MONITORING OF QUALITY OF CRIŞUL REPEDE RIVER WATER, UPSTREAM TO ORADEA

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Abstract

The monitoring the quality of Crişul Repede river water was done by following the physico-chemical indicators over a period of ten months in the year 2010, from January to October: physical indicators (river flow, water temperature, pH, suspended solids), oxygen regime (dissolved oxygen, oxygen saturation, CBO_5, CCO-Mn, CCO-Cr), phenolic compounds and anionic detergents. The data presented in this paper reveal a predominant I class water quality in the analyzed section of Crişul Repede river, upstream to Oradea.

Key words: Crişul Repede river, physical indicators, oxygen regime, phenolic compounds, anionic detergents.

INTRODUCTION

The water is not pure in nature, it has many dissolved salts and other suspended matter. Some elements are present in most water and have significant concentrations, while others are rare or only in very small quantities:

- **major constituents** (from 1 to 1000 mg/L): sodium, calcium, magnesium, bicarbonate, sulfate, chloride, silica;
- **secondary constituents** (from 0,01 to 10 mg/L): iron, strontium, potassium, carbon, nitrogen, fluorine, boron;
- **minor constituents** (from 0,0001 to 0,1 mg/L): antimony, aluminum, arsenic, barium, bromine, cadmium, chromium, cobalt, copper, germanium, iodine, lead, lithium, manganese, molybdenum, nickel, phosphate, rubidium, selenium, titanium, uranium, vanadium, zinc;
- **present as trace constituents** (usually under 0,001 mg/L): beryllium, bismuth, cesium, gallium, gold, indium, platinum, gold, scandium, silver, thallium, thorium, tin, tungsten, zirconium.

Surface waters in our country are qualitatively regulated by 1146/2002 Order - normative benchmarks for surface water quality classification - which includes five quality classes, as follows:

Class I is water that can be used for district heating with drinkable water and livestock units, food, certain irrigation, fish farming, swimming pools, etc.

Class II is water that can be used in industry, fish farming, leisure and urban needs, etc.

Class III is water that can be used for irrigation, hydroelectric power stations, cooling aggregates, supplying washing stations etc.

MATERIAL AND METHOD

The water samples were collected from Crişul Repede river, upstream to Oradea, by the employees of the National Administration, "*Romanian Waters"* Basin Water Administration Criş.

The observing of the physical indicators was done over a period of ten months in 2010, from January to October.

Determining the water temperature

Surface water temperature varies according to the air temperature, while the deep water temperature is constant. Temperature determining is done only at the place of drawing and if possible, directly in the water source.

The air temperature is determined together with the water temperature.

Determining the water pH

The pH varies a little compared to the neutral pH, because of the presence of CO_2 , bicarbonates and carbonates.

The hard water has higher pH, compared to the soft water. The waste waters pH may be acidic or alkaline and is a cause of disturbance of the biological balance of the receiving basin, preventing the normal development of the self-purification process. Colorimetric and electrometric methods are used to determine the water pH.

Determining the dissolved oxygen in water

Water samples are collected according to STAS 2852 in glass bottles. Together with the collection of samples, the water temperature is also recorded. The binding of dissolved oxygen in water is done immediately after sampling, with 2 ml of alkaline potassium iodide solution and 2 mL of solution of manganese sulphate. The residual chlorine interferes in the determination of dissolved oxygen in drinkable water.

Determining the biochemical oxygen demand (CBO_5)

The drawing of samples is done according to STAS 5436. If the pH sample is outside the scope of 5.5 to 8.5, then it is adjusted with sodium hydroxide or sulphuric acid in the presence of blue bromtimol indicator.

Determining the phenolic compounds in water

The separation of phenolic compounds is carried out either by simple distillation or by steam stripping. The present phenolic compounds are dosed by the spectrophotometric method of the compound formed by 4 aminoantipyrine or para-nitroaniline. The sensitivity of the method is of 0.1 mg phenolic compounds per liter of solution.

RESULTS AND DISSCUSIONS

The following graphs represent the monthly variation of the indicators studied in the water of Crişul Repede River, under supervision upstream to Oradea, for a period of ten months.

From the graphical representation of the values obtained it is noted that the flow of Crişul Repede River is higher in winter due to the rainfall in those months and the maximum flow is recorded in May with a value of 82.5 m/s (Fig.1). The water temperature varies within normal limits with a maximum of 21.3°C in August (Fig.1). The water pH is within normal limits given by the regulations in force with values between 7.4 in March and 8.1 in January and April (Fig.2). In the case of suspended matter the values obtained are within the limits of STAS 6953-81 with an excess value in June (Fig.2).

