ORGANIC CONTAMINANTS IN THANE CREEK WATER AND THEIR CONCENTRATIONS.

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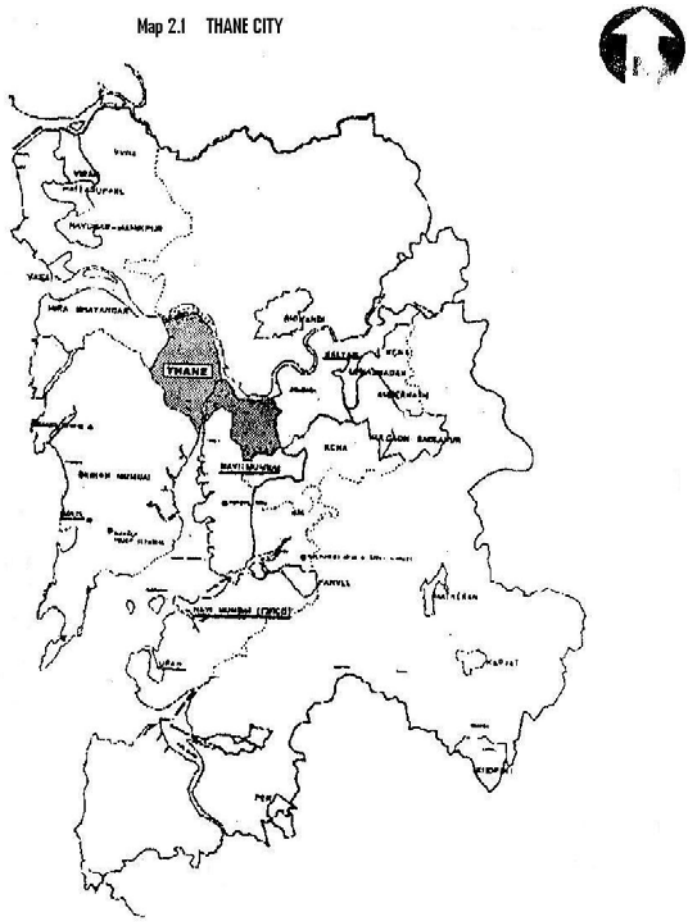
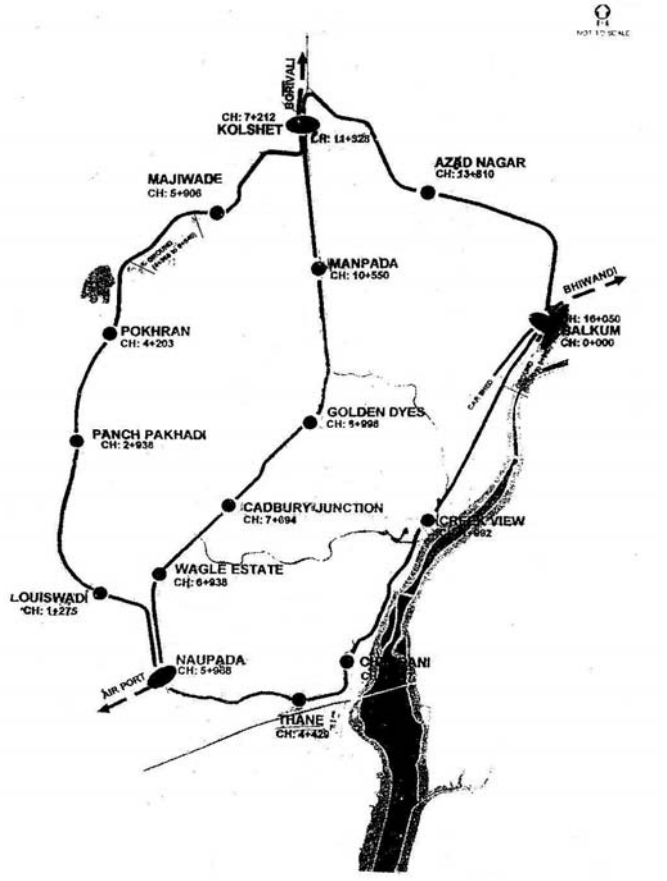
Abstract : The present investigation was carried out during the period of June 2002 - May 2004 to study the different organic contaminants presents in Thane Creek water. The creek water shows high of B.O.D and C.O.D. along with high concentration Value of phenolic comp. Detergents Methanol, ethanol, Acetone and low concentration of Dichloromethane and ether. Which are toxic to aquatic life and Human life. The origin of these contaminants is mainly from the entry of effluents from surrounding industries.

