



APPLICATION BRIEF – COBALT CATALYST RECOVERY FROM PTA

PURIFIED TEREPHTHALIC ACID AND COBALT

The production of purified terephthalic acid (PTA) from para-xylene uses cobalt among other chemicals as a catalyst for the oxidation reactions. Manufacturers seek to separate and recover the spent catalyst from wastewater and PTA byproducts. The recovery of the cobalt also allows easier disposal of the wastewater which is freed of heavy metals.

ENVIROGEN SOLUTION FOR COBALT RECOVERY

The cobalt catalyst recovery process flow is a multi-unit process. The feed stream is filtered, and pH adjusted to the optimal level for adsorption. Cobalt catalyst is removed in the Catalyst Recovery Vessels (CRVs) by ion exchange resin in a process called “catalyst sorption”. Catalyst Sorption (CS) is the process of exchanging ions in the wastewater for ions that are chemically bonded to the solid polymeric ion exchange resin material. Ion exchange resins are generally in a bead form, which has charged functional groups built into the polymer structure. These functional groups “hold” ions of opposite charge by electrostatic attraction. Ion exchange occurs because the functional groups have a greater affinity for the ions in solution than for the ions that are attached to the polymer’s functional groups. The CRVs utilize specialty selective ion exchange resins for this recovery. The cobalt catalyst ions present in the wastewater are exchanged and removed from the waste stream.

The ion exchange process is typically an N+1 process. Where N equals the number of vessels for the service flow and one vessel is in regeneration stand-by. Typically, the process is single pass, but can also be in a lead-lag configuration for improved impurities and cobalt recovery.

When the ion exchange resin is converted to the “Cobalt Catalyst form” that is to say, when the resin has removed cobalt to its capacity point, the ion exchange resin requires regeneration with an acid followed by a caustic solution. Regeneration is the process of removing the cobalt ions from the ion exchange resin by “reversing” the ion exchange process. The “reversing” of the ion exchange process is accomplished by passing concentrated acid and caustic solutions through the ion exchange resin. The chemicals utilized in the regeneration process are selected based on the type of catalyst reuse desired and the overall chemistry of the specific process. The purpose of the regeneration process is to remove the cobalt ions from the resin in a form that can readily be reused in formation of the catalyst package without significant processing. After regeneration, the ion exchange resin is ready again to treat PTA wastewater containing cobalt catalyst.

The regeneration is a multi-step process that segregates the cobalt from the rest of the waste stream. The PLC controller and the associated process set points ensure both high conversion and cobalt recovery. Depending on the site’s chemistry, these systems can be co-flow or counter-current

regenerated. The system is designed to meet local discharge requirements and may include additional process steps accordingly.

ENVIROGEN SYSTEM BENEFITS

The Envirogen process offers many benefits to PTA manufacturers and is applicable to other chemical process streams as well.

BENEFITS INCLUDE:

- Uses nonthermal separation technology
- Reduces operating costs
- Improves product quality and yield
- Avoids waste disposal

RECOVER MORE:

- Typically 90+% of catalyst is recovered.

ADDITIONAL SOLUTIONS OFFERED

- Spinning wastewater recycle
- Dye wastewater recycle
- Glycol purification
- Spinneret cleaning water treatment
- Solutions for manufacturing of polyester, nylon, acetate, spandex, and other polymers

CONTACT US FOR ALL YOUR WATER TREATMENT SYSTEM NEEDS!



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