Title: **Microwave assisted gas-phase reactions over solid catalysts**
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Microwave dielectric heating application associated to gas-phase reactions over solid catalysts has been examined. The reactions that have been studied are the decomposition of hydrogen sulfide, the reduction of sulfur dioxide with methane, the reforming of methane with carbon dioxide and the hydrodesulphurization of thiophene, all of them related to heterogeneous catalytic processes. The reactant conversions as a function of the temperature, in microwave and conventional heating conditions, have been reviewed. The question of thermal and non-thermal effects has been also discussed. Finally, within the framework of microwave irradiation and as far as future challenges are concerned, emerging areas have been presented.