

## New Modification for Waste Water Treatment Plant

Mojtaba Mahmoudi Majdabadi<sup>1 +</sup>

<sup>1</sup> M.Sc Environment Health Engineer

**Abstract.** I'd like to introduce a new Modification for Waste Water Treatment Plant, which that its name is "Majd Time Cyclic Reactor" (MTCR) that:

- It is a modification of activated sludge.
- In MTCR There is a continuous flow to inlet and from outlet.
- Wastewater level in basin is constant (no filling and decant volume is need).
- It operates simple and doesn't require settling tank
- It has capability of nitrification and de-nitrification.
- It contains in low cost and is applicable for upgrading existing wastewater treatment plants
- It is simple and acts in low hydraulic head loss
- In comparing With SBR (Sequence Batch Reactor) because it hasn't variable water level, hydraulic head for decanting and doesn't need decanter and isn't a batch system.

**Keywords:** Activated Sludge Treatment, Modification of Activated Sludge, SBR, Time Cyclic Reactor.

### 1. Introduction

The Majd Time Cyclic Reactor (MTCR) is a continues flow suspended growth process (activated sludge) in which all major applied steps occur in the one tank with four compartments in a timing cyclic order (figure 1). It is also applicable in more tanks.

MTCR can be designed as same as extended aeration in addition for removing TSS and BOD, to enhance removal nitrogen, phosphorus, and as well as ammonia. The continues flow reactor accepts influent in to three compartments and effluent only from one another compartment, that follows the timing cycle sequences as shown in figure 1.

The MTCR comparison with SBR:

- Water level in reactor is constant and doesn't need to Fill / Decant volume
- No need for decanter system
- No need to low water depth
- In contrast downstream units shall be sized in smaller design for the continues flow
- Blowers shall be sized smaller capacity in a larger period of aeration time
- Hydraulic head loss is as same as extended aeration process
- Each cycle contains: aeration, settle and discharge
- This modification shall be used to upgrade for existing aerated lagoons, conventional and extended processes and even is able for the SBR
- It is a simple operational system
- Both systems would need a PLC (Programmable Logic Controller) to meet the required adjusting cycle steps

---

<sup>+</sup> Corresponding author. Tel.: + 982188803930; fax: +982188895770  
E-mail address: majdabadi83@yahoo.com.

