

ANALYSIS OF ARSENIC IN INDUSTRIAL AREAS OF VISAKHAPATNAM, INDIA

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ABSTRACT

The nature of water is the most important and it is essential for all forms of life. The water is mainly polluted by the different industrial effluents that directly contaminate the lakes channels, rivers and seas. Due to this, the ground water is contaminated with the heavy metals. The surroundings of the Industrial areas are more affected by Arsenic where the people suffer from Arsenic related diseases. The World Health Organization (WHO) recommended the maximum concentration of arsenic in drinking water is 10 g/l or below than this. The Arsenic concentration levels are more in summer than in winter season is observed from the analysis of ground water.

KEY WORDS : Arsenic, Arsenic contamination, Adsorbents, Arseno molybdate method.

INTRODUCTION:

Water is the important resource which is basic to the human life. Generally water obtained from two types of natural sources: surface water (lakes, ponds, rivers, streams etc.) and ground water (boreholes and well water). Water plays an important role like domestic, industrial supply, irrigation in all over the world. But increase of population, industrialization and urbanization cause the contamination of ground water. The contaminated ground water is not easy to restore. Hence it is necessary to protect quality of ground water. According to WHO 80% of diseases arise due to contaminated ground water. As the ground water flows from recharge area to discharge area the ground water quality will decrease due to chemical reactions. Heavy metals are important environmental pollutants which are increased by human activities like mining, agriculture, discharging industrial effluents containing metals without giving any treatment from industries like steel plants, battery, Thermal power plants and over usage of fertilizers containing heavy metals in agriculture are the main reasons to contaminate the ground water. The traces of Arsenic ions play an important role in human life which affects the central nervous system. The objectives of this study are 1) to evaluate the dissolved heavy metals in the ground water 2) to provide

controlling techniques. Arsenic is naturally occurring element. It is odorless and tasteless. It is available in inorganic form in the environment. It enters into groundwater through underground rocks, soil and industrial human activities. If the arsenic stocks in human body cancer, neural disorders are caused. Daily consumption of water with greater than 0.01mg/l of arsenic, less than 0.2% of the fatal dose, can on long term lead to problems with the skin as well as circulatory and nervous systems.

METHODS AND MATERIALS:

The adsorbents preliminary screened were Brick powder, Multani Mitti, Iron Dust and Lemon Peel powder (Table 1). Initially all the adsorbents were screened by adding 1 g of each adsorbent to 100ml of solution Arsenic. Adsorption methods were adopted for removal of heavy metals and these methods are suitable when Arsenic is present in low concentrations. For this purpose, an aqueous solution of 100 ml of Arsenic of various concentrations was taken in 100ml reagent bottles and 1 gm of adsorbent was added to the solutions. The initial and final concentrations of aqueous solution of Arsenic determined by Arsenomolybdate method and percentage removal of Arsenic were determined.

Industrial Study areas of Visakhapatnam, Bheemunipatnam:

It is located in the Vizag district, Andhra Pradesh State, the average annual rain fall is 356.7mm, the areas are covered by Deccan trap, different soils like red soil, medium black soil, mixed soil. The peak temperature was recorded in the year 2016 was 42°C in the month of April and the lowest temperature 12°C recorded December. Relative humidity of 63.7% and 93.9% was observed in April and September respectively. Bheemili beach is located at the origin of the Gosthani river, at a distance of 24km from VSKP. Level fluctuated from 23% in pre-monsoon and 20% in post-monsoon. Bheemilipatnam is one of the industrial areas of VSKP. It comprises the Pharma industries, packing industries, agro industry, food industry etc..

Bheemunipatnam and near areas belonging in VSKP, AP state to find out the extent of contamination in ground water like bore well from the discharges of industry effluents.

Samples were collected from the borewells in various places of Bheemunipatnam. The samples were analyzed by Arsenomolybdate method using UV spectro photometer for toxic arsenic element. The study reveals that the ground water has high concentration of some of the chronic element like arsenic. This occurs due to the discharge of effluents from different areas located in Bheemili.

