

# Executive Summary



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1. Title of the Project: Abdul Kalam Technology Innovation National Fellowship
2. Date of Start of the Project: 01.01.2018
3. Aims and Objectives: To develop and demonstrate the following technologies to the field scale: (i) Fluoride removal from groundwater; (ii) Removal of cyanide from steel plant effluent; (iii) Scaling up of cold sterilization technique for storing tender coconut water with high shelf life using suitable membranes; (iv) Removal of heavy metals from groundwater
4. Significant achievements (not more than 500 words to include List of patents, publications, prototype, deployment etc)

The fluoride removal technology from groundwater using mineral rich carbon was developed and the prototypes of 500 L/day capacity have been deployed in Mithila Primary School and Buxituli Primary School, Bankura district, West Bengal. Similarly about 15 domestic fluoride removal filters (60 L/day) are distributed in various households in the same district.

Iron and bacterial removal filters of capacity 2000 L/day are deployed in 6 locations Police Training School, Salua, Subsidiary training center, Salua, EFR Battalion Office, Salua. Similar unit is deployed in Raja Narendra Lal Khan Women's College, Medinipur, and West Bengal. One such unit is deployed in Kalighat Temple, Kolkata. Similar 10 domestic units 10 L/h are installed in different houses.

A treatment method has been developed using hydrogen peroxide in presence of air bubbling at controlled rate and exposure to UV radiation. The cyanide completely degraded to produce nitrogen di oxide and carbonate. Based on a satisfactory

performance of 2 m<sup>3</sup>/h plant at Tata Steel, the company is setting up a plant of 80 m<sup>3</sup>/h capacity at Angul, Orissa.

A suitable ultrafiltration hollow fiber membrane cartridge was developed to filter tender coconut water. The filtrate is packed aseptically. The filtered juice stored under normal refrigeration temperature has long shelf life (18 weeks) without addition of any preservative or chemicals and retaining the original flavor, taste and nutritional profile of the juice. This technology was demonstrated in laboratory to number of interested entrepreneurs and one pilot unit (80 L/day) was deployed in Madhura Agro Process Pvt Ltd., Coimbatore.

A demineralized water plant of capacity 200 L/day was installed using resin based technology at Rainbow Food Products, Kharagpur.

Mainly demonstration of various technologies in the field scale was the primary objectives of this study. However, following scaling up study of hollow fiber membrane based system was published: R. Mukherjee, P. Bhunia, S. De, "Long term filtration modeling and scaling up of mixed matrix ultrafiltration hollow fiber membrane: a case study of chromium (VI) removal" J. Membr. Sci., 570-571 (2018) 204-214 (**IF: 7.183**).

## 5. Concluding remarks

Sustainable domestic and community based fluoride removal filters have been successfully installed at affected area of Bankura, West Bengal. Community based filter mainly installed at affected primary school in Bankura. This project directly helps the primary school children for drinking fluoride free water and it will benefit the children health. Community based iron and bacteria removal filters were installed at police training centres nearby IIT Kharagpur. Around ten thousand police trainee was benefited from this project. Also 12 number of iron and bacteria removal domestic filters were installed at different parts of West Bengal. Cyanide removal treatment method has been developed and successfully installed at Tata Steel, Jamshedpur. Novel hollow fiber membrane cartridge is developed to filter tender coconut water. This technology has been successfully installed and demonstrated in fruit juice industries.