

International Multidisciplinary
Research Journal

*Indian Streams
Research Journal*

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RNI MAHMUL/2011/38595

ISSN No.2230-7850

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EVALUATION OF PHENOLIC COMPOUNDS IN GROUND WATER OF AURANGABAD CITY



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ABSTRACT

Aurangabad city is a prominent Industrial hub with five Industrial areas in its periphery. Eight wells in two area were selected for estimation of Phenolic compounds in ground water. As per EPA guidelines (US Environmental Protection Agency) the release of untreated Phenolic compounds treated is harmful for public health. GC-MS technique used was used to observe the content of Phenolic compounds from two areas i.e. School and Bus stand areas respectively. Out of eight wells sampled, one of the well recorded the highest values of Phenolic compounds i.e. 82 ng /L , 55 ng/ L for 4,6- Dinitro-2-methylphenol, 17 ng/L for 2,4-Dinitrophenol , 16 ng /L

for 2-Methylphenol , 12 ng /L for both 2- Chlorophenol and 2,4,6-Trichlorophenol, 11 ng /L for 2-Nitrophenol and 2,4Dichlorophenol , 7 ng/L for Pentachlorophenol , 4 ng /L for 4-Nitrophenol and 3 ng /L for 4-Chloro-3-methylphenol. respectively .

KEYWORDS : Survey , Phenolic compounds, GC-MS technique, 2,4-Dinitrophenol, 2,4,6-Trichlorophenol, Pentachlorophenol.

INTRODUCTION

Phenolic compounds are considered as toxic pollutants since they are harmful to plants, animals and humans, even at low concentrations. There are many sources of phenolic compounds like steel mills, coke oven plants, paints, coal gas, synthetic resins, petroleum refineries, pharmaceuticals, petrochemical plywood industries. Amongst the effluents containing Phenol , the highest concentration of phenol >1000 mg/L is typically generated from coke processing alone. Phenolic compounds are in the range of 12–300 mg/L in resin plants waste. The Environmental Protection Agency (EPA) has set a limit of 0.1 mg/L of Phenol in wastewater. The World Health Organization (WHO) has set 0.001 mg/L as the limit of phenol concentration in potable water.(Rashed ,2013). The city of Aurangabad is an example of rapid industrialization. There are five established Maharashtra Industrial Development Corporation (MIDC) industrial estates at Waluj, Paithan, Chikalthana, Chittagaon and Shendra. Water is an essential resource for different uses such as domestic and industrial activities. It is stated that the development of any area is dependent on the water quality

and supply. Thus because of all these reasons, the ground water table of Aurangabad is also under the risk of being polluted. The major factors contributing to the pollution of rivers, lakes and nallahs can be listed as follows: i) Domestic sewage, ii) Industrial effluent, iii) Agricultural runoff, v) Municipal Solid Waste or sanitation facilities, vi) Erosion from the catchment areas. (MPCB, 2010) vii) chlorination of mono and polyaromatic compounds in soil and water. (Niedan, et al. 2000). Toxicity of phenol in water due to its reactivity with chlorine (Cl) and nitrate (NO₂) in the soil to form Chlorophenol and Nitrophenol respectively. The maximum permissible concentration of Phenol in wastewater should be less than 1 ppm (Mahamuni and Pandit, 2005; Maleki et al., 2005). The concentrations of Chlorophenols ranged between 5-10 ng/L in oceanic waters whereas 2-2000 µg/L is the highest concentrations are detected for river waters.

MATERIAL AND METHODS:

The samples were collected from two areas in Aurangabad city (India). Four wells were selected from the first area (Bus stand station) and four wells from the second area (School area). The GPS system was used to locate the sample position, and the site map distribution is as shown in Fig (1).



Figures (1) the Map of Aurangabad city (India) shows two study area 1) School area 2) CIDCO Bus Station

Estimation of phenolic compounds in ground water by GC–MS:

Samples were collected in glass bottles suitably cleaned before collecting the sample and then shipped to the laboratory. (Padmaja Aerobiologicals Laboratory, Mumbai). The analysis was done as follows: Analyses and surrogates were extracted by passing a 1 L water sample through a solid phase extraction (SPE) cartridge containing 0.5 g of a modified polystyrene divinyl benzene copolymer. The organic compounds are extracted from the solid phase with a small measure of methylene chloride. The sample constituents are separated, identified, and measured by injecting an aliquot of the concentrated extract into a high resolution fused silica capillary column of a GC/MS system. Compounds eluting from the GC column are identified by comparing their measured mass spectra and retention times to reference spectra and retention times in a data base. Reference spectra and retention times for analytes are obtained by the measurement of calibration standards under the same conditions used for samples. The concentration of each identified component is measured by relating the MS response of the quantitation ion(s) produced by that compound to the MS response of the quantitation ion(s) produced by a compound that is used as an internal standard. Surrogate analytes, whose concentrations are known in every sample, are measured with the same internal standard calibration procedure.

