Chemistry Research Journal, 2019, 4(2):9-15

Available online www.chemrj.org

Research Article

ISSN: 2455-8990
CODEN(USA): CRJHA5

The investigation of the pollution sea water in Arzew west coast line in Algeria

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Abstract Oil is the source of pollution of marine life which can greatly influences the ecological balances and an extension of the economical activities of the affected regions. Petroleum hydrocarbons which arrive in the marine life may have four major origins: the geochemical sources, the extraction of petroleum, transportation and consumption.

The impacts of pollution by hydrocarbons are multiple. The more obvious aspects are the major disasters highly publicized as the tides black: high mortality of aquatic wildlife, edges of sea oiled.

The physico-chemical analysis of industrial wastewater after their physical treatment at the level of the Laboratory of GL2Z has many purposes to qualitatively assess these waters while determining the different parameters such as: the pH, temperature, conductivity, suspended matter, content in hydrocarbon content, fat oils, biochemical oxygen demand (BOD_5), chemical oxygen demand (COD), as well as phosphate (PO_4^{3-}), and as well a few heavy metals (Cr, Cu, Cd, Fe, Mn, and Ni).

These analyzes are carried out according to the standards and the regulatory techniques and these are does to the sampling up to the achievement of results.

The operations will have a role to differentiate between processes in order to determine with thoroughness the effectiveness of the different phases of purification. Analysis were performed on two points channel of rejection terminal 1 and 2; the analyzes were carried out at the Laboratory of GL2Z of Arzew and they have focused on the different settings.

According to the study we have performed on the Liquid Releases to Canal (1) and canal (2), we have noticed that the results obtained generally correspond to the standards adopted by the Algerian regulations.

Keywords marine pollution, hydrocarbons, environment, physico-chemical

Introduction

Surface waters constitute an ecosystem where reigns a community of living beings that establish the relationships and interactions between them and their environment. In this sensitive balance, a single factor of the ecosystem is modified, and that is the balance which is distributed.

Wastewater require to be treated prior to their evacuation in the receiving environment, the protection of the environment depends on it [1].

The pollution or contamination of the water can be defined as the degradation of the latter by modifying its properties physical, chemical, and biological; by spills, discharges, deposits and direct or indirect foreign body or of undesirable substances such as microorganisms, toxic products, industrial waste.

Pollution is directly linked to the industrial and agricultural activities. We are interested to release fluids transported by water, commonly referred to as industrial waste water carrying in general various highly toxic products with very high rates [2].

Chemical pollution is the result of chemical discharges, mainly of industrial origin. The chemical pollution of the waters is grouped in two categories:

-Organic (hydrocarbons, pesticides, detergents, phenols...);

-Mineral Resources (heavy metals, cyanide, nitrogen, phosphorus,...).

Pollution by hydrocarbons is resulted froms several activities related to the extraction of oil, to its transportation and downstream to the use of the finished products (fuels and lubricants), as well as to discharges by ships (tides black). Among the detected hydrocarbons, the saturated aliphatic hydrocarbons are the majority and are divided in the range C9-C29 (oil slices from which lube oils-engine) [3].

Water may contain pathogenic microorganisms (viruses, bacteria, parasites) they are dangerous to human health, and therefore limit the uses that can be made of the water (industry, domestic use...) [4].

The depollution of the waters can also be done to a lesse extent by assimilative. This assimilative can be exploited by man: it is the case of the stations autoépuratrices. The phytoplanktonic organisms, such as diatoms, or many of the plants as the rushes, can be used with effectiveness for the assimilative of waters [5]. The sea is also rich in active substances, microorganisms, and bacteria that help to defend themselves and to clean up. This is the case for example with bacteria able to degrade hydrocarbons discharged during a black tide. [6]

2. Materials and Methods

The physico-chemical analysis of industrial wastewater after their physical treatment at the level of the Laboratory of GL2Z is owing to qualitatively assess these waters while determining the different parameters such as: the pH, temperature, conductivity, suspended matter, content in hydrocarbon content, fat oils, biochemical oxygen demand (BOD_5), chemical oxygen demand (COD), as well as phosphate (PO_4^{3-}), and as well a few heavy metals (Cr, Cu, Cd, Fe, Mn, and Ni).

