# EFFECT OF ALKALI ACTIVATED GEOPOLYMER BALLS FOR BETWA RIVER WATER TREATMENT IN VIDISHA (M.P))

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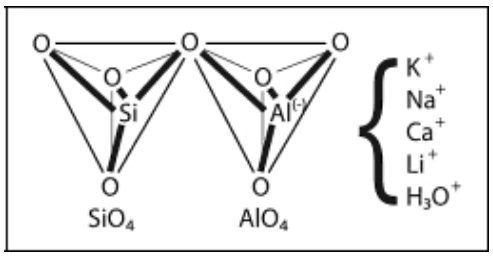
*Abstract :* Activation and an alkaline medium with an elevated PH. The activator for this structures are normally the sodium hydroxide (NaOH) or td with sodium silicate ($Na_2SiO_3$). The thermal treatment in specific temperatures activates the material modifying the crystalline structure to an amorphous one, due to the stored energy. These geopolymers are used in treating waste water and purifying them for consumable levels. In the present work experimental approach is carried out on treatment of BETWA river water by using geopolymers ball with a molarity of 10 M, 15,,17 M in comprising Sodium hydroxide (NaOH), Sodium silicate ($Na_2SiO_3$), Fly ash. The mixture is made in form of balls and used in pre filter with avtivated carbon varying ratios. The result shows that geopolymers Balls are good agents in treating waste water as it degrades the pH value below 8.5.

Keywords - Geopolymer ball .Antiscalant ball , ph,Fly ash

**Introduction**

Today, the need for production of new eco-friendly building materials from nation's natural sources and waste by products has been amplified vastly with an increase of general awareness about environmental issues which led to a rising concern over waste cohort and the comprehension that such materials must be pickled, disregarded or re-claimed. Increasing consumption and the simultaneous increase in the industrial production has caused both a rapid deterioration in natural sources and generation of hefty volumes of waste or by products {1}. Recent studies into the economically sustainable re use of wastes have given upsurge to different offers, including the opportunity of its inclusion in building materials {2, 3}.

These materials characterized under the alkali activated materials and usually known as geopolymer if their resources are from nature of geological pedigrees reach in silicon and aluminum, whereas industrial by products rich in silica and aluminum oxides such as coal fly ash ,silica fumes and granulated blast furnace slag considered as alkali activated materials .Which is the major category ,while the geopolymer can be careful as subset from this as accord with the French scientists Joseph Davidovits in 1978{4,5},who revealed and recognized of the research in geopolymer binder.




**Tetrahedral Configuration of Sialate (Davidovits, 1976).**

The binding phase in geopolymer is an amorphous aluminosilicate gel that be inherent in of a three dimensional framework of $SiO_4$ and $AlO_4$ tetrahedral linked by corner shaded O atoms in figure1,{6-8}.Geopolymer binders clasp many advanced properties over traditional ones although the most important is their low manufacturing energy intake and low $CO_2$ emission {9,10},which can be fixed as a Green Materials{11}.The important of green materials increased also immensely with the

increased ability for producing lightweight building materials in construction sector that can shield heat and sound, where traditionally ,ordinary Portland cement (OPC) has been used as the binder for concrete{12-14},exhibits high thermal transmission and said to be responsible for about 7% of the $CO_2$ emission wide-reaching.

Provide better thermal insulation for buildings, and cost less to transport and stiff when pre-fabricated structural components are made in factories, where using lightweight block is one of the important ways to making geopolymer as a light weight building materials.

The use of lower densities block is useful in terms of structural load bearing, and as an acoustic and thermal insulation. The densities can be reduced by replacing part of solids by air voids {15, 16}.

Numerous materials are available to suit lightweight production one of such chemical to generate gas within the mixture is metallic aluminium powder or flask and hydrogen peroxide ($H_2O_2$), which is very reactive in alkaline environments, such as calcium hydroxide or sulphate; the hydrogen peroxide and aluminium both has released the $H_2$ gas. Aluminium dissolved as aluminate $AlO_2$ and $H_2$ gas is enlightened and trapped within the cementitious paste expanding to surge the volume. In order to avert the escape of the gas, the paste much has a proper consistency and fast setting times {17, 18}.

- PH
- Alkantity
- Total dissolved solid
- Chloride
- Iron
- Sulphate

## I. Experimental Procedure

II. To carry out the present case study on BETWA river water

III. To make the Geopolymer ball in different molarity material using fly ash, sodium silicate and sodium hydroxide.

IV. To carry out water treatment using Alum Antiscalant Balls on BETWA river water.

V. To calibrate results on three days study on varying percent of sodium hydroxide and sodium silicate with water.

VI. To compare results based on pH, alkalinity, total dissolved salts, content of chloride, sulphate and iron values on different cases of water treatment.

