

*The organic behavior in the sewage water of the (ENAJUC) chlif by using q stabilizing ponds*

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***Introduction***

Waste water stabilization pond technology is one of the most important natural methods for waste water treatment. Consist of Shallow man- made basins comprising a single or several series of anearobic, facultative or maturation ponds. The primary treatment takes place in the anaeroble pond, which is mainly designed for removing suspended solide, and some of the soluble element of organic matter (BOD<sub>5</sub>).

During the secondary stage by facultative pond most of the remaning BOD<sub>5</sub> is removed through the coordinated activity of algae and heterotrophic bacteria and in the maturation pond insist on the remoral of pathogens and nutrients (especially niitrgen).

Waste stabilization ponds is well suited for tropical and subtropical countries because the intensity of the sunlight and temperature which consider a key factors for the efficiency of the removal elements.

So, our study conclude appling the natural facultative waste treatment sewage water for its operating technical appraise because of its experimental basin inside the factory by optimal dimensions for facultative pond, our study insiste on concentration variability of on as BOD<sub>5</sub> and dco and suspended matter for the pond in depth direction with the time.

The most appropriate wastewater treatment is that which will produce an effluent meeting thé recommended microbiological and Chemical quality guidelines both at low cost and with minimal operational and maintenance requirements (Arar, 1988). Adopting as low a level of treatment as possible is especially désirable in developing countries, not only from thé point of view of cost but also in acknowledgement of thé difficulty of operating complex Systems reliably. In many locations it will be better to design thé reuse System to accept a low-grade of effluent rather than to rely on advanced treatment processes producing a reclaimed effluent which continuously meets a stringent quality standard.

Waste Stabilization Ponds (WSP) are now regarded as thé method of first choice for thé treatment of wastewater in many parts of thé world. In Europe, for example, WSP are very widely used for small rural communities (approximately up to 2000 population but larger Systems exist in Mediterranean France, and also in Spain and Portugal) (Boutin et al., 1987; Bucksteeg, 1987). In thé United States one third of ail wastewater treatment plants are WSP, usually serving populations up to 5000 (EPA, 1983).

However in warmer climates (the Middle East, Africa, Asia and Latin America) ponds are commonly used for large populations (up to around 1 million). In developing countries and especially in the tropical and equatorial regions sewage treatment by WSPs has been considered an ideal way of using natural processes to improve sewage effluents.

Waste Stabilization Ponds (WSP), often referred to as oxidation ponds or lagoons, are holding basins used for secondary wastewater (sewage effluents) treatment where decomposition of organic matter is processed naturally, i.e. biologically. The activity in the WSP is a complex symbiosis of bacteria and algae, which stabilizes the waste and reduces pathogens. The result of this biological process is to convert the organic content of the effluent to more stable and less offensive forms. WSP are used to treat a variety of wastewaters, from domestic wastewaters to complex industrial waters, and they function under a wide range of weather conditions, i.e. tropical to arctic. They can be used alone or in combination with treatment processes.

A WSP is a relatively shallow body of wastewater contained in an earthen man-made basin into which wastewater flows and from which, after certain retention time (time which takes the effluent to flow from the inlet to the outlet) a well-treated effluent is discharged. Many characteristics make WSP substantially different from other wastewater treatment. This includes design, construction and operation simplicity, cost effectiveness, low maintenance requirements, low energy requirements, easily adaptive for upgrading and high efficiency.

2. Waste Stabilization Ponds System. A World Bank Report (Shoval et al. 1986) endorsed the concept of stabilization pond as the most suitable wastewater treatment system for effluent use in agriculture. Table I provides a comparison of the advantages and disadvantages of ponds with those of high-rate and low-rate biological wastewater treatment processes (note that Aerated Lagoon and WSP system are considered low-rate biological wastewater treatment processes). Stabilization ponds are the preferred wastewater treatment process in developing countries, where land is often available at reasonable opportunity cost and skilled labor is in short supply.

