JAP&T TPA-Timişoara

Available online at http://journal-of-agroalimentary.ro

Journal of Agroalimentary Processes and Technologies 2010, *16*(3), 310-312

Journal of Agroalimentary Processes and Technologies

The role of physical-chemical analysis on waste water from beer industry for monitoring these pollution degree

Petre Săvescu[1*], Dorin Constantin Costea[2], Liviu Mărăcineanu[3]

[1]*University of Craiova, Faculty of Horticulture, PC 200585, A.I.Cuza Street no13, Romania*
[2] *University of Craiova, Faculty of Horticulture, PC 200585, A.I.Cuza Street no13, Romania*

Received: 1 June 2010; Accepted: 17 August 2010

Abstract

For the destructive effects generated by a pollution technologies, one of the more important development direction of European Union include the promotion of the new unpolluted technologies and monitoring waste water came from industry too.

This present paper shows one of the objectives results of waste water monitoring pollution program – with water from beer industry- on unfolded program in collaboration with an area specialists, during three years (2005-2007).

Keywords: beer industry, waste waters, pollution items

1. Introduction

In the last years the beer market in Romania recorded an outstanding growth characterized by a rich diversity of types and by increasing the number of beer factories. The Competition has intensified the market economy should not affect anything harmful effects that could be produced (in case to negligence or irresponsibility) environment (in this case the receiving water) by wastewater from the brewing industry [1]. The beer is a product of fermentation and therefore from its manufacture may result of concentrated aqueous wastes are aggregated with those from the washings of rooms, tanks, pipes, packaging and the washing water becomes to diluted water[2].The Data from the literature [3] confirm that aqueous wastes are concentrated within 0.5% of the total flow of water discharged and containing about 24% of organic load (expressed as BOD5).Average wastewater load of a brewery mg/dm3 varies between 400 and 200 mg/dm3 BOD5 [4].

2. Materials and methods

In an extensive program of monitoring the waste water from beer industries that was developed over a period of three years (2005-2007) were studied the changes of main physical-chemical parameters of wastewater from a factory starch production in Southern Oltenia. In this program [5], were followed the Variability of pH, conductivity, alkalinity, fixed residue, total hardness, CCOMn, BOD5 and concentration of chloride, nitrates, nitrites, sulfates, phosphates, ammonium – and the results were comparing with the maximum allowable values for STANDARD water from the food industry.

For Analysis were used Ion-meters for laboratory type 3205 and type 3345 and specific kits for ever compounds.Samples met all the conditions of repeatability and were differentiated, as appropriate (normal operation of the plant, abnormal operating conditions, stop accidental or planned revisions). For correct and results were previously separate all substances that could interfere in the analysis.

Corresponding author: *e-mail:* psavescu@gmail.com

3. Results and Discussion

The wastewater can produced acid fermentation, promoting the rapid development of fungi, consuming faster the solved oxygen in to the receiver water, allowing the anaerobic decomposition phenomena with formation a sulfhydric acid [6]. Following the determinations were obtained the results from Table 1 and 2.

Table 1. The main physical-chemical items calculate of wastewater from the beer factory (averages values from 2005-2007)

	***p*H (unit for pH)**	**Conducti-vity (µS/cm)**	**Fixed residue (mg/L)**	**CCOMn (mg/L)**	**CBO_5 (mg/L)**	**Total Hardness (^{o} G)**	**Alkalinity (mE/L)**
The obtained average values	5,82	500	250	**1560**	**1000**	11,88	3,4
The maximum allowable values (STAS 4706-74)	7,2	1640	2000	**40**	**20**	15	4,5

Table 2. The variation of mean ion concentration determined in to wastewater from the beer factory (averages values from 2005-2007)

	Chlorides (mg/L)	**Nitrites (mg/L)**	**Nitrates (mg/L)**	**Sulfates (mg/L)**	**Phosphates (mg/L)**	**Ammonium (mg/L)**	**Phenols (mg/L)**
The obtained average values	**71**	0,297	**COL.**	19	3,746	1,683	2,247
The maximum allowable values (STAS 4706-74)	**60**	1	**25**	70	4	2	1

