



Assessment of direct and indirect photodegradation of selected drugs acting on the central nervous system



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Introduction

Drugs acting on the central nervous system (CNS), especially antidepressants have a very high growth dynamics of consumption. The widespread use of these compounds has led to their detection in surface waters and ground waters. Many drug substances and drug products are found to be decomposed under exposure to light, but the practical consequences will not necessarily be the same in all cases. The aim of the research was a comprehensive evaluation of photodegradation of selected drugs acting on the central nervous system. Aqueous solutions of drugs were irradiated in sunlight simulator without (direct photodegradation) and with the addition of humic acid (indirect photodegradation). The samples were tested using the bioassay and physicochemical methods. Toxicity of the samples were evaluated with standard organisms, from bacteria (Microtox), through protozoa (Spirotox) to crustacean (Thamnotoxkit F). At the same time the concentration of the parent substances was monitored using HPLC.

Goal

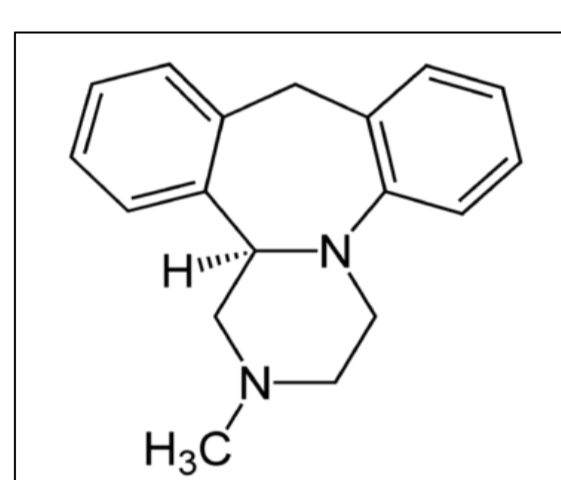
Evaluation of the toxicity and phototoxicity of mianserin and paroxetine in water and synthetic humic acid.

Conclusions

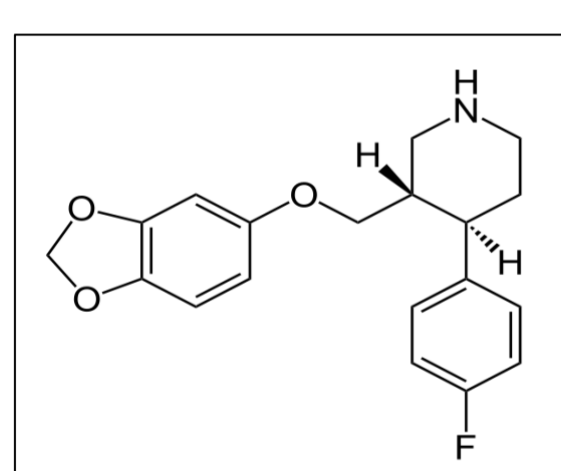
- Paroxetine is more toxic than mianserin to protozoa and crustacea, but less toxic to bacteria.
- Humic acid don't influence on the toxicity of pharmaceuticals to organisms.
- Irradiation of UV/Vis light increases decomposition of mianserin and paroxetine faster than Vis light only. Paroxetine is decomposed almost completely by UV/Vis during 2 hours.
- The addition of humic acid has no significant effect on the rate of decomposition of tested drugs.
- In all cases toxicity of the pharmaceuticals tested after irradiation to the test organisms is corresponded to the concentration of parent drugs. Thus photodegradation products aren't more toxic to the applied tests than the parent drugs.

Materials & methods

Compounds



Mianserin



Paroxetine



Humic acid (HA)

Suntest CPS/CPS+

- simulation of solar radiation (UV-Vis)
- simulation of solar radiation through window glass (Vis)



Bioassays



Microtox
Vibrio fischeri
bacteria



Spirotox
Spirostomum ambiguum
protozoa



Thamnotoxkit
Thamnocephalus platyurus
crustacea

Results