Wastewater stabilization pond systems are designed to achieve different forms of treatment in up to three stages in series, depending on the organic strength of the input waste and the effluent quality objectives. For ease of maintenance and flexibility of operation, at least two trains of ponds in parallel are incorporated in any design. Strong wastewaters, with BOD<sub>5</sub> concentration in excess of about 300 mg/l, will frequently be introduced into first-stage anaerobic ponds, which achieve a high volumetric rate of removal. Weaker wastes or, where anaerobic ponds are environmentally unacceptable, even stronger wastes (say up to 1000 mg/l BOD<sub>5</sub>) may be discharged directly into primary facultative ponds. Effluent from first-stage anaerobic ponds will overflow into secondary facultative ponds, which comprise the second-stage of biological treatment. Following primary or secondary facultative ponds, if further pathogen reduction is necessary, maturation ponds will be introduced to provide tertiary treatment.

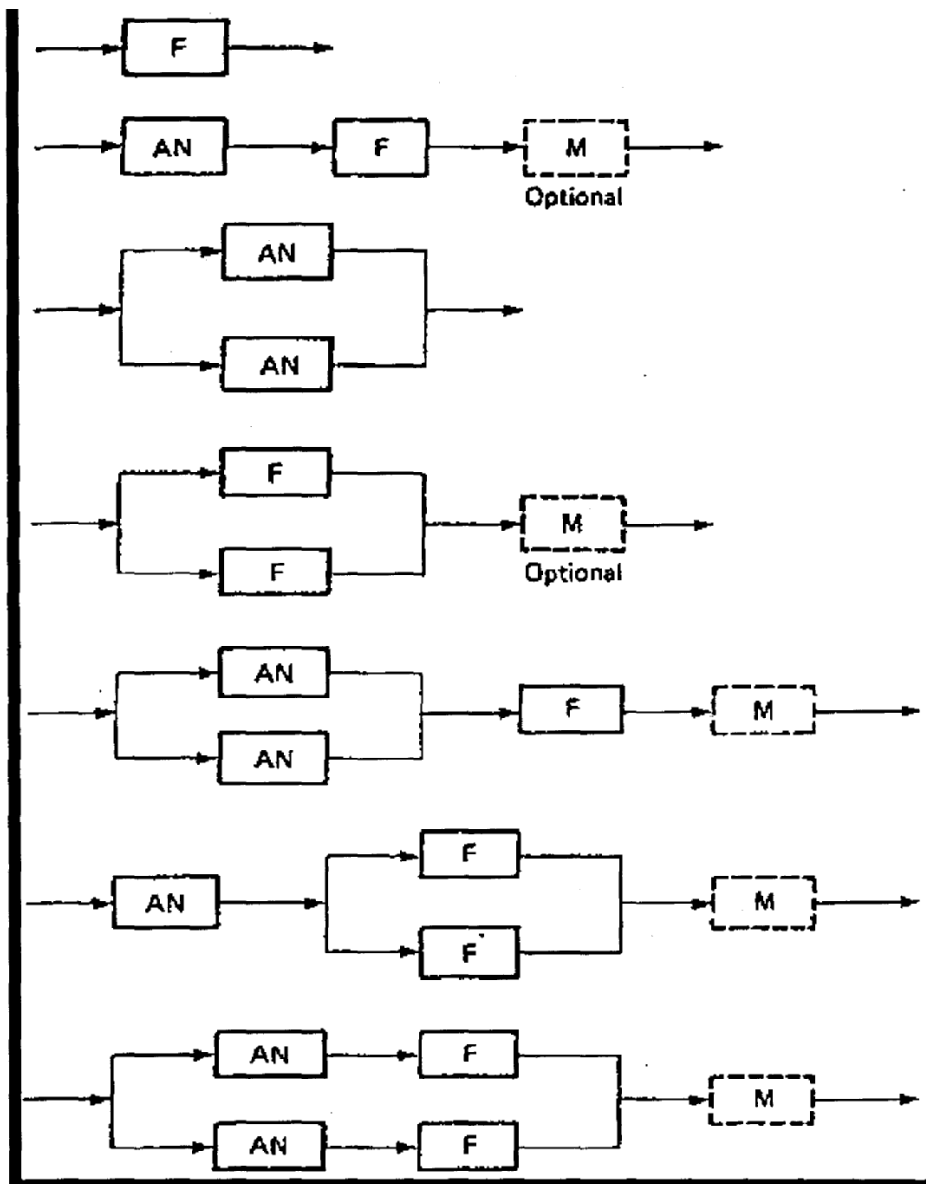


Fig. 1 Stabilization pond configurations: AN = anaerobic pond; F = facultative pond; M = maturation pond (Pescod and Mara, 1988).

