

## The Effect of Treating Eco-toxicity in the Wastewater Treatment Plants in Fossil Fuel Industrial Sites

Fu-An Chen<sup>1,\*</sup>, Meei-Fang Shue<sup>1</sup>, Ting-Chien Chen<sup>1</sup>, Hideo Utsumi<sup>2</sup>, Chau-Yang Chen<sup>1</sup>

<sup>1</sup>Tajen Institute of Technology, Taiwan, R.O.C.

<sup>2</sup>Faculty of Pharmaceutical Sciences, Kyushu University, Japan

E-mail: [fachen@ccsun.tajen.edu.tw](mailto:fachen@ccsun.tajen.edu.tw)

There are ten manufacturers in Da-Hse Industrial Park, Kaohsiung County, Taiwan, ROC. Before drain off the wastewater, the pretreated wastewater from these manufacturers must be reprocessed by treatment plan including five major units: equalization, primary clarifier, aeration basin, and final clarifier. This study investigates the eco-toxicities including estrogenic activity and oxidative liver injury of the effluent from every individual manufacturer and samples from each processing units. *in vitro* bioassays for endocrine disruptors (EDs) and oxidative liver toxicity were carried out using human breast cancer cell line, MCF-7 and MVLN, and human hepatoma cell line, HepG2. Occurrence ratio of estrogenic activity is 70% in pretreated wastewater from these manufacturers. The estrogenic effect was the largest at the influent unit of treatment plant and decreased through the treatment process. 84% of the estrogenicity clearance was found throughout the process units. Therefore, the treatment plant at Da-Hse Industrial Park is suitable for removing estrogenic substances. In addition, MVLN cells possess higher tolerance toward the toxicity of industrial samples than that of MCF-7 cells. Oxidative liver toxicity was estimated with thiobarbituric acid-reactive substances (TBARs) and lactate dehydrogenase (LDH) bioassays. The TBARs-positive ratio in the effluent samples of manufacturers is 90 % and their relative effect was between 4.6 to 82.7%. 97% of the reactive oxygen substances (ROS) clearance was found through all process units. Upon the LDH measurement, the LDH level increased in final clarifier unit (45 %) comparing to influent unit (15 %). The results indicate that the polymers used to recover activated carbon should possess potential liver cytotoxicity.