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Evaluation of Liquid Pollution at Bay of Arzew – Oran - Algeria

Karima Baghdad*

University of Oran Ahmed ben Bella, Department of chemistry B.P 1524 el M'naouer Oran 3100, Algeria

Email: arwachime@yahoo.fr

Abstract

Water pollution is a universal problem; this vital matter essential to the life of all living things has become rare where drought is the only truth despite rising rates of precipitate compared with recent years. Our study is precisely to support the conformity of effluents discharged in the Bay of Arzew with the standard Algerian and study the impact of organic pollution on surface water, to protect the environment where the final recipient is presented in our case by the sea. This bay is considered as a vulnerable area where the potential disasters can cause great maritime pollution. There are many vulnerable sites, which could cause serious pollution's problem by oil spills. The bay of Arzew presents probably the most polluted marine environment of the Mediterranean. For this purpose several samples are taken and a range of analysis is performed, such as chemical oxygen demand (COD), biological oxygen demand (BOD), oil content (HC). The main objective of this work is determining the source of pollution and the more intense process of treating the pollution before being evacuated to the sea.

Keywords: Wastewater; Industrial Discharges; Pollution; Oil; Water Management.

1. Introduction

Golf Arzew situated on the Greenwich meridian and 36 degrees north. It stretches from Cape Ivi (36° 37'N-0° 13'W) to Cape Carbon (35°54'N-0°20'W).

* Corresponding author.

E-mail address: arwachime@yahoo.fr

These two courses form the boundaries of the Gulf of Arzew beginning at the Cape Ivi, we find the mouth of the river Chellif formed of sand and silt, and about seven miles, the town of Mostaganem marked by a dense population and industrial activities. Then, a long sandy beach stretches in an arc ending on the large port-Arzew LNG Bethioua. At this level the rock coast come up to the islands north of Arzew and extends west to Cap Carbon.

Between Carbon Cap and Cap Ivi, the bay opens to the north of 72 km. Cape Carbon to Arzew sand plunges into the water and makes this area very hard. From the port of Arzew sand extends continuously over 13 km when a high rocky area filled the 3.5 km before the zone of the small port of Mersa El Hadjadj (Town of Mostaganem) [1].

The industrial zone of Arzew (IZA) is located in the western Gulf of Arzew; it is the culmination of a pipeline. Several industrial facilities are located such as the liquefaction of natural gas, petrochemical plants, a steel unit, a unit of industrial gases, a thermoelectric plant, incinerator, storage areas of petrochemicals and a major area of logistic support. All wastewater is discharged into the Gulf of Arzew; they cause disturbance and pollution (thermal pollution, chemical and organic pollution and pollution by oil).

According to European experts met in Geneva in March 1961: "A stream is considered polluted when the composition or the state of these waters is, directly or indirectly affected by reason of the action of man » [2].

There are more than 37 millions chemical substances are identified. We can distinguish two groups of chemical contaminants: the nature of hydrophobic chemicals, which tend to accumulate in aquatic organisms, in the sediment compartment of the coastal zone, and behave in terms of storage, and other hydrophilic substances carried in the dissolved state, which are diluted in the coastal zone and behave in terms of flows [6].

