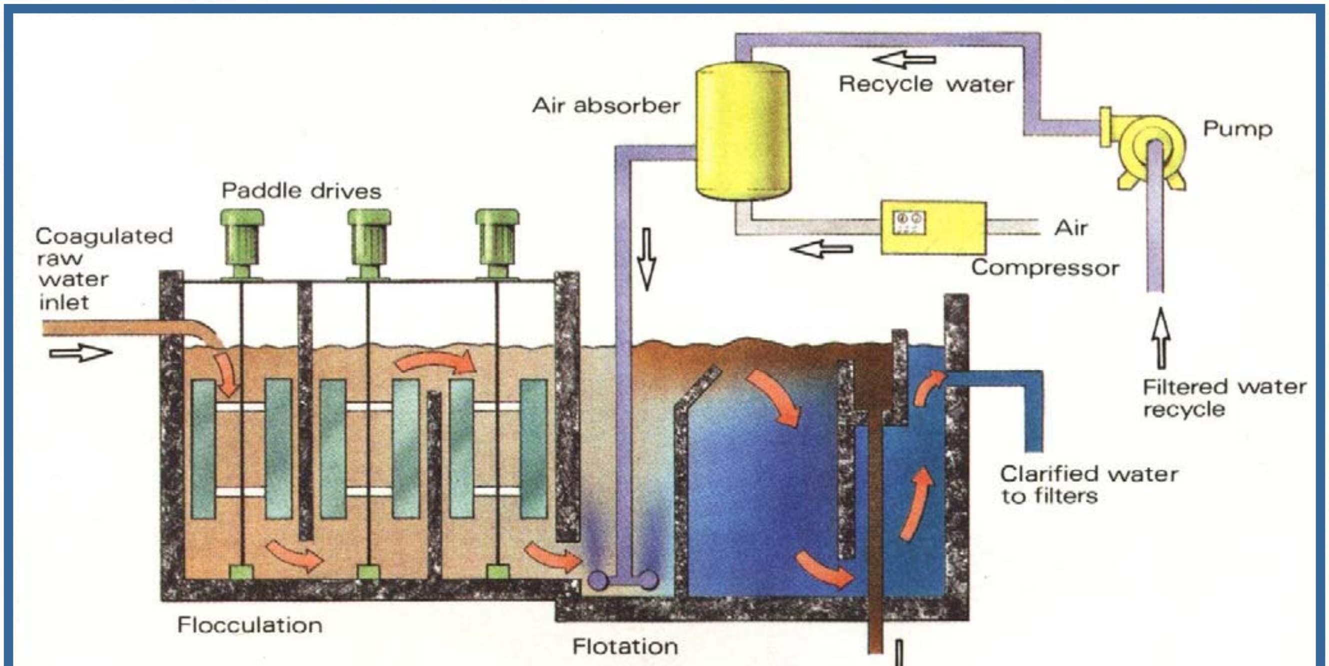
FLOTATION CLARIFIERS

Particulate matter in some raw waters can be buoyant (algae, peat, organic, colour etc). Settlement of these materials requires low surface rates in large tanks. This process can be unstable and some particles, especially algae, may float.

In these circumstances it is logical to turn the separation process upside-down and encourage impurities to rise to the surface. This can be achieved by attaching minute air bubbles to the flocculated particles.

The first step is to encourage colloidal matter and small particles to coalesce. This is achieved by adding a coagulant, upstream of the clarifier and the subjecting the coagulated water to gentle turbulence in zoned compartments, equipped with mechanical paddle flocculators, so that floc particles can form and grow.



Simplified diagram of the flotation process

Flocculation

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AIR SATURATED WATER

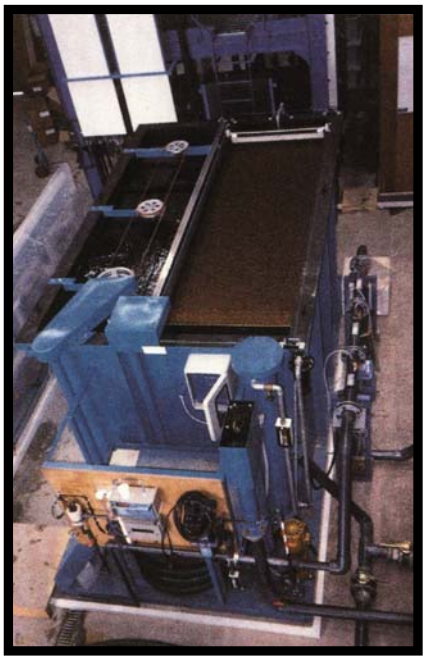
Flocculated water passes into the clarifier's flotation zone. At this point, a cloud of micro-bubbles is generated at the bottom of the tank to capture floc particles and lift then to the surface.

The most economical way of creating these micro-bubbles is by introducing a flow of water that has been saturated with air under pressure.

Filtrate, between 5% and 10% of the clarifiers throughput is pumped at 4 to 6 bar through a small packed absorber vessel supplied with compressed air. The air, at high pressure, dissolves in water falling through the absorber.

Air bubbles emerging at the inlet end of a flotation clarifier

Water recycle pumps, air compressor and packed absorber vessel.



Transportable flotation plant for evaluating and optimising the flotation process

Twin air absorbers and chain/flight skimmers

Skimmers in operation

SLUDGE FORMATION AND REMOVAL

Released air bubbles rise through the flocculated water, capturing floc particles and carrying them upwards. A carpet of granular, cohesive sludge forms on the surface of the flotation zone, compacted and partly de-watered by floc and bubbles being added below.

At the same time, clarified water is drawn from near the bottom of the tank to pass onto the next treatment stage – usually filtration.

The floating sludge carpet will normally remain stable for many hours. It can be removed hydraulically over a sludge weir or by a mechanical skimmer.

THE SETTLEMENT COMPARISON

Flotation is best used for waters with low levels of suspended solids perhaps up to 25mg/ℓ - which respond poorly to settlement processes.

Flotation is just one of many process options that PCI can offer in the fields of water clarification.

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WATER TREATMENT TECHNOLOGY