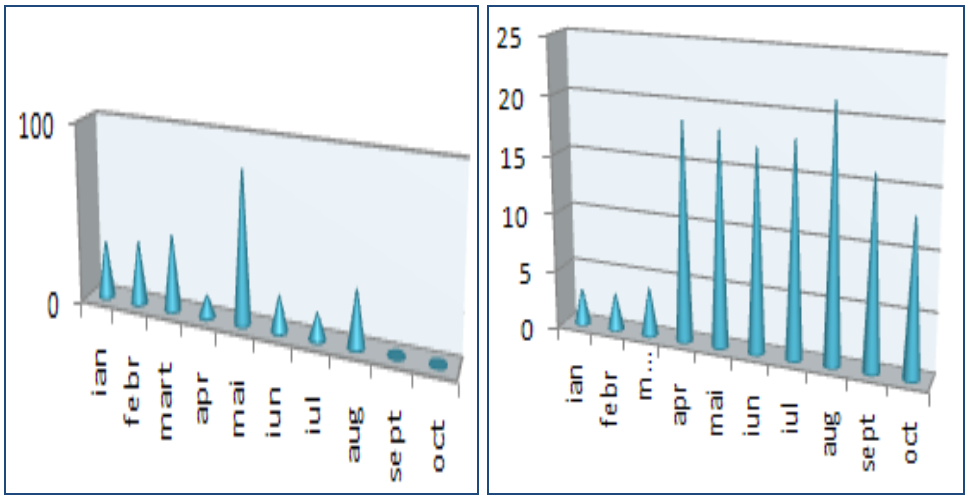

Fig. 1. Variation of flow and water temperature in Crişul Repede River

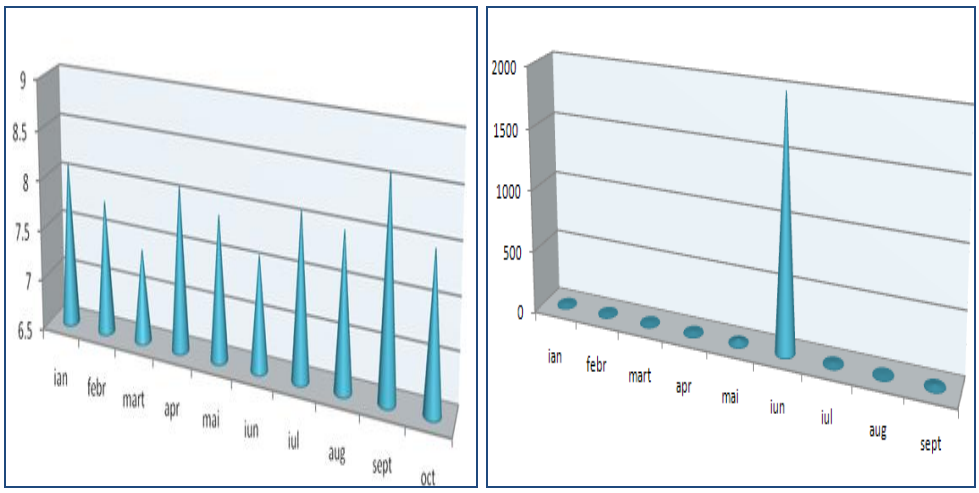

Fig. 2. Variation of pH and suspended solids content of water in Crişul Repede River

After obtaining the results of analysis of oxygen regime in river water collected from Crişul Repede we noticed that: the values of dissolved oxygen make the water fall in quality *class I*; the values of biochemical oxygen demand for BOD values make the water fall in quality *class I* in January, April, May, July and October; the values of chemical oxygen demand - potassium permanganate method (CCOMn) and chemical oxygen demand - potassium dichromate method (CCOCr) within the water in quality *class I* in all months except June when values were exceeded .

