INFLUENCE OF MICROWAVES ON CHEMICAL OXIDATION PROCESSES

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Abstract: The mechanisms of microwave heating for organic materials are effective, because these materials are weak electrical insulators. Dielectric properties of materials play a critical role in determining the interaction between electrical fields and chemical compounds.Oxidation of organic substances in the microwave field is considered a process that combines various physicochemical interactions. Oxidation of organic compounds with acids is a process that is widely used in various tests of various samples, and a study of this process is very important. Composition of oxidation products of a chemical is the same in terms of both thermal and oxidation when oxidation takes place due to microwave heating, but the study of the oxidation process in the microwave field will find that the kinetics of oxidation is different.

The dielectric properties of a material are given by:

$$\varepsilon = \varepsilon` - j\,\varepsilon`` = |\varepsilon|\, e^{-j\delta} \quad (1) \qquad j = \sqrt{-1} \quad (2)$$

where: ε – the complex relative dielectric constant; ε`- the relative dielectric constant; ε``- the relative dielectric loss factor; δ - dielectric loss angle (tang δ= ε``/ε`)

Dielectric properties of organic materials are affected by many factors, including frequency of microwaves, the temperature, moisture content and other factors.The highest temperature in microwave heating of a organic compound to boil depends on many factors: the physical properties of the solvent, the reactor geometry, mass flow, the flow of heat and electric field distribution.

Microwave System includes: applicator shaped paralellipiped aluminum walls, a magnetron which transmits at a frequency of 2.45 GHz. Transmission of electromagnetic waves from the magnetron cavity is made using a rectangular guide, located at the bottom of the oven.

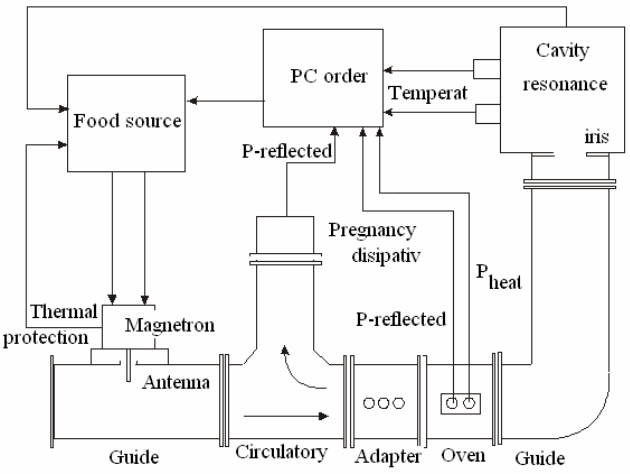

Figure 1. System generation, transmission and use in Microwave

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