



**From Concept to Reality**  
**Driving CO<sub>2</sub> Solutions**



- Acquired TOMCO2 Systems February 23, 2018
- Headquartered in Osaka, Japan with ~\$6B in Annual Sales (98% in Japan)
- >12,000 Employees
- A Market Leader in Japan Industrial Gas & Cryogenic Equipment
- Focus on International Acquisitions
  - Preference Towards US Manufacturing Companies with Engineered Industrial Gas Products
  - Acquire, Invest, & Grow



## About | Expansion – New Partnerships



- Acquired by Air Water in 2016
- Global Leader in Cryogenic Tank Manuf
  - Vacuum-Insulated Bulk Tanks
  - MicroBulk
  - Liquid Cylinder
  - BevCarb
  - LNG





## Backdrop | Then & Now



1970



Present Day

## Backdrop | Qualifications

- Experience in CO2 and Water Treatment Systems
- Number of Systems Installed – Over 1500
- Active Member of CGA
- Engineering Capability
- Optimized pH Control and CO2 Utilization
- Total System Responsibility
- ASME Pressure Vessel Shop
- Service Capability
- Made in the USA



## Backdrop | Advantages of Bulk Storage

- Most Economical Way to Store CO<sub>2</sub>
- Access Manway & Refrigeration Coils Standards
- Optional Refrigeration Package Available
- Ability to Provide a Refrigerated Tank Eliminates CO<sub>2</sub> Losses
- More Energy Efficient For Both Vapor and Liquid Withdrawals
- Aluminum Jacket and Seals to Protect Insulation
- 4" Insulation Standard and Optional 6" Flex Flow Available



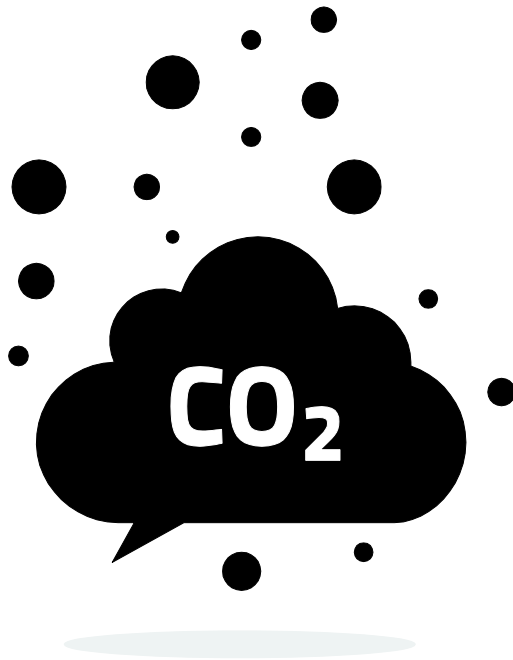


## Backdrop | Lease To Own Option

- TOMCO Lease/Own Agreement Allows Owners to Change CO2 Suppliers at Will
- CO2 Gas Suppliers Lease Agreement Do Not Allow other CO2 Suppliers to Fill Their Tank
- TOMCO Lease/Own Agreements can Include Freight & Installation
- Benefits from TOMCO's 24/7 Service and Technical Support
- Has Access to TOMCO's TurnKey Installation Service



