STUDY ON PARAMETERS OF USED WATER IN A CHEESE-PROCESSING FACTORY

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Received: March, 12, 2018
Accepted: May, 26, 2018

Abstract. The main purpose of the research consists in monitoring the quality of hygienic drinking water and wastewater in a food industry plant in order to obtain information on water quality, efficient treatment technologies. Following the results obtained drinking water samples were corrected from the point of view of quality accordingly to the acts in force. The results have also highlighted significant differences concerning the characteristics of drinking water and wastewater monitored depending on the source of water supply and the type of technological process. Chemical oxygen demand, biochemical oxygen, pH, total nitrogen and phosphorus are the parameters of qualitative indicators with significant differences from the point of view of statistics for wastewater.

Keywords: *wastewater, quality indicators, biochemical oxygen, nitrogen, phosphorus*

Introduction

In food industry water is used as a raw material, as a solvent for substances with different density when washing products and equipment, as transport water or merely cooling water [1 - 4].

Quality monitoring of the hygienic drinking water and the waste water discharged is one of the conditions requested for all producing, processing, storing, keeping, shipping and marketing product supply units [5 - 8]. The increase in acquisition, application and development of knowledge, advanced services and techniques in the fields of environmental protection, population's health, and information technology is influenced by research and multidisciplinary developing skills in order to improve technological performances required by the implementation of national and European normative and regulations on the control of environmental pollution (water pollution) [9 - 12].

Materials and methods

Drinking water samples were taken from the water supply situated at the entrance of the factory monitored or water basin drilled from well. To monitor the quality of non-treated wastewater, samples were taken from the sewage point towards the pre-purification plant and sewage point of its own purification plant of the food factory in question. The sanitary research of water was done by laboratory examinations and area investigations. Toxicological analysis of water consisted in determining the organoleptic and physical properties as well as of chemical composition. Water samples were taken in sterile flasks equipped with bottle shutters or cotton corks rolled in gauze and with paper caps,

preserved by refrigeration accordingly with legal normative in force. Waste water indicators are determined by standardized analysis methods, adapted to [13 - 15].

Water hardness was determined by complexometric titration (EDTA); pH was measured according to SR EN ISO 10523:2012; total phosphorous - according to SR EN 12240:2004; biochemical oxygen demand SR EN 1899-2:2002; biochemical oxygen after 5 days (CBO_5) was measured according to SR EN 1899-2:2002 („Water quality – Dilution and Pitching Method"); chemical oxygen - CCO-Cr index was measured according to SR ISO 6060:1996. Nitrites were determined by molecular absorption spectrometric method; nitrates were determined by 2, 6 dimethylphenol spectrometric method; total nitrogen was determined by Kjedahl method [16]. All tests were performed in triplicate and the results were statistically processed in the MCO 2016 Excel program.

Results and discussion

After having taken drinking water samples from the control points of the factory monitored, toxicological analyses were made in order to establish if the values of quality indicators of drinking water complied with the maximum admitted limits stipulated by the normative in force. The results of the tests are shown in Figure 1.