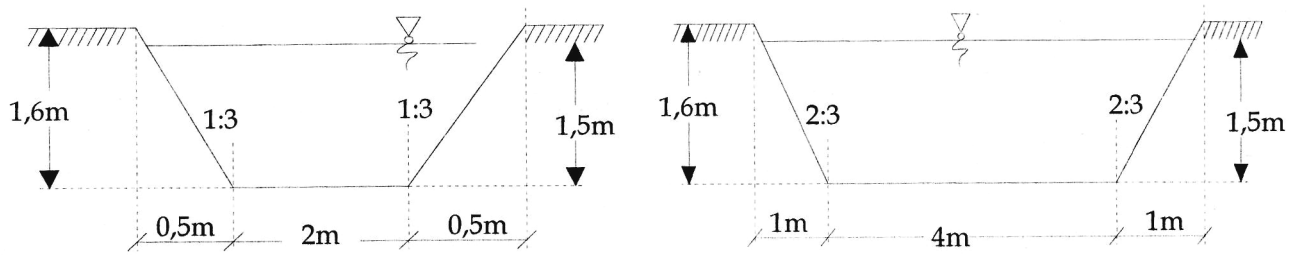
Typical pond system configurations are given in Fig. 1, though other combinations may be used.

3. Waste Stabilization Ponds Types and Functions WSP can be classified in respect to the type(s) of biological activity occurring in a pond. Three types are distinguished: anaerobic, facultative and maturation ponds. Usually a WSP system comprises a single series of the aforementioned three ponds types or several such series in parallel (see Section 2). In essence, anaerobic and facultative ponds are designed for BOD removal (Biological Oxidation Demand-see Section 3.1.1) and maturation ponds for pathogen removal, although some BOD removal occurs in maturation ponds and some pathogen removal in anaerobic and facultative ponds. In many instances only anaerobic and facultative ponds are required. In general, maturation ponds are required only when stronger wastewaters (BOD > 150 mg/l) are to be treated prior to surface water discharge and when the treated wastewater is to be The basin dimensions are follow (length 6 m, width 3m, depth 1.5m and walls slope are 1/3)

Table 1. Advantages and disadvantages of various sewage treatment systems (Arthur 1983).

	Criteria	Package plant	Activated sludge plant	Extended aeration activated sludge	Biological filter	Oxidation ditch	Aerated lagoon	Waste stabilization pond system
Plant performance	BOD removal	F	F	F	F	G	G	G
	FC removal	P	P	F	P	F	G	G
	SS removal	F	G	G	G	G	F	F
	Helminth removal	P	F	P	P	F	F	G
	Virus removal	P	F	P	P	F	G	G
Economic factors	Simple and cheap construction	P	P	P	P	F	F	G
	Simple operation	P	P	P	F	F	P	G
	Land requirement	G	G	G	G	G	F	P
	Maintenance	P	P	P	F	P	P	G