## About | What is CO<sub>2</sub>?

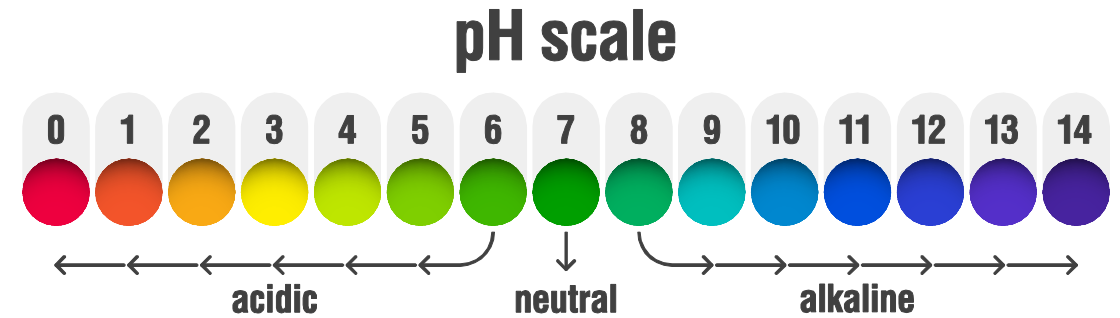


- Carbon Dioxide is a gas at normal atmospheric temperature and pressure. It is a colorless, odorless gas that is about 1.5 times more dense than air. It dissolves in water to form carbonic acid; H<sub>2</sub>CO<sub>3</sub>.
- Carbon dioxide gas is formed from the combination of two elements: carbon and oxygen.
- CO<sub>2</sub> is produced from the combustion of coal or hydrocarbons, the fermentation of alcohols, the production of anhydrous ammonia, by-product of other chemical processes, occur naturally in deep CO<sub>2</sub> wells and the breathing of humans and animals. Found in small proportions in the atmosphere, it is assimilated by plants which in turn produce oxygen.



## Backdrop | Why Do We Adjust pH?

- Stabilize Water Chemistry
- Corrosion Control
- Discharge Wastewater (Permit)
- To Reduce or Prevent Carbonate Scaling
- To Enhance a Chemical Reaction or Process
  - Polymers, Chlorine, Lime, Filtration, Contaminant Removal



## Equipment | pH Control

- CO<sub>2</sub> Storage
- Vaporizer
- Vapor Heater
- Pressure Regulator
- CO<sub>2</sub> / H<sub>2</sub>CO<sub>3</sub> Feed Panel
- Diffuser



## Equipment | Bulk Storage



C-Style Series  
3.75 Tons – 60 Tons Capacity



V-Style Series  
6 Tons – 100 Tons Capacity



E/WTC-Style Series  
3.75 Tons – 120 Tons Capacity



# Equipment | Vaporizers



Waterbath  
500 #/hr – 20,000 #/hr



Electric Pressure Build  
245 #/hr – 2150 #/hr



Direct to Process  
375 #/hr – 2,250 #/hr



Steam Heated  
500 #/hr – 18,000 #/hr

## Equipment | Vapor Heaters

Electric

720 #/hr to 1440 #/hr (Wall)  
2000 to 6000 #/hr (Floor)

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Steam

500 #/hr to 6,000 #/hr



# Equipment | CO2 Feed Systems

## CO2 Gas Feed

- 60% - 85% efficiency of the carbon dioxide
- Needs deep contact or holding basins.
- Able to reduce the pH to 7.0

