Studies on the Treatment of Odor Gases by Adsorption

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ABSTRACT

This study includes two parts. The first is to investigate the potential odor gases existing in the rubber industry. Monitoring was performed at the working places of a manufacture and its surroundings. Items examined include VOC, dust, hydrogen sulfide, mercaptan etc. The goal of this study is to find out the origin of pollutants and subsequently to seek methods for reducing these pollutants. The second part tries to remove the pollutants founded in the first part by using activated carbon treated with sodium hydroxide solutions at various concentrations. The initial concentrations of H2S and mercaptan are considered as a factor to study. Major results are summarized as follows: (1) For the rubber industry, particulate pollutants and VOC may escape from a mixing and/or milling machine during a knesding process. VOC and H2S are produced during the curing process. Twenty points in five manufactures were selected for examination. The concentration of H2S at five (out of 20) places exceeds its discharging limit. (2) From the surveying results, major odor gases are H2S, VOC and mercaptans. H2S does not dissolve in water, and therefore, activated carbon was chosen to remove H2S in a polluted air stream. Similarly, activated carbon was also used to adsorb mercaptan in a gas stream. (3) Based on the experimental results, we observed that the efficiency for adsorbing H2S using activated carbon is not satisfactory. However, the efficiency can increase 3 ~ 5 folds if the activated carbon has been treated with a NaOH solution. (4) The initial concentration of H2S in the gas stream will affect the breakthrough curve. Higher the initial concentrations, earlier H2S breakthrough will occur. (5) Experimental results show that the efficiency of absorbing mercaptan using activated carbon is higher than that for H2S. (6) In order to obtain the higher amount of NaOH impregnated in carbon, the best condition for preparing basic impregnated carbon is to immerse carbon in a NaOH solution with a concentration of 2 N for 20 hr. Key words: rubber industry, odor gas, H2S, 1-propylthiol (mercaptan), adsorption, basic impregnated carbon.

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