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STUDY AND ANALYSIS OF EKG APPLICATION TO SPORTS TURF

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Abstract —— *New applications for geosynthetics have been identified by combining the electrokinetic phenomena of electroosmosis, electrophoresis and associated electrokinetic functions such as electrolysis with the traditional functions of geosynthetics of drainage, filtration, containment and reinforcement to form electokinetic geosynthetics. Electrokinetic geosynthetics (EKG) have been identified as a technology, which combines a wide variety of materials, functions and processes to perform such diverse functions as dewatering, strengthening and conditioning in materials such as soils, sludges, slurries, tailings and composts.. The benefits and drivers for the use of EKG applications include, countering climate change, reduction in carbon footprint of processes, reduced costs, water recovery and compliance with legal directives.. On a technical level the use of electrokinetic techniques can be used to counteract climate change and reduce the risk of liquefaction of tailings.. In the biological dimension the effectiveness of EKG methods relates to increased biological activity in relation to increased oxygen availability and warmer temperatures and varying pH. Also it is used to stablise slopes in the areas where the soil is very weak and high moisture content. Applications have been identified in a range of industrial sectors including water, mining, civil and environmental engineering, food and sport..When used on natural sports turf, the combined effects include control of water flow, pore pressure, pH and oxygen levels. The result have shown that controlled application of electrokinetic phenomena using EKG provide several key benefits including: dewatering to influence water content, shear strength and ball bounce, and aeration of the root zone with increased root respiration and microbiological activity. Thus we have utilize the Electrokinetic geosynthetics (EKG) to a new form of stabilising the sports turf and we have interprete the result of the sports turf before and after applying the technique.*

Keywords- *geosynthetics,electrokinetic function,sports turf,unconfined compression strength,ph value.*

I. INTRODUCTION

Electrokinetics refers to the relationship between electrical potential and the movement of water and charged particles. Effects directly related to the application of a voltage via electrodes include; heating, electrolysis of water, and other electrochemical processes. Under a DC voltage water flows by electro osmosis from the anode (+ve) to the cathode (-ve).

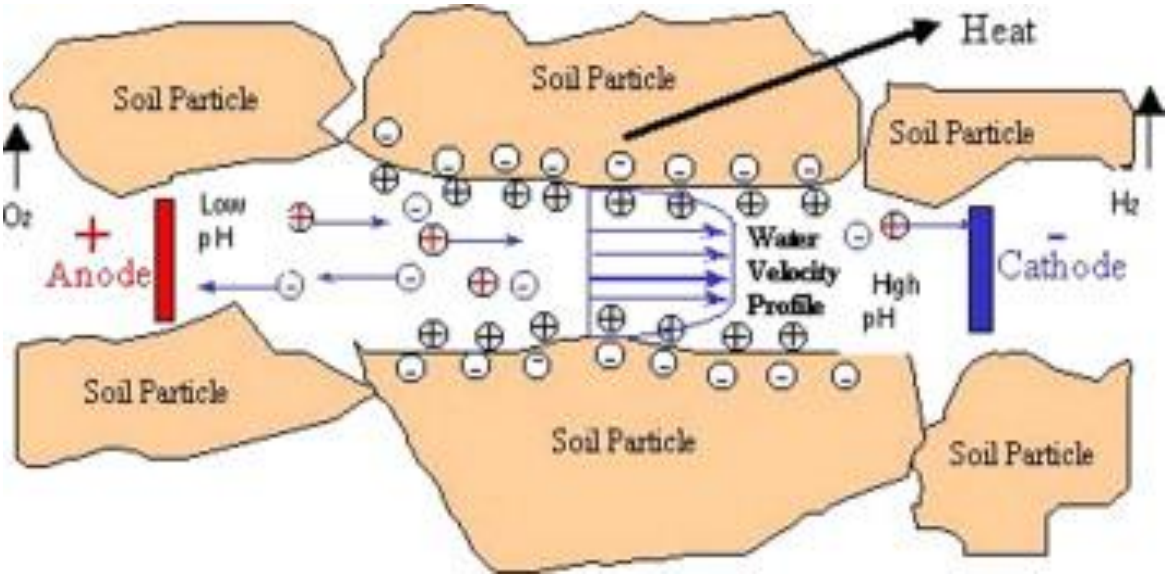


Fig 1:electrokinetic function diagram.

Removal of water from the cathode causes changes in the material such as an increase in strength (useful in turf stablisation) and a reduction in volume . Additional processes include:

- Movement of positive and negative ions (useful in soil conditioning or decontamination)
- Movement of particles in the water (removal of pathogenic bacteria)
- Production of oxygen at the anode (useful for composting and sports turf aeration)
- Production of heat (useful for composting and frost prevention in sports turf)
- Changes in pH (useful in regulating the acidity of growing media for sports turfs)
- Oxygenation reactions or electrochemical hardening of soils (useful in turf stabilisation).