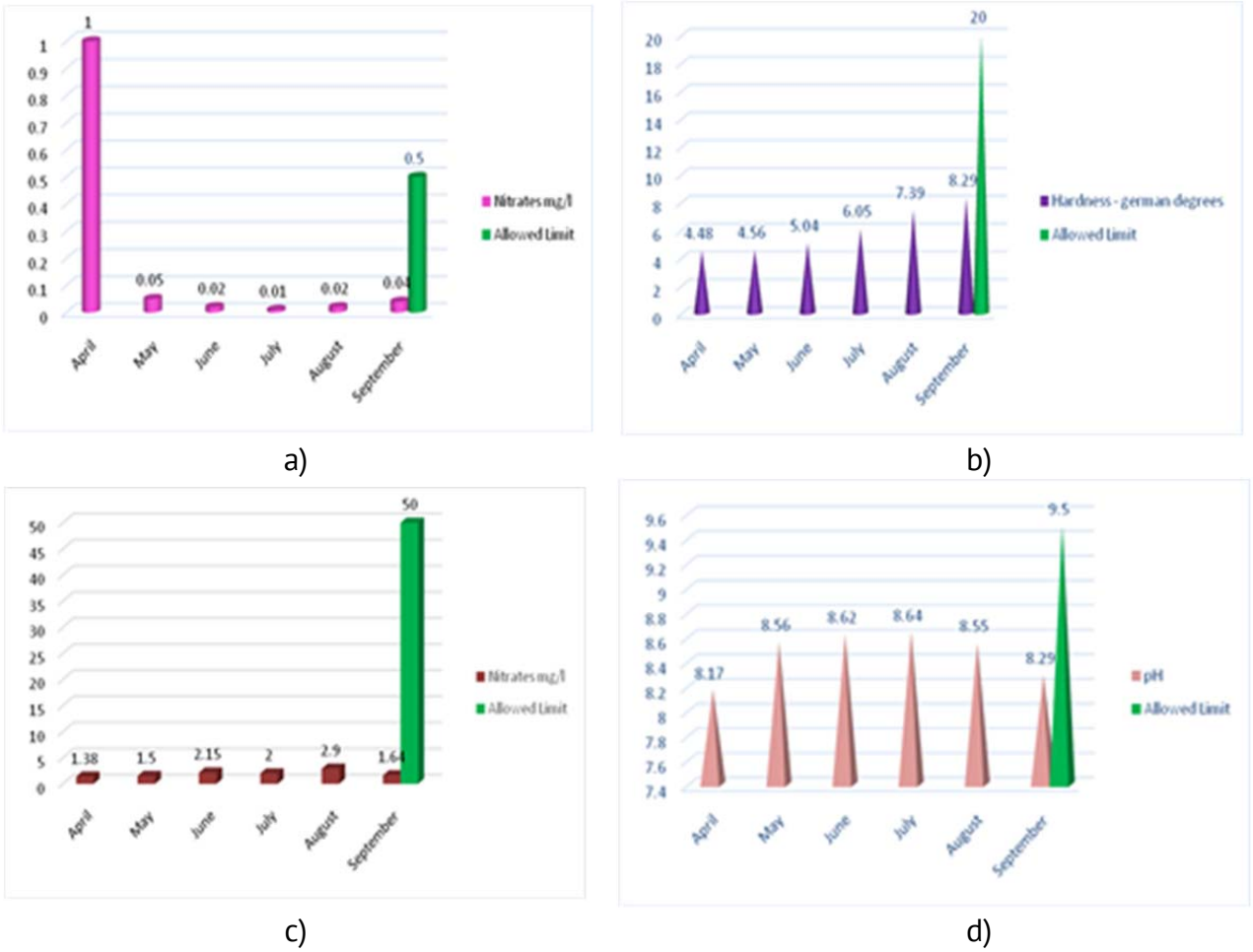


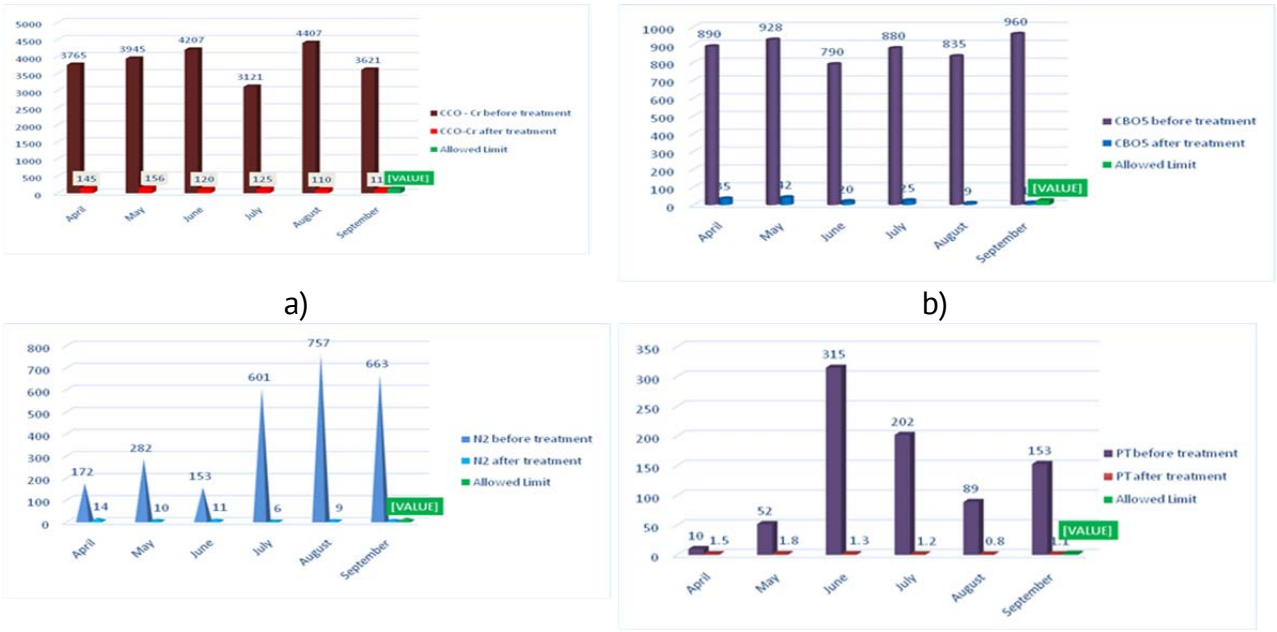
Figure 1. Control results for nitrites (a), nitrates (b), of hardness (c) and pH (d) in drinking water

The results of toxicological analyses of the samples taken during 08.04.2017-07.09.2017 from the food factory monitored showing that drinking water complies from the

point of view of quality indicators with the maximum admitted norms stipulated by the normative in force.

The following analyses on waste water were also made: CBO_5 was obtained by determining the oxygen content dissolved in water after sampling and after 5 days, and the difference was CBO_5; CCO-Cr – potassium bi-chromate method. The data written down in fig. 2 emphasize the fact that overtakes of the following quality indicators were registered: CCO-Cr, CBO_5, pH, total nitrogen and total phosphorous in waste water before getting to treatment plant.

Waste water samples sewed from the factory ranged within the maximum admitted limits imposed for surface water, with small exceptions regarding the indicators CCO-Cr and CBO_5, in the months April and May, of 145; 156 mg/l as against 125 mg/l admitted, 34 respectively; 42 mg/l as against 25 mg/l admitted. Thus, the treatment plant of the factory in question functioned at optimum parameters, complying with the quality requirements of wastewater.



a) b)

c) d)

Figure 2. Control results of CCO-Cr index (a), CBO_5 index (b), total nitrogen (c) and total phosphorous (d) in wastewater analyzed

Conclusions

In the designing of industrial treatment plants, the knowledge of water characteristics is the key factor as well as in the case of urban treatment ones. Among the main noxious substances of industrial wastewater are organic substances (expressed by CBO_5), substances in suspension, toxic substances, heavy metals etc. Anaerobe treatment is a widely used method to treat the effluent of milk and cheese processing factories. The anaerobe/aerobe combined treatment of the effluent from dairy and cheese factories has important advantages regarding the complete aerobe treatment, especially for the following benefits: a positive energy balance, reduced production of (bio) mud, and space demands significantly reduced. The recent development of high anaerobe reactors (HAR) and that of aerobe reactors (air transport) permit the extremely compact design of effluent treatment plant in view of complying with the strict quality requirements of surface water.

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