2. Materials and methods

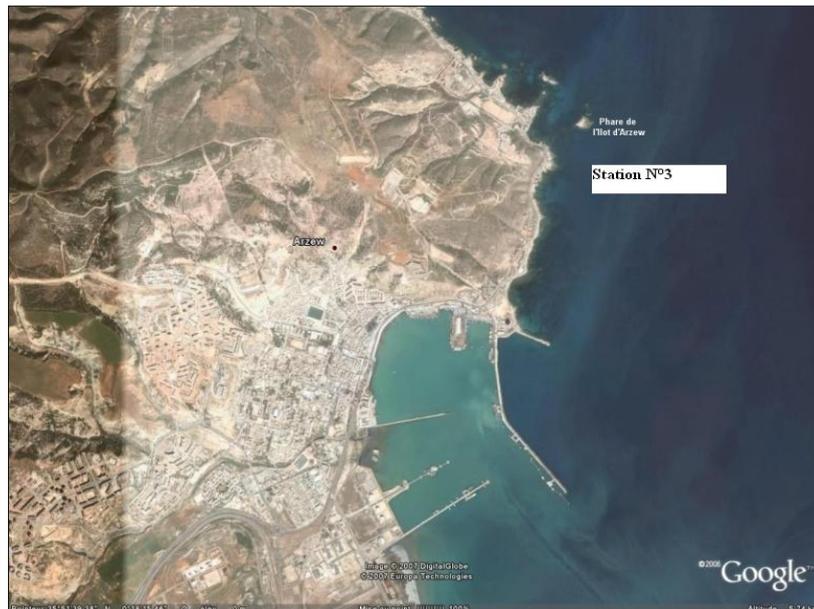
The water samples were removed at several points to estimate the intensity of pollution in the Bay of Arzew and investigate the conformity of effluents discharged with the standard of Algeria, to reach our target range of physical analysis and chemicals is performed, such as the potential of hydrogen (PH), the conductivity (C), the suspended solids (TSS), the chemical oxygen demand (COD) and the biochemical oxygen demand (BOD).

The sampling period is stretch during the month of June and July 2008 and April, June and July 2010. The sampling sites are the following: near to the liquefaction complex « Station 1 », Bethioua Port « Station 2 », Port of Arzew « Station 3 ». These sampling sites were chosen on the basis of their proximity to the industrials activities and the intensity of maritime traffic at the port of Arzew and Bethioua.

The water samples are brought to the laboratory in plastic bottles stored in a cooler, the analysis is performed on the same day, if not, the preservation of our samples is necessary, adding a few drops of sulfuric acid (for the chemical analysis). The storage temperature is - 4 ° C.



(a)



(b)

Figure 1: Map showing the collection sites (a), (b) in Gulf of Arzew, Algeria.

We can define the parameters of the liquid effluent as follows:

-*The physical parameters:* (color, Potential Hydrogen (PH), conductivity, temperature, turbidity, Suspended solids (TSS)).

-*The Chemical parameters:* The chemical oxygen demand (COD) is the amount of oxygen that was consumed by chemical way where the biochemical oxygen demand (BOD) is used to evaluate the intensity of treatment needed to purify with a biological process and to quantify the organic pollutant load of water [10].

3. Results:

Table 1: The concentrations of the physical and chemical parameters of station n° 1

Date	COD ppm	BOD ppm	TSS ppm
26-04-2010	145	34	0.02
29-04-2010	73.28	30.53	0.02
16-05-2010	73.3	30.5	1.0
20-06-2010	81.2	30	1.1