II. MATERIALS AND METHODOLOGY

2.1.Materials

Anode :Copper rod
Cathode :Stainless steel with geogrid

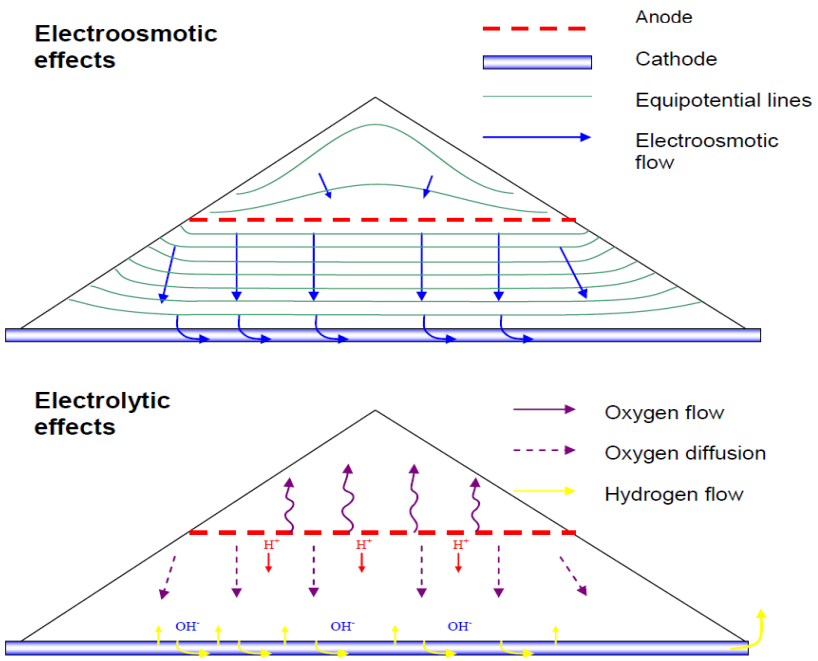
2.2.Methodology

Laboratory scale model was constructed using stainless steel sheet. The dimensions of the model are120cm X 120cm X 60cm as shown .. Conductive geogrid was placed on bottom of tank to act as cathode with the copper electrodesbeing placed horizontally at a distance above from the cathode toact as anode. Cathodes are created from geogrid by interlacing stainless steel wires in the textile.A 10 mm diameter and 300 mm long copper electrode was used as the anode. The conductive geotextile used was woven with steel filaments in warp direction only. The steel filament made thegeogrid conductive. The electrodes were then connected using standard flexible copper wire to an battery. A voltage of 10V,20V,30V was applied to the soil. After the test water content, pHvalue,and unconfined compressive strength were noted. Tests were repeated two times..before and after treatment were found out.

III. TABULATION AND PROCEDURE

Table 1: Variation of volts and amps applied to soil

SOIL PARTICULARS	AMPS AND VOLTS APPLIED	SYMBOLUSED
NATURAL SOIL	0AMPS 0VOLTS	NS
SOIL SAMPLE 1	NATURAL SOIL + 10AMPS AND 10VOLTS	S1
SOIL SAMPLE 2	NATURAL SOIL + 20 AMPS AND 20VOLTS	S2
SOIL SAMPLE 3	NATURALSOIL + 30 AMPS AND 30VOLTS	S3



Thus the soil is classified based on the volts and amps supplied.Batteries are connected in series for test.As the process continues it makes hydrogen to flow down towards cathode and makes oxygen flow upward making grass growth good.Also it helps the soil in turf to stablise and thereby it increase the ball bounce.

IV. RESULT

Table 2: Variation of results with different volts and amps applied to soil.

DESCRIPTION	NS	S1	S2	S3
PH VALUE	4.5	2.5	1.9	1.2
UNCONFINED COMPRESSION STRENGTH N/mm^2	0.0005	0.0009	0.001	0.0012
MOISTURE CONTENT	10	8	6	2.5

4.1PH VALUE:

Chart 1 shows pHvalue goes on decreasing on increasing volts and amps.This pH value is taken from pHmeter.This value is taken on anode side as hydrogen ion concentration moves towards cathode side.In anode side oxygen releasing goes on increasing resulting in good growth of grass in turf.

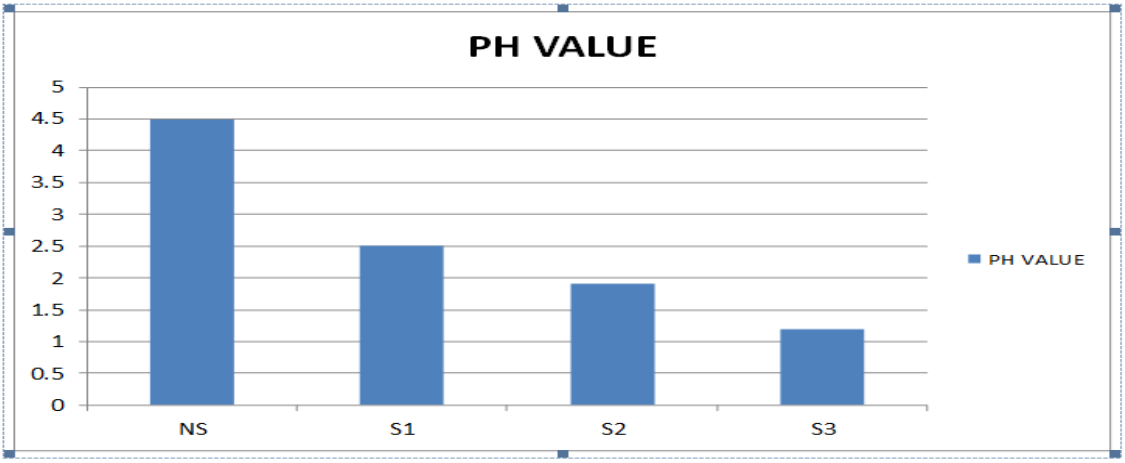


Chart 1:Variation in pHvalue for different volts and amps.