INTRODUCTION

The Thane Creek is situated at $70^0.55''$ to $70^0.00$ longitude and $19^0.00''$ to $19^0.15''$ latitude at Thane City, for fish collection fishrmen used 26 Km. area of creek. Fishes are important as food for human contains vitamins and if also gives economical help to the surrounding Fishrmen. Thane, New Mumbai cities are well developed Industrial Zone for chemical and bio-product industries. The effluents of the industries pollute water due to organic contaminants. Now a day fishermen experience less fishes in Thane creek its is because of organic contaminants in creek, several species of prawns, carbs, bivalves, gastropods and finfish which were caught in upper region (Tandel 1984, Pejawar 1984).



THANE CREAK
Map 2.3 Thane creak with Ulhas river



MATERIALS AND METHODS :

Thirteen sampling stations on either sides of the creek at a distance of 13 km were selected the first sampling station was at the distance of 10 km. from sea. For each sampling stations water sample were studied for monsoon season, winter season and summer season for two consecutive years. In each season fortnightly samples was collected, means in each season eighty time samples were collected and average were calculated. The concentration organic contaminants like oil and grease, phenolic compounds detergents, methanol, ethanol, acetone, dichloromehane, chloroform, benzene, 1-4 dioxane were studied because of conc of Organic contaminants the value BOD and COD varies from low value to high value. Thirteen sampling stations were selected for measurement of concentration of organic contamination 1) Custom office 2) Thane Station, 3) Bandokar college, 4) Mahagiri 5) Kalwa bridge (Kalwa side) 6) Kalwa bridge (mid zone) 7) Kalwa bridge (Thane side) 8) Akash Ganga – 1 9) Akash ganga -2 10) Akash ganga Nallah 11) Saket 12) Parcik Naka 13) Mumbra Reti Bunder.

All the samples were collected stored and analysed as per the methods given in APHA , AWWA, WPCF (1980) and Trivedy and Goel (1986).

RESULT'S AND DISCUSSION

Chemicals and reagents of standard quality. A.R. grade and glass wares of borosil and pyrex marks were utilized through out the experimental work for determination of pH and detergents PH meter and spectrophotometer were standardized by standard solution and calibrated for organic, contaminants like methanol, ethanol, ether Acetone, dichloromethane, chloroform, Benzene 1-4 dioxane – Gas chromatography of head space Analyser.

Table 3.1 : Maximum & Minimum values of the Different Parameters of the Water during Monsoon Season (June. – Sept., 2002) at different sites of the Thane Creek

Physical Parameters	H/L Tide	Maximum	Minimum
pH	H.T.	7.20 at (2,5,13)	7.162 at (10)
	L.T.	7.25 at (3)	
Temperature	H.T.	26.33 at (7)	26.05 at (2)
	L.T.	25.59 at (9)	25.21 at (13)
BOD	H.T.	33.12 at (10)	25.25 at (9,13)
(mg. / lit. as 02)	L.T.	39.87 at (5)	35 at (7)
COD	H.T.	49.37 at (7)	42 at (1)
(mg. / lit. as 02)	L.T.	51.37 at (12)	45 at (1)
Specific Parameters			
Oil & Grease	H.T.	NIL	NIL
(mg. / lit.)	L.T.	NIL	NIL
Phenolic Comp.	H.T.	0.18 at (4,5)	0.15 at (1,2,9)
(mg. / lit.)	L.T.	0.20 at (12)	0.17 at (9)
Detergents	H.T.	0.29 at (4)	0.107 at (7)
(mg. / lit.) as MBA'S	L.T.	0.37 at (4)	0.12 at (8,11,13)