It was observed that the arsenic concentration increased in the ground water during the season (pre-monsoon period).

After the monsoon rains ,the metal concentration in the ground water reduced by half which may be due to dilution.this contaminated ground water is utilized for drinking ,which is hazardous to the survival of humans. Effect of toxic elements on the health of the residents in the surrounding residential areas is observed.

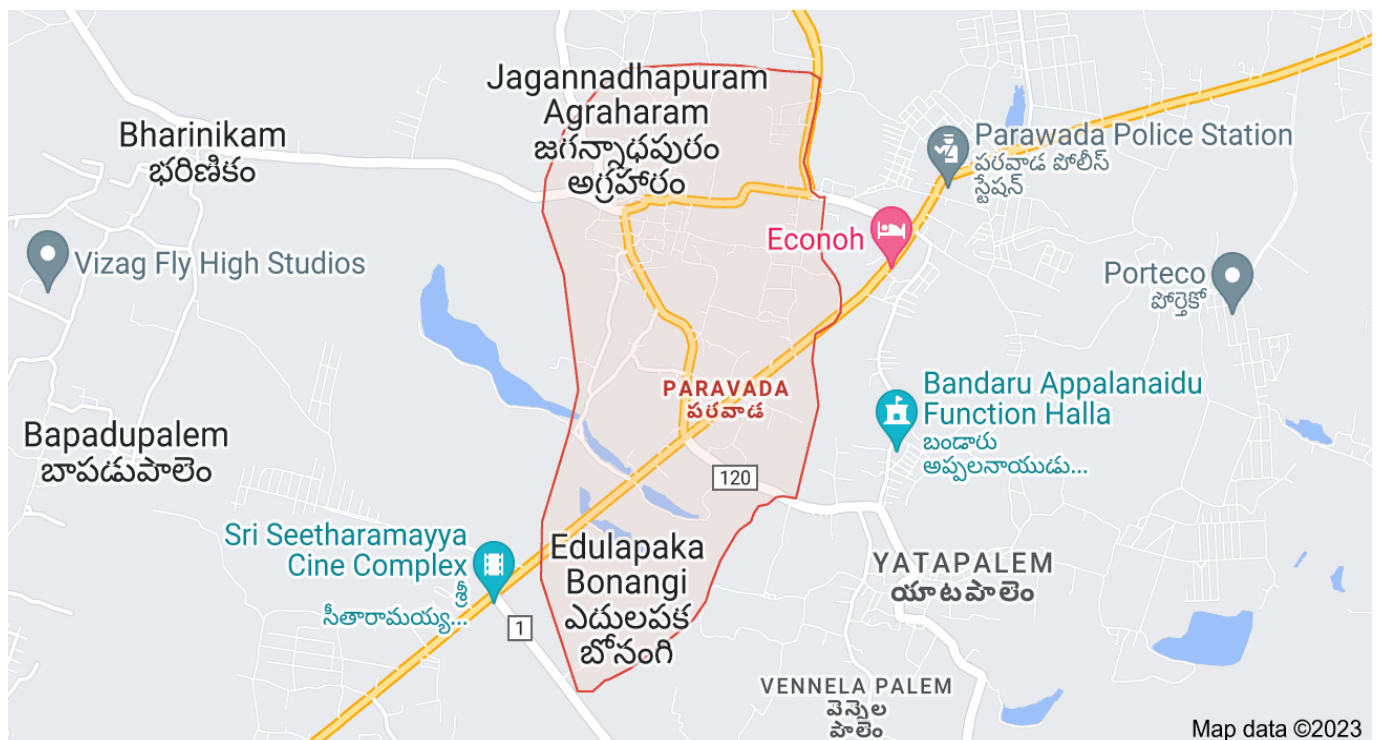
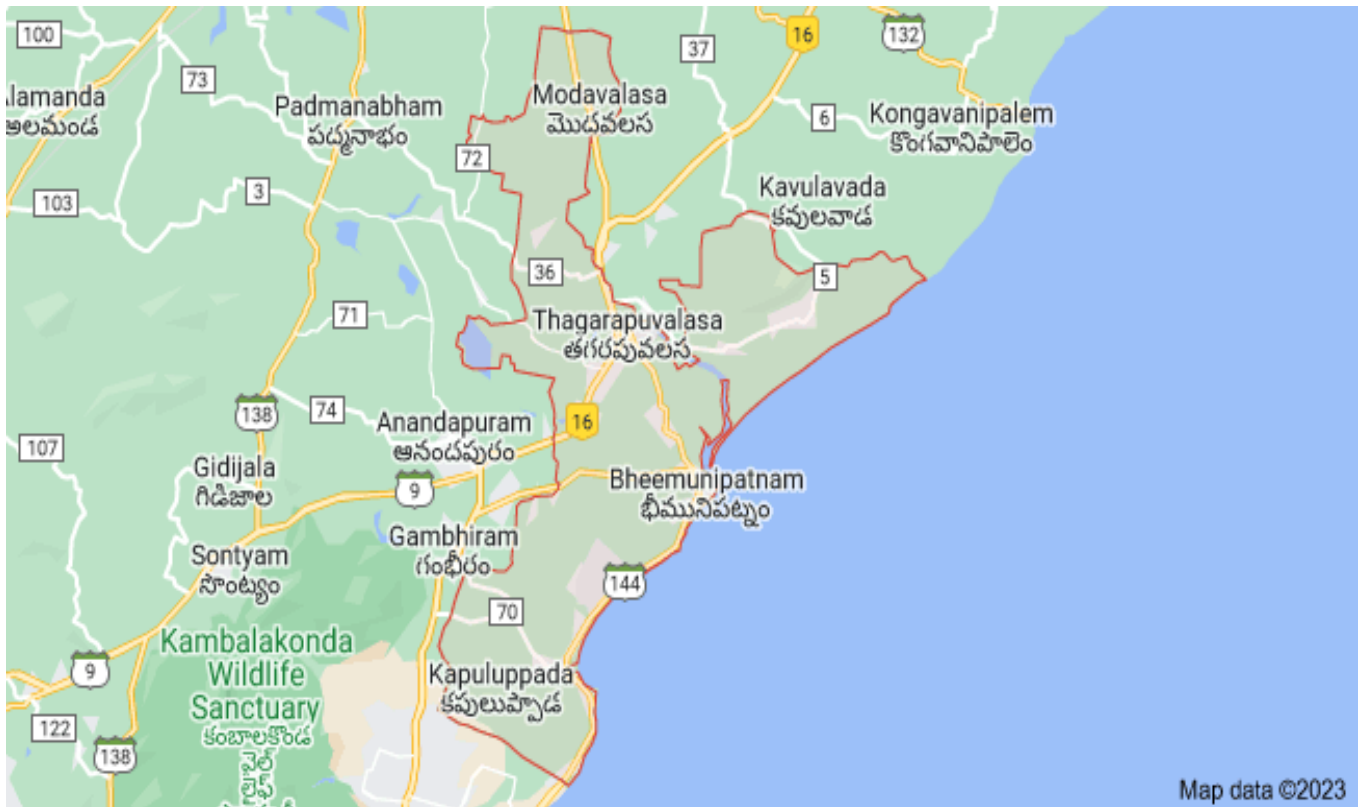
Parawada is an industrial zone located about 39km from the city centre on the vskp-gjw mine line .actually parawada is a mandal in anakapalli district in the state of ap in india .parawada neighbourhood NTPC simhadri beside parawada.

