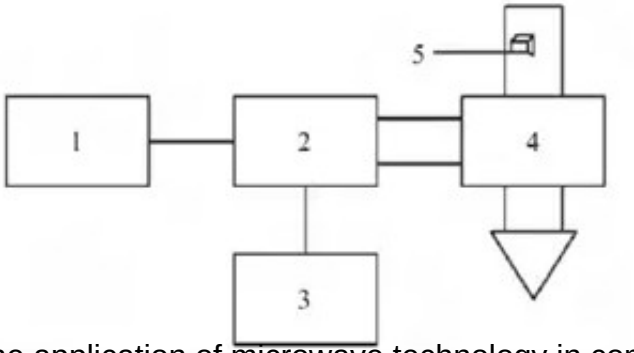
Application of microwave technology in the pharmaceutical industry

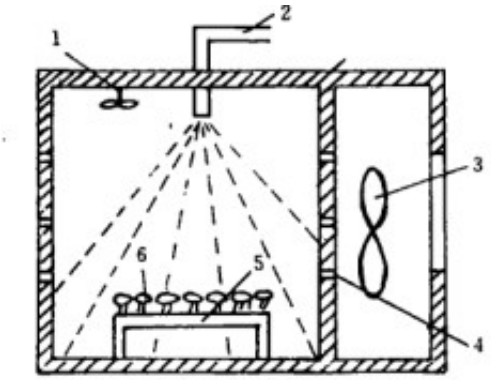
Abstract: Starting from the application of microwave technology, the paper analyzes the two characteristics of microwave drying equipment in the pharmaceutical industry. It puts forward some opinions on the application problems in the drying and extraction process, and points out some key points that should be considered in the design of microwave equipment. .

Key words: pharmaceutical microwave drying; extraction; equipment design



The application of microwave technology in communication, measurement and national defense has been well known. In recent years, microwave drying, microwave sterilization, microwave extraction and other equipment have been introduced in the pharmaceutical machinery industry. And it has been well applied in some large pharmaceutical factories, showing irreplaceable advantages in improving drug quality, energy conservation, safety and environmental protection.

The application of microwave technology in the pharmaceutical industry is mainly reflected in two aspects: one is the drying of drugs (pills and herbs), and the other is the extraction of medicinal materials (active ingredients).



1. Mechanism of microwave drying

1.1 Microwave heating and drying is the use of microwaves to interact with matter molecules in rapidly changing high-frequency electromagnetic fields. The microwaves are absorbed to generate thermal effects, and the electromagnetic energy is directly converted into medium heat energy to achieve the purpose of drying.

Microwave heating is a type of radiant heating that is carried out under the radiation field of a waveguide, cavity or microwave generator antenna. It is the direct interaction between the microwave and the object, so that the material is heated inside and outside at the same time, without transferring heat through convection or conduction.

Since the microwave energy is directly absorbed by the water, the microwave electric field has the permeability to the material, and the moisture inside and inside the material can be heated simultaneously by the microwave, for example, the cloth is uniform and the heating is uniform; the microwave has the material while drying Sterilize the role of insecticide.

1.2 In the production process of modern Chinese patent medicine, we must extract, concentrate, dry, and process the finished Chinese medicine into a finished product, then dry and sterilize, and then package into the distribution channel. After the process of extraction, concentration, production, etc., the finished product is further dried and sterilized, and repeated high-temperature operations are performed. Because the higher the temperature, the higher the production efficiency.

When many enterprises dry the raw materials, they are dried for more than 100 °C for several hours. The medicinal materials become dry materials. When concentrating or drying the finished products, the time can reach two days at this high temperature. In this state, most of the active ingredients of Chinese herbal medicine have evaporated.

The spray drying method commonly used in the manufacture of modern Chinese medicines, the inlet air temperature is controlled at 200 ° C ~ 300 ° C, the active ingredients of the drug are rapidly evaporated, and the dried powder is like brown dust. The powder prepared by the natural low-temperature drying method is black, and is as slippery as starch. In this state, the active ingredient and the active ingredient in the medicinal material are relatively stable. Therefore, it is very important to choose the right drying technology, and microwave technology is very suitable for the drying of medicines.