G = Good
F = Fair
P = Poor

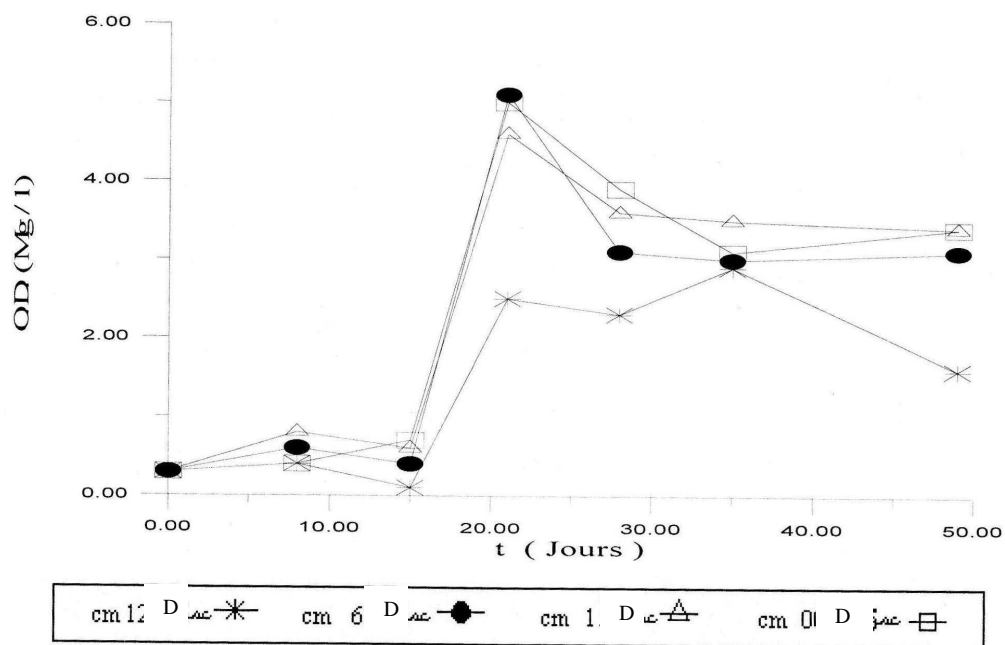


**Figure 1: Experimental basin design**

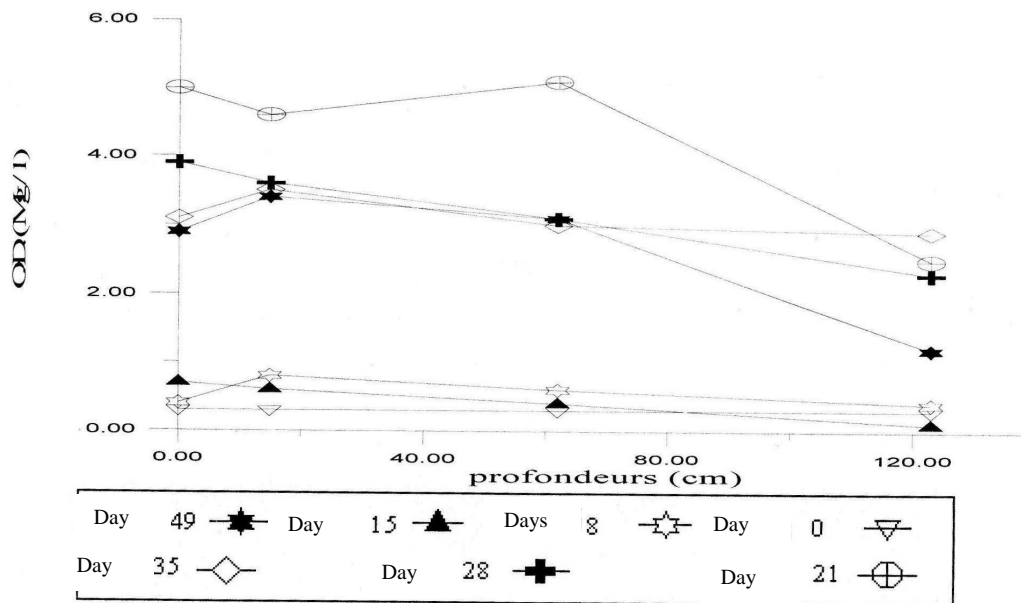
### Experimental results

Soluble oxygen measurement as the figure below showing that the oxygen concentrations were near to zero during first and second weeks and then jumping with the beginning of third week from 4.6;g/l to 5.5;g/l and then gradually reducing toward the end of seventh week to reach from 3.4mg/l to 3.1mg/l.

The figure shows the biological processes in beginning of experiment and with the beginning of third week algae activity appearing supplying oxygen through photosynthesis then because of aerobic oxidation the oxygen reduced with reducing algae with reducing food material.



