MICROWAVE PHOTOCHEMISTRY OF SUBSTITUTED PHENOLS

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The fact that electrodeless discharge lamp (EDL) generates ultraviolet radiation when placed into the microwave field has been known for long time [1-3]. The low powered and low-pressure electrodeless lamps were utilized in spectroscopy four decades ago [4]. However, its application for organic photochemistry has been shown only recently [5-11].

We disclosed the studies of microwave photochemistry in an original photochemical reactor consisting of EDL placed into the reactor vessel of a commercial microwave oven (Figure) [12]. The UV discharge in the lamp [13] is generated by MW field with a consequence of the simultaneous UV and MW irradiation of the sample. Such a simple arrangement brings a unique possibility to study photochemical reactions under extreme thermal conditions.

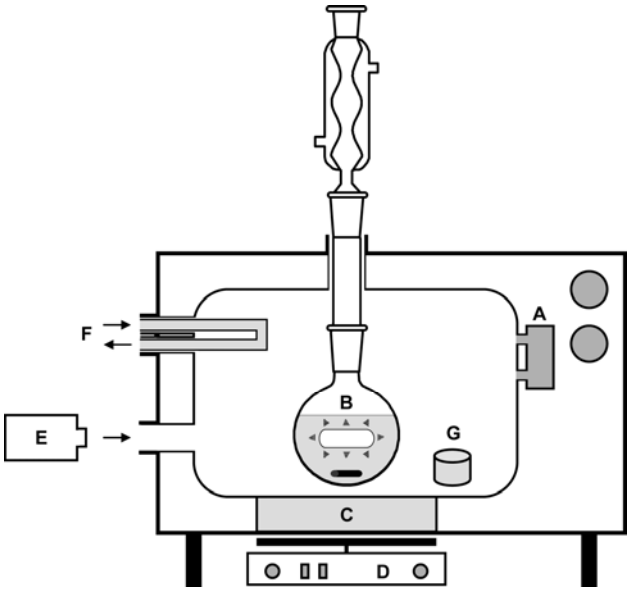
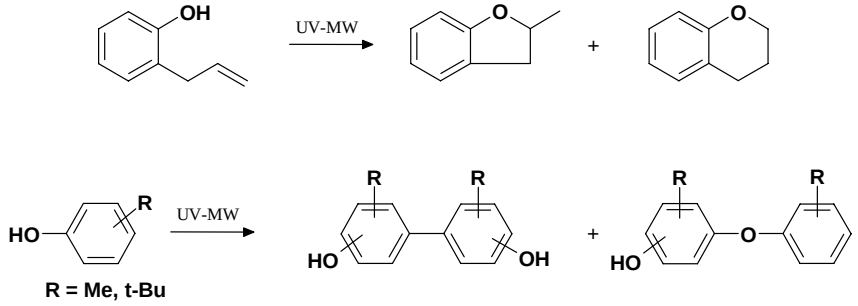


Figure: A modified MW oven for microwave photochemistry experiments:
(A) *magnetron,* (B) *reaction mixture with MWL and stir bar,* (C) *aluminum plate,* (D) *magnetic stirrer,*
(E) *infrared pyrometer,* (F) *circulating water in a glass tube,* (G) *a solid absorber inside the oven cavity*.

We reported on the photochemical reaction of substituted phenols (Scheme 1) in non-polar (hexane, benzene) and polar (MeOH) solvents under MW irradiation using system with EDL or classical UV lamp (RVC-400 W). The study was focused on the temperature products distribution in different types of solvents. The enhanced acidity of phenols in their excited states to iniciate chemical reaction was used as an attractive concept.

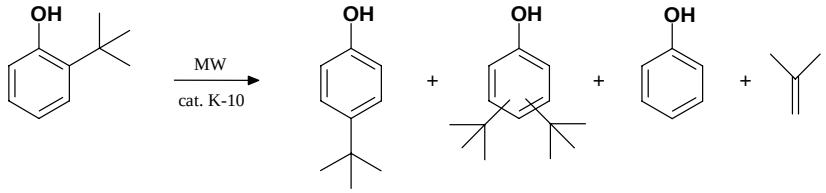
Allyl phenols undergo photocyclization reaction to yield a mixture of dihydrofuranyl and dihydropyranyl ethers (Scheme 1). The ratio of products was depended on temperature and type of solvents. Alkyl phenols provide the mixture of products (Scheme 1), mainly bis (alkyl) phenols and di-

alkyl-hydroxy-diphenyl ethers. The ratio and type of photoproducts were dependent on position (*o*-, *m*-, *p*-) and bulky of substituents, on temperature, on kind of sensitization, on the solvents and on the presence of oxygen in reaction mixture.



Scheme 1: Reaction of substituted phenols in microwave photochemical experiments

When the influence of UV or MW irradiation on the selectivity of reaction was compared, the product distribution was completely different (Scheme 2), i.e. *ortho*-tert-butyl phenol provided only transalkylated and dealkylated products.



Scheme 2: Reaction of phenols under MW irradiation

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