INNOVATIVE CLEANER PRODUCTION PROCESS AND SUSTAINABLE TREATMENT WITH RECOVERY AND REUSE OF WATER & CHEMICALS

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Abstract

Environmental challenges in treatment and disposal of tannery effluent with high salinity, stringent environmental regulations including Total Dissolved Solids (TDS), etc. resulted in development of appropriate cleaner process, segregation of streams, upgradation of treatment technologies with advance oxidation process, recovery of quality chromium, salt & water for reuse.

Introduction

The developments of cleaner process and effluent treatment are :

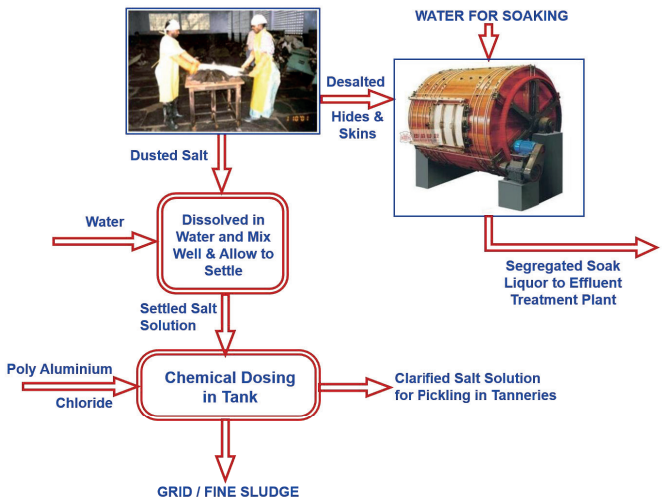
- Improved desalting mechanism for skins using DODECA (12 frame) system.
- Reduction in Sulphide usage and discharge by using suitable enzymes.
- Improved Chrome Recovery System with recovery of Chromium in the form of cake & reuse of supernatant in the tanning process.
- Safe and sustainable disposal of waste fleshing by conversion into fertilizer.
- Anaerobic digestion of sludge with bio-energy generation.
- Development of biological treatment including Sulphide oxidation by introducing advanced aeration and oxidation treatment with ozone.

The technological developments are being implemented in commercial scale and most of them are First of their kind in Asia.

Materials and Methods

- Desalting using DODECA frame, reduction of float by 50% for soaking, segregation, separate treatment under Zero Liquid Discharge (ZLD) system with recovery of quality water and salt.
- Recovery of Chromium by adopting chemical precipitation using Sodium hydroxide as alkali and recovery of Chromium as cake from chrome slurry by using Chamber Filter Press and reuse of supernatant after treatment.
- Advanced Jet Aeration in deeper tanks for improved Oxygen transfer.
- Advance oxidation system using Ozone for removal of colour by generation of Oxygen from the Atmospheric air using Oxygen generator and generation of Ozone from Oxygen at the ratio of 100:15 (Oxygen → Ozone in m3/hr).

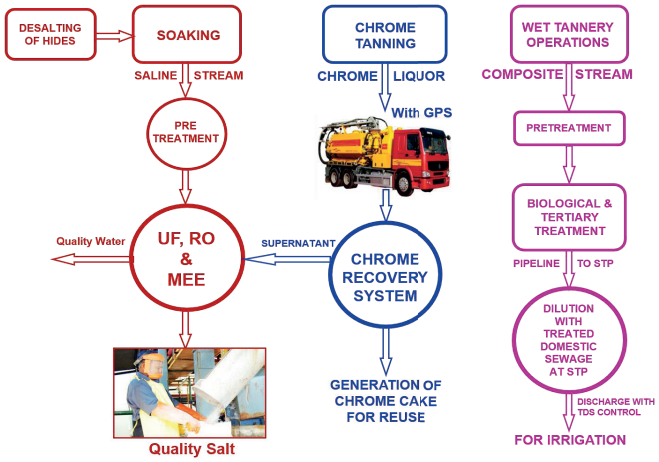
DESALTING USING DODECA SYSTEM



Results and Discussions

- Improved desalting using DODECA mechanism removes the applied salt from 60% to 30% on weight basis.
- By adopting desalting and improved cleaner production, the TDS level in the effluent reduced from 20000mg/l to less than 10000mg/l.
- Improved Chrome Recovery System generates chromium in the form of cake / powder and treatment of supernatant for reuse. Results in better chromium management in cluster of tanneries.
- Jet Aspiration system in carousel type Aeration tanks upto 7m depth transfer Oxygen to the level of 2 kg/kWh compared to 1.2kg/kWh in diffused aeration.
- Wide scope for replicability in many tannery clusters processing from raw hides and skins to finished leather.
- Advanced oxidation system using Ozone removes the colour and reduce the non-degradable COD in the treated effluent with detention time of 60 to 90 minutes - First of its kind in World Leather Sector.

INNOVATIVE CLEANER PRODUCTION AND ADVANCED OXIDATION TREATMENT WITH TDS CONTROL



Conclusion

These sustainable technological developments in improved cleaner production reduce the level of TDS in the effluent discharge by 50% and hazardous category sludge generation by 60%. The development of improved aeration and oxidation in the treatment plants increases the oxygen transfer efficiency, reduced colour & non-degradable COD and meets all Environmental discharge norms. Based on pilot and full-scale developments, the innovative technologies are being replicated in Effluent Treatment Plants (ETPs) and Common Effluent Treatment Plants (CETPs) in India and other countries.

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