

CHEMICAL REACTIONS UNDER THE PRESENCE OF SUSCEPTORS

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The use of microwaves as an energy source for chemical reactions has been investigated for many years. The interaction of electromagnetic waves such as microwaves with matter is characterized by absorption, transmission and reflection mechanisms. All or some of the participants in a chemical reaction follow the above mechanisms. It was found that it is possible to alter in a controlled fashion the effect of microwaves on some chemical reactions by the presence of some susceptors. Susceptor's properties such as its shape, dielectric properties and dimensions are the principal variables that must be known. Several experiments using waveguides as applicators and powers between 25 to 300 W were conducted. Chemical reactions using sulfuric acid as catalyst showed very large variation in presence of susceptors. The time reaction was controlled by the presence of such susceptors. The effect of susceptors on the electric field distribution was the explanation for the time reaction reduction. If the medium is a material with low dielectric properties the susceptors used increased (positive effect) in a controlled manner the reaction time. If the medium has high dielectric properties the susceptor has a negative impact on the absorption of microwaves. Figure 1 shows the effect of the presence during heating of sulfuric acid. Figure 2 shows the effect of the presence of a susceptor during the hydrolysis of benzamide using a solution of 20% (v/v) of sulfuric acid. The susceptors were cylinders of diameter between 0.7 and 2.2 mm and length between 40 to 61 mm.

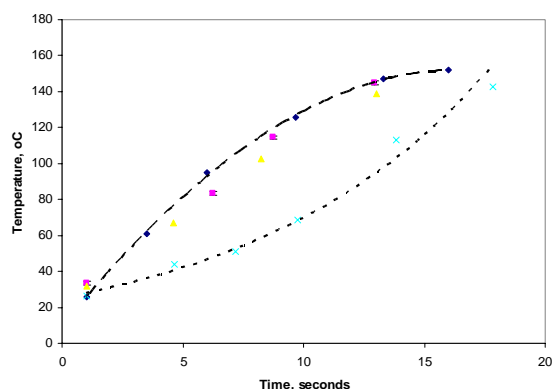


Figure 1. Microwave heating of sulfuric acid. Upper curve: sulfuric acid. Lower curve: sulfuric acid plus susceptors.

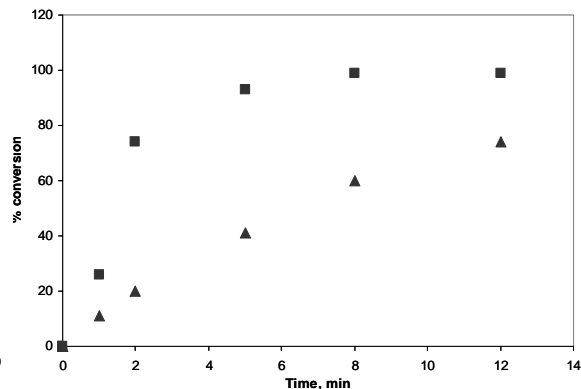


Figure 2. Microwave hydrolysis of benzamide. Upper curve: mixture. Lower curve: in presence of susceptors.