## Carbonic Acid (PSF)

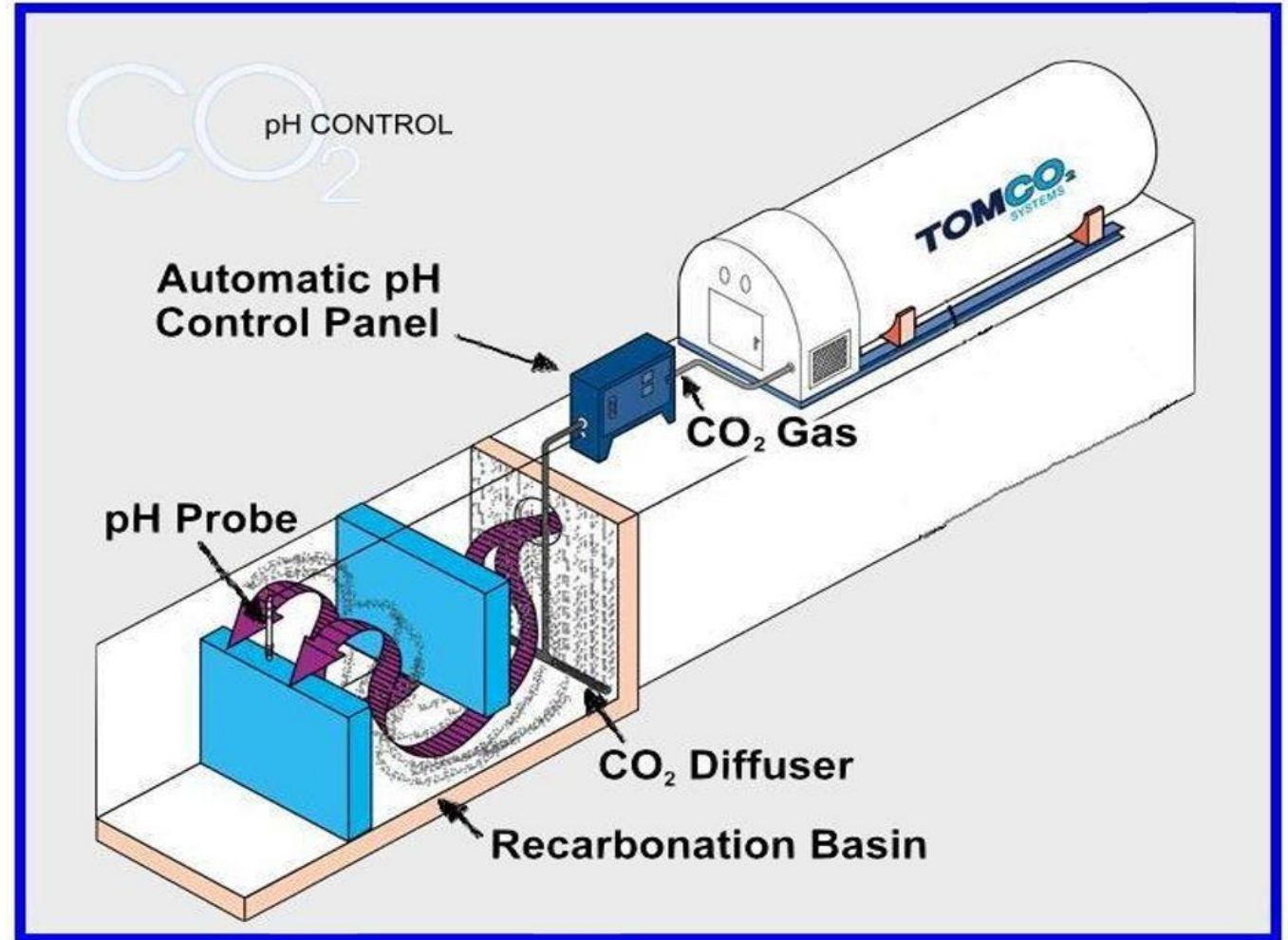
- Minimum 95% efficiency of the carbon dioxide
- Able to reduce the pH to 5.5 – 6.0
- Can be injected in a pipe, basin, tank or shallow channel.
- Eliminates the need for deep contact or holding basins.