These analyzes were carried out according to the standards and the regulatory techniques and this since the sampling up to the achievement of results.

2.1. Sampling Method

The sampling operations carried out by our care and this for the purpose of proceeding to a thorough study of analysis.

The ten operations will have a role to differentiate between processes in order to determine with thoroughness the effectiveness of the different phases of purification. Analyzes were performed on two points channel of rejection terminal 1 and 2 the analyzes have been carried out at the Laboratory of GL2Z of Arzew.

2.2. Analysis methods

We are going to present the different methods of analyzes carried out.

According to the degree of elimination of pollution and the processes implemented, our follow-up has affected eight 11 analyzes are:

2.2.1. Determination of the chemical oxygen demand (COD)

Boiling at reflux, under the conditions defined in this standard, a test of the sample in acid medium. This in the presence of a known quantity of potassium dichromate and sulphate of money which play the role of a catalyst of oxidation of sulphate of mercury (II) allowing to form a complex with the chloride ions.

Determination of the excess dichromate salts with a titrated solution of sulphate of iron(II) and ammonium and calculates the cod from the quantity of potassium dichromate reduced.

It was added slowly and carefully, 15 ml of sulfuric acid-sulfate money in shaking carefully the flask of a circular movement;
It was brought to the boil and reflux for 2h, left to cool down and wash the inner wall to the distilled water; then it was titrated the excess dichromate with the solution of sulphate of iron (II) and ammonium, in the presence of 1 or 2 drops of indicator solution to the Ferroïne.
It was done as a test following the same operating mode.
The chemical oxygen demand, DCO, expressed in mg/L, is given by the formula:

COD = 8000 * C * (V1 - V2) / V0

C: concentration in mol/L of sulphate of iron (II) and ammonium

V0: volume in ml of the taken before dilution

V1: volume in ml of sulphate of iron(II) and ammonium used for the test

V2: volume in ml of sulphate of iron(II) and ammonium used for the determination of the sample

2.2.2. Determination of the content of the hydrocarbons (H.C) and oils fats in the water

Oils, fats and total hydrocarbons dissolved in the waters (worn, oily,); are extracted by the solvent S-316 (TetraChloroHexaFluoroButanetane) (C_4Cl_4F=).
After extraction, the solvent phase is separated and directed to the measuring cell of the analyzer to infrared OCMA 310 (HORIBA).
Operating mode for measuring oils fats is the extraction technique.
Operating mode to measure the total hydrocarbons is the technique of filtration, and extraction.
An average of 03 consecutive readings.
The concentration of total hydrocarbons will be as follows:

Mg/l d'HCT= Lecture/10 [10] : Etant le "Facteur de dilution".

2.2.3. Determination of material in suspension

Determination by weighing after filtration of the water on disk in the glass fiber, and then drying the disk to 105°C in a vacuum.
Suspended Solids (ppm) measured to the filter of 8.0 µm

$$= \frac{(\text{final weight} - \text{initial weight in g of filter}) \text{ X } 1000000}{(\text{Initial Weight} - \text{final weight in g of the bottle})}$$

2.2.4. Determination of the biochemical oxygen demand (DBO_5)

Preparation of a solution obtained by dilution of the sample using dilution water providing a planting. Incubation for 5 days in the dark in an enclosure set to 20°C or - 01 °C. Measurement of the quantity of oxygen consumed.

2.2.5. Determination of the iron content

The reagent Ferro Ver reacts with all the dissolved iron and most of the insoluble forms of iron present in the sample, to produce of ferrous iron soluble. The ferrous iron reacts with 1,10 phenanthroline of reagent to form a orange coloring proportional to the concentration of iron.

2.2.6. Determination of the ION phosphoric acid ($PO4^{3-}$)

It puts the Hach spectrophotometer in service by selecting the program 480 and the wavelength 430 nm. Then, takes 25 ml of the sample in a test tube of 100 ml with plug.
Finally we add 01ml of the solution of acid molybdenum vanadate of ammonium.

2.2.7. Determination of heavy metals

Heavy metals are toxic elements which may cause the mortality of agencies.
They can also be absorbed directly through the food chain causing the effects chronic or acute.