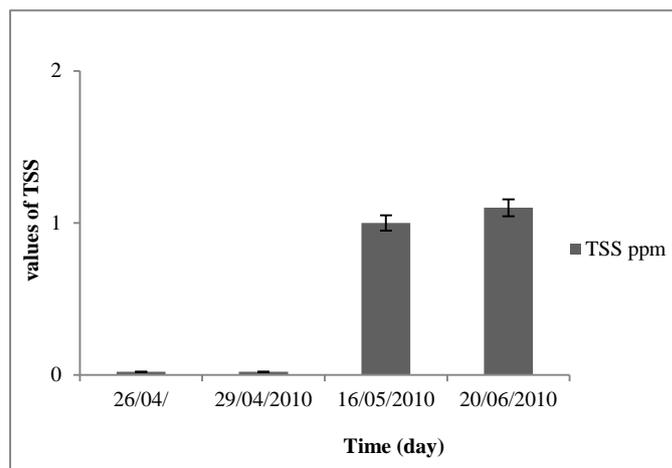
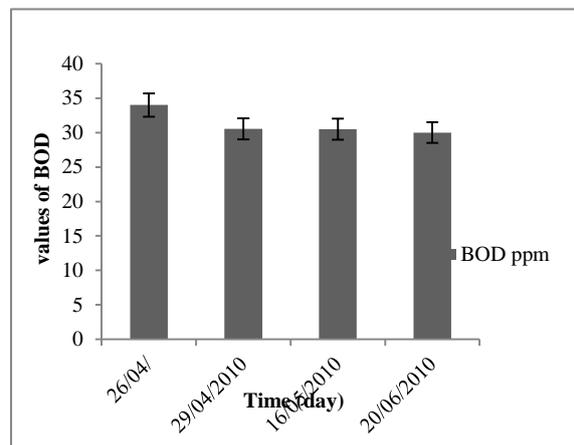
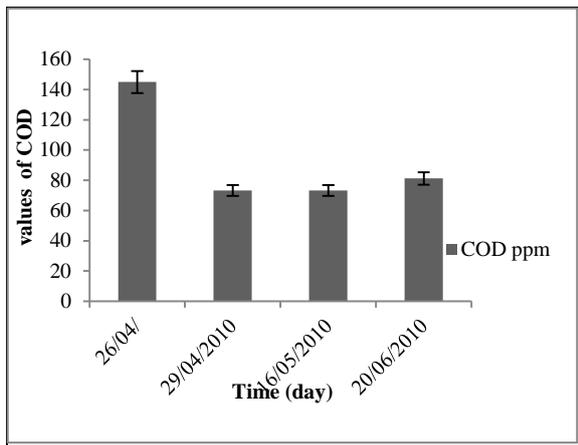


Figure 2: Variations of the chemical and biochemical oxygen demand and the suspended solids from the station n°1.

Table 2: The concentrations of the physical and chemical of station n° 2

Date	PH	Conductivity (mS/m)	Temperature C°	Chemical oxygen demand (ppm)
30/06/2010	7.79	53.97	26.1	1062.7
13/07/2010	7.7	53.8	29.3	1845.6
21/07/2010	7.85	54.52	28.6	2144.36
22/07/2010	7.8	54.57	28.9	1903.42

mS/m :millisiemens per meter ; ppm: Parti per milione

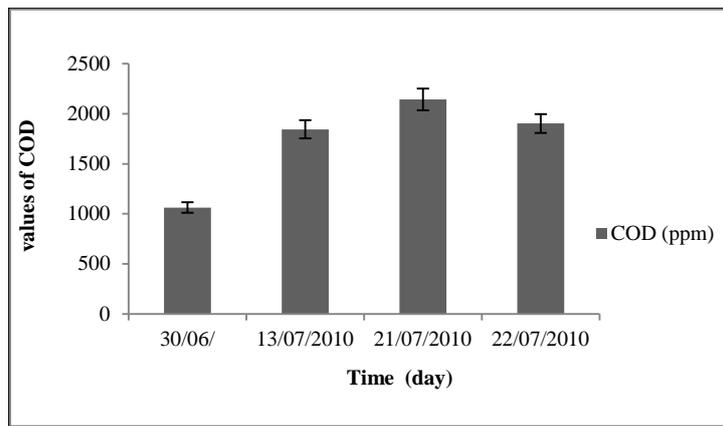


Figure 3: The quantity of the chemical oxygen demand of the Bethioua port.

In general ,the variation of chemical oxygen demand and biochemical oxygen demand (Station n°1) is in the standards (the Algerian standard executive N° 06-141 of 20 Rabie El Awwal 1427 corresponding to 19 April 2006 defining the limit values for discharges of industrial liquid effluents) excepting the first value that far exceed the range ,in effect, the results of the port of Bethioua (the month of June and July 2010) are very far from the values marked at the port of Arzew in the same period of 2008, the liquid waste and the industrial liquid discharge untreated sanitary constitute the principal source of pollution of the Bethioua port , that is justified the values of COD and BOD recorded . The waste industrial water of the station n°1 was treated but the efficacy of this treatment remains low and limited because the treatment plants at the industrial zone are poorly managed where biological treatment is poorly controlled and lack of analysis to ensure the proper functioning of the station (or the desired devices are unavailable or lack of staff) and in the worst case is the failure of the station.

