# Microwave Sterilization vs Microwave Sterilization Equipment

Microwave Sterilization Main feature:
1 Fast sterilization speed and short time The traditional sterilization method relies mainly on heating. The heat is transmitted to the inside through the surface of the food through conduction, convection or radiation. The transfer rate depends on the heat transfer characteristics of the food, thus causing the surface temperature of the food and the center. The difference, thus extending the total time required for food sterilization. However, the microwaved material directly absorbs the microwave energy during the microwave treatment, and uses the transmission effect to combine the thermal effect and the non-thermal effect to make the food uniform and rapid, to rapidly heat up, kill the microorganism, and the processing time is greatly shortened.
2 Maximize the nutrition and flavor of foods The nutrients and aromatic substances of meat products are easily disintegrated under high temperature. The traditional sterilization methods are caused by long heating time and high temperature, and the nutrients and flavor substances are destroyed. In contrast, microwave energy can achieve the desired bactericidal effect at a lower temperature and in a shorter period of time. Generally, the sterilization temperature can be achieved at 75 to 80 ° C, thereby retaining more nutrients, color, fragrance, Taste, shape, etc. [10].
3 Sterilization is thorough, energy-saving and efficient. When microwave sterilization, regardless of the shape of each part of the object, microwave
The generated heat can be uniformly penetrated into it, and the uniformity is greatly improved, and the internal wetness and external coke endogenous phenomenon can be avoided, which is beneficial to the quality assurance of the meat. When microwave sterilization, the object to be heated is generally placed in a sealed heating chamber made of metal, the microwave can not be leaked, the external heat loss is small, and can only be absorbed by the heated object, and the air in the heating chamber and the corresponding container are not heated, no extra The heat loss is only a fraction of the energy consumed in the power section and the tube. Compared to conventional sterilization methods, microwave sterilization generally saves 30% to 50% of electrical energy.
4. High safety In medicine, the microwave power commonly used in diathermy is as high as 1 000 MW/cm2, but no obvious lesions have been found. However, when the animals were completely exposed to 100 MW/cm2 of microwave radiation, the body temperature of the test animals increased significantly. Based on this experiment, the American National Standards Institute (ANSI) issued a standard: Under normal circumstances, the safe dose of human body for a long time to receive microwave irradiation is 10MW/cm2. In addition, since microwave energy is controlled in a heating chamber made of metal and a waveguide, microwave leakage is effectively controlled, there is no radiation hazard and harmful gas emissions, no waste heat and dust pollution, no pollution of food, and no pollution to the environment.
5 Easy to operate, easy to control Microwave sterilization process is simple and easy to operate, and the thermal inertia is small when microwave heating, the heating can be stopped when the power is cut off, and the shutdown and lifting of the working state can be controlled by the electrical device, and the computer can be used according to different The food processing technology adjusts the preset program and quality automatic monitoring control at any time.

Factors affecting the effect of microwave sterilization
The main factors affecting the microwave sterilization effect are microwave sterilization parameters and sterilization objects.
1 Microwave sterilization frequency In terms of heating, the higher the frequency, the faster the heating rate, and the stronger the sterilization effect. However, the higher the frequency of microwave sterilization, the more favorable it is to heat sterilization, and the penetration depth of microwave should also be considered. The higher the frequency, the shorter the wavelength and the smaller the penetration depth. At the heating rate,
2. The microwave of 450MHz is faster than the microwave of 915MHz, but the penetration depth of 915MHz microwave is larger than that of 2 450MHz microwave. Therefore, the microwave frequency should be selected considering the thickness of the material. For thicker materials, it is necessary to achieve uniform sterilization. Smaller frequencies; thinner materials can be used at higher frequencies to increase sterilization speed.

3. Output power and sterilization time The larger the microwave output power, the stronger the electric field acting on the medium, the more intense the molecular motion, the faster the temperature of the item is heated, and the stronger the sterilization effect. Since the irradiation dose is a combination of microwave power and time, the microwave sterilization effect is enhanced with the prolongation of the sterilization time under the condition that the output power and other conditions are unchanged.
4. Moisture content of food The ability of water in food to receive microwaves is stronger than other substances such as protein and starch. The reason why microwaves can kill microorganisms is because they contain water that can absorb microwave energy, or they are in moisture. Absorbs the medium and acts as a bactericidal agent.

The Leader uses a continuous high-power microwave with a frequency of 2 450 MHz and a power of 0 to 3 kW to irradiate the S. aureus 25932 in dry and wet state with different intensity and time, compare the killing rate, and compare with the simple heat sterilization. To study the sterilization law of high power microwave. The results showed that the temperature of the microwave with different intensity and irradiation time did not change significantly after the action of dry bacteria, but the number of viable bacteria decreased significantly (p

Microwave Sterilization Equipment Main feature::

1, short time, fast

Conventional thermal drying sterilization transfers heat from the surface of the object to the inside through heat conduction, convection or radiation. It often takes a long time for the inside of the object to reach the desired dryness and sterilization temperature. The medium consists of polar molecules and non-polar molecules. Under the action of electromagnetic fields, these polar molecules are shifted from the original random distribution state to the polarity according to the polarity of the electric field. Under the action of high-frequency electromagnetic fields, these orientations are constantly changing according to the frequency of the alternating electromagnetic, which causes the molecules to move and rub each other to generate heat. At this time, the field energy of the alternating electric field is converted into thermal energy in the medium, so that the temperature of the medium is continuously increased, so the microwave

heating is the dielectric material itself depleting the electric field energy and generating heat. Therefore, the microwave heating treatment time is greatly shortened, and under a certain power density intensity, generally only a few tens of seconds and a few minutes can achieve satisfactory results.

2, low temperature drying sterilization to maintain nutrients

Microwave has the thermal effect of rapid heating and non-thermal effect double sterilization, compared with conventional thermal drying, sterilization can achieve the desired drying and sterilization effect at relatively low temperature and short time. The general sterilization temperature is 65-70. C, 75-80. C or 103-121. In C, the time is 3-8 minutes, and it can retain more food nutrients and color, fragrance, taste, shape and other flavors. For example, the vitamin C retained by conventional heat treatment of vegetables is 46-50%. In contrast, microwave treatment can achieve 60-90% of vitamin C retention, and conventional heating method has a vitamin A retention value of 58%. Microwave heating can reach 84%.

3. Saving energy

The microwave energy conversion efficiency is high, generally above 70%. The microwave directly treats the food, and the heating box itself is not heated, so there is no additional heat energy loss, so energy saving, generally saving 30-50%.

4, even and thorough

Conventional thermal drying and sterilization are started from the surface of the material and then transferred to the inside of the material by heat conduction. There is a temperature difference between the inside and outside of the material, and the internal and external drying and sterilization effects are poor. In order to maintain the flavor and shorten the processing time, the internal temperature is not sufficient to affect the drying and sterilization effects. This phenomenon can be improved by increasing the processing temperature, however, this causes the color, fragrance, taste, shape and the like of the surface of the article to be degraded. The microwave has the penetrating property, and the surface and the interior simultaneously act to ensure that the internal and external temperatures together achieve the required value, so the drying and sterilization are uniform and thorough.

5, easy to control, easy to achieve automated production

The microwave food drying and sterilizing treatment equipment is simple in operation, easy to control, has no thermal inertia, can be processed according to different food process specifications, reduces production operators, and reduces production costs.

6, simple equipment, advanced technology

Compared with conventional sterilization, microwave sterilization equipment does not require boilers, pipeline systems, coal yards, and transportation vehicles. As long as it has basic water and electricity conditions, it has no special requirements for the plant, and has low investment

and quick effect.