

Microwave bread making technology

Abstract: [Microwave heating equipment](#) technology was used to replace the baking oven to produce bread, and a single fermentation method was used to produce bread. The reasonable technological route and technological parameters were determined by experiment, which proved that the method was feasible and the product quality was ideal.

Microwave heating equipment refers to the electromagnetic waves with wavelengths between 1mm and 1m (300MHz to 30GHz). Its frequency is very high, also known as UHF electromagnetic wave. In the traditional baking process, heat is transmitted to the heated material by heat source in the form of conduction, convection and auxiliary injection. This baking is carried out from the surface to the inside. The power of heat transfer is the temperature difference between the surface and the inner layer. The smaller the temperature difference in the inner surface of the material, the slower the heating speed. Increasing surface temperature is often used as the main method to speed up heating. Therefore, it is difficult to solve the problem of slow heat transfer in traditional baking method, and the [bread heating equipment](#) can make up for this shortcoming.

Materials: Bread special flour, white granulated sugar, milk powder, salt, grease, water and so on.

Equipment: flour mixing machine, fermentation box, metering equipment, microwave oven and so on.

The technological process includes batching, stirring, (dough modulation), fermentation, segmentation, dough rubbing, static, shaping, waking up, microwave oven baking, egg liquid decoration, electric oven, cooling, finished products.

Main points of operation: weigh all kinds of raw and excipients according to the formula and reserve them after processing (dry material sieving). In addition to salt and grease, all the ingredients are put into the mixing tank. Slow stirring for 3 minutes, adding salt, stirring at medium speed for 5 minutes. When the gluten is basically formed, grease is added and stirred until the surface of the dough is smooth, soft, delicate and extensible. The dough temperature is 28~30 degrees. The fermentation of 2.2.3 fermented dough is accomplished by the life activities of yeast. Yeast uses nutrients in the dough to proliferate with the participation of O₂, producing a large amount of CO₂ gas and other substances. After fermentation under anaerobic conditions, the dough is bulky and has a good flavor.

1, rubbing and dividing. Put the fermented dough on the operation table and divide it into a small weight block. 2, rub round and static. The irregular small pieces are rubbed into round balls to make the core firm, smooth and uniform in structure. After 3 to 5min static, it can be fermented slightly, and then it can be reshaped.

Plastic is a highly skilled process, and it is also an important operation to determine the shape of bread products. Different shaping methods can be made into various shapes of bread.

The temperature of wake-up is 38 °C, the relative humidity is 85%~90%, 25~30 minutes, the degree of wake-up is 50%.

The microwave frequency is 896MHz to 2450MHz for baking, and the baking time is determined according to the size of the dough. 2.2.8 Electric oven coloring to make the product skin bright, good color and luster, after microwave baking, the billet must be sent into the electric oven color, temperature 200-300, 4-5 minutes, can make the bread has a good appearance.

Take out from the oven, adopt natural or ventilated cooling mode, to the center of the bread temperature reached room temperature, can be packaged.

Results and discussion:

1. The fermentation temperature of dough is generally at 28~30 °C. This temperature is not only a suitable temperature for yeast fermentation, but also an important condition for protein in flour to absorb water to form gluten. In order to get the dough suitable for temperature, the temperature of the water is generally adjusted or raised. But we should pay attention to the maximum temperature of the water should not exceed 50 degrees, so as not to affect the processing performance of dough.

2. The combination of microwave and traditional baking methods can produce high-quality bread in 1/3 of the time of traditional baking methods, and standard metal baking moulds can be used.

3. Baking, like other food processing, is a complex physicochemical system, which needs to occur in an orderly manner with appropriate time or temperature conditions. Rapid microwave heating can cause breakage, excessive expansion or explosion of baked products, and even rubber-like structure of products. Therefore, we must strictly control the time during microwave baking.

4. During microwave baking, the material can usually penetrate the electric wave evenly in all parts of the material, producing heat, and there is no large temperature difference in conduction heating. Therefore, the homogeneity of baking can be greatly improved.

5, microwave baking without smoke and dust, neither pollute the food, nor pollute the environment, clean and hygienic.

6. Microwave heating is fast, efficient and energy saving. Considering the taste and nutrition of food, a short time of heating can ensure that the product has a good taste, and can retain more nutrients.

7. Simply using microwave as heat source can't make baked products form good skin and color, so combining microwave with traditional baking method can get good product quality. Therefore, the bread obtained by microwave heating should also be put into an electric oven for a short time to bake, producing Maillard reaction, forming a good bread skin.