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Identification and Characterization of Aromatic Compounds from Ground Water in the Patancheru Industrial Development Area and its Environment, Medak District, Andhra Pradesh, India

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ABSTRACT

Many number of Bulk drug, and pharmaceutical, fertilizer, electroplating industries have opened since 1970's in the Patancheru Industrial Development Area of Medak District, A.P., India. Fe industries are releasing treated and few industries are releasing untreated effluents in to the nearby Nakkavagu river, which is flowing nearer to this Area. In this paper we found nearly 60 varieties of Aromatic Compounds from the samples of effluents and various ground waters etc., Water samples from Nakkavagu are also tested and found various toxic Aromatic compounds.

Key word: Effluent, COD, Carcinogenecity, Teratogenecity.

INTRODUCTION

Now-a-days many people / Scientists are discussing the various pollution problems of Patancheru. Because more than 450 industries are located in and around dealing in the production of Pharmaceuticals, Bulkdrugs, paints and pigments, metal treatment and steel rolling, cotton and synthetic yarn Electroplating, casting, beverages, distilleries, and engineering goods.

CETP is situated near Peddavagu and the waste water is discharged into the Peddavagu stream from the CETP was found to have BOD more than 8000 mg/l, and also various phenolic and Arometic compounds.

Water chemistry

Water samples were collected for analysis from borewells, dugwells and surface water bodies at 10 locations.

For instance the maximum permissible limits of BOD of the waste water is 30 ppm, If it is discharged into inland waters,it is 350ppm. If discharged into a public sewer and 100 ppm if

discharged on to land or coastal region (CPCB).

10 samples are tested for the BOD value and also for various Aromatic compounds.

We also tested two samples for pesticide lindane and parathion using GC-Mass Spectrography.

Instruments / Methods

Effects of water pollution on Environment: Many Borewells, dugwells and ground water sources, aquifers are contaminated with these chemicals and the Nakkavagu's water turned brownish water more foam on surface. Many villages from Arutla, sultanpur etc., are complaining that their yields have dropped.

Many people are effected in patancheru because ground waters are contaminated by the Aromatics and phenols. The factories still releasing their chemicals water in to the Nakkavagu stream. Many times children who are playing and swimming in this river are developing rashes on skin and they are complaining burning sensation in eyes.

The major Organic compounds are:

- Aliphatic
- Aromatic
- Heterocyclic
- Organo Halogen compounds- Organo phosphate compounds which also have solubility in water.

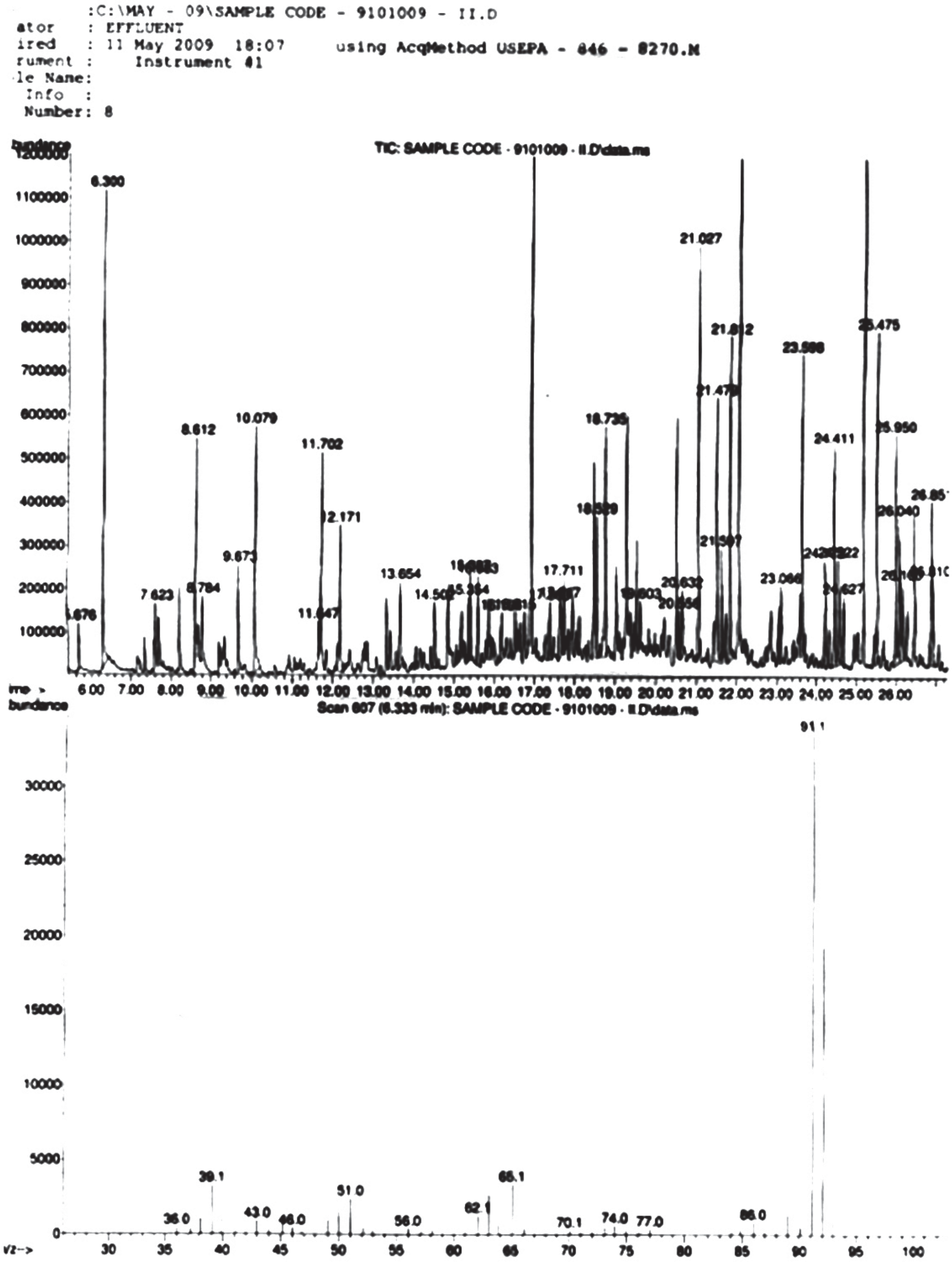
Combinational Factors:

The three combinational factors are COD, BOD and inert TDS provide 8 possibilities as under:

1) COD (H), BOD (H), TDS (H)
2) COD (H), BOD (H), TDS (L)
3) COD (H), BOD (L), TDS (H)
4) COD (H), BOD (L), TDS (L)
5) COD (L), BOD (H), TDS (H)
6) COD (L), BOD (H), TDS (L) H = High
7) COD (L), BOD (L), TDS (L) L = Low

We also calculated BOD and COD values of two samples. Sample 1 from CETP effluent before discharging in to Nakkavagu stream and another sample from a Bulk drug industry which is decomposing effluent from CETP. Both the values have largest variation. Initial BOD is $\geq$ 8000

S.No	RT	Area Pet	Compound name	% of matching
1	5.6809	0.0225	Methyl Isobutyl Ketone	60
2.	6.3013	0.2162	Toluene	95
3.	7.6277	0.0386	Acetic acid, butylester	78
4.	8.6119	0.0893	Ethylbenzene	91
5.	8.7884	0.0364	Benzene, 1,3-dimethyl-	97
6.	9.6709	0.0474	2-Pentatone, 4-methoxy-4-methyl	90
7.	10.0774	0.1202	Pyridine, 2-chloro-	97
8.	11.6499	0.0294	Pyridine, 3-bromo-	94
9.	11.7034	0.092	Tetramethylbutanedinitrile	90
10.	12.1687	0.0699	2-Thipheneacetic acid	52
11.	13.6557	0.0411	3-Chloro-4-fluoroacetophenone	96
12.	14.5061	0.0268	Benzothiazole	90
13.	15.3565	0.0221	Benzothiazole, 2-methyl-	81
14.	15.3886	0.0405	Pyridine-4-carboxylic acid, 3,5-dichloro-	97
15.	15.5812	0.0322	Thiourea, trimethyl	52
16.	16.1642	0.0212	Thiourea, N, N'-dimethyl	91
17.	16.5172	0.0237	Pyridine, 2-(phenylmethyl)-	91
18.	17.3676	0.0222	Ethanone, 1-(benzothiazoyl)-	76
19.	17.619	0.0297	Butylated Hydroxytoluene	95
20.	17.7153	0.0241	Benzenamine, 3-bromo-	95
21	18.5283	0.058	Benzothiazole, 2-(methylthio)-	53
22.	18.7365	0.0936	Benzenamine, 2-chloro-4nitro	99
23.	19.6033	0.0223	3,5-Pyridinedicarboxylic acid, 2,4,6-trimethyl	98
24.	20.5607	0.0157	diethyl ester	98