**1.1Methodology:-** The complete methodology is carried out experimentally. At the initial stage materials are procured. The water is collected in containers from BETW RIVER WATER.
The initial value PH level in the procured water was above 8.6 which is harmful and not suitable for consumption

**1.2 Geopolymer material:** NaOH is Available in college. $Na_2SiO_3$collected from Department lab and Fly ash are collected in quantity of 5 kg for each of the cases described below.
**1.3** Three different cases for geopolymers materials are made in form of balls

**Case 1**

The mixture is made from fly ash, Na2si03, Noah and water. The amount and ratio is given in table below

**TABLE 1**

| Case 1 | Fly ash | $Na_2SiO_3$ | NaOH | Water | Molarity |
|---|---|---|---|---|---|
| Quantity | 5 Kg | 600 Gram | 400 Gram | 600 Ml | 10 |

**Case 2:**

**TABLE 2**

| Case 2 | Fly ash | $Na_2SiO_3$ | NaOH | Water | Molarity |
|---|---|---|---|---|---|
| Quantity | 5 kg | 400 Gram | 600 Gram | 625 Ml | 15 |

**Case 3:**

**TABLE 3**

| Case 3 | Fly ash | $Na_2SiO_3$ | NaOH | Water | Molarity |
|---|---|---|---|---|---|
| Quantity | 5 kg | 700 Gram | 700 Gram | 700 ml | 17 |

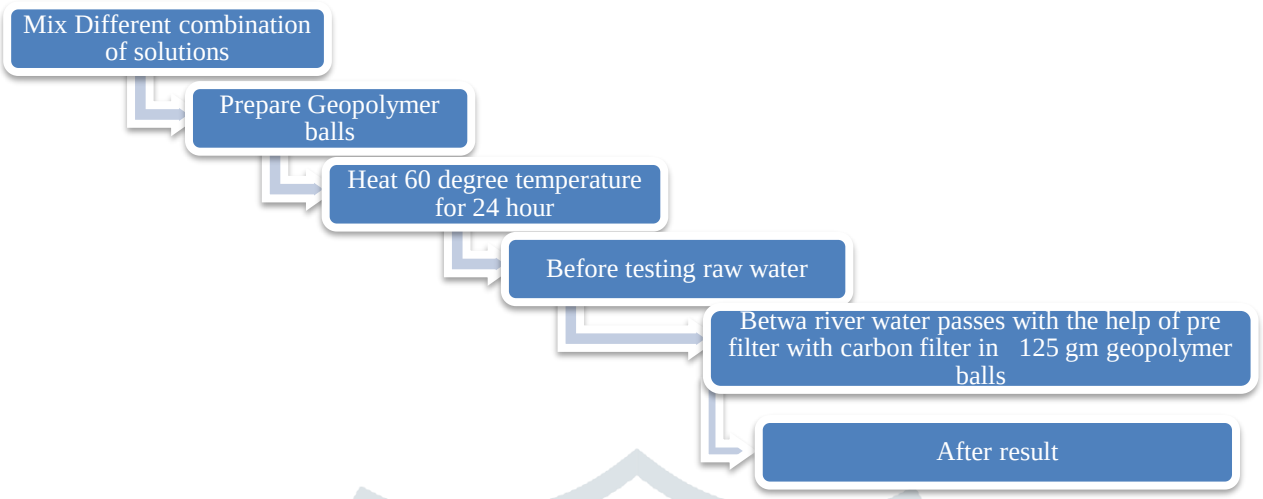



Fig 1.1

ANTI SCALENT BALLS GEOPOLYMER BALL PRE FILTER CARBON FILTER

**1.4 RESULTS AND DISSCUSIONS**

RESULTS COMPARSION ALKANITY, TDS (TOTAL DISSOLVED SOLID, CHLORIDE, IRON AND SULPHATE CONTENT . IS CODE 10500:1991

| SAMPLE | PH | ALKANITY(mg/l) | TDS(mg/l) | CHLORIDE (mg/l) | IRON(mg/l) | SULPHATE (mg/l) |
|---|---|---|---|---|---|---|
| Raw water | 8.3 | 150 | 700 | 105 | 0.18 | 38 |
| Antiscalant ball | 8.4 | 160 | 460 | 90 | 0.16 | 28 |
| Case 1 | 7.85 | 300 | 667 | 75 | 0.16 | 32 |
| Case 2 | 7.92 | 210 | 726 | 85 | 0.14 | 30 |
| Case 3 | 7.82 | 215 | 702 | 95 | 0.17 | 26 |
| Combination of different geopolymer balls | 7.9 | 220 | 667 | 100 | 0.11 | 30 |

- Complete process of making Geoploymer balls is successfully incorporated and the results for pH values, Alkanity, TDS (total dissolved solids), chloride, iron and Suphate for all three cases are obtained as per IS CODE 10500:1991
- The final dried geopolymer balls were put inside the Pre filter with activated carbon candle
- The process of filter is carried out for 1 liter of water collected for cases 1, case 2, and case 3 and combination of balls and pass 20 minutes from all 3 cases.

**1.5 Conculsion** :- The complete experiment is performed successfully and required results are obtained. It was observed that geopolymer balls compare to Antiscalent ball is worthy water content plays the major role in the end product properties. This water content value rises the adsorption capacity of the end geopolymer ball toward micro pollutant. Accordingly, these Geopolymer balls could be used for the, water channels/pipes, and low cost macro-scale water filtration Systems. The current work successfully shows that geopolymers are an efficient method for treating waste water as the parameters obtained in the results for pH, Alkanity, TDS (total dissolved solids), chloride, iron and Sulphate contents are within the permissible limits and are hence safe for consumption IS CODE 10500:1991.

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