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PROBLEMS OF THE WASTEWATER TOXICITY WITH A POSSIBILITY OF PROMPT ON-LINE WATER CONTAMINATION MONITORING

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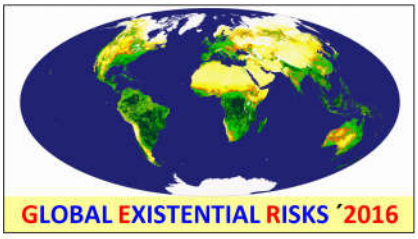
PROBLEMATIKA TOXICITY ODPADOVÝCH VÔD S MOŽNOSŤOU RÝCHLEHO ON-LINE SLEDOVANIA KONTAMINÁCIE VODY



ABSTRACT
This article takes the problematic of the wastewater toxicity with the possibility of fast online monitoring of a contamination of the water. The reaction time of the monitor is very important, because a fast and reliable information can avoid a contamination from a technological process in any kind of production or technological process. There is a new online toxicity monitor developed by a German company in test run on a wastewater plant of a chemical plant watching the contamination level in the effluent channel.

KEY WORDS: *Wastewater, Monitoring, Toxicity*

Introduction

Nowadays, there are several methods of water toxicity monitoring. The most interesting are i.e. the drinking water monitoring using special kind of fish, as i.e. in Vienna. Of course, there are online analysers to monitor the standard parameter and quality of the water, but using biological systems for monitoring of the water is natural and much more indicative for water quality.
If we are talking about the waste water toxicity monitoring, using such biological indicators is much more difficult. For such applications are more suitable the technical systems.

Water toxicity

Wastewater is simply water that has been used. It usually contains various pollutants, depending on what it was used for. It is classified into two major categories, by source:

- Domestic or sanitary wastewater. This comes from residential sources including toilets, sinks, bathing, and laundry. It can contain body wastes containing intestinal disease organisms.
- Industrial wastewater. This is discharged by manufacturing processes and commercial enterprises. Process wastewater can contain rinse waters including such things as residual acids, plating metals, and toxic chemicals.

Wastewater is treated to remove pollutants (contaminants). Wastewater treatment is a process to improve and purify the water, removing some or all of the contaminants, making it fit for reuse or discharge back to the environment. Discharge may be to surface water, such as rivers or the ocean, or to groundwater that lies beneath the land surface of the earth. Properly treating wastewater assures that acceptable overall water quality is maintained. In many parts of the world, including in the United States, health problems and diseases have often been caused by discharging untreated or inadequately treated wastewater. Such discharges are called water pollution, and result in the spreading of disease, fish kills, and destruction of other forms of aquatic life. The

pollution of water has a serious impact on all living creatures, and can negatively affect the use of water for drinking, household needs, recreation, fishing, transportation, and commerce.[1]

Monitoring of water toxicity is of special importance, especially when surface water or ground water are used for the preparation of drinking water. Since a variety of substances are harmful for human being reliable online monitoring is recommended.[2]

Treatment of domestic and industrial wastewa- ter is crucial for protec tion of receiving waters. Parameters such as pH, dissolved oxygen, BOD, COD, TOC, TDS, and TSS are generally used for evaluation of effluent quality. How- ever, these parameters can not be used for evaluation of toxicity e ffect on receiving waters due to some specific defects.[3]

Online waste water toxicity monitoring

Toxic shock due to certain chemical loads in biological wastewater treatment systems can result in death of microorganisms and loss of floc structure.[4]

There are several toxicity monitoring methods of waste water toxicity determination. There was an online toxicity monitor developped by german company Iotronic Process Monitoring which ist now being in testing operation. The test is running in a chemical plant on the waste treatment plant.

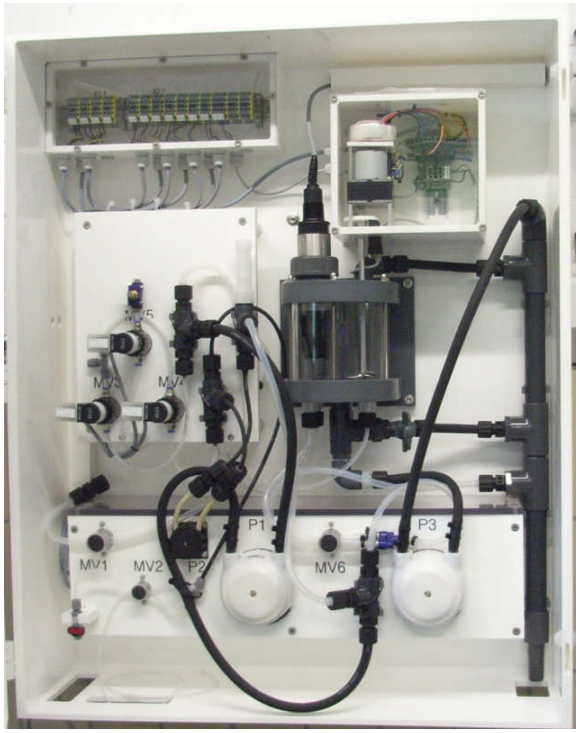


Bild 1 TOX Monitor concept.[5]

Conclusion

The TOX Monitor is able to put out the result in a few minutes. The more time of measuring cycle the more quickly can the operator react on a critical situation and avoid a contamination from the effluent.

[1] PolutionIssues. Waste water treatment. http://www.pollutionissues.com/Ve-Z/Wastewater-Treatment.html
[2] LAR. https://www.lar.com/news-events/news-display/article-management/detail-view/news/online-water-toxicity-monitoring.html
[3] H Movahedian, B Bina,GH Asghari. 2005. Toxicity Evaluation of Wastewater Treatment Plant Effluents Using Daphnia magna. http://www.bioline.org.br/pdf?se05011
[4] Kelly, C.J.; Lajoie, C.A.; Layton, A.C.; Sayler, G.S. Bioluminescent Reporter Bacterium for Toxicity Monitoring in Biological Wastewater Treatment Systems.
[5] Internal documentation of Iotronic Process Monitoring

References

Internal documentation of Iotronic Process Monitoring

Kelly, C.J. - Lajoie, C.A. - Layton, A.C. - Sayler, G.S. Bioluminescent Reporter Bacterium for Toxicity Monitoring in Biological Wastewater Treatment Systems. – In: Water Environment ResearchVol. 71, No. 1 (Jan. - Feb., 1999), pp. 31-35. - [on-line] Available on - URL: https://www.jstor.org/stable/25045171?seq=1#page_scan_tab_contents]

Movahedian, H. - Bina, B. - Asghari, GH., 2005: Toxicity Evaluation of Wastewater Treatment Plant Effluents Using Daphnia magna. – IN: Iranian J Env Health Sci Eng,2005, Vol.2, No.2, pp.1-4. - [on-line] Available on - URL: http://www.bioline.org.br/pdf?se05011

Online Water Toxicity Monitoring. LAR's online toxicity analyzer ToxAlarm. - [on-line] Available on - URL: https://www.lar.com/news-events/news-display/article-management/detail-view/news/online-water-toxicity-monitoring.html

PolutionIssues. Waste water treatment. - [on-line] Available on - URL: http://www.pollutionissues.com/Ve-Z/Wastewater-Treatment.html

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