

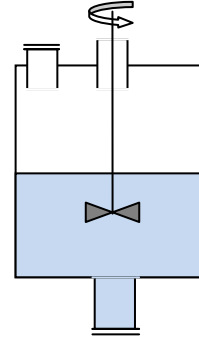
Hydraulic models of natural systems: النماذج الهيدروليكية للأنظمة الطبيعية

The five principles reactor models that are of interest with respect to water quality modeling are :

- 1- Batch reactor.
- 2- Complete – mix reactor (CFSTR).
- 3- Plug flow reactor (tubular reactor).
- 4- Cascade of complete – mix reactors.
- 5- Packed bed reactor.

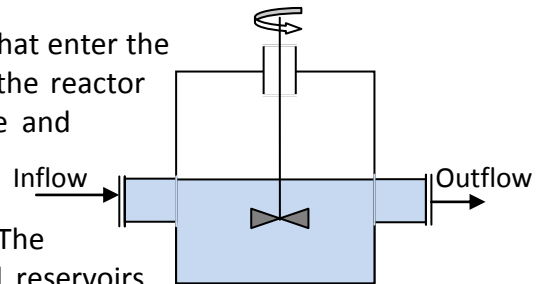
1- Batch reactor:

A reactor in which flow is neither entering nor leaving is defined as a batch reactor. Batch reactors are sometimes used to model shallow lakes that are mixed completely.

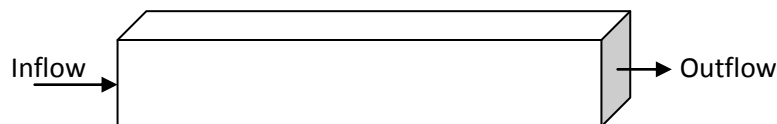
**2- Complete – mix reactor (CFSTR).**

In the complete – mix reactor, fluid particles that enter the reactor are instantaneously dispersed throughout the reactor volume. The fluid particles will remain some time and then leave the reactor.

The complete – mix reactor is known as the "continuous – flow stirred – tank reactor (CFSTR)". The Complete – mix model is used to study lakes and reservoirs with continuous inputs and outputs.

**3- Plug flow reactor (tubular reactor).**

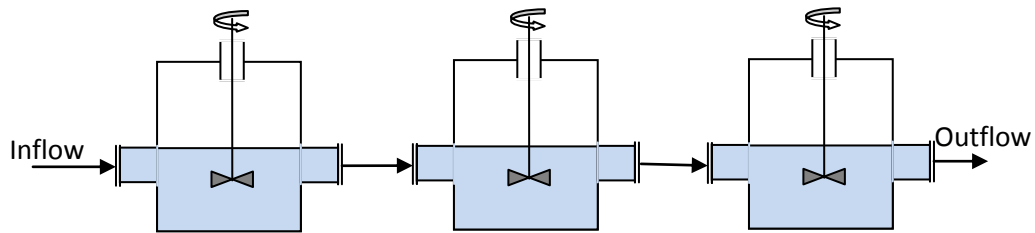
In the Plug flow reactor (PFR), fluid particles pass through the reactor and are discharge in the same sequence in which they entered the reactor. Plug flow reactors are often identified as "tubular reactor", plug flow models are used to study river and estuary system.



4- Cascade of complete – mix reactors.

The cascade of complete – mix reactors is used to model the flow regime that exists between the complete – mix and plug flow reactors.

If the cascade is composed of one reactor, the complete – mix flow regime prevails. If the cascade consists of an infinite number of reactors in series, the plug flow regime results.

**5- Packed bed reactor.**

Reactors filled with some type of packing medium are known as "packed – bed reactor". In the field of water quality management, packed – bed reactor models are used to study the movement of water and contaminants in groundwater systems.