Table 3: The concentrations of the physical and chemical parameters of station n° 3

Date	COD ppm	BOD ppm	TSS ppm
02/06/2008	2852	98	1
16/06/2008	233.5	155	21
23/06/2008	743.728	199	25
07/07/2008	222	34	34

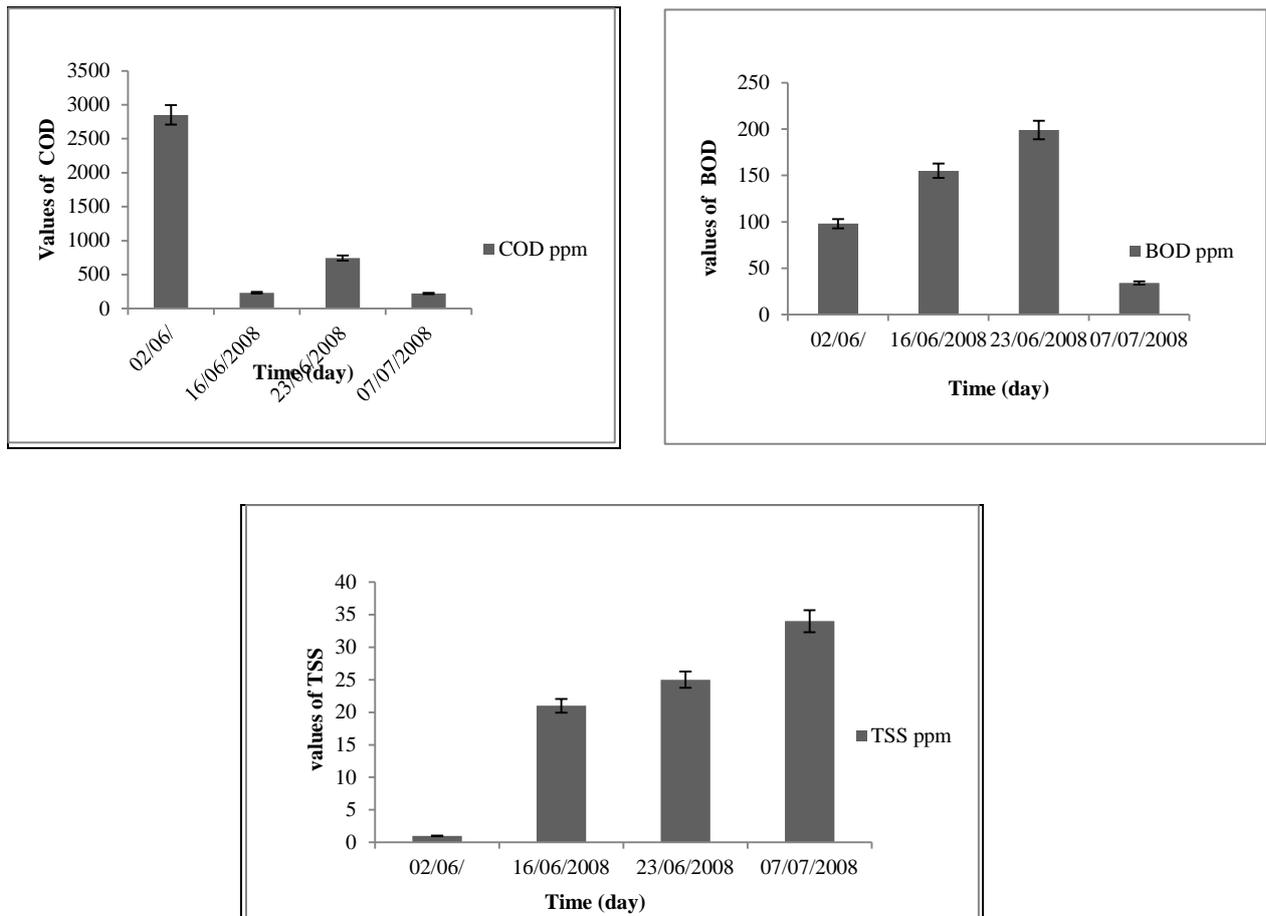


Figure 4: Variations of the chemical and biochemical oxygen demand and the suspended solids from the port of Arzew.