Methanol (mg/lit.)	H.T.	1.40 at (6,7)	0.94 at (1)
	L.T.	1.95 at (1)	1.60 at (11,12)
Ethanol (mg/lit.)	H.T.	0.14 at (4,6,13)	0.12 at (5,10,11,12)
	L.T.	0.31 at (7)	0.11 at (6)
Ether (mg/lit.)	H.T.	0.025 at (2)	0.011 at (5,9,13)
	L.T.	0.060 at (9)	0.012 at (11,12,13)
Acetone	H.T.	0.081 at (12)	0.067 at (2)
(mg/lit.)	L.T.	0.083 at (12)	0.071 at (2)
Dichloro Methane	H.T.	0.20 at (1)	0
(mg/lit.)	L.T.	0.31 at (1)	0
Chloroform (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL
Benzene (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL
1-4 dioxane (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL

H. T. = HIGH TIDE L. T. = LOW TIDE

Figures in bracket indicate the number of sampling station.

Table 3.2 : Maximum & Minimum Values of the Different Parameters of the Water during Winter Season (Oct. – Jan., 2002-03) at different sites of the Thane Creek

Physical Parameters	H/L Tide	Maximum	Minimum
pH	H.T.	7.24 at (3)	7.10 at (5)
	L.T.	7.38 at (11)	7.23 at (7)
Temperature	H.T.	26.98 at (4)	26.75 at (7,8,9)
	L.T.	25.96 at (8)	25.12 at (6)
BOD	H.T.	154.37 at (8)	94.12 at (11)
(mg. / lit. as 02)	L.T.	95.37 at (10)	61.62 at (7)
COD	H.T.	337.75 at (8)	159 at (3)
(mg. / lit. as 02)	L.T.	165.12 at (4)	119.37 at (6)
Specific Parameters			
Oil & Grease	H.T.	NIL	NIL
(mg. / lit.)	L.T.	NIL	NIL
Phenolic Comp.	H.T.	0.18 at (5)	0.14 at (7,8,10)
(mg. / lit.)	L.T.	0.22 at (9,12)	0.15 at (7)
Detergents	H.T.	0.20 at (5)	0.14 at (9)
(mg. / lit.) as MBA'S	L.T.	0.41 at (2)	0.15 at (7)

Contd.

Methanol (mg/lit.)	H.T.	2.24 at (4)	1.98 at (7)
	L.T.	2.08 at (9)	1.68 at (5)
Ethanol (mg/lit.)	H.T.	0.024 at (7)	0.0013 at (6)
	L.T.	0.0216 at (8)	0.0016 at (12)
Ether (mg/lit.)	H.T.	0.002 Showing Con.	0.014 at (12)
	L.T.	0.002 Showing Con.	0.014 at (2)
Acetone	H.T.	0.21 at (1,3)	0.17 at (2,7)
(mg/lit.)	L.T.	2.23 at (10)	0.15 at (7)
Dichloro Methane	H.T.	0.66 at (1)	0.078 at (9)
(mg/lit.)	L.T.	2.54 at (10)	0.045 at (7)
Chloroform (mg/lit.)	H.T.	0.67 at (9)	0.064 at (7)
	L.T.	NIL	NIL
Benzene (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL
1-4 dioxane (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL

H. T. = HIGH TIDE L. T. = LOW TIDE

Figures in bracket indicate the number of sampling station.

Table 3.3 : Maximum & Minimum Values of the Different Parameters of the Water during Summer Season (Feb. – May., 2003) at different sites of the Thane Creek

Physical	H/L Tide	Maximum	Minimum
pH	H.T.	7.37 at (7)	7.18 at (5)
	L.T.	7.22 at	7.15 at (5,13)
Temperature	H.T.	27.68 at (5)	27.36 at (11)
	L.T.	27.57 at (11)	27.35 at (2)
BOD	H.T.	72.75 at (8)	62.25 at (13)
(mg. / lit. as 02)	L.T.	84.32 at (13)	65.87 at (3)
COD	H.T.	153.80 at (5)	135.75 at (1)
(mg. / lit. as 02)	L.T.	207.72 at (9)	102.13 at (1)
Specific Parameters			
Oil & Grease	H.T.	NIL	NIL
(mg. / lit.)	L.T.	NIL	NIL
Phenolic Comp.	H.T.	0.30 at (9)	0.20 at (7)
(mg. / lit.)	L.T.	0.25 at (13)	0.12 at (10,12,13)
Detergents	H.T.	0.322 at (13)	0.12 at (10)
(mg. / lit.) as MBA'S	L.T.	0.307 at (11)	0.10 at (10)

Contd.

