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Phenol photodegradation process assisted with Wells–Dawson heteropolyacids

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Abstract: This work aims to investigate the catalytic properties of the heteropolyacids (HPAs) withinphotocatalytic process. Photocatalytic degradation of phenol in aqueous solution was performedusing Wells–Dawson HPAs as catalysts under UV-illuminated condition at 254 nm.The effects of various parameters such as, concentration of catalyst, initial pH, and initialphenol concentration on the performance of photocatalytic process have been investigatedto obtain the efficient and durable catalysts and determine the better reaction conditions.The kinetics and the efficiency of phenol degradation were determined by various analyticaltechniques, such as HPLC and TOC. The results show that the photocatalytic degradationefficiency increases with decreasing pH and the optimum pH is 2 for both catalysts. Thephotodegradation follows pseudo-first-order kinetics with rate constants $k = 8.56 \times 10^{?2}$ and $9.94 \times 10^{?2}$ $min^{?1}$ for iron- and vanadium-substituted HPAs, respectively.

Keywords : Well-Dawson HPA, Homogeneous catalysis, Phenol photodegradation, UV irradiation