

Eco Friendly Brick Produced by the Reaction of Bacteria

D.Karunagaran

Assistant Professor, Dept. of Chemical Engineering,
Sri Sivasubramania Nadar College of Engineering, Kancheepuram

Abstract

This paper discuss about the preparation of soil bricks using the bacteria which will give effective way to settle down in the natural phenomena. The bacteria that is used for the concrete repair to eradicate the plugging of pores and to avoid the cracks in the concrete. In this process it uses the microbial mineral precipitation to manufacture the bricks which will improve the behavioural pattern of the concrete. Also it will discuss about the chemical process takes place in the concrete. In this it will produce the adverse effect of the enviroment friendly bricks.

Key Terms : chemical process, bacteria, MICP

I. INTRODUCTION

This paper speaks about the brick making in using the microbial bacteria. The concrete that forms the major component in the construction which will show the easy availability and the convinent cost. It uses the microbiologically induced calcium carbonate precipitation (MICP) to settle down the soil and it will be create more stability to the brick. It will also used this for the various process. It has the ability to set the heal the crack of the construction materials. It will induce some microbial activities which will results some sedimentation process. The processes that will be occurred inside and outside the microbial cell were create some distance away with in the concrete. This bio mineralogy concept will increase the potential invention of the new material. In this process the bricks can be manufactured in the room temperature itself. Therefore it will create the unpolluted environment. In this process the microbiological calcium precipitate will stick as microbes in the sand that joined together like glue which results the brick that turns to the sand stone.

II. EXISTING SYSTEM

In this existing system the process of the brick made by using the wood, charcoal and some other fuel products. It will exit the carbon components which will pollute the environment and it will leads to the sub healing process. These bricks are not stable and it will not be used for the reusable process and this will produce the environmental degradation. To make the brick from the clay is the tedious process. It will take many steps to manufacture the process. Therefore it will extract more man power and the suitable climatic condition

for the process of brick making. The preheating process will take place before making the brick into the proper structure.

III. PROPOSED METHODOLOGY

In this proposed methodology the bricks can be manufactured using the bio-bacteria which will exist the harmful effects and also helps to reproduce the same process from the existing brick. This process will also reduce the man power and it will form the bricks in the room temperature itself.

IV. BACTERIA USED IN CONCRETE

The bacteria are mainly classified into three types based on its shapes, gram stain and the oxygen demand. Among these bacteria there are some self healing bacteria which will do some favor effects. When the sand molded structure is breaked the water seeps inside the crack will damage the brick formation. The bacteria will provide the precise environment and it will germinate the contact with the water and it will feed on the sand like a glue of calcium lactate. These types of bacteria is called genus bacillus along with this it uses nitrogen and phosphorus to fix with the content. The bacteria that feeds the oxygen to the content and it is consumed to the calcium lactate which is converted to the insoluble limestone. This will provide the additional advantage for the manufacturing process. When the water seeps into the concrete it will induce the bacteria to generate automatically and it will multiply quickly. This will helps to convert the nutrients into lime stone within seven days. For the normal manufacturing of the bricks it will take several weeks ago for the process. This will process in the very low temperature which is the added advantage to the to settle the concrete stably.



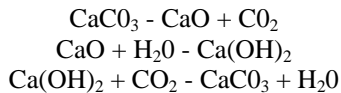
FIG 1: MICP BACTERIA

It will also use the anaerobic type of bacteria which will be used along with the concrete to fix

them predominantly. The bacterium first germinates by the pores and it will be manifested with the quorum sensing to grow large amount of bacteria at particular time in the proper medium.

V. CHEMICAL REACTION OF BACTERIA IN BIO BRICK

In this process it will use different types of bacteria. Also it uses the calcium carbonate precipitate in various ways. To govern the bacteria based on the four factors the concentration of the calcium and the concentration should dissolved only in the inorganic carbon and the PH value and the availability of nucleation.



The concentration of the carbonate ions will be related to the concentration of the dissolved inorganic carbon based on the exposure of the atmosphere which depends upon some environmental factors such as temperature and the pressure of carbon dioxide. By altering some of the precipitation parameters the influence of micro organism will be increased and in the sulphur cycle the particular sulphate reduction was done. This was the process in the that should be carried out in the bio mineralization sulphate reducing bacteria under anoxic conditions. The microbial reaction will increase the both PH and the concentration of the dissolved inorganic carbon. The urea is induced as a catalyst for this process.

The conventional process of building the chain reaction in the microbial induced calcium carbonate precipitation using the nontoxic bacteria in the sand that requires no heat for hardening the process. The calcite precipitation were produced to be induced the reactions in the perfect measures and terms. The bacteria which provide the precise environment that will form the combination of the nitrogen and calcium for the conversion of the lime stone will form the natural bio brick in the room temperature. The water component used in the mixture is to deliver the sedimentation reagent and to recycle the closed loop system.

The biomason uses bacteria to form sand into the crystalline structure that is used to from the bio bricks in the proper structure. It will also find a way to set the change in the climatic condition and that will produce the marvelous effect in the precise environment. The bacteria that induce the calcite precipitation in the sand and yields the bricks with the stone like properties.

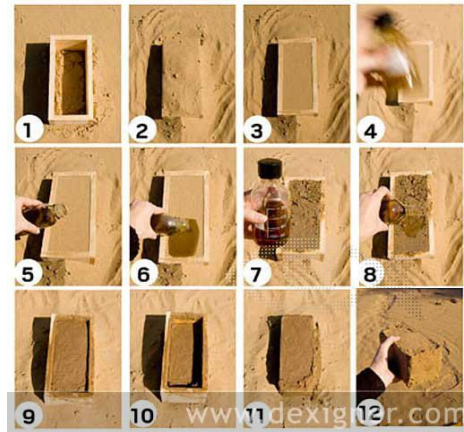


Fig 2: Process of Bio Brick

The calcite precipitation will produce the vast amount of that will convert the ammonia to nitrate which is penetrated in brick formation and it is caused by the nonpathogenic bacteria. Within the few days the chemical reaction that fit into the mineral growth will fuse the sand and brick.

