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## Application of bismuth vanadate in the photodegradation of brewing industry effluents

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### Resumo-Abstract

The brewing industry is one of the largest industrial consumers of water, generating effluents with a high pollutant load due to waste arising from the processing and cleaning of equipment. Inadequate disposal of these effluents can lead to contamination of water bodies, resulting in significant environmental impacts [1]. Despite technological advances, challenges in treating these effluents remain, highlighting the need to optimize and implement advanced treatment methods that are effective in degrading the organic matter present. In this study, the efficiency of bismuth vanadate ( $\text{BiVO}_4$ ) as a photocatalyst in the degradation of effluents from the brewing industry under UV-visible irradiation was evaluated. The experiment was carried out in a bench system, containing a jacketed cell with a maximum capacity of 100 mL, where the brewery effluent was placed together with photocatalyst ( $\text{BiVO}_4$ ) dispersed in the solution plus the addition of hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) in some tests under agitation. A mercury vapor lamp (80 W) was used, shining light at 5 cm from the solution, and controlled temperature. The tests last 4 hours for photolysis and 4 hours and 30 minutes for photocatalysis; aliquots were withdrawn at times from 0 to 240 min. where 30 minutes of photocatalysis is reserved for the adsorption of the material in solution. Samples are analyzed pH; UV-Vis absorption spectra; total organic carbon;. Two studies were carried out: study of catalyst concentration and study of pH of the effluent in photodegradation. The results for the study of the two concentrations were carried out at pH 4.0 and 10, in photocatalysis with catalyst concentrations of 500 and 1000 ppm, the samples at pH 4.0 present the same behavior profile at different times of irradiation of light. For pH 10, the effluent presented two distinct groups in terms of its behavior, samples added with  $\text{H}_2\text{O}_2$  showed greater degradation compared to samples without added  $\text{H}_2\text{O}_2$ , all tests were monitored at a wavelength of 330 nm. There is a difference in samples with pH 10 added with  $\text{H}_2\text{O}_2$  with those with pH 4.0, in photolysis this difference was 33.91% while in photocatalysis it was 8.46%, demonstrating that there was greater degradation of effluent with pH 10 with the addition of hydrogen peroxide, in the photocatalytic tests the greatest TOC removal occurred in the photocatalysis of 1000 ppm  $\text{BiVO}_4$  with 18.93%. Heterogeneous photocatalysis showed satisfactory results.

**Keywords:**  $\text{BiVO}_4$ , Advanced oxidative processes, Heterogeneous photocatalysis.

### References

[1] OLAJIRE, Abass A. The brewing industry and environmental challenges. **Journal of cleaner production**, v. 256, p. 102817, 2020.

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