

Technology Application Bulletin

Clarifier Based Wastewater Treatment Systems

MB0911

Almost all industrial processes generate some form of wastewater. In a world of constantly changing environmental regulation, costly wastewater disposal, and limited, costly fresh water supplies, dealing with wastewater presents complex, difficult choices to a manufacturer. For instance, is it more cost effective to completely eliminate the discharge of a particular process wastewater via treatment, recycle, or reuse; or simply treat the wastewater and release it to the environment? The answer to this question is unique to each situation.

Inclined plate clarifier (IPC) based wastewater treatment systems often provide the most economical method for treatment of many wastewaters for recycle, reuse, or discharge. In comparison to many other technologies, IPC based systems can treat many dissolved pollutants with removal as non-hazardous solids and the process is a robust one that is not easily damaged by operator error or changes in the wastewater stream.

Inclined Plate Clarifiers

ProChemTech was founded in 1987 to provide industry with the quality innovative chemical products, equipment, system design, and the professional technical support needed to



operate industrial and commercial water and wastewater systems in the most cost effective and environmentally safe manner. We soon found that no supplier offered integrated chemical-equipment packages, systems, for treatment of industrial wastewaters. Based on previous experience, we have designed our own IPC and have been using them in many industrial wastewater applications since 1988.

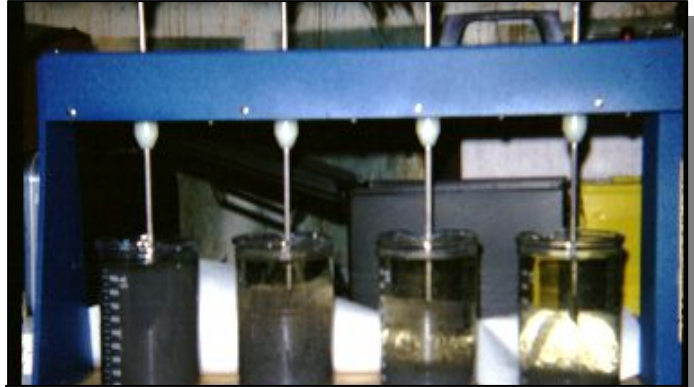
IPC units designed and built by ProChemTech have many unique features such as polished fiberglass plates, stainless steel adjustable weirs, and a very advanced hydraulic design, which make them the best performing units on the market. Units typically achieve effluent turbidities less than 1 ntu, no post clarification filtration needed.

Wastewater Treatment Chemistry

Our experience has taught us that each wastewater is unique and that a specific treatment train should be designed for each to obtain optimum results. Finding the right chemistry to treat a given wastewater starts in our laboratory, where the level and chemical form of pollutants are determined. Using this analytical data, we select several chemistries for detailed bench-scale treatability testing to ascertain the best one for that wastewater.

As a chemical manufacturer, we have both an extensive selection of chemistries available to us due to our years of industrial wastewater treatment experience and, if needed, can design and produce completely new products to address a specific problem.

Each IPC based wastewater treatment system is custom designed using our treatability work on actual wastewater samples and extensive experience working with wastewaters from many different industries. This method results in the most cost-effective, reliable treatment system design possible.



A graphic demonstration of suspended solids removal by ProChemTech polymer technology

Wastewater Recycle/Reuse

Recycle and reuse of industrial wastewater presents some unique chemistry problems not normally considered during the design of wastewater treatment trains. For instance, many consulting engineers like to use ferric chloride as a primary precipitant followed by use of calcium hydroxide for pH neutralization. While this train will work on many different wastewaters, its use increases the amount of corrosive chloride and scale-forming calcium remaining in the treated wastewater. ProChemTech has invented a number of unique treatment chemistries designed to prevent the addition of unwanted materials to treated wastewaters, which facilitates recycle/reuse while effectively removing the targeted pollutants.

Pollutant Removal

Environmental restrictions are constantly changing, usually resulting in decreased discharge limits for wastewater pollutants. Meeting these decreased limits often requires application of non-traditional chemistry trains or research and development of entirely new chemistries. ProChemTech has met such challenges many times by developing innovative technology to reduce levels of such pollutants as arsenic, antimony, selenium, barium, and lead to values impossible to obtain with traditional chemistries.

The following is a list of a few of the industries where we have provided systems to treat various wastewaters:

- ⇒ Gallium arsenide semi-conductor manufacturing
- ⇒ Glass container and light bulb manufacturing
- ⇒ Corrugate manufacture/printing
- ⇒ Electronic capacitor manufacturing
- ⇒ Ferrite magnetic material manufacturing
- ⇒ Electroplating – all metals and cyanide
- ⇒ Electroless plating – all metals



- ⇒ Phosphatizing, anodizing, and chromatizing systems
- ⇒ Semi-conductor packaging
- ⇒ Silicon carbide, carbon and graphite manufacturing
- ⇒ Vibratory finishing – all metals
- ⇒ Circuit board manufacturing
- ⇒ Organic dye wastewater
- ⇒ Industrial laundry wastewater
- ⇒ Cosmetic manufacturing
- ⇒ Railcar cleaning wastewater
- ⇒ Gas well hydrofracture flowback and production wastewater

IPC Pilot Plant Systems

We maintain a skidded 5 gpm nominal rated pilot plant IPC wastewater treatment system for field testing of developed wastewater treatment chemistries. This unit is typically supplied configured for the specific wastewater and treatment chemistry. It provides up to four separate mixed tanks prior to the IPC section and one mixed tank post clarification. Multiple pH and ORP control circuits can be provided with as many separate chemical feeds as desired as well as proportional clarifier sludge recycle to any of the prior mix tanks. Mixers can be single speed or VFD controlled. Sludge draw is typically time proportioned and a pilot filter press can be supplied as part of the pilot plant package. The unit is typically rented on a weekly basis, with or without chemical supply.



ProChemTech IPC systems have been provided in flow rates from 5 to 1000 gpm and have included some unique system applicationsⁱⁱⁱⁱⁱⁱ with reuse or recycle. Multiple installations in some industries has proven the excellence of our systems. Recent work has involved treatment of Marcellus gas shale wastewater for barium removal and total reuse of the wastewater to produce salable products.

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ⁱ “The Blue Valley Fish Culture Station, Treatment and Beneficial Reuse of Abandoned Mine Drainage”, Keister, Sleigh, and Sabatose, PAEP, May 2009

ⁱⁱ “Industrial Wastewater Zero Discharge: A Case History”, Kephart and Keister, WEF, March 1997

ⁱⁱⁱ “Water and Wastewater Treatment, Conservation, and Reuse in an Integrated Circuit Packaging Plant”, Keister, WEF, March 1998