Methanol (mg/lit.)	H.T.	1.44 at (7)	1.24 at (1)
	L.T.	1.53 at (11)	1.28 at (1)
Ethanol (mg/lit.)	H.T.	0.430 at (10)	0.009 at (5,12)
	L.T.	0.656 at (1)	0.014 at (9,11)
Ether (mg/lit.)	H.T.	0.014 at (11)	0.009 at (5,12)
	L.T.	0.028 at (8)	0.014 at (9,11)
Acetone	H.T.	0.207 at (1)	0.158 at (10)
(mg/lit.)	L.T.	0.195 at (1)	0.160 at (10)
Dichloro Methane	H.T.	NIL NIL	
(mg/lit.)	L.T.	NIL NIL	
Chloroform (mg/lit.)	H.T.	0.031at (2,7)	0.011 at (11)
	L.T.	NIL	NIL
Benzene (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL
1-4 dioxane (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL

H. T. = HIGH TIDE L. T. = LOW TIDE

Figures in bracket indicate the number of sampling station.

Table 3.4 : Maximum & Minimum Values of the Different Parameters of the Water during Mansoon Season (June-Sept. 2003) at different sites of the Thane Creek

Physical Parameters	H/L Tide	Maximum	Minimum
pH	H.T.	7.17 at (3)	7.115 at (7)
	L.T.	7.16 at	7.12 at (11)
Temperature	H.T.	25.78 at (12)	25.55 at (13)
	L.T.	25.71 at (1)	24.86 at (6)
BOD	H.T.	75 at (9)	58 at (2)
(mg. / lit. as 02)	L.T.	74 at (9)	58 at (2)
COD	H.T.	134 at (12)	108 at (8)
(mg. / lit. as 02)	L.T.	181 at (10)	88 at (8)
Specific Parameters			
Oil & Grease	H.T.	NIL	NIL
(mg. / lit.)	L.T.	NIL	NIL
Phenolic Comp.	H.T.	0.19 at (2)	0.14 at (12)
(mg. / lit.)	L.T.	0.18 at (2,3)	0.14 at (11)

Contd.

Detergents	H.T.	0.02 at (7)	0.08 at (12)
(mg. / lit.) as MBA'S	L.T.	0.116 at (5,7)	0.08 at (12)
Methanol (mg/lit.)	H.T.	1.07 at (8)	1.00 at (12)
	L.T.	1.10 at (9)	0.68 at (1)
Ethanol (mg/lit.)	H.T.	0.12 at (1)	0.06 at (12)
	L.T.	0.23 at (13)	0.06 at (10)
Ether (mg/lit.)	H.T.	0.025 at (12)	0.011 at (3)
	L.T.	0.022 at (1)	0.009 at (8)
Acetone	H.T.	0.17 at (2)	0.13 at (13)
(mg/lit.)	L.T.	0.17 at (8)	0.12 at (5)
Dichloro Methane	H.T.	NIL	NIL
(mg/lit.)	L.T.	NIL	NIL
Chloroform (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL
Benzene (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL
1-4 dioxane (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL

H. T. = HIGH TIDE L. T. = LOW TIDE
Figures in bracket indicate the number of sampling station.

Table 3.5 : Maximum & Minimum Values of the Different Parameters of the Water during Winter Season (Oct.- Jan., 2003-04) at different sites of the Thane Creek

Physical Parameters	H/L Tide	Maximum	Minimum
pH	H.T.	7.16 at (13)	7.10 at (5,7)
	L.T.	7.18 at (7)	7.12 at (4,12)
Temperature	H.T.	25.24 at (8)	24.05 at (2)
	L.T.	25.22 at (8)	23.98 at (13)
BOD	H.T.	76.75 at (9)	54.75 at (4)
(mg. / lit. as 02)	L.T.	76.75 at (9)	59.50 at (2)
COD	H.T.	107 at (12)	93.87 at (8)
(mg. / lit. as 02)	L.T.	124.08 at (10)	83 at (1)
Specific Parameters			
Oil & Grease	H.T.	NIL	NIL
(mg. / lit.)	L.T.	NIL	NIL

Contd.

