HEAVY METAL MONITORING IN CRIŞUL REPEDE RIVER ORADEA AREA

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Abstract

The monitoring of the Fe, Zn and Cu concentrations in Crisul Repede and Peta River waters was done by atomic absorption spectrometry method:, in upstream and downstream of Oradea, during four months: January, February, March and April, 2009, show that the drinking water source of Oradea corresponds with the requirements stipulated by Law 458/2002 changed and completed – Law 311- 28 of June 2004 regarding drinking water quality. In accordance with STAS 3086/68 SR ISO 6332/96, the concentration of Fe is under minimum limits accepted. In accordance with STAS 3264/81 SR ISO 6333/96, the concentration of Mn is under minimum limits accepted and in accordance with STAS 3224 – 69, Cu and respectively in accordance with STAS 6327 – 81 Zn concentration, are integrates much under minimum limits accepted.

Key words: atomic absorption spectrophotometric technique, heavy metals (Fe, Cu, Mn and Zn) concentrations

INTRODUCTION

The reduction of incidence of the numerous diseases transmitted through water raising the population assurance degree with drinking water and sewerage systems, us one of the greatest successes of the last 150 years (Lassiter and all, 1978). Though, international plan, the sickness associated with the contaminated water keeps being a problem of public health because they are more and more evidences of association between drinking water chemical contaminations and producing or favoring the appearance of sicknesses through some diseases as cancer, congenital malformation, and endocrine disruption, chronic and acute intoxications (Mertz and Cornatzer, 1971). The purpose of this paper work is the characterization of the drinking water source of Oradea regarding heavy metal point of view as Fe, Zn, Mn and Cu which could outrun the admitted limits because of the local industry.

EXPERIMENTAL

The principle of Fe determination method from water is based on bivalent ferric reaction with 1, 10 fenantroline forming a colored compound and measuring the color intensity at 510 nm. For total ferric dosage it is necessary to bring all ferric forms to bivalent ferric through reduction with hydroxylamine chloralhydrate. For spectrophotometer determination has been used molecular absorption spectrometric equipment UV-VIS Unicam EM 12.0 and molecular absorption spectrometric equipment GBC Cintra EM 14.0.

The determination of Zinc and Manganese has been done through atomic absorption spectrophotometry method. For determination of the metals in suspension, the sample fixes through acidulation without filtering. The aspiration in flame can be done from supernatant. It has been used a spectrophotometric equipment with correction for background noise in case of zinc determination and without correction for manganese. The flame used to bring analyzed elements in atoms form is air – acetylene. To improve the sensibility has been used atoms trap technique, which enlarges sitting time of atoms in optical road. This technique gives raised sensibilities until 100- 150% for zinc but it has no effect in manganese determination. For Mn determination has been used SOLAAR 969 Spectrometer equipped with universal burner of 50 mm.

Cupper has been determined also through atomic absorption from water samples conserved through acidulation. The interferences elimination it is done through temperature program, using pyrolitic graphite tubes, matrix modifier's help, through standard ads method and background correction utilization. The SOLAAR 969 atomic absorption spectrometer has been equipped with hollow cathode lamps suiting analyses metals, with background correction system deuterium lamp and graphite furnace.

RESULTS AND DISCUSSIONS

The obtained results after determination through spectrometer atomic absorption methods regarding zinc, manganese, copper and atomic absorption in case of iron from river water in amount and avail of Oradea from Crisul Repede and Peta in amount and avail of Sinmartin (as an important tributary which traverses the town and flows into Crisul Repede) are presented in figures 1,2,3,4.

The study consist in analyses made on these waters, in Quality of Waters Laboratory from "Directia Apelor Crisuri " Oradea, following the content of heavy metals, ferric, manganese, zinc and copper, during 4 month: January, February, March and April, considering the fact that this river represents the drinking water source of Oradea.

