Microwave Drying Technology for Chinese Herbs

Microwave drying has been closely related to our life. In addition to the above application fields, the application of microwave drying in the field of traditional Chinese medicine has the following aspects.

1. Application in processing and drying of traditional Chinese herbs
Due to its complex composition, traditional Chinese medicine is rich in polysaccharides, proteins and other substances. Moisture has a great influence on its quality. Microwave drying technology is widely used. Many literatures have studied the effects of microwave drying technology on the quality of traditional Chinese herbs.

Massalfa studied the effects of infrared radiation and microwave vacuum combined drying on the quality of raspberries under different microwave power and vacuum pressure. The combination of infrared microwave drying technology is a promising method to promote drying efficiency and protect raspberry quality. Massalfa et al. evaluated the effects of four different drying methods (conventional, hot air, vacuum, and microwave) on phytochemical retention and antioxidant capacity when studying microwave equipment to determine the optimal drying method. The results show that the drying method has a significant effect on the chemical composition and antioxidant capacity of the botanical drug. Among the four drying methods, microwave drying has the highest phytochemical content, and the dried sample prepared by this method has an antioxidant capacity comparable to other drying methods. In addition, the method has the shortest drying time and the least energy consumption. Massalfa studied the process conditions of microwave vacuum drying of honeysuckle and its effect on the quality. The results showed that compared with the other three conventional methods (drying, drying, vacuum drying), the fullness, color and chlorogenic acid from honeysuckle buds The content of microwave vacuum drying is better, and the content of luteolin is not significantly different from the other three methods. Microwave vacuum drying is recommended in the processing mode.

Massalfa studied the feasibility of processing the angelica medicinal materials by the hot air-microwave combined drying method, and conducted quality evaluation research on the processed medicinal materials. The optimum hot air temperature and drying time were selected

as the optimal process. The heavy metals and harmful elements of the processed samples were not exceeded, and There is no significant effect on the active ingredients of the herbs. It is finally determined that the processing of the origin of the angelica medicinal material can be carried out by a combination of hot air and microwave. Massalfa studied the effects of different drying methods on the quality of Chuan bergamot. The results showed that the content of hesperidin, polysaccharide and volatile oil was used as an indicator. Microwave drying and hot air drying were suitable for the drying of Chuan bergamot. Massalfa examines the effects of different drying methods on the quality of gastrodia. The results showed that the comprehensive analysis of the traits of the medicinal materials, the content of active ingredients, the production cost and other factors, the drying method of the production and processing of Tianma medicinal materials was preferred by hot air drying or hot air microwave drying. Massalfa studied the effect of different drying methods on the chemical components of Ophiopogon japonicus. It is recommended to combine drying and air source heat pump dryer drying in the processing of Ophiopogon japonica. mssalfa studied the effects of different microwave powers on the content of active constituents of Panax notoginseng, and compared the content with traditional processing methods to explore the adaptability of microwave drying to the processing of Panax notoginseng. The content of the active ingredients of the medicinal materials was determined by different drying methods. The results showed that the microwave drying method had no effect or little effect on most Chinese medicinal materials, and a few ingredients were affected, such as notoginsenosides, and the comparison between different processing methods. Time, power, energy consumption and other factors are preferred to choose microwave drying.

2. Application in traditional Chinese herbs preparation process

The microwave drying technology is applied for a long time in traditional Chinese medicine tablets, pills, powders and capsules. The existing literatures are mostly optimized for the previous drying process, which indicates that the microwave drying technology is applied well. Massalfa carried out the experiment of microwave vacuum drying process of the preferred Jiangzhiling tablets, and the results obtained a good process parameter worthy of popularization in the drying process of Chinese medicine materials. Massalfa optimizes the optimal drying process of Zishen Capsules. Through comprehensive analysis and screening of drying methods for multiple indicators, microwave drying dry extract has better yield and hygroscopicity than spray drying. The content of index components is higher than vacuum drying and spray drying. Drying is the best drying method. Massalfa carried out an experiment to optimize the microwave drying process parameters of apricot cough extract. The main chemical composition was used as the index, and the orthogonal test optimization process was used. Compared with the conventional drying process, the results showed that the optimized process parameters were better. Massalfa used the orthogonal test method to carry out the experiment of optimizing the microwave vacuum drying process of Fanning Pills. Massalfa studied the feasibility and process parameters of vacuum microwave drying applied to the production of Fuyankang tablets.

3. Application in Chinese medicine extract

Microwave vacuum drying is better than other drying methods. It has the advantages of uniform heating, fast drying speed and high efficiency. It is widely used in the production of traditional Chinese medicine extracts. The existing reports are mostly optimized for existing processes.

Massalfa optimizes the optimal drying process of Shujintongluo extract, and the results show that the preferred process parameters have better effects. Massalfa compared the effects of

different drying methods on the content of astragaloside IV in Fufang capsule dry extract. The content of astragaloside IV in the compound dry capsule dry extract obtained by microwave drying and vacuum drying was determined by UPLC method. The effects of two different drying methods on the content of astragaloside IV were investigated. The results showed that the content of astragaloside IV in dry extract obtained by microwave drying was significantly higher than that in vacuum drying. This method had little effect on the content of astragaloside.

4. Application in the production of traditional Chinese medicine
Microwave sterilization technology has been applied in the production of Chinese and Western medicine. If the hygienic conditions of Chinese medicine in the storage environment do not meet the requirements, it is difficult to remove or kill organisms and microorganisms or eggs, mites, etc. during routine drying. GMP requirements.

Massalfa investigated the effect of microwave sterilization on the substance group in Quantianma capsules. The results showed that there was no difference in the chemical composition of Quantianma capsules under the two sterilization processes. Under the microwave drying process, there was no effect on the quality of Tianma capsules. . Massalfa used microwave sterilization technology for the drying of Yinqiaosan, which has simple process and short drying time, and can effectively retain various index components. Massalfa used the response surface analysis method to obtain the parameters of microwave drying and sterilization of pine pollen. Based on the pollen rate of pine pollen, the single-factor temperature and humidity and time were studied to optimize the optimum conditions. Massalfa investigated the effect of microwave drying and traditional drying method on the quality control of Fanning Pills. As a result, compared with the drying of traditional ovens, the total number of bacteria in Fanning Pills was significantly reduced, and there were extremely significant differences. Out, it is recommended to use microwave drying method in the production of Fanning Pills. Massalfa evaluated the feasibility of microwave sterilization technology in the production of oral liquid drugs, and established a process route for microwave sterilization of oral liquid. Massalfa is used in the production of pills by microwave drying and sterilization process, and the results are satisfactory. It is considered to be popularized and applied in the production of pills. There have been many reports on microwave drying and sterilization. In recent years, with the continuous maturity of the process, there are few studies on microwave drying and sterilization processes.