They are dangerous for the environment because they are not degradable.

To determine the concentrations of these metals it uses the method of analysis by spectrophomètre of atomic absorption [7].

3. Results and Discussion

The results of the analyses showed the values taken a canal of rejection terminal (1) and (2) Analyze are the values of output to sea.

3.1. The pH, Temperature, Conductivity measurements

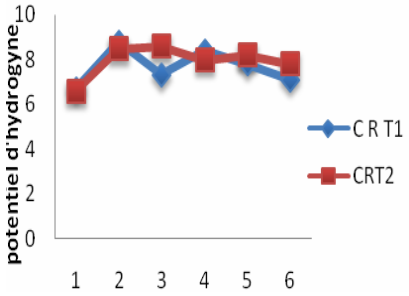

Figure 1: The pH variations

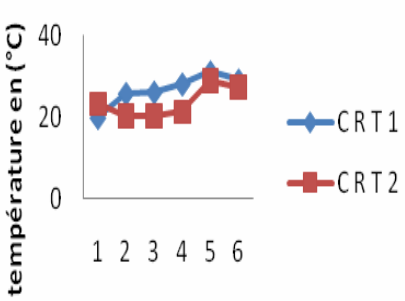

Figure 2: Temperature variations

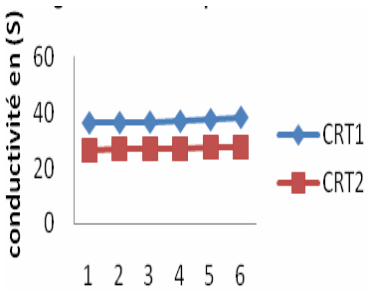

Figure 3: Conductivity variations

In figure 1, according to the results we have performed the Liquid Releases to Canal (1) and canal (2) and we have noticed that the results obtained generally correspond to the standards adopted by the Algerian regulations.

The pH of the water discharged by the station of GL2Z of Arzew are in the standards because according to the regulations the latter is fixed between 6.5-8.5

In figure 2, the values of the temperature of the waters of rejection are between 25–30 °C. These values are balanced to the standard 30 °C. This generates a thermal pollution.

In figure 3, we noticed that the conductivity in canal1was always higher than to the conductivity in channel 2.

3.2. Measurement of the Liquid materiel (MLM), Determination of the chemical oxygen demand COD Determination of the biological application of oxygen BOD_5

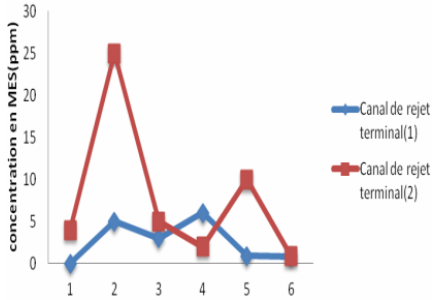

Figure 4: Variation of MES

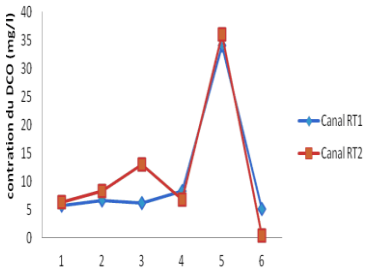

Figure 5: Variation of COD

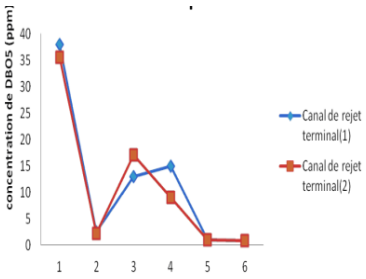

Figure 6: Variation of BOD_5

In figure 4, we noticed that the values of the liquid material in the channel (1) are higher than that in the channel (2) and the required standardization at 35mg/l.

In figure 5, the values of the COD are lower compared to the standard values at 120mg/L.

In figure 6, the values of the BOD_5 of channel (1) are superior to that of channel (2) they required standardization at 35 mg/l.