To be able to interpret the obtain results these were compared with admitted limits for surface water and quality condition of drinking water from table 2 (Law Water no. 107, 2004; Law Drinking Water Quality no. 458, 2004; Laws Europea, 2002).

Table 1

Surface water characteristics meant preparing drinking water

	Parametres	**A1 G**	**A1 I**	**A2 G**	**A2 I**	**A3 G**	**A3 I**
1	**Ferrum disolvate mg/l Fe**	0,1	0,3	1	2	1	
2	**Manganese mg/l Mn**	0,05		0,1		1	
3	**Copper mg/l Cu**	0,02	0,05(O)	0,05		1	
4	**Zinc mg/l Zn**	0,5	3	1	5	1	5

Table 2

Quality conditions of drinking water
(in accordance with water Law, from Official Monitor)

Parametre/ Measure of unite	**CMA Value**	**Analise method**
Fe µg/l	200	STAS 3086/68 SR ISO 6332/96
Mn µg/l	50	STAS 3264/81 SR ISO 6333/96
Cu mg/l	0,1	STAS 3224/69
Zn µg/l	5000	STAS 6327/81

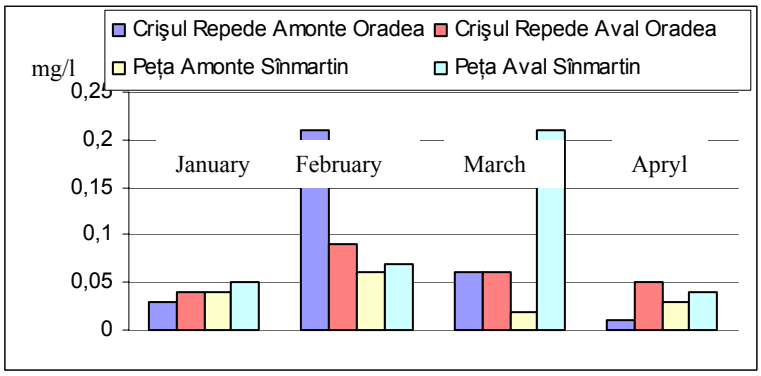

Fig. 1. The graphic representation for ferrum content in Crisu Repede and Peta water, in Upstream and Downstream of Oradea and Sanmartin.

Regarding Fe quantity in water, it can be observe that in March was registered a growth of the concentration in Peta Upstream Sanmartin. Consider only this month, Peta in upstream Oradea water would fit in A1 category of surface water, therefore that water need an easy and fast pretreatment to be potable. It is possible to exclude two results, from two month of the 2005 year, the ones which will frame the water in an inferior category.

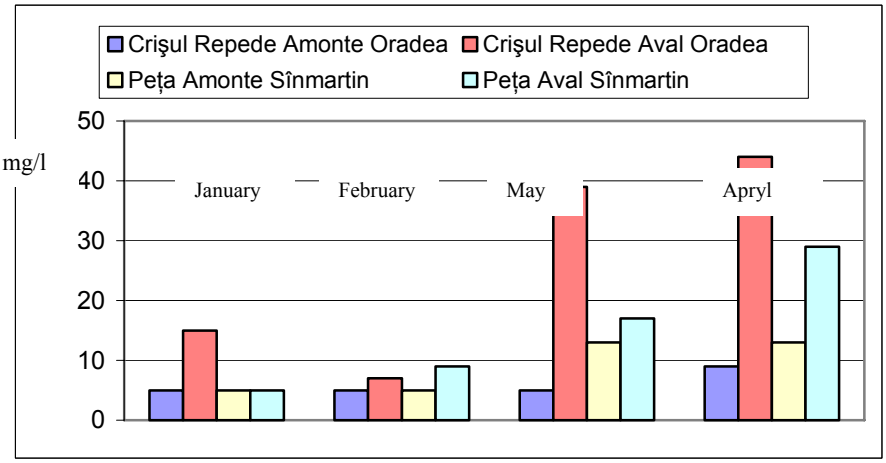

Fig. 2. The graphic representation for Zinc in Crisu Repede and Peta water in Upstream and Downstream, of Oradea- Sanmartin.

