

CASE STUDY: COMMON SPENT ACID MANAGEMENT FACILITY



A well known industrial association, collectively with the technical assistance from Advent Envirocare Technology Pvt. Ltd., Ahmedabad-based leading company engaged in offering environment related solutions, has developed “Common Spent Acid Management Facility” at Ahmedabad. The objective of the project is beyond

mere treatment and hence incorporated the three R’s of environment protection: Reuse, Recycle and Recovery into the project. The result today is that the Spent Acid CETP is primary a waste exchange plant rather than a treatment facility. The spent acidic waste undergoes Reuse, Recycle and Recovery by following means:

- Colorless & pale acidic waste is REUSED in neutralizing alkaline effluents from textile processing industries and as raw material for manufacturing certain chemicals such as alum and ferrous sulphate.
- High strength acidic waste with insignificant impurities is RECYCLED in manufacturing certain dyes intermediates such as in isolation of H-Acid, FC Acid, DASA, etc.
- Light coloured spent acid, irrespective of its strength and organic Impurities, is used for RECOVERY of gypsum. The gypsum is dewatered and used in cement packaging as setting agent.

Concentrated Sulphuric Acid and Oleum are principal raw materials used by dyes and dye intermediate manufacturers. Excess chemicals required for the reactions end up as waste, typically with 10 to 30% sulphuric acid. Such concentration of acid is quite low to be reused in the process. Moreover, the organic impurities and colour of the spent acid also makes reuse of the acid in the same industry impractical. A part of the waste generated is hauled away by traders who sell them to certain user industries like textile and coagulant manufacturers. However, the demand of spent acid is much lesser compared to supply, one of the major reasons being lack of information about the actual need in terms of quantity & quality of spent waste and the timing of supply. Hence, the residual spent acid, which can not be sent for reuse, needs to be treated by the generating industry. Storage, handling and treatment of spent acid is an arduous task, requiring ample resources in terms of space as well as expertise.

Operations:

The industries require a minimal storage capacity for spent acid, which can be as low as a single tanker load, i.e. 10 kL. Designated and authorized tankers are sent by CETP to collect the spent acid. The said tankers carry PCB-approved manifests for transportation, on the lines of the ones used for transportation of hazardous waste. On reaching the CETP, the tanker is weighed on in-house weigh-bridge and spent acid sample is collected for analysis.

The spent acid waste brought to the plant is collected in different tanks according to its strength, colour and reuse potential. Colourless or pale coloured acidic waste can be reused by certain industries such as textiles and manufacturers of alum, ferrous sulphate, etc. The textile processing units have alkaline effluent due to use of caustic and soda ash and the quantity of wastewater is usually quite large. Spent acidic waste is sold to such authorized textile units using CETP's designated tankers carrying CETP's name and details, whereby their effluent is neutralized. These tankers also carry along the special manifest for transport of spent acid. Similar transport methodology is adopted for sale of spent acidic waste to manufacturers of alum, ferrous sulphate and other such chemicals which utilize the spent acid as raw material. High strength acid waste with insignificant impurities are sold to manufacturers of certain dyes intermediates like H Acid, FC Acid, DASA, etc. for recycling the spent acid in the manufacturing process, i.e. for isolation.



The spent acid left after exploiting the reuse and recycle potential to its fullest is then again be segregated based on potential of recovering gypsum as by-product. The spent acid with low chloride content and acceptable colour is used to recover saleable gypsum. Neutralizing such spent acid with hydrated lime, with or without

limestone, generates gypsum slurry. At average acid concentration of 20% on wt. / wt. basis, approximately 10 – 12% gypsum slurry is produced on neutralization. The neutralized slurry is then dewatered in mechanical dewatering device called filter press. Due to the large quantity of gypsum produced in the plant and to ensure minimum free moisture in dewatered solids, advanced technology in pressure filtration using membrane-type filter presses is being adopted for the first time on such a large scale in India. The system has automation in terms of feeding, squeezing and cake discharge. The solid gypsum cake is discharged directly into underlying truck with a facility to discharge it to adjoining godown if truck is not present. The truck so loaded is weighed on an in-house weigh-bridge and covered before sending it to the

cement manufacturers for blending and standardization. The trucks to be used for transportation of gypsum also bear CETP's name and other details and carry special manifest designed for the purpose.

The filtrate after recovery of gypsum and dewatering of neutralized unusable acid contains relatively larger amount of dissolved organics. To bring down the COD and BOD levels of filtrate to within the discharge norms of CETP, a large bio-treatment system has been provided. The biotreatment system is built based on an advanced US technology wherein there are no moving parts in contact with the effluent and operating biomass levels are significantly higher than conventional systems. The excess biomass generated on biological action is mixed with the neutralized slurry of unusable acid for dewatering and eventual disposal to the landfill. The biotreatment effluent is pumped to another Common Effluent Treatment Plant promoted by the industries association for final treatment before disposal.

Thus, the Common Spent Acid CETP Facility is a Waste Exchange Centre that utilizes the approach of Reuse, Recycle and Recovery to its best potential and at the same time, renders comprehensive treatment to the effluent. It bridges the gap between generators and users by providing a single source of collection and supply within and around Ahmedabad. It is a boon to dyestuff industries and an ultimate solution for the spent acid disposal mitigating the deleterious effects of spent acid on the environment and people at large. It contributes to the overall growth of chemical sectors which provides employment to thousands of skilled and unskilled workers. It received accolades from GPCB and they even recommended all the major industrial sectors having chemical units to implement this concept. The plant adopting the above technology converts the waste to value rich by producing Gypsum which is in huge demand in cement industries.



An acid disposal system of this standard once again stands testimony for the concern shown by industries, statutory and regulatory bodies in Gujarat towards the environment. It is unparalleled and an ultimate solution to acid disposal problem. While we can not get rid of acid usage, an efficient remedial measure will always satisfy the statutory and regulatory bodies, which in turn will augment the growth of the industries of this nature. It ensures the sustenance of livelihood of several people who are currently employed by these industries.