

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 Aluminium substituted hydroxyapatite incorporated carbon was developed and the prototypes of 500 L/day capacity have been deployed in Mithila Primary School and Bakshituli 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. Twelve community scale filters of capacity 2000 L/h are deployed in the affected districts of Bankura and Purulia. The Fluoride removal technology is transferred to M/s, Mondal Precision Pvt. Ltd., Howrah on March, 2022.

Iron and bacterial removal filters of capacity 2000 L/day are deployed in 7 locations Police Training School, Salua, Subsidiary training center, Salua, EFR Battalion Office, Salua.

Similar five filters are deployed in Raja Narendra Lal Khan Women's College, Medinipur, West Bengal. One such unit is deployed in Jhargram Police Station, Paschim Medinipur and in Kalighat Temple, Kolkata, West Bengal. Similar 10 domestic units 100 L/day are installed in different houses.

A treatment method has been developed for cyanide removal from steel industry effluent using hydrogen peroxide in presence of air bubbling at controlled rate and exposure to UV radiation. The cyanide completely degraded to produce nitrogen dioxide and carbonate. Based on a satisfactory performance of 2 m³/h plant at Tata Steel, the company has set up a plant of 80 m³/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 1000 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 scale fluoride removal filters have been successfully installed at affected area of Bankura and Purulia in West Bengal. This project directly helps the primary school children for drinking fluoride free water and it will benefit the children health. Twelve community scale filters are deployed in the affected districts of West Bengal. This technology is transferred for commercialization as well. 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 20 number of iron and bacteria removal domestic filters were installed at different parts of West Bengal.

Cyanide removal treatment method has been developed and 80 m³/h capacity plant successfully installed at Angul, Tata Steel, Orissa. Novel hollow fiber membrane cartridge is developed to filter tender coconut water. This technology has been successfully installed and demonstrated in fruit juice industries.