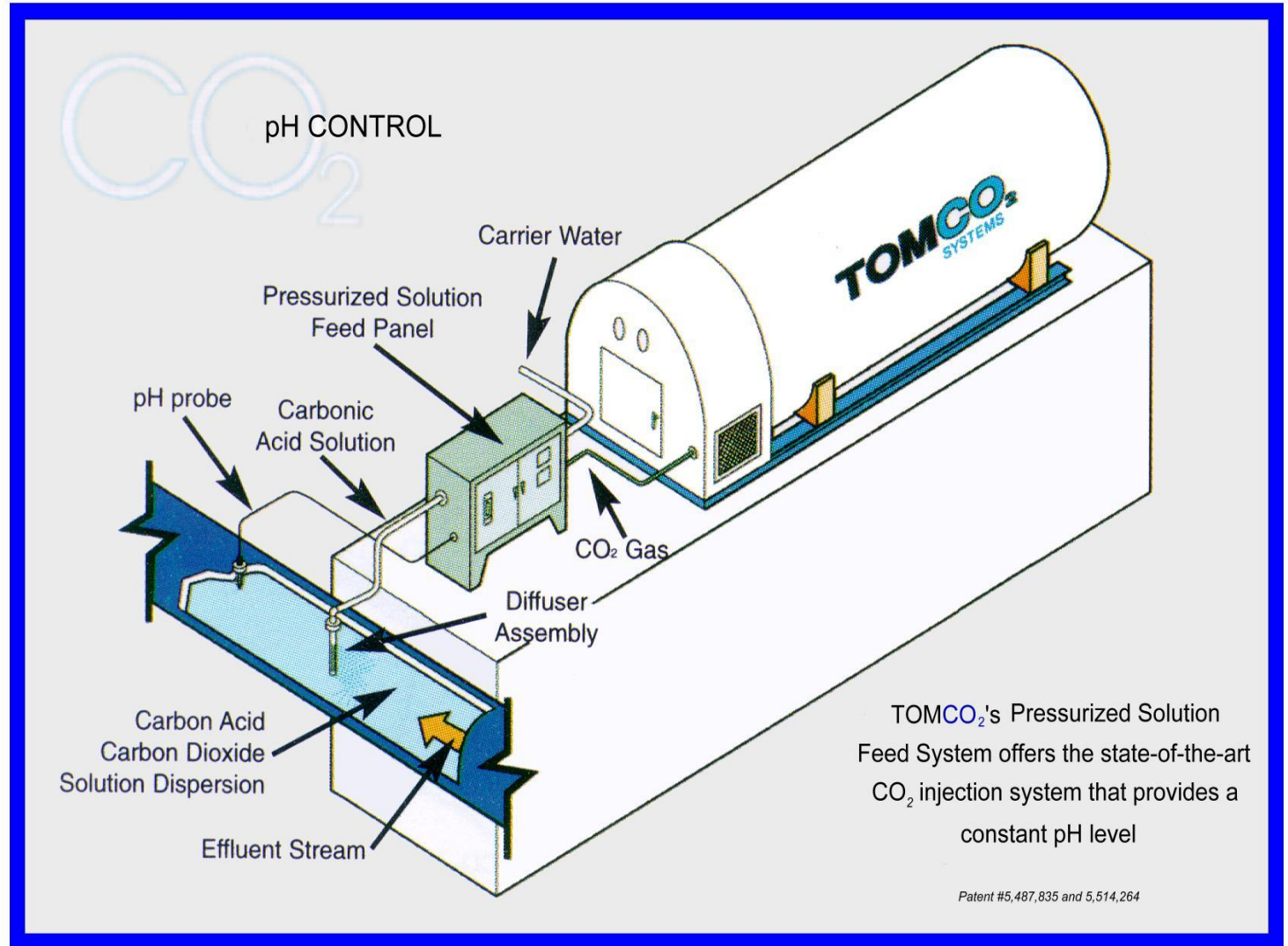
## Systems | CO<sub>2</sub> Gas Injection

- Gas (CO<sub>2</sub>) + Liquid (water) reaction takes time
- Requires tremendous surface area (fine bubbles)
- Interference of other gases; i.e. air
- Requires mixer or baffles to hold the gas down in the water
- Lower efficiencies due to gas bubbles at the surface



## Systems | Carbonic Acid Injection(PSF)

- CO<sub>2</sub> pre-reacted to form Carbonic Acid
- Liquid / Liquid (Carbonic Acid / Water) Reaction
- Immediate reaction (Requires less time)
- Close to 100% efficiency
- Higher pressure improves CO<sub>2</sub> solubility
- More effective pH control
- Faster reaction time reduces scale potential.



# Equipment | Diffusers

## Gas Feed

- Uses fine porous diffuser to disperse the CO<sub>2</sub> into a deep basin.

