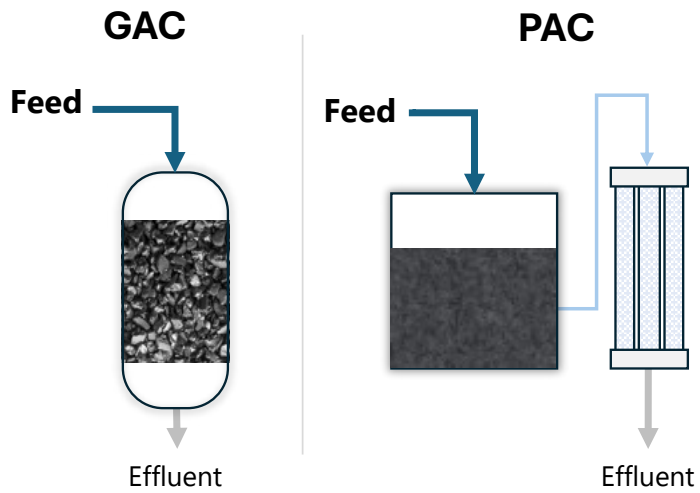
Activated Carbon (AC)

Process Description

AC is an adsorption process used in water and wastewater treatment to remove organic contaminants responsible for odor, taste, and color, as well as select inorganic compounds like hypochlorite and hydrogen sulfide. AC is produced by pyrolyzing carbon-rich materials and activating them to develop a porous structure with high surface area for adsorption. Granular activated carbon (GAC) is typically operated in fixed-bed filters, with feedwater entering from the top and treated water exiting from the bottom. In addition to adsorbing dissolved contaminants, GAC filters can capture suspended solids, necessitating periodic backwashing to maintain hydraulic performance. Over time, GAC can transition to biologically activated carbon (BAC) as biofilms develop on the media surface, enabling biological degradation of biodegradable organic compounds in addition to adsorption.

Powdered activated carbon (PAC) is dosed directly into raw water streams or mixing basins and is subsequently removed through sedimentation or filtration. Once the adsorption capacity is exhausted, the media is either replaced or regenerated for reuse.

Process Schematic



Publications

- Membrane applications and opportunities for water management in the oil & gas industry (Link)
- Detailed organic characterization of process water to evaluate reverse osmosis membrane fouling in industrial wastewater treatment (Link)
- Osmotically assisted reverse osmosis: assessing pretreatment on hypersaline produced water (Link)
- Qatargas wastewater treatment plants: an advanced design for water reuse (Link)

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