

Simultaneous Adsorption and Characterization of NO_x and SO_x Emissions from Power Generation Plant on Sliced Porous Activated Carbon Prepared by Physical Activation

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Abstract : Air pollution has been a major challenge for the scientists today, due to the release of toxic emissions from various industries like power plants, desalination plants, industrial processes and transportation vehicles. Harmful emissions into the air represent an environmental pressure that reflects negatively on human health and productivity, thus leading to a real loss in the national economy. Variety of air pollutants in the form of carbon oxides, hydrocarbons, nitrogen oxides, sulfur oxides, suspended particulate material etc. are present in air due to the combustion of different types of fuels like crude oil, diesel oil and natural gas. Among various pollutants, NO_x and SO_x emissions are considered as highly toxic due to its carcinogenicity and its relation with various health disorders. In Kingdom of Saudi Arabia electricity is generated by burning of crude, diesel or natural gas in the turbines of electricity stations. Out of these three, crude oil is used extensively for electricity generation. Due to the burning of the crude oil there are heavy contents of gaseous pollutants like sulfur dioxides (SO_x) and nitrogen oxides (NO_x), gases which are ultimately discharged in to the environment and is a serious environmental threat. The breakthrough point in case of lab studies using 1 gm of sliced activated carbon adsorbant comes after 20 and 30 minutes for NO_x and SO_x, respectively, whereas in case of PP8 plant breakthrough point comes in seconds. The saturation point in case of lab studies comes after 100 and 120 minutes and for actual PP8 plant it comes after 60 and 90 minutes for NO_x and SO_x adsorption, respectively. Surface characterization of NO_x and SO_x adsorption on SAC confirms the presence of peaks in the FT-IR spectrum. CHNS study verifies that the SAC is suitable for NO_x and SO_x along with some other C and H containing compounds coming out from stack emission stream from the turbines of a power plant.

Keywords : activated carbon, flue gases, NO_x and SO_x adsorption, physical activation, power plants

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