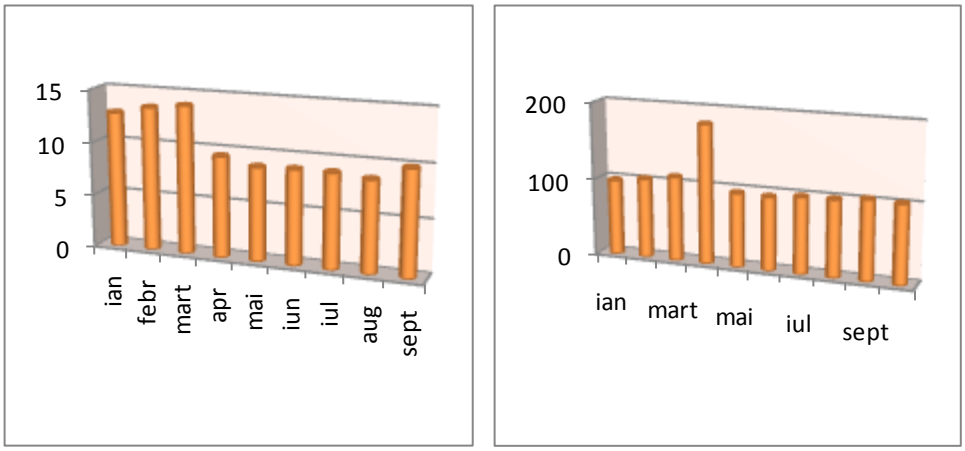

Fig. 3. Variation of dissolved oxygen content and oxygen saturation

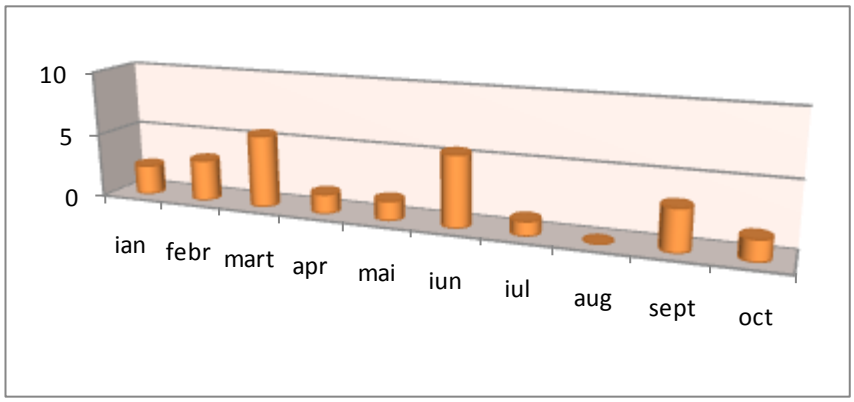

Fig. 4. Variation of biochemical oxygen demand

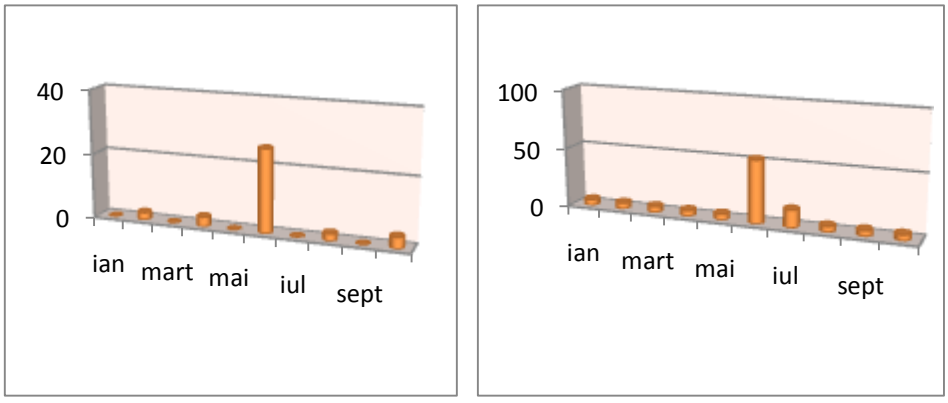

Fig. 5. Variation of chemical oxygen demand by potassium permanganate method (CCOMn) and potassium dichromate method (CCOCr)

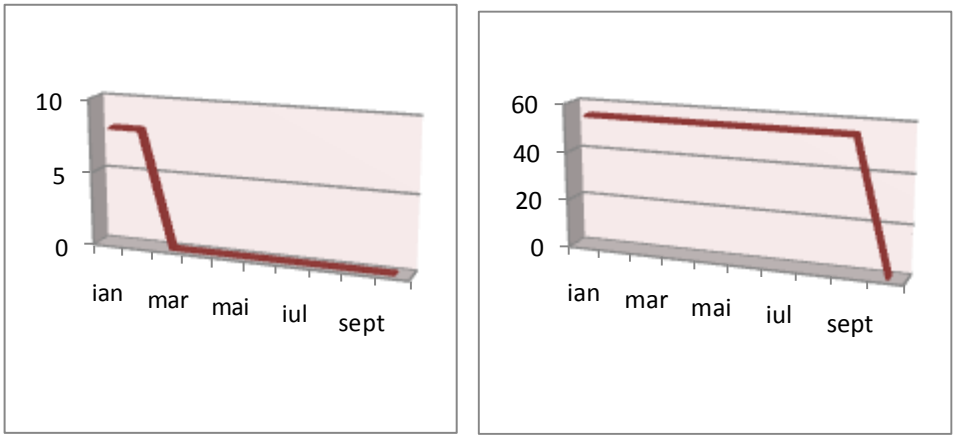

Fig. 6. Variation of content of phenols (phenol index) and anionic active detergents

CONCLUSIONS

✓ The observing of physical and chemical indicators was done over a period of ten months in 2010, from January to October: physical indicators (river flow, water temperature, pH, and suspended solids), oxygen regime (dissolved oxygen, saturation oxygen, CBO_5, CCO-Mn, CCO-Cr), phenolic compounds and anionic detergents.

✓ The data presented in this paper reveal a predominance of water in quality class I in the analyzed section of Crişul Repede River, upstream to Oradea, although in June some exceedance of the limit values was observed on the following indicators: suspension matters, CBO_5, CCO-Mn, CCO-Cr.

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