

## **DEGRADATION OF PHENOL BY THE TECHNIQUE OF PULSED HIGH VOLTAGE DISCHARGE IN WATER**

**Yasemin KAPLAN and Özlem SELÇUK KUŞÇU**

Süleyman Demirel University, Department of Environmental Engineering, Çunur Campus,  
Turkey

### **ABSTRACT**

The pulsed high voltage discharge as one of the AOTs has been developed to remove phenol. The basic mechanism of the oxidation process is the formation of plasmas, which can promote both physical and chemical processes leading to strong UV light, local high temperature, intense shockwaves and the formations of chemically active species such as  $\bullet\text{OH}$ ,  $\text{H}\bullet$ ,  $\text{O}\bullet$ ,  $\text{O}_2$ ,  $\text{HO}_2$ ,  $\text{H}_2\text{O}_2$  respectively, etc. The technique of pulsed high-voltage discharge in water is a combination of chemical, photochemical, ultrasonic and electrical process. Results obtained using the pulsed high voltage discharge for phenol removal is reported in this study. The removal of phenol and the effects of various reactor and operation parameters on the removal efficiency were studied. It was found that the phenol in aqueous solution could be destroyed effectively by the pulsed high voltage discharge. In this study, optimum pH and temperature value resulting in a maximum removal of phenol was reported as 12 and 35 °C, respectively. Phenol removal efficiency showed a slight decrease with increasing initial solution conductivity. The phenol degradation is increased with increasing of the peak voltage. Phenol removal efficiency was 14%, 19%, 24% and 29%, respectively when voltage is applied 6, 12, 18 and 24 kV at 45 min of treatment time. The phenol removal efficiency are 40% for initial phenol concentration of 40 ppm at 24 kV voltage and 60 min reaction time during treatment with pulsed discharge. The pH was decreased and the conductivity was increased due to released organic acids such as formic, acetic, oxalic, propanoic acid, maleic acid and free chloride ions in the degradation process.