Phenolic Comp.	H.T.	0.135 at (1)	0.092 at (10)
(mg. / lit.)	L.T.	0.137 at (9)	0.10 at (11)
Detergents	H.T.	0.0825 at (1)	0.60 at (10)
(mg. / lit.) as MBA'S	L.T.	0.0762 at (1)	0.0425 at (13)
Methanol (mg/lit.)	H.T.	1.047 at (1)	1.020 at (9,10)
	L.T.	1.042 at (1)	1.020 at (9)
Ethanol (mg/lit.)	H.T.	1.063 at (13)	0.040 at (11)
	L.T.	0.070 at (13)	0.040 at (11)
Ether (mg/lit.)	H.T.	0.0150 at (9)	0.0120 at (4)
	L.T.	0.0150 at (3)	0.0120 at (4)
Acetone	H.T.	0.146 at (2,3)	0.0122 at (6)
(mg/lit.)	L.T.	0.145 at (13)	0.0127 at (6,10)
Dichloro Methane	H.T.	NIL	NIL
(mg/lit.)	L.T.	NIL	NIL
Chloroform (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL
Benzene (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL
1-4 dioxane (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL

H. T. = HIGH TIDE L. T. = LOW TIDE
Figures in bracket indicate the number of sampling station.

Table 3.6 : Maximum & Minimum Values of the Different Parameters of the Water during Summer Season (Feb.-May, 2003-04) at different sites of the Thane Creek

Physical Parameters	H/L Tide	Maximum	Minimum
pH	H.T.	7.20 at (1)	7.14 at (3)
	L.T.	7.21 at	7.16 at (6,7)
Temperature	H.T.	27.90 at (4,6)	27.81 at (8)
	L.T.	27.98 at (23)	27.80 at (11)
BOD	H.T.	72.12 at (1)	56.75 at (9)
(mg. / lit. as 02)	L.T.	73.80 at (11)	58.87 at (9)
COD	H.T.	94.75 at (3)	74.50 at (8,9)
(mg. / lit. as 02)	L.T.	91.5 at (11)	77 at (4)

Contd.

Specific Parameters			
Oil & Grease	H.T.	NIL	NIL
(mg. / lit.)	L.T.	NIL	NIL
Phenolic Comp.	H.T.	0.125 at (1)	0.10 at (5)
(mg. / lit.)	L.T.	0.147 at (1)	0.10 at (3,5,7,12,13)
Detergents	H.T.	0.066 at (1)	0.045 at (2)
(mg. / lit.) as MBA'S	L.T.	0.072 at (5)	0.051 at (13)
Methanol (mg/lit.)	H.T.	1.07 at (5)	1.03 at (8,9)
	L.T.	1.06 at	1.03 at (11)
Ethanol (mg/lit.)	H.T.	0.051 at (1)	0.025 at (13)
	L.T.	0.047 at (1)	0.026 at (7)
Ether (mg/lit.)	H.T.	0.018 at (5,9,11)	0.011 at (7)
	L.T.	0.019 at (9)	0.012 at (8)
Acetone	H.T.	0.13 at (9)	0.166 at (12)
(mg/lit.)	L.T.	0.13 at (10)	0.12 at (3,6,7,11)
Dichloro Methane	H.T.	NIL	NIL
(mg/lit.)	L.T.	NIL	NIL
Chloroform (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL
Benzene (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL
1-4 dioxane (mg/lit.)	H.T.	NIL	NIL
	L.T.	NIL	NIL

H. T. = HIGH TIDE L. T. = LOW TIDE
Figures in bracket indicate the number of sampling station.

(Michro-9) were used and was standardized by authentic sample. The maximum and minimum concentrations of organic pollutants are given in table 3.1 to table 3.6 of year 2002-2004 of monsoon season, winter season and summer season along with organic contaminants. The change in pH, temp. B.O.D. and C.O.D. value also given in the same table.