4. Discussion

The oil companies located at the coast of Arzew, are considered the main cashier of the national economy where the impact of their activities on the environment are not measured or controlled. Their recent environmental strategy (HSE organism) was imposed as part of international competition. The HSE is a recently created; it does not currently have any precise data on the extent of pollution where the certification procedure is not a signal of performance criterion.

When a company's performance was used, it need only comply with legal standards and rules to attain his goal and bring a certifying body from abroad and pay to be certified [11]. That justified the one hand the lack of treatment plants and other justified the huge quantities of liquid effluents discharged directly into the sea without any treatment.

Table4: the limit values for discharges of industrial liquid effluents by Executive Decree No. 06-141 of 20 Rabie El Awwal 1427 corresponding to 19 April 2006.

Parameters	Unit	Limit values
Temperature	C°	30
PH	/	6.5 à 8.5
TSS	ppm	35
BOD	ppm	35
COD	ppm	120

Despite the availability of port companies (APC) in the port of Arzew and the port of Bethioua, the peak of pollution is increasing day by day, that the means available in these two ports are intended to fight against pollution by oil (accidental pollution) . The unconsciousness of the local authorities took part in this problem, where the wastewater from the town of Arzew are discharged in the port, therefore the struggle against the chronic pollution remains far from any realization.

This catastrophic situation gives us a clear apercus about the future of the flora and fauna in this bay, we can not quantify the amount of the damage resulted, and even the possible effects that can menace the human health ,because this pollution is moving due to wind and movement of waves.

5. Conclusion

Bay of Arzew has become badly polluted by the huge load of pollution discharged and irresponsibility of some. The evacuation of industrial sewage by the industrial zone, carried by a sewer-type unit that releases to the sea through the « Oued TASMANIT » and « Oued ERRAHI ».

Our study includes all parameters and conditions can determine the source of the most intense pollution. Indeed, the results show that liquid discharges of the Arzew bay are not conformed to the Algerian standards. The liquid effluents must be treated at the wastewater treatment plant to remove the organic pollution in order to respect the limit values of COD, BOD, which are respectively (120 ppm, 35 ppm) .For this purpose ,we must considered all versatile can impose this major problem, where the pollution is spotted all along the coast of western Algeria.

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References

- [1] *Coastal Development Plan Wilaya of Oran*, Environment Directorate of the Wilaya of Oran, 2009.
- [2] P. Pesson .*The pollution of inland waters*,Bordas, Paris, 1976.
- [3] L.Vandevenne. *Management of urban and industrial wastewater and documentation* ,*Technique*, Ed Lavoisier, 1982.
- [4] A. Casser . *Purification of waste water in the processing and electroplating of metals*, Ed Eyrolles, 1975.
- [5] A. Kadi. “The water management in Algeria”, *Hydrological Sciences Journal-of Hydrological Sciences*, 42(2) April 1997.
- [6] M. Marchand .”Marine chemical pollution”, *Chemical News*, 2008 ; n° 325 : 35-40.
- [7] M. Marchand. “Accidental marine pollution of crude oil, chemicals and other marine spills” , *magazine of Annales des Mines, Responsibility & Environment* ; july 2003 :70-92.
- [8] M. Marchand, C. Tissier .*Analyse du risque chimique en milieu marin*, Ed Ifremer, 2005.
- [9] J. Rodier. *Analysis of the water*, 7th ed Dunod, Bordas, Paris 1984.
- [10]M. Tardat-henry .*Water chemistry*, ed the clay Griffin 1992.
- [11]M. Kacemi. “Coastal protection in Algeria between local politicians and authorities: the case of the industrial pole of Arzew (Oran-Algeria)” ,*the science magazine of the environment VertigO* 2006 ; Vol7 n° 3 :1-11.