The zinc doesn't reach disturbing height concentration in none of the months, the found quantities in these surface waters being much under the admitted level in accordance with STAS (the admitted limits in this case being very high) meaning that this doesn't influence the quality of drinking water in an emphasized way, than in extremely high concentrations.

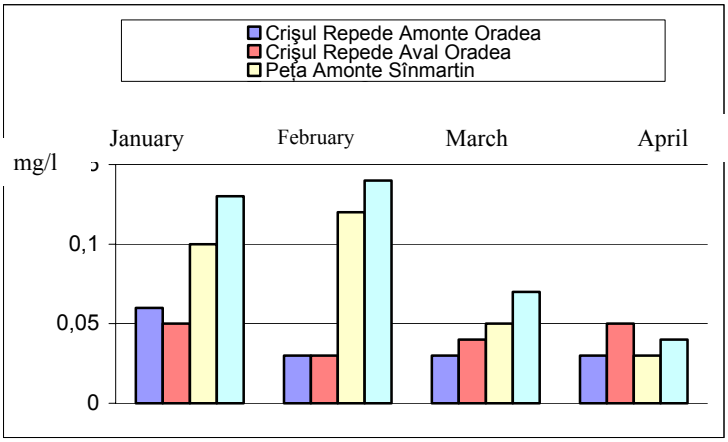

Fig. 3. Graphic representation for manganese content in Crisu Repede and Peta water in Upstream and Downstream, of Oradea- Sinmartin.

Manganese, as we can notice, reaches the biggest heightsconcentration in January and February, especially in Peta water, being necessary a little overtreatment of the water.

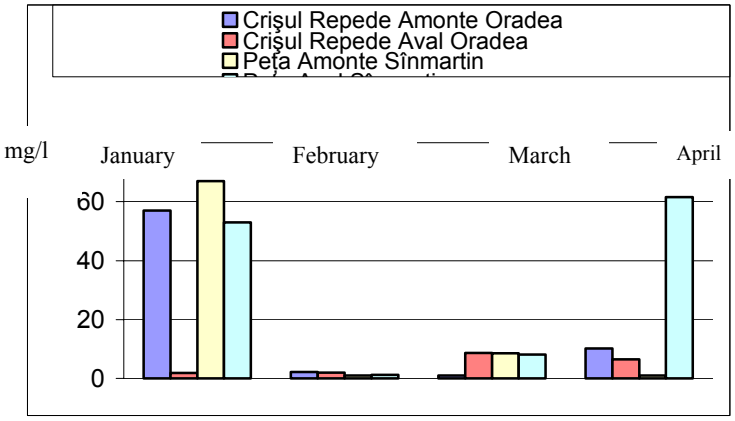

*Fig. 4.*Graphic representation for copper content in Crisu Repede and Peta water, in Upstream and Downstream of Oradea- Sinmartin.

Regarding copper, it is noticeable a growth of the concentration in surface waters in the cold month, January, in Crisu Repede Upstream Oradea and Peta Upstream and Downstream of Sinmartin water. In case of Peta section, in Downstream Oradea the concentration is higher in comparison with the admmited value in April, by external causes, which lead to a little pollution, which was remedied in the following months. In April, we can affirm that the pollution was different than the one in January, because in February and April, the copper concentration was smaller than in January.

CONCLUSIONS

Drinking water source of Oradea (Crisul Repede River), is in accordance with the requirements of potability stipulated in Law 458/2002 modified and completed by Law 311-28/June 2004 regarding quality of drinking water.

In accordance with STAS 3086/68 SR ISO 6332/96, the manganese concentration, in accordance with STAS 3224- 69, the copper concentration and in accordance with STAS 6327-81 the Zinc concentration, frames much under the minimum potability limits admitted.

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