

ABSTRACT

Thermal power plants were established in Pakistan to generate electricity in the last decade of 20th century. These power plants use heavy Furnace oil in bulk quantities as fuel and cause serious air and industrial wastewater pollution. Effluents of thermal power plants carry a heavy pollution load particularly of Oils and greases and are a serious threat to the environment. The present research work was aimed to select the best polyelectrolyte or polyelectrolytes for industrial wastewater treatment especially, for effluents of thermal power plants. For analysis of oily wastewater samples Kot Addu Power Company (Kapco) plant was selected, as almost all-thermal power plants designed to the same. The initial oil and grease of the sample was 135ppm and Total suspended solids (TSS) were 310ppm, which were very high to the NEQS levels.

The experimental work carried to bring oil and grease and TSS within National Environmental quality standards. Wastewater samples containing oils and greases treated with a series of polyelectrolytes PC 4000, PC 4004, PC 4005, PC 4012 and PC 4014 newly developed by M/S Betzdearborn & GE Company. "Jar Test Procedure" was employed to achieve purposes of study due to its reliability and convenience to operate at laboratory testing.

Results of experimental work indicate that PC 4000 and PC 4004 are the best polyelectrolytes for Oily wastewater treatment PC 4000 reduce oil and grease from 135 to 10ppm at its 50ppm dose and TSS from 310 to 54ppm. PC 4004 yielded even better results and reduced oil and grease from 135 to 8ppm whereas TSS from 310 to 52ppm.

One of the major objective of present study was selection of polyelectrolytes economic point of view. Because polyelectrolytes are more expensive, these are further employed for treatment with the aid of coagulants Ferric Alum, Ferric Chloride, Ferric Sulfate and Aluminum Sulfate were used as coagulants. Combination of polyelectrolytes with coagulant reduced its cost for treatment.

The results obtained due to combine demulsification activity of the polyelectrolytes and coagulants are much better as compare to their application alone, regarding the removal of oil and grease and TSS. Here again PC 4000 and PC 4004 proved the best to be used with coagulant combination. Combination of PC 4000 with Ferric Chloride Coagulant reduced oils and grease from 135 to 10ppm and TSS from 310 to 35ppm. PC 4000 showed excellent results. It reduces oil and grease from 135 to 7ppm and TSS 310 to 32ppm. Results of above both polyelectrolytes combination with Ferric Chloride coagulant, meet the values of Oil and Grease and TSS to the NEQS limiting values.

Technically selected polyelectrolytes were subjected to their economical evaluation. Economically, PC 4000 and PC 4004 are recommended for industrial wastewater treatment. But PC 4004 prove to be the best polyelectrolyte technical as well as economical point of view, to be used for treatment especially of thermal Power Plants to remove oils and greases and TSS to meet limiting values set by the NEQS.