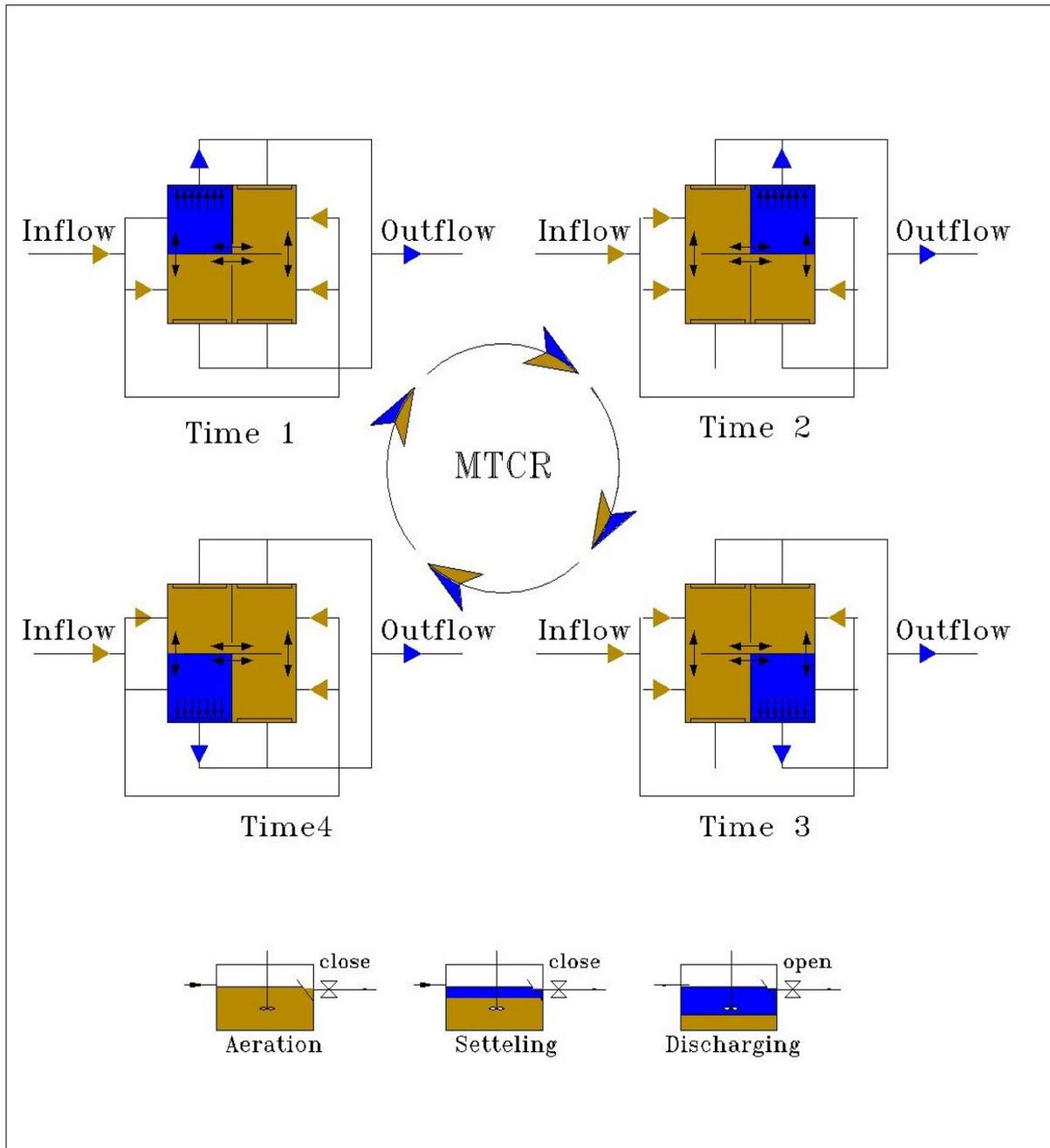


Fig. 1: Majd Time Cycle Reactor (MTCR) design principle

## 2. General Considerations

The different modifications of the conventional activated sludge process have been employed extensively worldwide. All kinds are capable of meeting secondary treatment effluent limits. Below are the important modifications of the activated sludge process, including with general bases of flow diagram, methods of aeration, design of aeration tanks, final sedimentation units and sludge handling systems

The important modifications of sludge are:

- Conventional
- Step aeration
- Contact stabilization
- Completely mixed
- Extended aeration

- Oxidation ditch
- Sequence batch reactor(SBR)