The pH was slightly alkaline through out the study period it varied from 7.10 to 7.38. Thus the pH was observed to be in the range of TLV. During study period water temperature was found higher in summer season and lower during winter season. The maximum temp. was 27.98^0c at Mumbra Retibunder at low tide and minimum temperature recorded 23.98^0c at Mumbra Retibunder. The B.O.D. value of Thane creek at high tide was 154.37 and low tide 95.37 at station no. 8 and 10 respectively during winter season 2002-2003 and the lowest value was 25.25 mg/lit during monsoon season of year 2002-03 at station of no.9 and 13 of high hide. The C.O.D. value higher 337.5 at high tide at station no. 8 and 165.12 value at low tide during winter season of year 2002-03 and the lowest value

was 42 mg./lit. During monsoon season of year 2002-03 at station No.1 g. high tide. Oils and Greases:- In all season (Monsoon, Winter and Summer) the value of Oil and greases was not detected during high tide and low tide of year 2002-03 and year 2003-04.

Phenolic Compound -The phenolic compounds higher value recorded at high tide was 0.30 mg/ lit at station no 9 of summer seasons 2002-03 and lower value during winter season at high tide was 0.092 mg/lit at station no 10 of the year 2003-04. Detergent -The detergent value of 2002-03 was higher in winter season 0.41 mg/lit at high tide at station no 2 and lowest value was 0.045 mg/lit in winter season at station no.13 in the year 2002-03. Methanol-The methanol value was recorded higher during summer season at high tide 2.24 mg/lit at station no. 4 and lower during the monsoon season at high tide 0.68 mg/lit at station no. 1 in 2002.03. Ethanol -The ethanol value was recorded highest during summer season 0.656 mg / lit at high tide at station no. 1 and lower value was recorded during winter season 0.0013 mg/ lit at high tide at station no 6 in year 2003-04. Ether -The ether value recorded highest during monsoon season 0.060 mg/lit at station no. 9 and lowest value during winter season 0.0014 mg/ lit at station no. 12 during the year 2003-04. Acetone -Acetone value in year 2002-03 was recorded highest during winter season 0.23 mg/lit at station No. 10 and lowest value during monsoon season 0.0122 mg/lit at station no. 6 of high tide during the year 2003-04. Dichlormethane -The Dichloromethane value recorded highest 2.54 mg/lit at station no 10 during winter season of low tide and lowest was 0.045 mg/lit during winter season of low tide in year 2002-03. Chloroform -The value of Chloroform varies from 0.011 mg/lit to 0.67 mg/lit in the winter and summer season of year 2002-03 only. Benzene - Was not detected. 1-4 Dioxane -Was not detected The over all study shows that the Thane creek water is polluted by organic contaminants having high concentration of phenolic comp, Detergents, Methanol, ethanol, Acetone and low conc. Dichloromethane and ether.

Recommendations

1. To establish the legal basis for banning the pollution of navigable waterways.
2. Investigation of water pollution related to disease and public health.
3. Prohibiting oil discharge in Coastal Water.
4. Pollution control law of regulation of waste disposal.
5. Federal grants for water treatment plants.
6. Restoration and maintenance of country water.
7. Land and water conservation fund act money made available for local states and federal acquisition of open space and parkland.

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ENVIRONMRNTAL CLEANUP- EXTRACTIVE SEPARATION AND ESTIMATION OF TOXIC METALS

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- **ENVIRONMENTAL POLLUTION BY TOXIC METALS IS MAJOR THREAT TO SOCIETY**
- **TOXIC METALS LIKE LEAD AND COPPER ARE WELL KNOWN POLLUTANTS**
- **LEAD AND COPPER WERE ALSO FOUND PRESENT IN FOD SAMPLES LIKE RICE GRAINS AND LEAFY VEGETABLES LIKE SPINACH**
- **CHRONIC EXPOSURE TO COPPER CAUSES NEPHRITIS. EXPOSURE TO LEAD CAUSESSCARING AND SHRINKING OF KIDNEY TISSUE.**
- **EXCESS OF COPPER IN ENVIRONMENT AND AQUATIC LIFE IS HARMFUL FOR LIVING ORGANISMS**
- **CHRONIC COPPER CAUSES GASTROINTESTINAL CATARRAH AND HEAMACHROMATOSIS**
- **IN VIEW OF THESE SEVERE EFECTS OF COPER AND LEAD, A SIMPLE AND RAPID METHOD FOR THEIR SEPARATION AND**