It has a large number of pharmaceuticals ,chemical industries.so,in this area water is most drug polluted.

The average annual rain fall is 580-1045mm.the areas are covered by various chemical and soil like red loaming,sandy and black cotton soil.the peak temperature was recorded in the year 2016 was 44°C in the month of april and the lowest temperature was 11°C recorded in December .relative humidity of 57% and 48% was observed in april and oct.respectively.the major river sarada in the surrounding of anakapalli in general the water level is below 5.7m .the water level fluctuates from 15% to 23%

Parawada is the major industrial hub of anakapalli in the major city of vskp.industries such as chemical industries,paper industries,polymer products pvt.ltd.ferro and non-ferro industries,paints industries,pharma industries,large port ,apiic industries.

However the highest level of drug pollution in water was found in parawada and its related areas from 2011,nearly 20 different manufactured drugs in water.the pollution results found in water by the overall small and large local pharmaceutical companies.



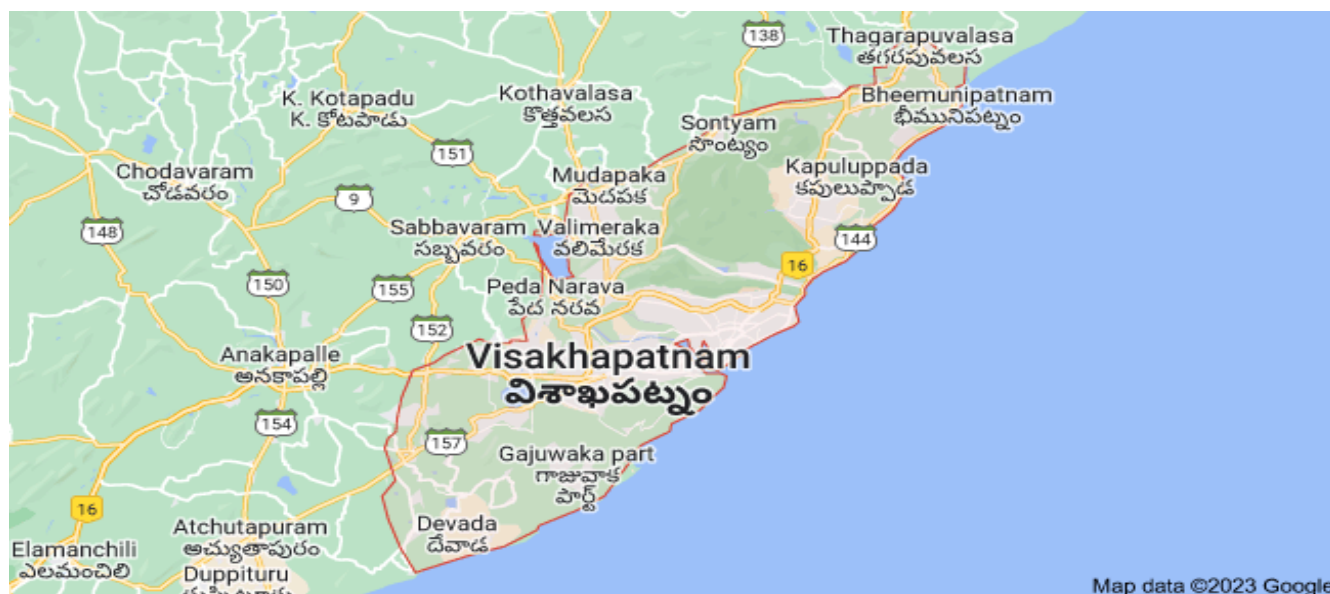
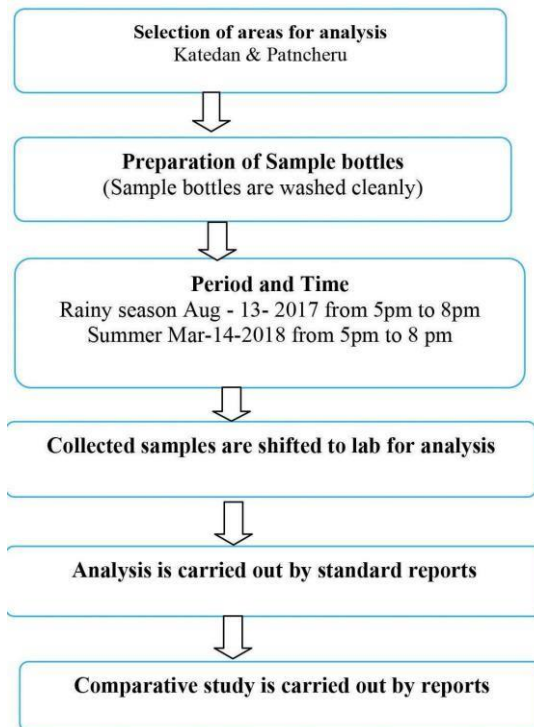