RESULTS AND DISCUSSION:

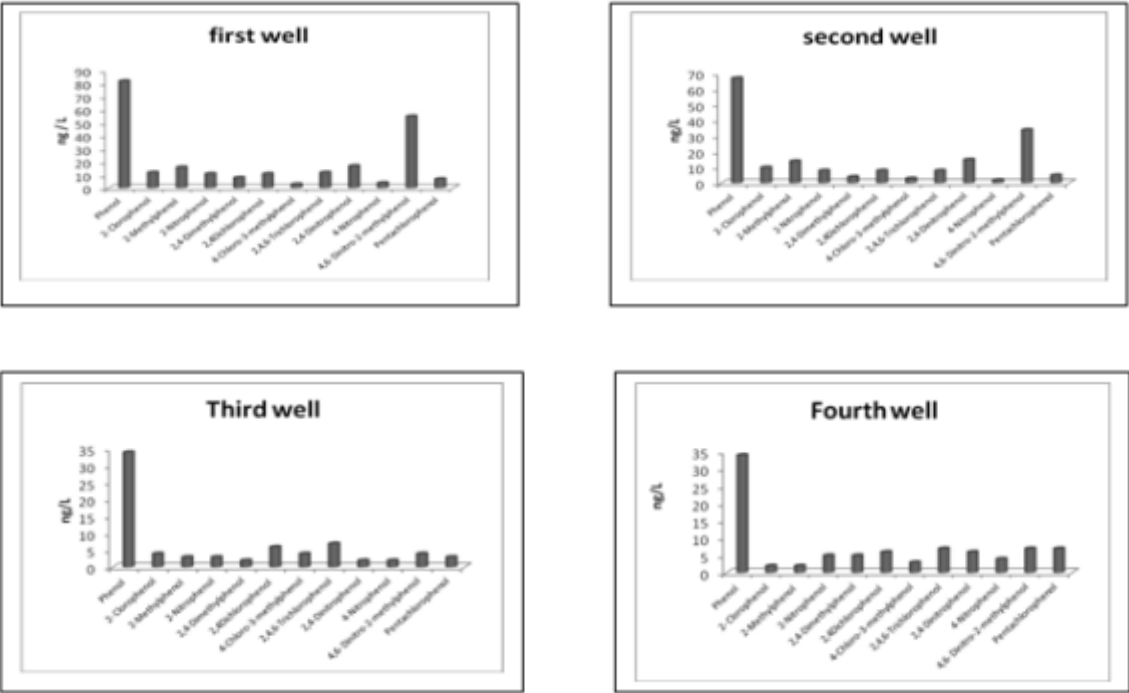


Figure (2) Graphs showing the concentration of phenolic compounds in first area of survey (School area) for four wells

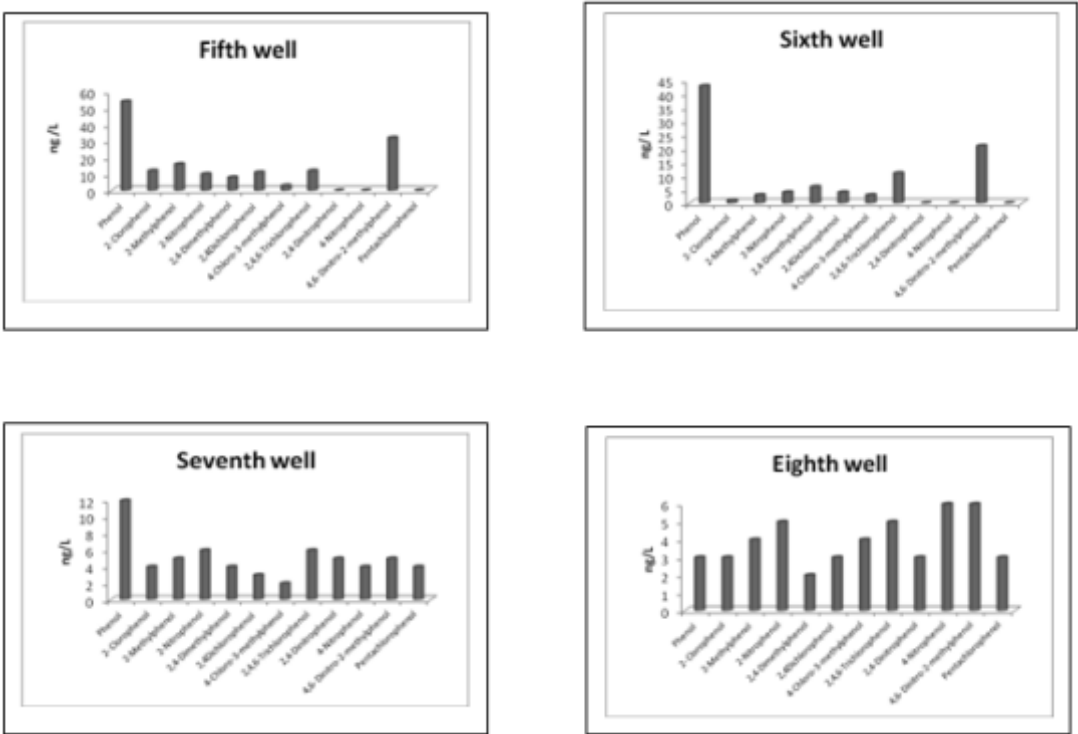
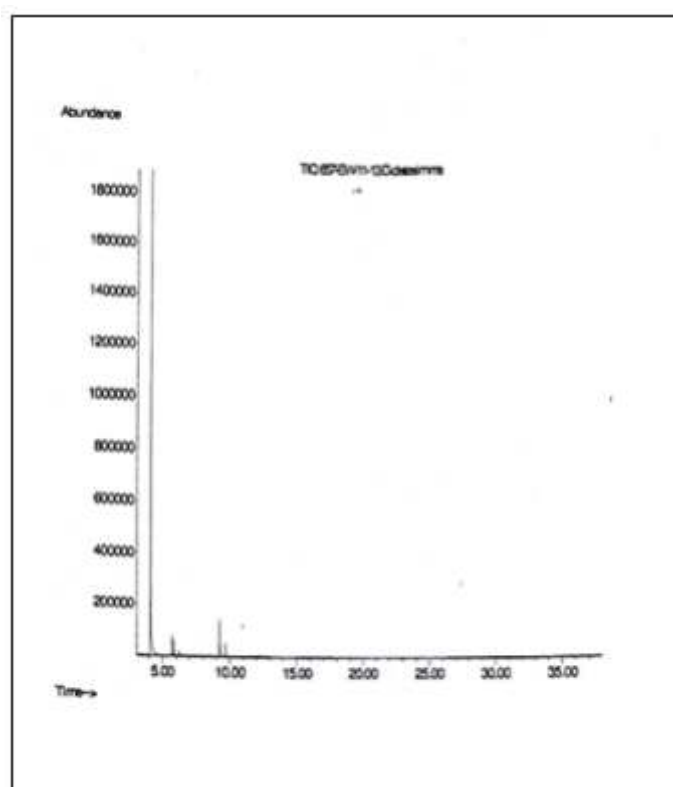