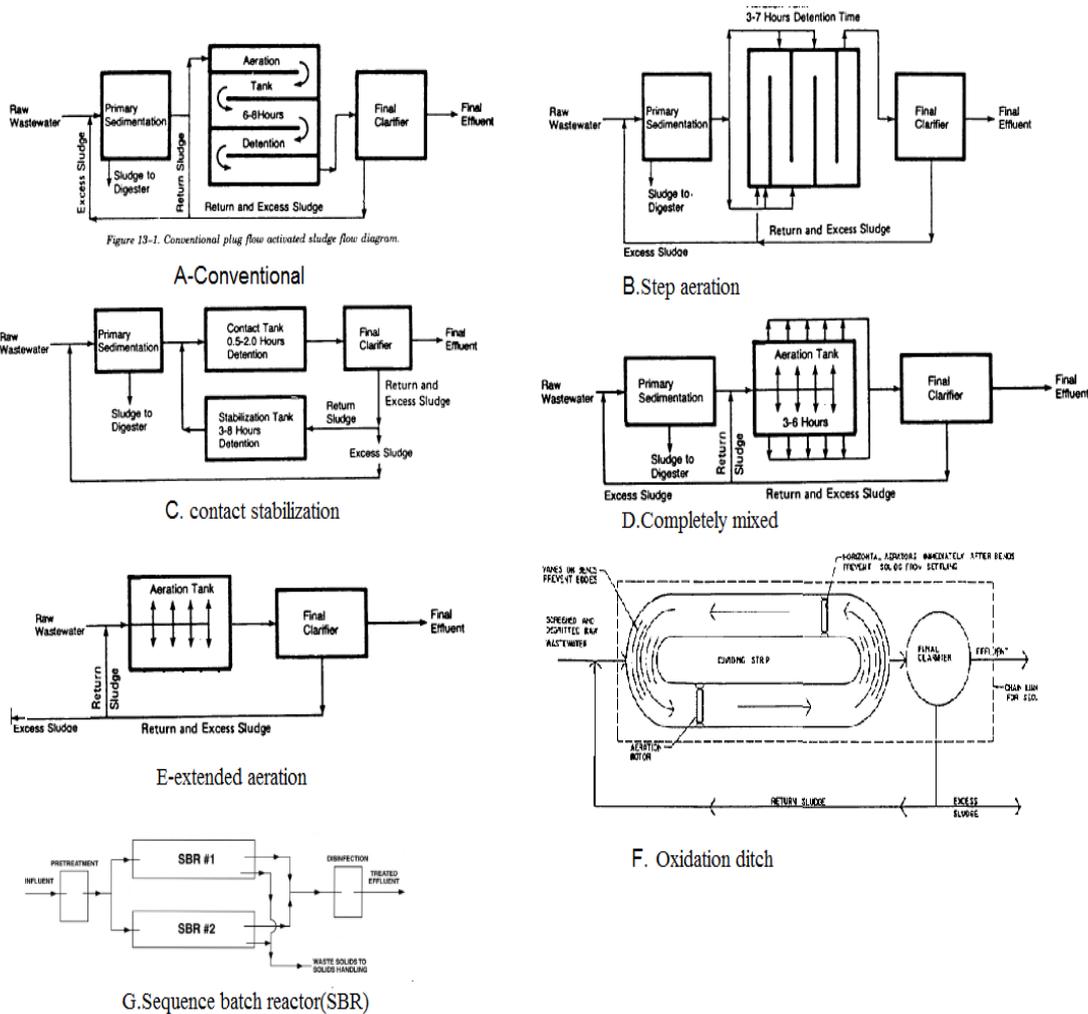


Fig. 2: The important modifications of activated sludge

### 3. MTCR Process Description

MTCR is an activated sludge modification of wastewater treatment system in which treatment operations are carried only in one basic Tank. This tank has got four compartments which each compartment has a valve for inlet and another valve at the end edge of fixed outlet weir.

The MTCR controlling process equipments are: inlet and outlet valves, air blowers for diffusers, sludge pumps that they would controlled and coordinated by a PLC (Programmable Logic Controller).

Treatment in MTCR is accomplished in three cycle events. The 1<sup>st</sup> event is React which influent wastewater distributed into three compartments with mixing or aeration with retain sludge blanket. This event can take place under aerated or un-aerated conditions. Settle is the 2<sup>nd</sup> event occurs when all mixing and aerating operations are turned off and are permitted to settle the mixed liquor solids and a clear supernatant to form in the upper water level of the compartment.

The 3<sup>rd</sup> event, the Draw event occurs for discharging of clear water from weir to outlet conduit. Meanwhile excess Sludge also can be discharge by pump, since the settled sludge bed will have a maximum concentration of solids.

The timing and sequencing of events in each cycle depends on the influent wastewater characteristics and the treatment objectives, Aerated conditions, nitrogen and phosphorus removal.

Thus In each cycle:

- React event occurs in 3 compartments at 3, 4 or 6 hours.
- Settle event occurs in 1 compartment before Draw event during 10-15 minutes.
- Draw event after settling event in the related compartment occurs 3,4 or 6 hours respectively and reflectively by the react event time.

#### **4. References**

- [1] ARMY TM 5-814-3. AIR FORCE AFM 88-11. Vol 3. DOMESTIC WASTEWATER TREATMENT. DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE. AUGUST 1988
- [2] [WWW.UEMGROUP.COM/aerobic-treatment.htm](http://WWW.UEMGROUP.COM/aerobic-treatment.htm)