EVALUATION OF KINETICS DEGRADATION OF METHYLENE BLUE IN UV SYSTEM WITH PHOTOCHEMICAL GENERATION OF OZONE.

Nycolas Alfonso Rabuske Gollmann (IC) 1, Pâmela A. M. dos Santos (PQ) 2, Raul F. de Mello Peters (PG) 2, Rômulo de Oliveira Schwaickardt (PG) 2, Énio Leandro Machado (PQ) 2.

1 Departamento de Química e Física, Universidade de Santa Cruz do Sul, CEP 96815-900, Santa Cruz do Sul, RS, Brasil
2 Programa de Pós-Graduação em Tecnologia Ambiental, Universidade de Santa Cruz do Sul, CEP 96815-900, Santa Cruz do Sul, RS, Brasil
*enio@unisc.br

Keywords: UV, ozone, kinetics, degradation, methylene blue.

Abstract
To evaluate the kinetics degradation of methylene blue in an UV 254nm system, with circulation of ozone created in a reactor with an UV 185nm lamp.

Introdução
Advanced oxidation processes (AOPs) have received a lot of attention from researchers in the last years, given their high efficiency in degrading organic compounds and being relatively cheaper. However, preliminary studies of the process are needed, investigating, besides reactional parameters, the kinetics involved in this process. With that purpose, kinetic models are developed in order to test and classify the experimental data. This work aimed to evaluate the kinetics degradation of a synthetic dye (methylene blue) in an UV 254nm system, with circulation of ozone photochemically created in a reactor with an UV 185nm lamp.

Resultados e Discussão
The reactors were configured, as is shown in the picture:

Picture 1. Configuration of the reactors

The solution of methylene blue had 5 mg.L\(^{-1}\) of concentration. The test ran for 1 hour. The samples were read in a PróAnálise® spectrophotometer with a wavelength of 665 nm. The results showed degradation of the dye in the three configurations, though the one using only the UV 254nm lamp has had an erratic performance, taking around 20 minutes to start degrading the dye. On the ozone-based configuration, and especially in conjunction with the UV 254nm lamp, the degradation was very efficient all the time along. The kinetic constants were calculated using the Lagergren method.

Table 1. Kinetic constants of degradation of methylene blue in each process.

<table>
<thead>
<tr>
<th>Process</th>
<th>Kinetic constant (min(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV</td>
<td>-0.0025</td>
</tr>
<tr>
<td>O(_3)</td>
<td>-0.007</td>
</tr>
<tr>
<td>UV/O(_3)</td>
<td>-0.0103</td>
</tr>
</tbody>
</table>

Conclusões
The system used was efficient in degrading the synthetic dye, and there was greater efficiency in combining the UV 254nm lamp and ozone. In future studies, tests are planned with real wastewater, as well as recirculation of the sample through the UV 185nm reactor.

Agradecimentos
UNISC (Universidade de Santa Cruz do Sul)