## Carbonic Acid

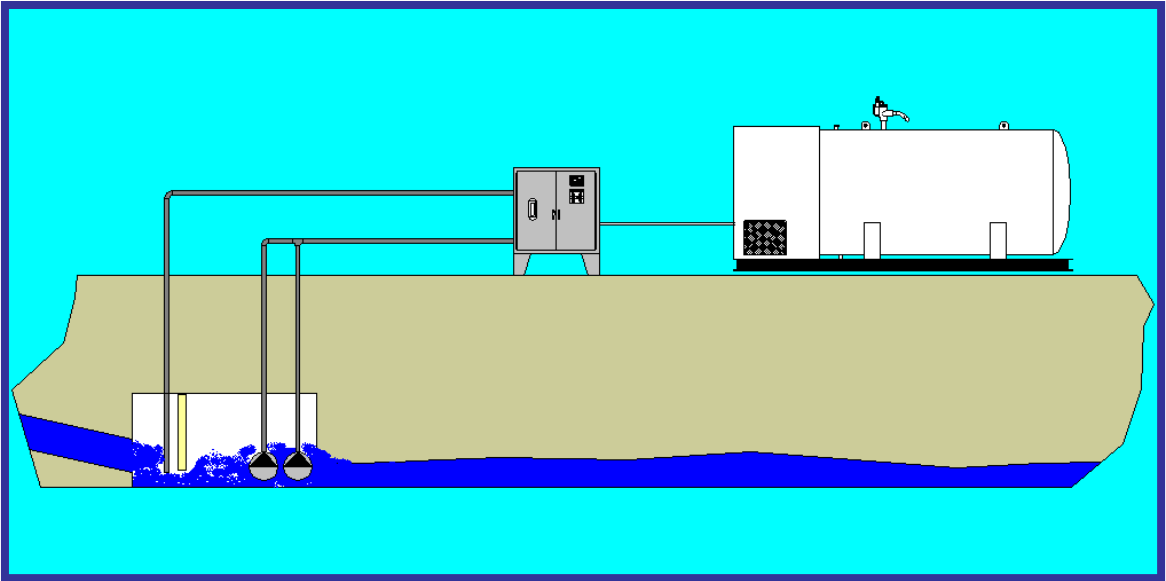
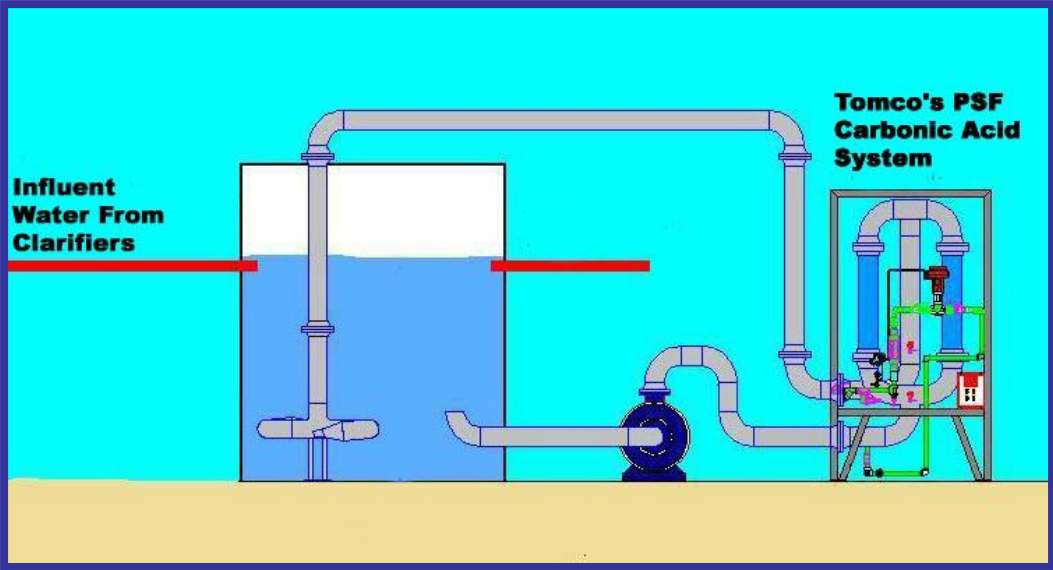
- Disperses Carbonic Acid into a water stream to form the chemical reaction desired. Designed to fit in any situation



