be used. If farmers use pesticides in accordance with the rules, it will promote the development of the food industry; However, if pesticides are used unreasonably in the process of planting, it will pose a great threat to food safety. In the process of pesticide use, the chemical harmful components in pesticides will remain in crops and then transfer to the prepared food. After eating the food with chemical pesticide residues, people will lead to the accumulation of chemical substances in the body, which will cause human discomfort in light cases and cancer in serious cases. Therefore, it is necessary to strictly detect the pesticide residues in food. Therefore, the state has issued relevant policies to classify and detect pesticide residues in food, so as to standardize the use of chemicals.

3.3 Veterinary Drug Residues

In the new period of social development, people have increased their demand for life. Therefore, they began to eat a large number of animal food, which promoted the rapid development of China's aquaculture industry. In the process of animal breeding, in order to ensure the health of animals, farmers will use veterinary drugs. However, once the use of veterinary drugs exceeds the standard, it will lead to the transfer of veterinary drugs to the human body after people eat meat and meat products with agricultural and veterinary drug residues, which will pose a great threat to human health. At present, veterinary drugs are often detected in the detection process of meat products in China. Therefore, the relevant standards drafted by the state regulate the use of veterinary drugs.

3.4 Prohibited Additives

Since 2008, people have gradually become familiar with the concept of prohibited additives. In order to curb the use of non edible additives in food, the government has publicized the prohibited additives in food. However, in order to seek higher benefits, some food manufacturing enterprises will also use prohibited additives in food production to seek higher economic benefits. People will endanger their own health after eating food added with prohibited additives. Therefore, the detection of illegal additives should be strengthened. At the same time, it is also the most important part of food safety detection.

3.5 Chemical Hazardous Substances Produced by Endogenous Changes in Food

In the process of food preservation, if the appropriate preservation method cannot be selected, the quality of the food itself will be changed. A series of chemical changes will occur in the process of food deterioration, resulting in harmful chemicals in the food, exceeding the safety standard. People will endanger human health after eating deteriorated food

4. Application of Instrumental Analysis in the Detection of Chemical Hazardous Components in Food

4.1 Electrochemical Analysis

In the detection of chemical hazardous substances in food, electrochemical analysis is used, that is, the relationship between detection and electrochemical properties on the basis of material composition in solution. This method is widely used in food safety detection. So far, when electrochemical analysis is used to detect food safety, many application methods will be used, such as potential analysis, electrolytic analysis, coulometric analysis, polarography and voltammetry. The use of electrochemical analysis to detect chemical hazardous substances in food has the advantages of simplicity and rapidity, and has high analysis efficiency. It can sensitively detect food safety and obtain high accuracy detection results. Therefore, it is widely used in food safety detection.

4.2 Spectral Analysis

In the inspection of chemical hazardous substances in food, the most important detection method is spectral analysis. Spectral analysis has strong professionalism and ultra-high sensitivity, so it is widely used in food safety detection. Among them, the simplest operation is spectrophotometry, which is convenient for staff to operate. Moreover, it has the advantages of simplicity and quickness, and can effectively play a role in food safety detection, such as detecting the content of nitrite in food. When analyzing whether there are heavy metals in food, the most commonly used detection methods are atomic absorption spectrometry and plasma emission spectrometry. In recent years, they have been widely used by various food inspection institutions, especially in recent years, combined with inductively coupled plasma mass spectrometry, which can analyze elements more efficiently, It can improve the detection efficiency of staff, save detection time and improve detection effect. So far, China has begun to rise the spectrometer use system. When using the spectrometer for food safety detection, the efficiency of elemental analysis has been effectively improved, and it can directly determine whether the sample contains chemical hazardous substances, so as to avoid the loss of target substances in the process of detection.

4.3 Chromatography

The use of chromatography to detect food safety can mainly use gas chromatography, liquid chromatography and ion chromatography. These analysis methods can effectively detect whether there are chemical hazardous components in food. The use of gas chromatography can quantitatively analyze the low boiling point organic chemicals contained in food, and can also detect whether the materials contacted by food contain chemical hazardous substances in the process of packaging, such as pesticides, aromatics, antioxidant agents, etc. In food detection, the most commonly used chromatographic method is liquid chromatography, which is widely used to detect whether the content of food additives exceeds the standard, such as the dose of preservatives and colorants in food. Ion chromatography is often used to detect whether there are inorganic ions in food. For example, it can detect inorganic ions in food or sulfate in milk. Chromatographic analysis is mainly used to detect pesticide residues in fruits and vegetables, whether there are chemicals in meat and fish, and acrylamide in fried food. It has the advantages of high efficiency and strong sensitivity, and can obtain effective detection results of complex samples in a short time.

4.4 Gc-Ms Technology

As people pay more and more attention to food safety, China has issued new standards for testing food. In order to meet the continuous improvement of food testing requirements, relevant testing technologies are also developing. Especially in recent years, the rapidly developing GC-MS technology can detect complex organic compounds in food. Therefore, It is widely used in food safety testing. Because GC-MS has the advantage of high sensitivity, it has obvious advantages in the analysis of trace substances. With the continuous development and innovation of this technology, it has gradually become mature, which can detect pesticide residues and veterinary drug residues in food and so on.

4.5 Instrumentation of Pretreatment

In recent years, China's food testing industry is developing continuously, so the analytical instruments are also making continuous progress. The pretreatment equipment is moving towards the development direction of intelligence and automation, and is widely used in the detection of food chemical hazardous components. For example, the application of automatic solid phase extraction instrument in food safety detection can reduce the workload of staff, carry out food safety detection without being on duty, and avoid the error of results caused by human operation errors in the process of food detection, It has great advantages.

5. Conclusion

China's food safety detection technology is developing continuously, gradually moving towards the direction of high precision and high efficiency, and the detection instruments are also developing continuously. So far, people have paid extensive attention to food safety. If the traditional detection technology is still used in the detection of food, it can not be applicable to the development speed of today's society. Therefore, it is necessary to update the detection technology to improve the accuracy of detection results. The application of instrumental analysis in food detection improves the detection efficiency, and can obtain more accurate detection results, ensure food safety and provide people with safer and assured food.

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