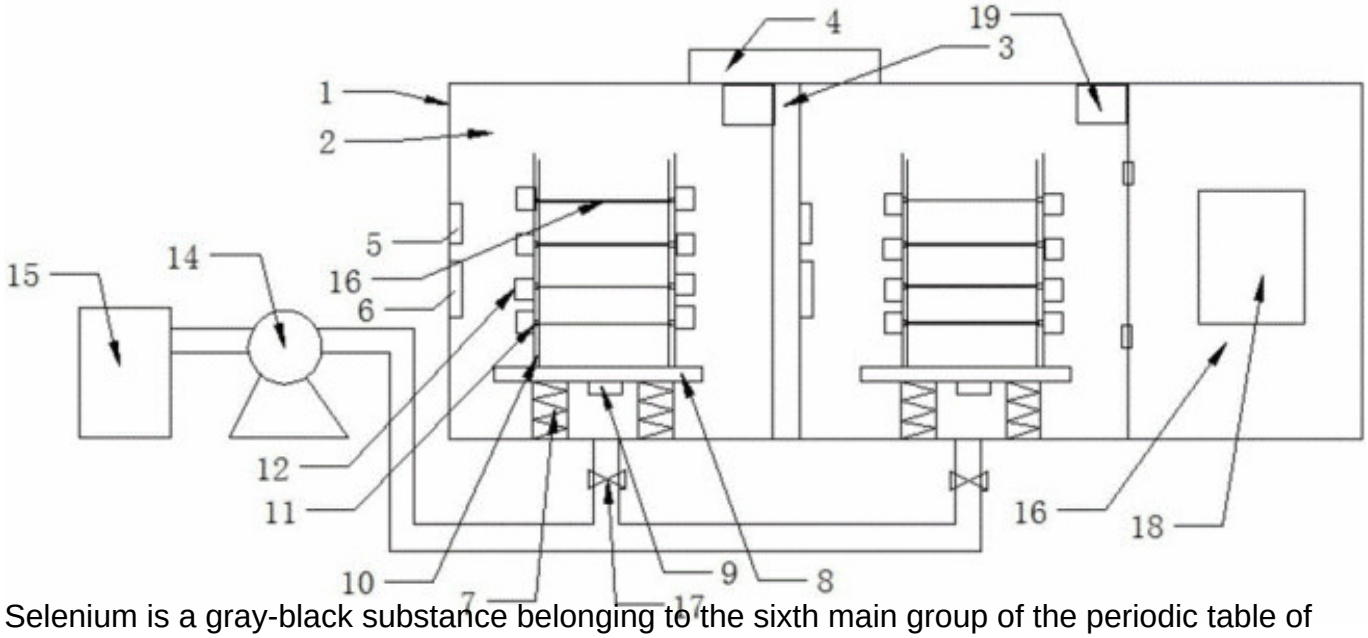
Application of Microwave Drying Technology in Selenium Refining Production



Selenium is a gray-black substance belonging to the sixth main group of the periodic table of elements. Like sulphur, selenium can form amorphous and crystalline solids with different melting point and specific gravity. Amorphous selenium has no melting point, and begins to soften at 40-50 C. It can flow at 100 C and become liquid at 220 C. The melting point of crystalline selenium is 170-180 [1]. microwave drying machine

In the refining process of selenium, crude selenium and refined selenium should be dried separately, considering their composition and melting point. The main drying and dewatering methods used for selenium powder are electric oven drying method and steam pot heating drying method. These two drying methods are all heated by heat conduction from surface to inside, which have low drying efficiency and energy dissipation. High consumption, selenium easy to produce melting caking, high labor intensity of post personnel and other shortcomings. Microwave drying machinery and equipment

Microwave drying is a new heating and drying technology. It is different from traditional heating and drying by heat transfer. It has the advantages of fast heating and drying, low energy consumption, high efficiency, uniform drying and high automation. It has been widely used in the drying and dewatering of food, medicine, chemical industry and other industries, but in metallurgical industry. In the process of metallurgical production, materials often need to be dried before entering pyrometallurgical smelting and after hydrometallurgical refining. Microwave drying has gradually entered the metallurgical industry, and constantly expands the scope of drying, showing a good application prospect in the metallurgical industry.

Principle of Microwave Drying Selenium Microwave is a kind of high-frequency electromagnetic wave, which can produce high-frequency electromagnetic field with a frequency of 300-300 000 MHz and a wavelength of 0.001-1 M. Microwave has the characteristics of short oscillation period, strong penetration ability and thermal effect under the interaction of matter and electric

field. There is no temperature gradient in the microwave heating process, which can make the temperature difference between inside and outside of the heated material very small. Selenium powder has good absorption performance to microwave. When microwave acts on the water-containing Selenium powder, the wet Selenium powder is in the microwave high frequency electric field with very short oscillation period.

The internal water molecules polarize and align neatly around the microwave electric field, then rotate rapidly with the direction of the alternating phase change of the high frequency alternating electric field, and produce violent collisions and frictions, which can reach as many as 100 million times per second. Finally, part of the microwave energy can be converted into molecular kinetic energy, and displayed in the form of heat, so that the temperature of water can be raised, and it can be separated from selenium powder to achieve the purpose of drying and dehydration. That is to say, after microwave enters selenium powder and is absorbed, its energy is in the dielectric of selenium powder.

As a new technology in the world, microwave drying technology has been successfully applied in many fields. Its unique heating method and drying principle open up a new way for the drying of selenium powder. Although the application of microwave drying technology in the field of selenium powder production has just begun, microwave drying has changed the conventional form of infiltration from surface heating layer to inside-out heating method, which has the characteristics of rapid drying, uniform drying, high efficiency, energy saving and convenient operation of wet materials. According to the principle and characteristics of microwave drying, This technology will be widely used in the field of heating and drying in the smelting industry.