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S.No	RT	Area Pet	Compound name	% of matching
26	21.0261	0.1248	Phthalic acid, isobutyl nonyl ester	90
27	21.4807	0.1225	Benzenecarbothioc acid, 2,26-dichloro, S-methyl eser	70
28	21.5984	0.0386	Pyrimidin-4-amine, 2-methylthio-5-(2=thienylmethylsulfonyl)-	53
29	21.8123	0.1176	1-,2-Benzenedicarboxylic acid, butyl 2-methylpropyl ester	96
30	23.0639	0.0303	Ferrocene, 1, 1'2,2',3,3',4,4'-octamethyl	64
31	25.64	0.0.275	9-Chloro-1-phenazinol 5-oxide	51
32	24.1711	0.0347	9,10-Anthracenedione, 1,3,5-trihydroxy-7-propyl	64
33	24.4118	0.0851	Ethanone, 4-(2,4dihydroxybenzylidenaminmo) phenyl-	78
34	24.5241	0.0451	3-Formyl-10-methylphenotihiazine	72
35	24.6311	0.0265	1-Alanine, N-(4-trifuloromethylbenzoyl)-,octyl ester	53
36	25.4762	0.108	4,5-Dimethoxy-2-biphenylcarboxylic acid	59
37	25.9522	0.0769	1-(2-Aminobenzylidene)-1,2,3,4-tetrahydroacridine N-oxide	96
38	26.0378	0.0575	1,2-Benzenedicarboxylic acid, mono (2-ethylhexyl) ester	90
39	26.1019	0.0369	1-Adamantanecarboxamie, N-(3-methylphenyl-	72
40	26.808	0.0306	Triphenylphosphine sulfide	99
41	26.808	0.0664	Pyrimidine-2,4,6(1H,2H,5H-trione, 1,3-dimethyl-5-(4-pyridylmethylaminomethylene)-	72

mg/l, after treated in CETP BOD value will be > 350 mg/l.

In the below table the following compounds are present indicated along with the Retention time.

Method of Test: US EPA – 846 – 8270

EPA refers to methods for chemical analysis of water and wastes.

USEPA office of Research and Development.

SW – 846 refers to test methods for evaluating solid wastes, physical / chemical methods.

The Water samples from various areas are tested by using the above method and we got the following results.

The effects of various chemicals on humans and also various materials of Environment. Benzene present in water can seep into the surrounding soil. Humans most often come into contact with benzene either by breathing it in drinking contaminated water, or through skin absorption.

If benzene contact with low conc; for a short time can cause headaches, vomiting, , elevated heart rate and loss of consciousness.

People who work with benzene or who are exposed to it over a long period of time are at the high risk for developing benzene – related illness which range from anaemia to cancer.

Immediate signs and symptoms of exposure to benzene in humans.

- Drowsiness
- Dizziness
- Irregular heart beat
- Headaches
- Tremors
- Unconsciousness
- Death (At very high levels).

Direct exposure of the eyes, skin or lungs to benzene can cause tissue injury and irritation.

DHHS – has determined that benzene causes cancer in humans. Long term exposures to high levels of benzene in the air can cause leukemia, cancer of the blood forming organs.

Paint, varnishes industries use toluene.

Effects of toluene on humans

Historical reports of blood effects caused by toluene are more than benzene contamination. Liver or kidney damage is observed in many cases. Prolonged contact can cause dermatitis (dry, red skin).

There are case reports of accident ingestion of toluene causing severe central nervous system (CNS) depression and death.

The international agency for research on cancer (IARC) has concluded there is inadequate evidence for the carcinogenecity of toluene in humans.

Toluene in humans causes teratogenicity (facial aberrations, reduced growth, neuro behavioural delay, renal / urinary problems. These extreme exposures to toluene as well as other confounding factors such as tobacco and alcohol abuse are not relevant to occupational situations.

CONCLUSIONS

Basing on the findings of the toxicity of chemicals the industries must adopt treatment technologies which will not release the effluents with such toxic chemicals or else they can adopt green chemistry to reduce these toxic compounds from their effluentsand so even if they release effluents, environment is not effected as well as humans and other living creatures. The following compounds are obtained in the GC-Mass Screening (various water samples from the above areas of patacncheruare screened and the below chromatogram is indicating the %of the aromatic compounds).

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