

## V<sub>2</sub>O<sub>5</sub> NANOPARTICLES FOR DYES REMOVAL FROM WATER

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**Abstract.** Rapid population growth, urbanization and industrialization pose significant threats to the aquatic ecosystem. The discharge of untreated dyes contaminated wastewater causes harmful chemical and biological changes in water bodies as well as human disease. The most common dye used at industrial scale is methylene blue (MB). Recently, numerous metal oxide nanoparticles adsorbents have been applied for the purpose of treatment of water from dyes. This paper deals with V<sub>2</sub>O<sub>5</sub> nanoparticles adsorbents, obtained by thermal pre-treatment carried out by increasing the temperatures between 90 and 750°C. The surface chemistry of the newly prepared nanoparticles was investigated by X-ray diffraction and scanning electron microscopy, Fourier Transform infrared spectroscopy and thermogravimetric techniques. Furthermore, the prepared nanoparticles were tested for MB removal from modelled water solution. The obtained results indicated that high MB removal efficiency (93%) and adsorption capacity (27 mg/g) after 40 min of adsorption were obtained for samples of V<sub>2</sub>O<sub>5</sub> annealed at 500°C in comparison with V<sub>2</sub>O<sub>5</sub> treated at 90, 250 and 750°C, respectively. The applicability and suitability of the two kinetic models were tested and the removal mechanism was proposed.

**Keywords:** hydrothermal method, annealed vanadium pentoxide, methylene blue adsorption, nanoparticle.

Received: 04 November 2021/ Revised final: 12 December 2021/ Accepted: 16 December 2021

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