**Figure 2: dissolved oxygen variance with time**



**Figure 3: dissolved oxygen variance with depth**

**Oxygen chemical demand (Dco):**

The oxygen chemical demand is an important parameter for biological contamination and by which we can estimate the total organic matter ready for oxidation, Dco always relating to DBO<sub>5</sub>, in the beginning Hs value about 760mg/L, but H reducing slowly reaching to third week and fifth week which that rotated with organic matter degradation as illustrated in table below.

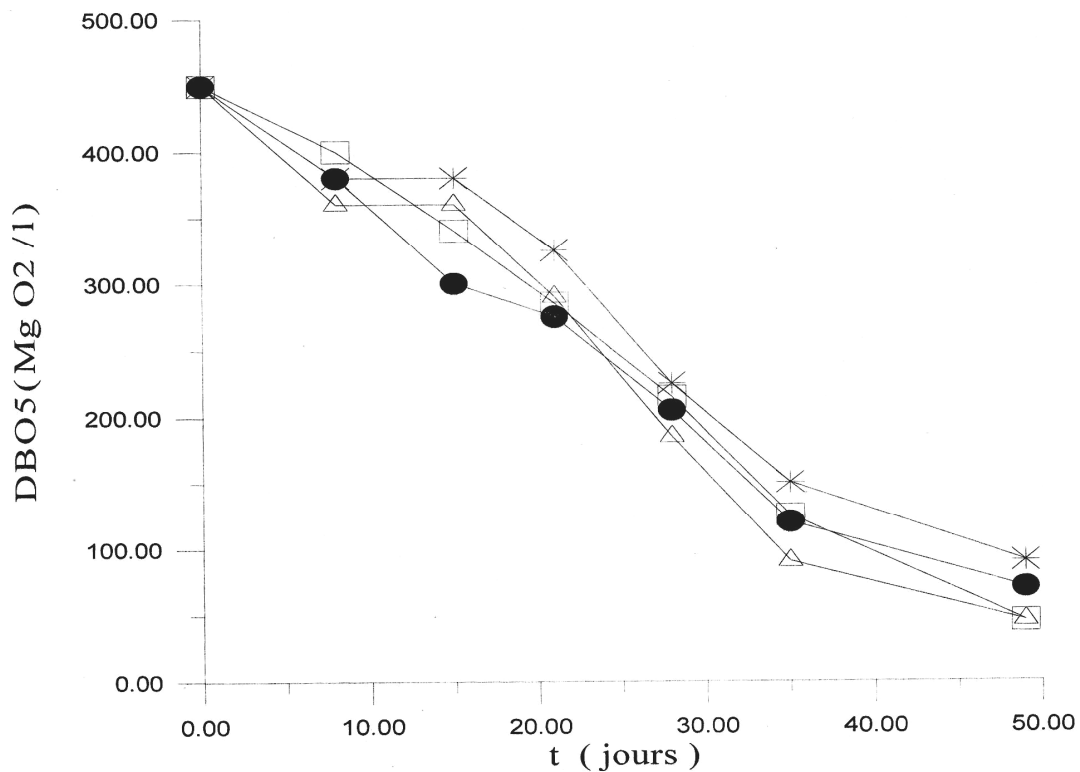
**Tabel 1: removing percentage for organic material.**

Setting time (days)	7	14	21	28	35	49
Surface	10,73	27,84	36,60	49,48	59,88	88,16
First depth	5,86	10,62	16,32	58,03	80,90	-
Second depth	5,65	24,09	39,69	43,33	71,80	86,84
Third depth	2,72	12,41	24,97	46,17	69,63	76,32

**The oxygen biological demand (DBO<sub>5</sub>):**

The average measurement for oxygen biological demand around 68.33 mg O<sub>2</sub>/L and Hs value appropriate with the scour of world health organization (WHO) which estimate by 30mg/L and that depend on the time and removing percentage of organic matter. Hs value shows the constant value at sixth week, therefore Hs appropriate to constructing aerating

stabilization pond to get agoot quality of water, the value of  $DBO_5$  reducing from about 450  $mg\ O_2/L$  to around 100  $mg\ O_2/L$  within 50 days.



**Figure 4:  $DBO_5$  concentration variance with days**

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