



## Chemiluminescence of luminol in presence of humic acids

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### Introduction

Quantitative analysis of persistent toxic substances (PTS) in natural waters is essential to understanding global biogeochemical cycling. The study of humic acids in aqueous solution has been of particular interest over the past 50 years due to their role in various chemical, physical and biological processes in natural waters<sup>1</sup>. The study of the role of humic acids in photodegradation of PTS is the aim of this work. One solution is the use of chemiluminescence (CL) detection coupled with humic acids, which has been rapid and highly sensitive.

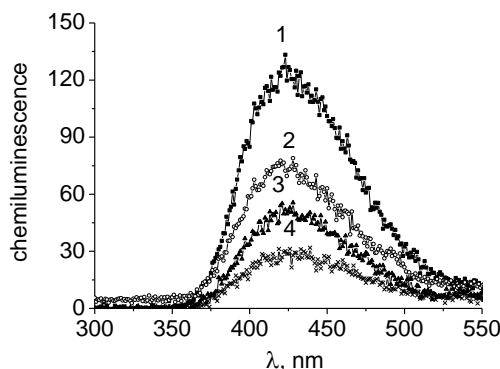
### Materials and Methods

Many compounds have been shown to emit light upon oxidation; the most studied is probably 5-amino-2,3-dihydro-1,4-phthalazinedione, commonly known as luminol<sup>2</sup>. The antiradical activity of humic acids before and after irradiation was analyzed in the CL reaction of luminol using the Cary Eclipse spectrophotometer ("Varian", Australia) by "Chemiluminescence" and "Kinetics" regimes.

### Results and Discussion

Humic acids are biopolymers and contain natural antioxidants, which are free radical scavengers. The intensity of CL is markedly reduced in the presence of unirradiated humic acids (Fig.1). After irradiation with KrCl excilamp, humic acids effectively quench luminescence of luminol. This may be due to the formation under the action of ultraviolet free radicals of humic acids, which contribute to quenching the CL reaction. It is fixed that the CL time is the maximum with the addition of humic acids irradiated for 8 minutes. The graphic form of the luminol CL kinetics corresponds to the exponential law. The damping of CL luminol in the presence of irradiated humic acids can be divided into two components—a fast one (up to 1 s) and a slow one (up to several minutes).

**Figure 1: Chemiluminescence spectra of 3 mM luminol (1) in the presence of unirradiated (2) humic acids and irradiated for 2 min (3) and 32 min (4) by KrCl excilamp.**



### Conclusion

The results of experiments indicate that, the intermediate products of photo-oxidation of humic acids of molecular nature are the source of quenchers of luminol chemiluminescence. The obtained quantitative characteristics can be used to develop methods for monitoring the peroxide oxidation of pollutants in water and detailing the mechanisms of their phototransformation in the presence of humic acids, which will be the subject of further research.

### Bibliography

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