## Equipment | Carbonic Acid Diffusers (Patent # 6637731 & 6767008)

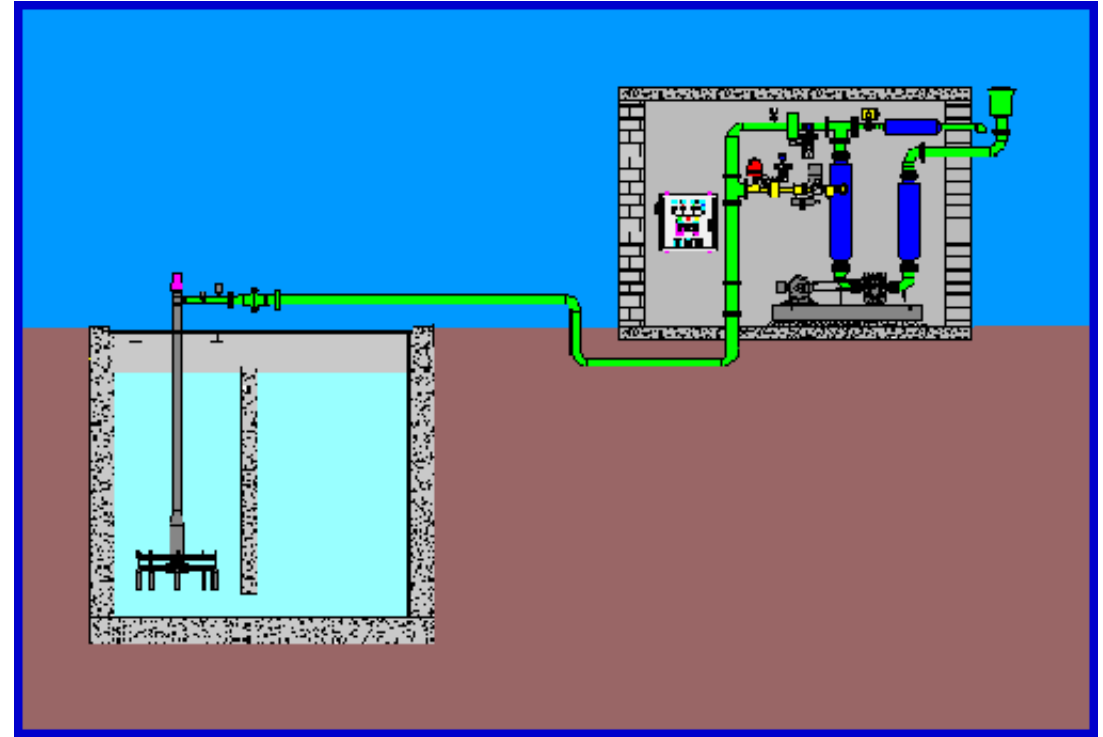
- Counter Current
- Cross Sectional Coverage
- Pressure
- Efficient Mixing
- Immediate Reaction

# Systems



## Equipment | More

- Dewars (Mini Bulk)
  - 400 # Liquid CO<sub>2</sub>
- High Pressure Cylinders
  - Multiple Size Gas
- Stack Gas
  - Contains 10 % - 12 % CO<sub>2</sub>
- Submerged Combustion Burners
  - Uses natural gas, butane, propane or digester gas to produce CO<sub>2</sub>.





# Industrial | Applications

## Power Industry

- pH Control for Ash Ponds
- pH Control for wastewater and Boiler Blow Down water.
- Scale reduction of cooling water

## Steel & Chemical Industry

- pH Control for Wastewater, Boiler blow down water.

## Textile Industry

- pH Control for Wastewater.

## Concrete & Mining Industry

- pH Control for Wastewater.
- pH Control for Storm water Run Off.

## Food and Beverage Industry

- Carbonation
- Formation of Hypochlorous Acid For Bacteria Kill
- pH Control for Wastewater.



## Industrial | pH Control Methods

- Liquid CO<sub>2</sub> Feed Systems
- Gas Eductor / Vacuum Feeder
- Chlorinator / Solution Feeder
- Carbonated Water Feeder
- Mineral Acids