Why Solvent Extraction

- **Method is simple and rapid**
- **Method is highly accurate and precise**
- **Free from many interferences**
- **Very economic and convenient**
- **Wide range of Applications**

Tributyl Phosphine Oxide (TBPO)

- **Wide range of extractants were used or extraction of lead and copper, however, neutral organophosphorous compounds are found to be most potent extractants.**

  $C_4H_9P=O$ a neutral organophosphorous compound used as a potent extraction for metals like U, Th, Cu, Cd, Bi etc.

- **Extraction Methods using TBPO offer very clean and efficient separation of desired constituents and is free from many interferences.**

Salicylate media

- **Generally metal extractions are carried out from mineral acid media like HCl etc.**
- **Na salicylate solution is used as an effective media for the separation of metals.**
- **Salicylate media is weakly acidic media which reduces corrosive effects of strong mineral acid media.**
- **Most of the Metal complexes with sodium salicylate poses a ring structure which easily facilitates their transfer into the organic phase.**

Table1: Optimum Extraction Conditions

Metal ion	Aqueous phase		Organic phase (5 cm^3 in Toluene)	Extraction period	Stripping solution	Determination
	Salicylate, mol/dm^3	pH				
Pb (5-40 µg)	6.25×10^{-3}	3.8-4.2	2.29×10^{-2} mol/dm^3 TBPO	30 sec.	0.1 mol dm^{-3} HNO_3 (2X5 cm_3)	Determined spectrophotometrically by PAR
Cu (1-40 µg)	2.5×10^{-2}	2.9-3.1	$2.28X\ 10^{-1}$ mol/dm^3 TBPO	60 sec.	0.05 mol dm^{-3} HNO_3 (2X5 cm_3)	Determined spectrophotometrically by PAR

Nature of extracted species

Nature of extracted species is deduced from log-log plots.

Slope for plot of log Distribution ratio v/s log of Salicylate concentration for lead and copper at fixed pH and TBPO concentration are 1.7 and 2.2 respectively

Slope for plot of log Distribution ratio v/s log of TBPO concentration for lead and copper at fixed pH and Salicylate concentration are 1.8 and 2.0 respectively

Extraction takes place by salvation mechanism where initially two salicylate ions get coordinated with metal ion. This neutral metal salicylate is further solvated by two TBPO molecules rendering it hydrophobic, facilitating transfer into the organic phase.

The actual composition of the extracted species can be given by following reactions.

$$M(H_2O)_4^{2+} + 2H_{Sal}^{-} = M(H_{Sal})_2(H_2O)_2 + 2H_2O$$

Metal salicylate

$$M(H_{Sal})_2(H_2O)_2 + 2TBPO = M(H_{Sal})_2\,2TBPO + 2H_2O$$

Solvated metal salicylate

Table 2: Diverse ion effect

Aqueous Phase: 1.7X10^{-3} mol dm^{-3} sodium salicylate at pH 3.2 with 40 µg of pb(II) and 20 µg of Cu(II)

Organic phase: 2.5X10^{-1} mol dm^{-3} TBPO dissolved in toluene

Foreign ions	Tolerance limit, µg	Foreign ions	Tolerance limit, µg	Foreign ions	Tolerance limit, µg
Zn(II)	100	Zr(IV)	1200	Fe(III)	none
Cu(II)	200	Hf(IV)	400	Y(III)	1500
Mn(II)	2000	Ti(IV)	500	EDTA	*none
Ba(II)	400	Ce(IV)	200	Th(IV)	200
Cd(II)	100	Te(IV)	200	SO_4^{2-}	300
Mg(II)	200	V(V)	2000	Cl^-	1000
Sb(III)	500	U(VI)	1000	NO^{3-}	2000
Al(III)	500	Cr(VI)	250	SCN^-	250
La(III)	2000	Mo(VI)	150		

Table 3 : Separation of Pb(II) from binary and multicomponent mixtures.

