



## The use of ultrafiltration in enhancement of chemical coke oven wastewater treatment

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### ABSTRACT

Coke oven wastewater is one of the most contaminated and toxic aqueous stream generated in thermal coal processing systems. It contains a significant amount of organic and inorganic pollutants, among which substances well recognized as environmental and living organisms toxicants can be found, that is, polyaromatic hydrocarbons, cyanides and sulphides. In the conventional coke oven treatment system, these contaminants should be eliminated from the stream at the chemical wastewater treatment site. However, due to operational limitations, a part of the compounds remains in the stream, which is introduced to further biological treatment, which may lead to the inhibition of biological processes. The main goal of the presented research was to investigate the enhancement of chemical treatment loop operation by means of ultrafiltration. Three types of polymeric, polyethersulphone membranes differed in cut-off equal to 20, 10 and 5 kDa (by Synder) were tested towards efficiency of complex cyanides and chemical oxygen demand (COD) removal at simultaneous monitoring of the capacity and the fouling affinity. The impact of transmembrane pressure and membrane cut-off on the process performance was checked. The evaluation of processes was made on the basis of flux stability, fouling intensity, complex cyanides and COD removal rates. The studies revealed that ultrafiltration process enabled to remove complex cyanides up to 75%, whereas COD was decreased by 27%. The satisfactory recovery of membranes initial capacity reaching 95% was observed.

*Keywords:* Coke oven wastewater; Chemical treatment; Complex cyanides separation; Ultrafiltration

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