

## NEW NANOSIZE MATERIALS OBTAINED BY THERMAL TREATMENT OF VANADIUM OXIDES WITH APPLICATION IN DYES REMOVAL IN WASTEWATER TREATMENT

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**Abstract.** Rapid population growth, urbanization and industrialization pose significant threats to the aquatic ecosystem. A water contamination has a significant impact on environment and has become one of the major problems facing the world today. 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 are methylene blue. Recently, numerous metal oxide nano-particles adsorbents have been applied for the purpose of treatment of water from dyes. This paper deal with V<sub>2</sub>O<sub>5</sub> nanoparticle adsorbents which were obtained by thermal pretreatment carried out by increasing the temperatures between 90 and 750°C. In order to obtain more detailed information on the surface chemistry of the newly prepared nanomaterials, the characterization was done by X-ray diffraction and scanning electron microscopic, Fourier transform infrared spectrometry and thermalgravimetric investigation techniques. The prepared nanoparticles were tested for methylene blue removal from water model solution. UV-Vis analysis indicated that high MB removal efficiency (93%) and adsorption capacity (27 mg/g) after 40 minutes of adsorption were obtained over 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 V<sub>2</sub>O<sub>5</sub>, methylene blue adsorption, nanoparticles.