

A Comparative Study of the Parameters in the Industrial Effluent Water in Trichy Region

K.G. SEKAR* and R. RAJAJI

Post-Graduate Department of Chemistry, National College, Tiruchirapalli-620 001, India

For many years, many industries like chemical industries, refineries etc. employed various chemical treatments along with water. After processing, the effluents are discharged. The influence of these effluents on human health has been undertaken on a large scale in our country and are controlled by environment bodies. Six different water samples of Trichy region were analysed. This work includes all aspects of the treatment of effluents arising from various branches of various industries. In sympathy with modern legislative trends, the emphasis is one means of avoiding or at least minimising the pollutants present in the effluent. The results obtained and discussed herein suggest that water from various industries which contains relatively low hardness (total, temporary and permanent hardness) and low pH values with acceptable limits. The present study has been done to compare the parameters for combined, treated effluents in winter and rainy season and biodegradability in winter season.

INTRODUCTION

Acids, alkalis, oils, grease, floating, suspended and dissolved organic matter, phenols, cyanide are the major constituents present in an effluent. Cyanide is one of the poisonous matters. It can connect the oxidation enzyme of the biological ferric cell to cause the organism oxygen deficiency. Cyanide often exists in waste water polluted by electrodeposit, mine-selecting, tanning, refineries and other chemical industries. In view of the complexity of this problem, it was considered necessary to formulate standards for the industrial effluents. This work includes all possible aspects of the treatment of effluents¹⁻⁵ arising from various branches of various industries. Almost all industries in Tiruchirapalli are discharging effluents to rivers Cauvery and Kollidam, and these two rivers are the main source of water for the surrounding farmers, for their agricultural purposes. So this water should not be polluted. Thus the effluent is treated with maximum precaution and discharged. In this paper the updated method⁶ is applied for the determination of trace amounts of harmful elements in water. Due to nature of the work, the water samples collected from Electroplating Industries, Producer Gas Plant, Refinery, Tanning Industry in different seasons are found to vary greatly in their chemical constituents.

TABLE-1
WATER QUALITY VARIATION AT DIFFERENT SOURCES IN TRICHY REGION

Source of water	pH Value	Total hardness (ppm)	Permanent hardness (ppm)	Temporary hardness (ppm)	Phenolic compound (ppm)	Free ammonia (ppm)	BOD mg/L	COD mg/L
FOR COMBINED EFFLUENTS								
Electroplating plant	W 7.14	128.40	112.40	80.00	62.40	160.40	800	1800
	R 7.00	142.00	109.00	78.41	62.04	175.40	800	1810
Producer gas plant	W 6.70	99.60	75.00	50.00	644.80	212.60	832	1592
	R 6.20	110.00	70.41	50.20	644.10	241.60	420	1580
Refinery plant	W 4.50	260.01	220.00	200.00	60.00	278.40	600	962
	R 4.12	240.00	212.00	195.00	61.24	274.00	450	712
Tannery plant	W 8.10	112.20	75.00	52.00	—	62.62	600	980
	R 8.60	98.00	70.00	55.42	—	62.00	600	960
FOR TREATED EFFLUENTS								
Electro plating plant	W 7.0	108.20	90.40	60.00	5.80	9.42	600.24	1964.00
	R 6.8	122.42	94.20	64.24	5.60	9.40	612.46	650.00
Producer gas plant	W 6.2	68.40	54.20	30.32	12.42	11.46	200.00	842.00
	R 6.0	97.12	34.64	34.64	11.64	11.00	180.46	841.62
Refinery plant	W 6.2	170.42	190.42	170.42	4.20	14.27	15.00	18.62
	R 6.0	1809.00	160.58	160.46	3.80	15.54	20.42	16.14
Tannery plant	W 8.2	80.42	60.24	32.28	—	3.21	50.46	1672.68
	R 8.0	60.46	64.24	30.42	—	3.46	60.50	1611.32
S 2400 II 981 (Tolerance limit)	5.5 to 9.0	Negligible	Negligible	Negligible	Nil to 2 ppm	Nil	500	Nil

(W—winter; R—rainy season)

EXPERIMENTAL

50 L of water samples were collected from four sources: electroplating, producer gas plant, refinery and tanning in both winter and rainy season of the year 1999–2000. The water samples were analysed for qualitative characteristics such as pH value, total hardness, permanent hardness, temporary hardness, free ammonia, phenolic compound, BOD, COD, etc.

The experimental procedures³ are very simple to perform and low cost (which is important for chemical industries).

RESULTS AND DISCUSSION

Water quality: The various characteristics of water used for investigating the effects of water quality were studied and the results are shown in Table-1.

The data presented in Table-1 suggest that the pH values in winter season recorded in electroplating plant, producer gas plant, refinery plant and tannery plant are 7.14, 6.7, 4.5 and 8.1 respectively, while the corresponding values rainy season are 7.0, 6.2, 4.2 and 8.6 respectively. The tannery water contains higher pH and the refinery plant contains very low pH, while the others are within the acceptable limits for agricultural run. The pH of treated water has been restored to the level of incoming water.

The combined effluents have a very high total hardness, permanent hardness, temporary hardness, phenolic compound, free ammonia etc., and this is reduced to about 80%.

But if we compare the results of phenol and free ammonia from combined and treated effluents, the phenolic content has shown considerable reduction due to the above treatment, similarly a free ammonia analysis of four industrial effluents gave the following results for BOD and COD (Table-1).

TABLE-2
BIODEGRADABILITY OF DIFFERENT EFFLUENTS IN TRICHY REGION

Effluent	Ratios of BOD and COD (in winter season)	Bio-degradability
Electroplating industry	1 : 3.27	Bio-degradable but not too significant extent as non-biodegradable materials are predominant.
Producer gas plant	1 : 4.21	Much less biodegradable refractory organics are present in high concentration.
Refinery	1 : 1.24	Highly biodegradable, non-biodegradable materials are almost absent.
Tannery plant	1 : 33.15	Highly biodegradable refractory organics are present in high concentration.

Table-2 shows that the data recorded in rainy season are better than those in winter season. The data recorded in treated effluent are better than combined effluent.

ACKNOWLEDGEMENT

The authors express their sincere thanks and gratitude to Thiru, K.R. Krishnaswamy, Department of Chemistry, National College, Trichy, for his suggestions during the progress of this study.

REFERENCES

1. J.D. Cunningham and Anderson, *J. Env. Qual.*, **4**, 455 (1975).
2. Varadarajan, *J. Agric*, **57**, 359 (1970).
3. G. Vela and J. Ralsion, *J. Microtrial Canada*, **24**, 1366 (1978).
4. Abhaya Kumar Gupta, *J. Rec. Adv. Ap. Sci.*, 651 (1984).
5. Indian Standard Tolerance Limit for Industrial Effluents, Part I: General Limited, 2nd Revision, IS:2490, (1981).
6. Wilson and L.O. Mechinon, *Biol. Prob. in Water Pollution*, Tr. Of (1956).

(Received: 14 September 2000; Accepted: 16 November 2000) AJC-2171