Figure (3) Graphs showing the concentration of phenolic compounds (Bus stand area) for four wells

The highest values of phenolic compounds was recorded from samples obtained from the school area at 82 ng/L for phenol, 55 ng/L for 4,6-Dinitro-2-methylphenol, 17 ng/L for 2,4-Dinitrophenol, 16 ng/L for 2-Methylphenol, 12 ng/L for both 2-Chlorophenol and 2,4,6-Trichlorophenol, 11 ng/L for 2-Nitrophenol and 2,4-Dichlorophenol, 7 ng/L for Pentachlorophenol, 4 ng/L for 4-Nitrophenol and 3 ng/L for 4-Chloro-3-methylphenol. These Phenolic compounds are likely to enter the environment and thus through biomagnifications may reach us finally. These results are similar to the result of Delfino and Dube (2007) who also estimated the contaminated ground water and detected the presence of Phenolic compounds in potable water samples. They found that the daily exposure was in the range of 10-240 mg of phenol per person. The result was correlated with an increase in cases of diarrhea, mouth sores, dark urine and burning pain in mouth. Synthesis of Chlorophenols proceeds through the participation of chloroperoxidases found in plants and microorganisms in the presence of hydrogen peroxide and inorganic chlorine (Niedan, et al. 2000; Penttinen, 1995). All Chlorophenolic compounds are toxic to aquatic species in varying degrees depending on the number and the position of the chlorine substituents on the benzene ring.



CONCLUSIONS

During investigation of phenolic compounds from eight selected wells from Aurangabad city, it is found that all well water contain phenolic compounds in micro nano gram, but well No, 1 i.e. from Holly cross Area. It is recorded the high concentration of phenolic compounds were recorded in nano gram. It indicates that the well water is not good for drinking purpose as per EPA guideline. Almost all well water nearby Holly cross including bore well recommended to be monitoring of phenolic compounds for human health and same recommended.

ACKNOWLEDGEMENTS :

I am thankful to the Ministry of Higher education of Iraq and also the Dr.Babasaheb Ambedkar University, Aurangabad for permitting me to carry out research work pertaining to my thesis.

REFERENCES

- 1.Mahamuni, N. N., & Pandit, A. B., (2005). Effect of additives on ultrasonic degradation of phenol. Ultrason. Sonochem, 13 (2), 165-174.
- 2.Mohamed N. R..(2013), Adsorption Technique for the Removal of Organic Pollutants from Water and Wastewater, Organic Pollutants - Monitoring, Risk and Treatment , Chapter 7.
- 3.Maharashtra Pollution Control Board Aurangabad Regional Office,(2010) .
- 4.Niedan, V., Pavasars, J., Oberg, G., (2000). Chloroperoxidase-mediated chlorination of aromatic groups in fulvic acid. Chemosphere 41, 779– 785.
- 5.Penttinen O.P.,(1995) Chlorophenols in aquatic environments: structure–activity correlations, Ann. Zool. Fennici., 32 , 287–294.



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