3.5. Determination of the content of the iron; in copper and Ion phosphoric acid ($PO4^{3-}$)

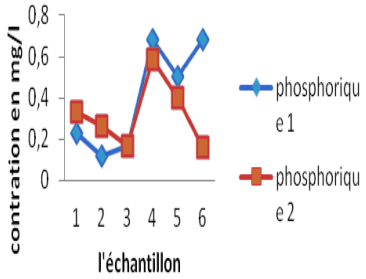

Figure 7: Content of $PO4^{3-}$ Variations

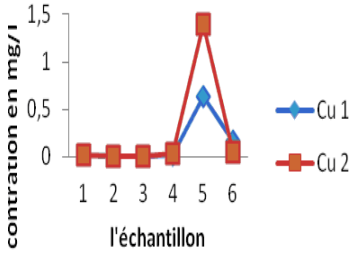

Figure 8: Content of copper Variations

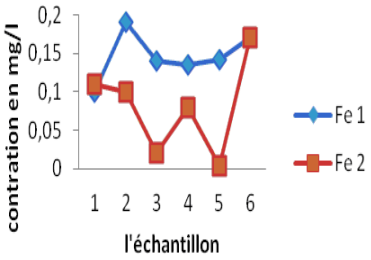

Figure 9: Content of iron Variations

In figure 7,8 ,9 we found that during the entire period monitored channels, the levels of iron obtained are in the Standards 3 mg/L and do not exceed the values of 0.2 mg/l.

We noticed that during the entire period follow-up of channels, the values of ion of the phosphoric acid are obtained in the standards and do not exceed the threshold value limit which is 10 mg/l. Even the values of the levels of copper obtained are in the Standards 0.5mg/the part the concentration of sample 5 is exceeded the standard in both channels.

3.6. The heavy metals

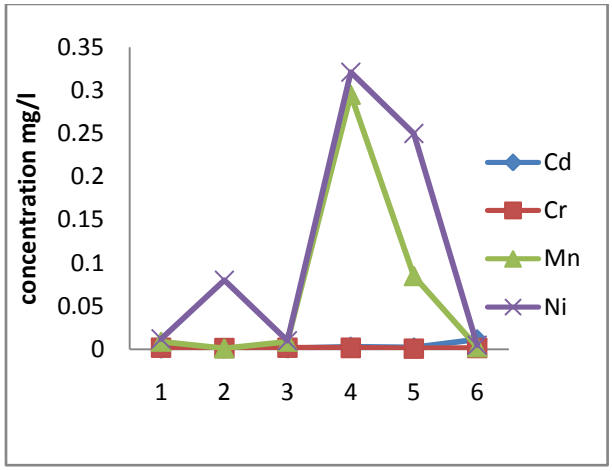

Figure 10: Variation of the concentration of heavy metals in the canal of rejection Terminal 1 as a function of time

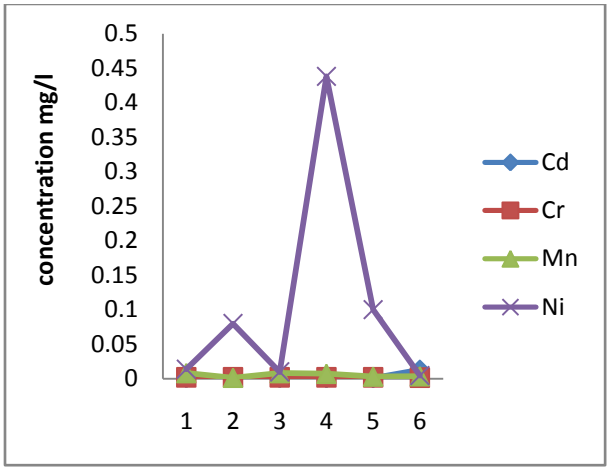

Figure 11: Variation of the concentration of heavy metals in the canal of rejection Terminal 2 as a function of time

In figure10 and 11 we have taken advantage of the monitoring of the levels of heavy metals in the waters of rejection. It has followed the content of metals during the internship which are: Cr, Ni, Cd, Mn. These analyzes have been carried out to the complex GL2Z by the equipment of SAA spectroscopy of flame by the method of the three standards. There are variations in the concentrations of Mn of Channal are too much higher of Mn of channel 2.

