Role of surface modification of some metal oxides with amino acids in upgrading the sonocatalytic degradation of nitrobenzene

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ABSTRACT

The influence of surface modification of some metal oxides (Fe₂O₃, CuO, NiO, and Co₃O₄) with amino acids was investigated in the sonocatalytic degradation of nitrobenzene (NB). Glycine, arginine, and glutamic acid were used as surface modifiers. This modification resulted in a considerable enhancement of sonochemical degradation of NB at pH higher than 7 with respect to the pristine catalysts before modification. Catalysts modified with arginine exhibited the highest degradation extent. The enhanced degradation efficiency was attributed to the promoted coupling via electrostatic attraction between the negatively charged NB molecules and the positively charged arginine layer on the surface of Fe₂O₃, CuO, NiO, and Co₃O₄. The attraction capability at all modified metal oxides increased via secondary forces such as hydrogen bonding, n–π and π–π interactions.

Keywords: Sonocatalysis; Nitrobenzene; Amino acid; Surface modification