Composition of the mixture, μg	Recovery,∗%	Relative error, ∗%	Estimation procedure for the added ion
Pb, 40; Cu, 40	99.5 99.0	0.5 1.0	PAR[17]
pb, 40; Ti, 50	99.5 99.3	0.5 0.7	H2O2[17]
Pb, 40; Fe, 100	99.1 99.6	0.9 0.4	thiocyanate[16]
Pb, 40; Cr, 100	99.0 99.4	1.0 0.6	DPC[17]
Pb, 40; Te, 100	99.3 99.3	0.7 0.7	$SnCl_2$[17]
Pb, 40; V, 50	99.7 99.6	0.3 0.4	PAR[18]
Zn, 100; Pb, 40 Cu, 100; Ni, 100 Co,50	99.0	1.0	
Pb, 40; Sb, 100 Te, 100; U, 100 Cr,100	99.1	0.9	

∗ Average of triplicate analysis

Table 4 : Separation of Cu(II) from binary and multicomponent mixtures.

Composition of the mixture, μg	Recovery,∗%	Relative error, ∗%	Estimation procedure for the added ion
Zn, 40; Cu, 40	99.5 99.0	0.5 1.0	PAR[17]
Cu, 40; Fe, 100	99.5 99.3	0.5 0.7	Thiocyanate[17]
Cu, 40; Co, 100	99.1 99.6	0.9 0.4	Nitroso-R-Salt[16]
Cu, 40; Sb, 100	99.0 99.4	1.0 0.6	Iodide[17]
Cu, 40; Te, 100	99.3 99.3	0.7 0.7	$SnCl_2$[17]
Cu, 40; Cr, 50	99.7 99.6	0.3 0.4	DPC[18]
Cu, 40; Pb, 100 Pb, 100; Ni, 100 Co,50	99.0	1.0	
Cu, 40; Sb, 100 Te, 100; U, 100 Cr,100	99.1	0.9	

∗ Average of triplicate analysis

Table 5 : Analysis of waste water samples

Sample	Lead content found by AAS	Lead found by proposed method	Standard deviation	*Relative standard deviation (%)
Industrial waste water	1.3ppm	1.32 ppm[a]	0.006	0.85
Well water from Thane	0.32 ppm	0.33 ppm	0.004	0.58

a-ppm : parts per million
*- : Average of six determinations

Table 6: Analysis of Environmental samples

sample	Pb(II) found by proposed method, μgm^{-3}	Cu(II) found by proposed method, μgm^{-3}	Pb(II) found by AAS method, μgm^{-3}	Cu(II) found by AASmethod, μgm^{-3}
Air borne particulate matter				
Tilak nagar area	0.83 0.52	0.36 0.108	0.84 0.51	0.38 0.108
Dadar area	0.84 0.47	0.52 0.103	0.85 0.47	0.56 0.102

Table 7: Analysis of food samples
Vegetable crops are often grown in polluted and degraded environmental conditions in the semiurban (or urban fringe) zone and are subject to further pollution from vehicles and industries during marketing. There is therefore significant cause for concern regarding contamination.

sample	*Pb(II) found by proposed method, mg/kg	* Cu(II) found by proposed method, mg/kg	Pb(II) found by AAS method, mg/kg	Cu(II) found by AASmethod, mg/kg
Leafy vegetable Spinach from thane market	0.19	0.04	0.21	0.05
Leafy vegetable Spinach from dadar market	0.27	0.06	0.27	0.06
Rice grain from thane market	2.6	0.86	2.44	0.88
Rice grain from Dadar market	2.7	0.86	2.76	0.88

* Average of six determinations

Conclusions

1. The solvent extraction methods developed for lead and Copper can be summarized as follows.
2. The methods are simple, rapid and precise.
3. It needs no pre equilibration or use of salting out agents. Extraction occurs in single step.
4. The methods are highly reproducible and the total analysis time is only about 20 minutes.
5. The methods are highly selective, they provide clear cut separation and quantitative estimation of lead and copper from associated elements, Environmental samples and food samples.