The concentration of the higher C is the concentration of metal nickel in the two channels and the maximum value is 0.45 mg/L is lower than of limited value 1mg/L, but the concentrations of chromium is very lower than the standard 0.5mg/l.

Heavy metals are toxic elements which may cause the mortality of agencies. They can also be absorbed directly through the food chain causing the effects chronic or acute.

They are dangerous for the environment because they are not degradable.

3.11. The hydrocarbons and oils greases

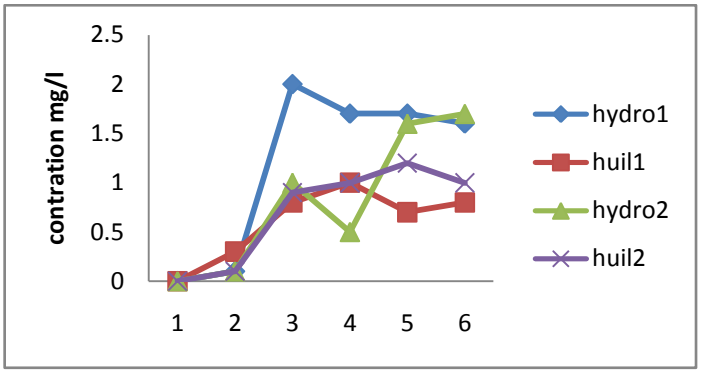

Figure 12: Variation of the concentration of hydrocarbons and oils fats in channel rejection of Terminal 1 and 2

Interpretation of figure 12: The presence of these elements may give a heavy pollution to the sits water as well as a flavor and specially odors.

The formation of films on the surface of the water prevents the oxygenation of the living and cause asphyxiation of the aerobic organisms.

In addition, some hydrocarbon molecules may be more difficult than to biodegradable.

4. Conclusion

The living resources and biodiversity are threatened by liquid effluents rejected by the industries of hydrocarbons in terms of the development of the coastal environment, pollution and exploitation.

Five monthly sampling were carried out for the control several physico-chemical parameters: temperature, pH, MY, COD, $PO4^{3-}$and biological: BOD_5, as well as the monitoring of heavy metals for the waters of rejection to control pollution of effluential dischange bolhtreated and untreated ones some parameters analysis were made to the complex GL2/Z.

In a general we found that the standards in the most part are respected except in the forced major cases such as the accidental stopping, technical and during periods of precipitation. We have found a temporary pollution in many periods well determined for some parameters of discharges of treated station (GN2Z). We also found a salinity very high level of water discharged to the sea.

In addition, the concentration of the COD is very variable and respected for the regulations values in Algeria. The ground water of Osmanabad districts was analyzed they found that this region is not much polluted, the COD in the range of 2000-4000 ppm and total suspended solids as 200-1800 ppm. The present study reveals that these parameters are very low in the water sample the same we found in our study [8].

Thermal pollution is usually caused by industries, but many regions have imposed legislation on power plants and their water cooling system. Construction operations can pollute a large number of lakes due to sediments [9].

References

[1]. Canadian Broadcasting Corporation. September 2004. Annual Checkup. http://www.cbc.ca/manitoba/features/lakewinnipeg/checkup.html.

[2]. Environment Canada. 2004. Water Pollution. http://www.ec.gc.ca/water/en/manage/poll/e_poll.htm.

[3]. Houston, A.H. 1983. Effets de la pollution thermique sur les poissons. Conseil National de recherche Canada: Comité associé sur les critères scientifiques concernant l'état de l'environnement. Ottawa

[4]. Jean Rodier, L'analyse de l'eau (eaux naturelles, eaux résiduaires, eau de mer) ,8éme édition.

[5]. Développement/graphisme :Mylène Lorre-Guidt

[6]. Guillaume Barucq.Terry C. Hazen et al. Deep-Sea Oil Plume Enriches Indigenous Oil-Degrading Bacteria**.** Published Online August 24 2010.

[7]. Annexe of laboratory of complex GL2Z. Arzew

[8]. Multivariate Analysis of Ground Water, Around Sugar Factories of Osmanabad District (India). Rasayane. J. Chem 2010.

[9]. Environment Canada. May 2011. Clean water - life depends on it!