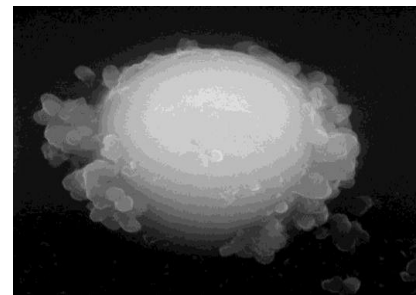


Fig 3: Bacteria Used for Brick Formation

This process will be helpful to the environment as well as the in the construction work. This bio brick will be very strong and it will stand together in any natural calamities. It will be used very effective and this process is the reusable process. The microbes that is used for the remedial for the building materials with the enhancing the durability in the characteristics. The form filled with the alternating layer of sand with the help of non pathogenic bacteria with the mineral substances by using microbial induced calcium precipitate process.

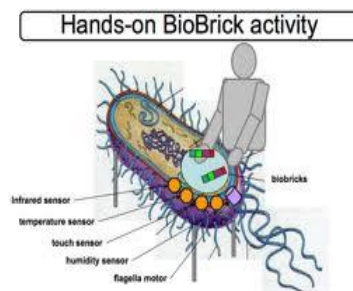


Fig 4: Processing of Bio Brick Activity

In the manufacturing process the calcium precipitate will be added as a catalyst for the clay to make brick in the room temperature. That is induced

with the reaction of calcium salicilite as the catalytic product for the sediment of bricks without cracking. Mainly in this process the bacteria will be used to reduce the cracking in the bio brick while the conversion process is takes place. In the sand molded structure it will not allow the water to turn inside the clay for the sedimentation process.

Since the micro organisms will be used for the various products it will be reacted in the clay at the room temperature to form the bio brick along with this it will use the microbial precipitate for the sedimentation of the brick process. Only some changes will be made with the micro organisms and in non toxic substance to give the advanced effects in the brick making process.

VI. CONCLUSION

This paper provides the solution for the process of brick making using the bacteria. Since the bacteria will be used for the many purpose it will also used in the civil construction and this process will be used for the brick manufacturing. The different types of bacteria with different properties to produce the amount of calcite precipitation may help the chemical process. It will observe the significant strength of bacteria in the manufacturing of bio brick. The brick making process will eliminate the carbon dioxide associated with the fire. The carbon will be removed from the atmosphere because of the bacteria. The process has also the potentiality to remove the pollution from the environment.

REFERENCES

- [1] K. D. Arunachalam, K. S. Sathyannarayanan, B. S. Darshan, and R. B. Raja, "Studies on the Characterization of Bio sealant properties of Bacillus sphaericus," International Journal of Engineering Science and Technology, vol.2, no.3, 2010, pp. 270–277.
- [2] Annie Peter,J, Lakshmanan.N, Devadas Manoharan.P, Rajamane.N.P & Gopalakrishnan. S —Flexural Behaviour of RC Beams Using Self Compacting Concretel. The Indian Concrete Journal, June 2004, PP 66- 72.
- [3] Benini S, Rypniewski W, Wilson KS, Miletti S, Ciurli S, Mangani S., "A new proposal for urease mechanism based on the crystal structures of the native and inhibited enzyme from Bacillus pasteurii: why urea hydrolysis costs two nickels." Structure7, 1999, pp.205-216.
- [4] Ghosh P, Mandal S, Chattopadhyay BD, Pal S., "Use of microorganism to improve the strength of cement mortar." Cement and Concrete Research 35, 2005, pp.1980-1983.
- [5] P. Tiano, L. Biagiotti, G. Mastromei, "Bacterial biomediated calcite precipitation for monumental stones conservation: methods of evaluation", Journal of Microbiological Methods, Vol.36, Issues 1–2,1999, pp.139 145.
- [6] [6] Seshagiri Rao M.V., Ch Sasikala V. and Srinivasa Reddy, "A Biological Approach To Enhance Strength And Durability In Concrete" Structures, International Journal of Advances in Engineering and Technology (IJAET), Sept 2012 4(2), 392 -399 (2012).
- [7] V. Ramakrishnan, R. K. Panchalan, S. S. Bang, and R.City, "Improvement of Concrete Durability By Bacterial Mineral Precipitation," International Conference on Fracture, 2005.
- [8] N. Chahal, R. Siddique, and A. Rajor, "Influence of bacteria on the compressive strength, water absorption and rapid chloride permeability of fly ash concrete,"Construction and Building Materials, vol.28, no.1, 2012, pp.351-356.
- [9] N. De Belie and W. De Muynck, "Crack repair in concrete using bio deposition," Concrete Repair, Rehabilitation and Retrofitting II, 2009, pp.777–782.
- [10] Muynck W, Dick J, De Graef B, De Windt W, Verstraete W, De Belie N., "Microbial ureolytic calcium carbonate precipitation for remediation of concrete surfaces." Proceedings of International conference on concrete repair, rehabilitation and retrofitting, South Africa, Cape Town, 2005, pp. 296-297.
- [11] Tai C.Y. and Chen F.B., Polymorphism of CaCO₃ precipitated in a constant composition environment. AIChE Journal , 44(8), 1790 - 1798 (1998).
- [12] Ciurli S, Marzadori C, Benini S, Deiana S, GessaC., "Urease from the soil bacterium: Bacillus pasteurii immobilization on Ca polygalacturonate." Soil Biol Bio chem 28, 1996, pp. 811-817.