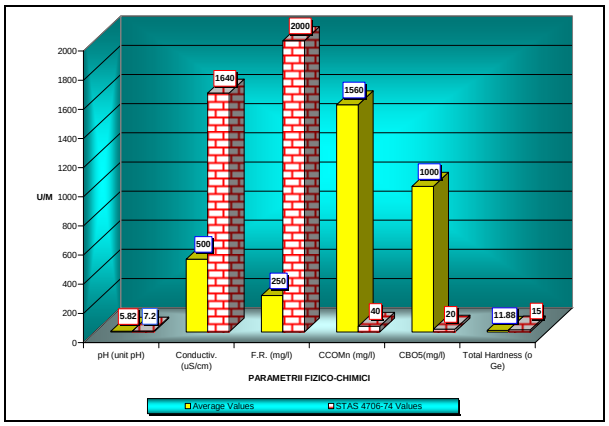

Figure 1. The main physical-chemical items calculate of wastewater from the beer factory (averages values from 2005-2007)

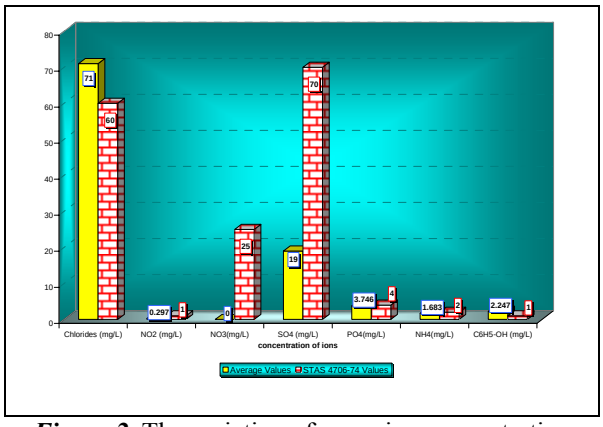

Figure 2. The variation of mean ion concentration determined in to wastewater from the beer factory (averages values from 2005-2007)

From the Tables 1 and 2, respectively figure 1 and 2 can be seen very clearly that we have a chemical consumption of oxygen - the oxidation of mineral salts and organic substances as determined by KMnO4 method (CCOMn), recorded an average of about 39 times greater than specific value of STAS; biochemical consumption of oxygen measured at five days, for oxidation of organic matter (BOD5) has registered a steady growth of 50 times.

Also a large increase (by 2.247 times the maximum permissible value) is recorded and readily biodegradable organic substances (phenols in this case).

A light exceeding (18%) were also registered to chloride ions. From all this follows a rather large doping with degradable organic matter in wastewater with receiving waters from the beer industry, contamination resulting in reduced dissolved oxygen content in water.

4. Conclusions

- Beer is a product of fermentation and after these operations appear concentrated aqueous residue plus other diluted wastewater-becoming from wash rooms, tanks, pipes, packaging;
- The main effect on the receiving water is contamination with degradable organic matter that can involve reduction of dissolved oxygen content in water;
- The feed materials (the mineral form or forms of organic mineralized matter) pass into receiving waters and may cause an indirect form of pollution (by atrophic media), resulting in explosive growth of algae and other aquatic plants harmful influence on creatures of others and the general deterioration of water quality;
- It is desirable before being discharged from the brewery, from wastewater to be removed (with organic solvent) phenols and concentrated aqueous wastes containing about 24% of organic load (expressed as BOD_5) .For these can be successfully used separators, extractors, concentrators-decanters.

References

1. J. B. Smith, W. A. Sims, The Impact of Pollution Charges on Productivity Growth in Canadian Brewing, *The Rand Journal of Economics,* **1985**, *16*(3), 410-423
2. Chiriac, V., Epurarea *apelor uzate şi valorificarea rezidurilor din industria alimentară şi zootehnie*, Editura Ceres, Bucureşti, 1987, 46-65
3. Teodorescu,I., – *Evacuarea şi epurarea apelor uzate din industria alimentară,* Editura Tehnică, Bucureşti, 1989, 59-63
4. Banu C., Apa *in industria alimentara.Epurarea apelor reziduale.* In: *Manualul inginerului de industrie alimentară*, vol I, Editura Tehnică, Bucureşti, 1998, 128-177
5. Savescu P., Giurgiulescu L., Gheorghita M, Study concerning the influences different technologies and the raw materials for alcohol industry on waste waters, *Agroalimentary Processes and Technologies*– University of Timisoara, Ed. Agroprint, Timisoara, 2002, 49-53
6. Săvescu P, Popa A., Popa Daniela, Cristina Banta, Environmental risk's decreasing according to the European Standard (QMS ISO 9000:2000) applied to food factories, *Journal of Environmental Protection and Ecology* **2005**, *6*(2), 260-266