

## Study of Phenol Contamination in Ground Water Resources Around Mahad Industrial Area in Raigad District (M.S.) Spectrophotometrically

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**ABSTRACT:** Phenols are toxic in nature. In present study the phenol contamination in ground water resources near Mahad MIDC area has been determined using calibration curve method spectrophotometrically. For that samples were collected from eleven different wells and analyzed. The results of all water samples show that observed phenol contamination is near about permissible limit. Throughout the year this water from all sampling sites can be used for domestic as well as irrigation purpose as contamination is within permissible limit.

**Keywords:** Calibration; Phenol; Permissible limit; Spectrophotometry; Well.

**INTRODUCTION:** This section should be succinct, with no subheadings. Phenolic compounds are toxic, widely used in the manufacture of synthetic phenolic resins, dyes, plastics, lamp black paints, air fresheners, paper soaps, paint removers etc. It is introduced into the environment through industrial discharges from coke oven plants, petroleum refineries, drug manufacturing units, antioxidants and dye industries. Phenol as priority pollutant and set a discharge limit of 0.1 mg/l of phenol in wastewaters. As per Indian Standards for disposal of treated effluents (IS: 2490 Part A), the permissible limit of phenol for the discharge of effluent into inland surface water is 1.0 mg/l and in public sewer and marine disposal it is 5 mg/L. The effect of phenol on the aquatic life is destructive at low concentrations; for fishes 5-25 mg/L is lethal depending on the temperature and state of maturity.

Well is the major source of water supply for domestic as well as agriculture purpose, the toxic phenol if present will definitely enter in human food chain via consumption of different flora, fauna and water itself. In present work an attempt has been made to determine phenol contamination in well water around Mahad industrial area spectrophotometrically.

**MATERIALS AND METHODS:** This part should contain sufficient detail so that all procedures can be repeated. It can be divided into subsections if several methods are described.

**Apparatus:** Spectrophotometer was used for spectral measurements. PH meter was used for pH measurements. All chemicals used were of analytical reagent grade and double distilled water was used for dilution.

**Reagents:** Phenol Stock : 1 mg mL<sup>-1</sup> stock solution of phenol is prepared in 5% ethanolic solution. Working standards were prepared by the appropriate dilution of the stock.

**Leucocrystal violet (LCV) [Eastman Kodak Co.]:** 250 mg of Leucocrystal Violet (4,4',4'' methyl-dynetrin (N, N'-Dimethylaniline) was dissolved in 200 mL of distilled water containing 3 mL 85% phosphoric acid (Merck) and the volume was made upto 1 litre with distilled water and was stored in amber coloured bottle away from sunlight.

**N- Bromophthalimide (NBP) [Loba chemie]:** 0.04 g NBP was dissolved in 8 mL acetic acid and the volume was made up to 25mL with double distilled water and was stored in amber coloured bottle.

**0.5% Sodium hydroxide:** 2 g sodium hydroxide in 100 mL distilled water.

**Buffer solution:** Buffer solution of pH 4 ±0.1 was prepared by dissolving 17.01 g potassium hydrogen phosphate in 490 mL water followed by drop wise addition of 85% phosphoric acid until the

pH becomes  $4 \pm 0.1$  and volume was made up to the mark in 500 mL standard flask.

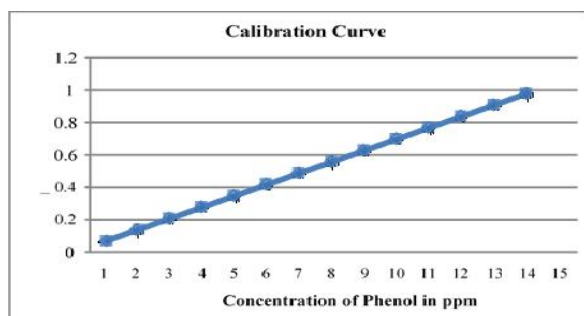
Waste water samples were collected from the Savitri River including Mahad MIDC area. They were filtered through Whatman No. 42 and stored in glass bottles. Then the samples were ready for analysis. Water samples were collected in triplicate after every two months for one year.

**Procedure:** Standard solution containing  $0.5 - 7.0 \mu\text{g}$  of phenol were prepared, 1mL of NBP was added and warmed slightly. After 2 minutes, 1mL of buffer was added and stirred gently. To this 1 mL of LCV followed by 0.5 mL of 0.5% NaOH and 1mL of CTAB was added and mixed. The solution was diluted up to 25 mL and kept at 30°C for full colour development. An intense violet colour dye having maximum absorption at 595 nm was obtained at  $\sim 4\text{pH}$ . The calibration curve was plotted absorbance against concentration in micrograms ( $\mu\text{g/l}$ ). Same procedure was followed for samples of water and concentration of phenol in samples were calculated from calibration curve.

## RESULTS AND DISCUSSION:

**Table 1: Showing Calibration Curve of Absorbance vs. Concentration of phenol in ppm ( $\mu\text{g/l}$ ).**

Absorbance	Concentration of Phenol in $\mu\text{g/mL}$
0.07	0.5
0.14	1
0.21	1.5
0.28	2
0.35	2.5
0.42	3
0.49	3.5
0.56	4
0.63	4.5
0.7	5
0.77	5.5
0.84	6
0.91	6.5
0.98	7



**Figure 1: Calibration curve.**

**Table 2: Observation.**

Well No/Sample no.	Concentration of phenol in $\mu\text{g/l}$ .					
	January	March	May	July	September	November
1.	0.47	0.45	0.39	0.35	0.41	0.51
2.	0.38	0.22	0.05	0.47	0.36	0.31
3.	0.32	0.22	0.55	0.26	0.15	0.35
4.	0.23	0.05	0.18	0.48	0.18	0.44
5.	0.49	0.95	0.03	0.32	0.19	0.11
6.	0.19	0.78	0.28	0.50	0.28	0.05
7.	0.44	0.97	0.44	0.13	0.37	0.58
8.	0.10	0.12	0.09	0.29	0.40	0.27
9.	0.15	0.14	0.19	0.22	0.34	0.24
10.	0.39	0.39	0.32	0.33	0.31	0.47
11.	0.20	0.33	0.27	0.51	0.11	0.21

The phenol concentrations in water samples analyzed by spectrophotometric method. The values are given in Observation Table No. 2. Shows phenol concentration in micrograms per liter ( $\mu\text{g/l}$ ) after every two months for one year.

**CONCLUSION:** This should clearly explain the main conclusions of the work highlighting its importance and relevance. In all seasons the concentration of phenol in water samples were found under permissible limit (1 to 2  $\mu\text{g/l}$ ) given by Bureau of Indian Standard for drinking water. If other parameters of water are in permissible limit people can use water from all sampling sites for drinking as well as other purposes such as irrigation and marine aquatic life throughout the year.

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