Table:

| Area/place | Borewell Depth(ft) | Arsenic level in □ g/l summer season | Arsenic level in □ g/l rainy season |
|----------------|--------------------|---|--|
| Bheemunipatnam | 165-170 | 15.5 | 4.3 |
| Tagarapuvalasa | 105-110 | 14.0 | 3.8 |
| Anandpuram | 110-120 | 11.0 | 2.9 |
| Parawada | 115-125 | 16.8 | 8.5 |
| Thanam | 120-130 | 18.0 | 9.5 |
| Anakapalli | 118-126 | 13.8 | 7.4 |
| Atchuthapuram | 120-130 | 14.0 | 5.5 |

Saki Lake is situated very close to the Patancheru Bus Terminus. Patancheru having a large number of pharmaceutical manufacturers, which has resulted in local river water being the most drug polluted water in the world.

Patancheru is located in Sangareddy District in Hyderabad. The average annual rain fall is 868mm. The areas are covered by hard rock like Archaeans, Deccan traps and recent Alluvium and the soils like Red loaming, Sandy and black cotton soil. The peak temperature was recorded in the year 2017 was

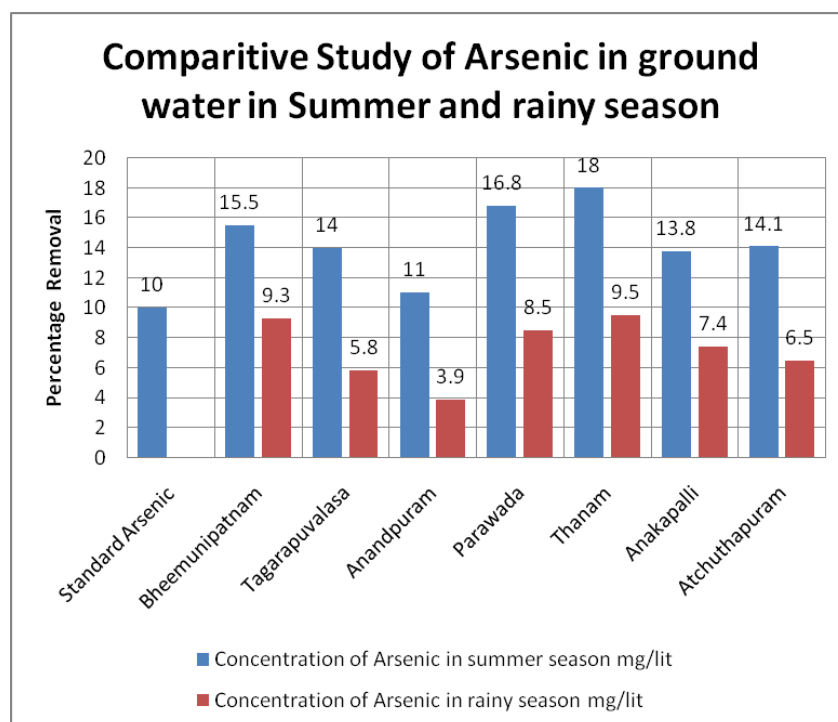


METHODS OF ANALYSIS:

Arsenic kit Arsenomolybdate method

RESULTS AND DISCUSSION:

The ground water analysis is done in a summer and rainy seasons .the arsenic concentration level in ground water is higher in summer season and low in rainy season.this is due to dilution by rain water in rainy season in summer arsenic concentration is very high due to accumulation of arsenic in deeper level.the highest arsenic level in the arsenic 22%. and lowest level 11.1%.



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