

ABSTRACT

Sustained supply of treated surface water which meets the drinking water standards is of paramount significance. Water treatment plants based on conventional technology have long been found to be uneconomical concerning usage of power, the requirement for area, dosage of chemicals and beset by non-functional mechanical components, to mention a few important markers. Superpulsators[®] are basically solids contact clarifiers, and are renowned for treating even low turbidity waters efficiently. However, like most of the proprietary technologies, are designed and sized by manufacturer's recommendations and rationales that explain their behavior are deficient. Therefore, water treatment plant at Surajpura, was visited for gaining insights into the design of Superpulsator[®] Clarifiers, and to contribute towards improvement of performance. Subsequently, a pilot plant based on Superpulsator[®] technology was designed and developed for a capacity of about 8000 liters per day at the Malaviya National Institute of Technology Jaipur, India. A conventional clariflocculator also designed for a capacity of about 8000 liters per day was constructed and studied in parallel.

Pre-chlorination dose 4.5ppm and post-chlorination dose of 1ppm, being currently administered at Surajpura WTP was found optimum. Zetapotential of colloidal particles in Bisalpur water was found to be -12.7mV. Zetasizing analyses indicate that the flocs are damaged due to hydraulic jump in the parshall flume of the WTP. Large D_{90} values were observed for the flocs in the clarified water from Superpulsator[®] pilot plant, which shows that coagulation and flocculation occur properly and result in adequate formation of sludge blanket for high solids contact. Analysis of the effect of coagulants, namely PAC and alum on the performance of Superpulsator[®] pilot plant and conventional clariflocculator was done. Much lower residual aluminium levels were obtained when alum was used as coagulant in the pilot plant as compared to PAC. Whereas, in case of conventional clariflocculator, PAC was found to give lower residual aluminium levels as compared to alum. However, turbidity in the filtered water was lower when alum was used for conventional clariflocculator as compared to PAC.

Keywords: Superpulsator[®] clarifier; conventional clariflocculator; pilot plant; particle size; zetapotential; polyaluminium chloride; alum; turbidity; residual aluminium;