## Abstract

After screening 8 ornamental plants for 20 ppm benzene removal in a static system by *Chamaedorea seifrizii, Scindapsus aureus, Sansevieria trifasciata, Philodendron domesticum, Ixoraebarbata craib, Monster acuminate, Epipremnum aureum,* and *Dracaena sanderiana* found that *D. sanderiana* had the highest benzene removal efficiency of 20 ppm under 32 ºC at 72 hours. In a long-term study, 4 cycles of benzene exposure were studied under both 24 hour dark and 24 hour light conditions. From the 2$^{nd}$ to 4$^{th}$ cycle, *D. sanderiana* growing under 24 hour light conditions had higher benzene removal efficiency than *D. sanderiana* growing under 24 hour dark conditions, and the closing of *D. sanderiana* stomata was found only in 24 hour dark conditions. At the final cycle, *D. sanderiana* still survived, and benzene uptake continued. From the calculation, 46% of benzene was taken up by *D. sanderiana* crude wax, while 54% of benzene was predicted to be taken up by the stomata at 72 hours. This result suggests that gaseous benzene phytoremediation is a sustainable technology. Due to high levels of benzene being taken up by crude wax, the application of plant wax for gaseous benzene adsorption was also studied. Twenty-one plant leaf materials such as *Homalomena rubescens, Citrus hystrix, Musa paradisiaca, Mangifera indica, Catura metet, Lagerstroemia inermis, Cananga odorata, Cassia siamea, Bougain villea, Litchi chinensis, Coccinia grandis, Dieffenbachia picta, Attacus atlas, Polyalthia longifolia, Acrostichum aureum, Ficus religiosa, Alstonia scholaris, Anthurium andraeanum, Plerocarpus Indicus, Lagerstroemia macrocarpa,* and *Dracaena sanderiana* were screened for benzene adsorption efficiency in a static system. The leaf materials from *Dieffenbachia picta, Acrostichum aureum, Ficus religiosa, Lagerstroemia macrocarpa, Alstonia scholaris,* and *Dracaena sanderiana* were found to have high potential for benzene removal. In addition, the relationship between quantity and composition of wax to benzene removal efficiency was also studied. The relationship between benzene adsorption and quantity of wax was found to be a logarithmic curve with $R^2$=0.65. Increasing crude wax can improve benzene adsorption, however, although high quantities of wax occurred in some leaf materials, low benzene removal was found to be significant if compared with other plant materials with the same wax quantity. For the composition of wax, alpha-linoleic acid and dodecyl cyclohexane were found to be the main composition in plant leaf materials with high benzene adsorption. This might also be a key factor for benzene removal. Therefore 15 g of 6 plant leaf materials with high gaseous benzene adsorption such as *D. picta, A. aureum, F.religiosa, L. macrocarpa, A. scholaris* and *D.sanderiana* were applied in a continuous system. Glass beads with cassava glue-immobilized with leaf material were investigated in a continuous adsorption system with 3 min of retention time. In an adsorption system, *A. aureum* and *A. scholaris* leaf materials showed the highest benzene removal capacity, around 60-80% benzene removal for 120 h. Other leaf material from *D. picta, F.religiosa, L. macrocarpa,* and *D.sanderiana* can uptake benzene around 60-80%, but theses material was saturated with benzene in 102 h. Physical sorption was confirmed by hexane desorption and the FT-IR results.

**Keywords:** Adsorption/ Benzene/ Crude wax/ *Dracaena sanderiana*/ Phytoremediation/ Plant leaf material