Int. J. Chem. Sci.: 6(2), 2008, 1115-1118

STUDY OF TOTAL SULPHIDE CONCENTRATION IN THE EFFLUENT STREAMS OF RIVER PANDU AT KANPUR

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ABSTRACT

These observations are based on the study of the total sulphide concentration form different sampling points of river Pandu. With the tremendous unplanned increase in the rate of urban population and rapid industrialization the waste products of their sewage and industries often find their way in the immediate environment. It is now posing a serious ecological problem of pollution in the rivers and streams. The untreated or partially treated domestic sewage and industrial effluents are generally discharged directly into the natural waters such as rivers, streams, ponds and lakes etc. Such waters are poor in oxygen; thus, disturb the economy of nature and create problems of international importance.

Key words: Sulphide, Effluent, Kanpur

INTRODUCTION

It is interesting to observe that streams under investigation may have been contaminated with substantial concentration of a wide range of organic and inorganic wastes depending upon the industrial sources. As far as inorganic constituents are concerned, total residual chlorine, sulphides, cyanides, nitrogenous species are heavy metals have attained considerable attention as their abnormal concentration level and heterogeneous distribution may be found in the river. Sulphide is a species, which may appear at higher concentration levels due to possible discharge form chemical, pigments, gas manufacturing and pulp and paper plants. It may be dispersed as S^{2-}, HS^{-} ions and insoluble sulphides of iron, manganese, lead and copper. Total sulphide also includes polysulphides etc. Sulphide at higher concentration level will give rise to reduced oxygen conditions by forming sulphite, sulphate and thiosulphate with the help of sulphur oxidising bacteria[1,2].

Metal dispersion forms the basis of specific chemical characterization of a river. They may get distributed in attachment with organic colloids[3], a fraction may be accumulated in the parts of aquatic biota including algae[4]. Environmental chemistry of

these elements are studied by different workers[5-10].

Effects of effluents discharges from the straw board milts, textile mills, steel factory and a heavy electrical factory, on the pollution-indicating characteristics of the river "Some" in Madhya Pradesh have been studied by Shastry et al.[11]. Meijers[12] studied the dispersion of the organic micropollutants in the river Rhine and Maos in 1974. A comparative study on organic constituents in polluted and non-polluted aquatic environment was made by Genki and Matsumato[13]. Physico-chemical studies of river Danube were performed by Literathy[14].

EXPERIMENTAL

Materials and methods

Estimation of sulphide: (i) Titration method for colourless samples and (ii) Ion selective electrode method for coloured samples.

pH conductivity: Electronic measurement

Calculation of unionized H_2S was made with the help of logarithmic practical constants for H_2S and conductivity and pH values at room temperature.

Table 1. Percentage of sulphide as H_2S and HS^-

Source (effluent from)	At the point of disposal		At the point of discharge	
	H_2S	HS^-	H_2S	HS^-
T. P. S.	30	70	40	60
Fertilizer plant	29	71		
P. I. E.	40	60	39	61
OFASAF	98	2		
DNIE	98	2	84	16
Govind Nagar sewage waste	100	0		

The sulphide concentration determined in the filtered effluent samples, at the point of disposal of each effluent stream has been found to exceed the permissible limit. In our view sulphide at higher concentration levels must be getting discharged as a result of use and processing of a variety of chemical compounds in different industries of that area. It may give rise to the anaerobic conditions in the effluent as well as in the river stream. Sulphide along with sulphite and thiosulphate, would exert an inorganic BOD in the stream as it is oxidisable to sulphates by the oxygen of the stream. Under anaerobic conditions, sulphide may get reduced leading to the formation of hydrogen sulphide in the effluent. At the point of discharge, the concentrations have been found reduced but still exceeding the permissible limits. The possibility of the S^{2-} species to be present is negligible, as pH of the effluent stream has never gone above 10.5. Theoretical calculation of unionized H_2S and sulphide as HS^- has led to the relative concentration at the points of disposal and discharges. For the practical purposes the ionization constant of H_2S in the logarithmic form i.e. pK, has been used to calculate the distribution of dissolved sulphide into two forms. The constant varies with temperature and ionic strength of waste solution.

Thus, by knowing the percentage of sulphide as H_2S, unionized H_2S was determined as –

Unionized H_2S = % of dissolved sulphide as H_2S x Total dissolved sulphide.

The relation distribution of H_2S and HS^- in Table 1 reflects that extremely reduced conditions (anaerobic) prevailed in the effluent steams OFASAF DNIE and Govind Nagar locality.

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Accepted : 05.03.2008