4.2UNCONFINED COMPRESSION STRENGTH:

Chart 2 shows unconfined compression test goes on increasing on increasing volts and amps.This value is taken from unconfined compression test..This value show that increasing strength increases ball bounce and helps in playing.

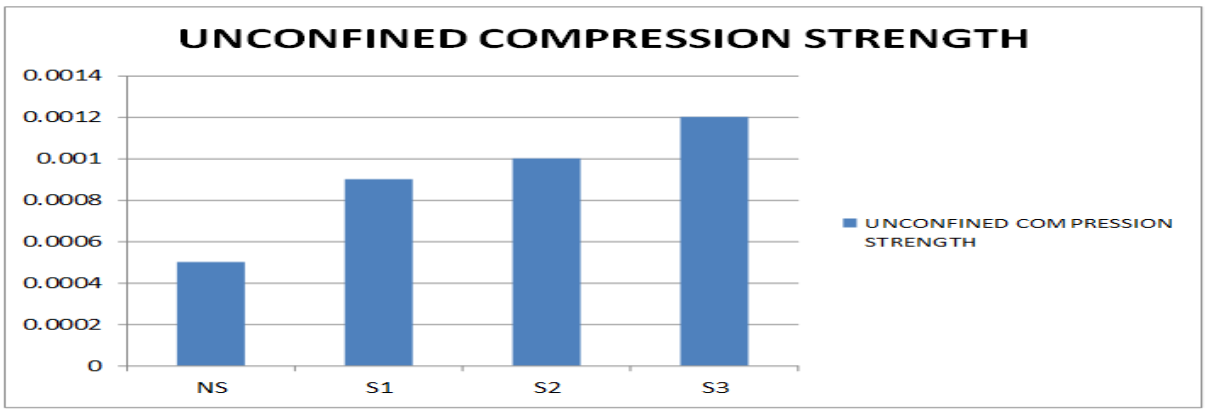


Chart 2:Variation in unconfined compression strength for different volts and amps.

4.3MOISTURE CONTENT:

Chart 3 shows moisture content goes on decreasing on increasing volts and amps.This value is taken from moisture meter..This value show that decresing moisture content increases soil stablisation of turf and helps in dewatering of turf.

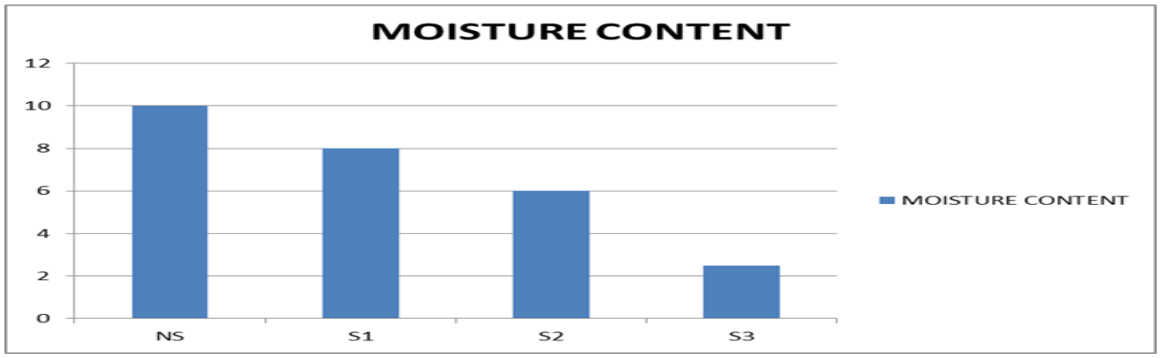


Chart 3:Variation in moisture content for different volts and amps.

V CONCLUSION

- PHvalue goes on decreasing on increasing volts and amps. This value is taken on anode side as hydrogen ion concentration moves towards cathode side.In anode side oxygen releasing goes on increasing resulting in good growth of grass in turf. Also it helps in degrowth of weeds.

- Unconfined compression test values goes on increasing on increasing volts and amps. This value show that increasing strength increases ball bounce and helps in playing. for players .It also helps in soil strength increasing parameter.

- Moisture content goes on decreasing on increasing volts and amps. This value show that decresing moisture content increases soil stablisation of turf and helps in dewatering of turf.

- Thus these three values helps in maintain the sports turf in good condition.Also in depth research has not done because it is connected more with biological methods.

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