WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Review on Concrete Blocks with Phosphogypsum

Rakeshwaran S [a], Dr. J. Premalatha [b]

[a] *Student, Kumaraguru College of Technology, Coimbatore, India.*
[b] *Professor, Kumaraguru College of Technology, Coimbatore, India.*

A B S T R A C T

This study reports and discusses a quick review of the literature on introduce phosphogypsum into the manufacturing of solid blocks by decreasing the cement content. Phosphogypsum is generated as a waste material from the production of the phosphoric acid in Fertilizer industry.

Keywords: Concrete blocks, Phosphogypsum, Alccofine, lime, Compressive strength, cement

1. Introduction

Solid blocks are construction materials that are commonly used in the building industry. These blocks are typically made from a mixture of cement, sand, and aggregates, such as gravel or crushed stone. They are produced through a process of compression and curing, in which the mixture is placed in a mold and allowed to set and harden. Solid blocks are available in a variety of sizes and shapes, including rectangular and square shapes, as well as different thicknesses. They are commonly used for the construction of walls, foundations, and other load-bearing structures, as they provide a strong and durable foundation for building. One of the benefits of using solid blocks is that they are relatively easy to work with and can be cut or shaped to fit a specific project..

2. Previous Studies on Phosphogypsum

Yanxin Wang, Chunjie Yan, Hui Gao, Zhu Shu, and Jun Zhou (2017) In this study, the Hydration-Recrystallization method is used to create non-fired bricks using waste phosphogypsum as the primary raw material. The recommended mix contains 75.0% phosphogypsum, 19.5% river sand, 4.0% Portland cement, and 1.5% hydrated lime; the corresponding compressive strength. and 1.5% hydrated lime; the corresponding compressive strength, water-saturated compressive strength, and bending strength of the bricks as-prepared are 21.8 MPa, 13.7 MPa, and 5.2 MPa, respectively.

Hanan Tayibi , Mohamed Choura, Fe´lix A. Lo´pez , Francisco J. Alguacil, Aurora Lo´pez-Delgado (2009) This paper's discussion of the use of PG raises difficult issues that cannot be resolved. Environmental issues are linked to the significant PG stockpiles and their detrimental effects on the nearby land, water, and air. Around 85% of the PG produced annually is dumped on land or in the ocean. Results from the studies under evaluation highlight the influence of specific chemical factors in relation to PG stacks. PG might be used more efficiently if research on impurity removal and pollutant concentrations connected with PG stacks is conducted. PG recycling is also a political, economic, and scientific issue in addition to an engineering and technological one.

Lassaad Ajam, Mongi Ben Ouezdou , Hayet Sfar Felfoul , Rachid El Mensi (2020) The purpose of this study is to use PG in the production of burnt hollow bricks. Thereafter, as a replacement for sand in brick formulation, the PG, which serves as a grease-remover, was used at various mass percentages of 0%, 5%, 15%, 25%, 30%, and 40%. Next, as a new product, fired mini-bricks were acquired and put through a number of standards testing encompassing aspect analysis, physical, chemical, mechanical, and environmental properties. According to research, up to 30% acceptable.

Hela Garbaya, Abderraouf Jraba, Mohamed Amine Khadimallah,Elimame Elaloui (2014 In this study density had a significant impact on the mechanical characteristics of the manufactured materials PGM 1/1 and PGM 1/2. These materials could be employed as building materials for non-load-bearing constructions or as decorative materials because of their reduced Young's modulus.

Rakhila1, A. Mestari1, S. Azmi1, A. Elmchaouri1 (2015) In this paper it has been discovered that samples up to 40% of PG successfully meet the parameters for the shrinkage. When PG content rises, so do water absorption and porosity. When the amount of PG grows, the chemical attacks on the ceramic materials result in greater weight losses.

Hayet Sfar Felfoul , Nizar Ouertani, Pierre Clastres , Mongi Benouezdou (2017) The use of PG in the creation of burned hollow bricks is the goal of this investigation. The PG, a grease-remover, was then employed in varied mass percentages of 0%, 5%, 15%, 25%, 30%, and 40% to replace sand in the brick formulation. The next step was to acquire burnt mini-bricks as a new product and subject them to a range of standards testing, including aspect analysis and examination of their physical, chemical, mechanical, and environmental qualities. Research indicates that up to 30% is okay.

3. Mineral Admixtures in Solid Blocks

Mineral admixtures increases strength, decrease water absorption, and other qualities of blocks while also improving the economics of combinations. By hydraulic or pozzolanic activity, mineral admixtures modify the characteristics of the hardened concrete. Phosphogypsum, alccofine, and lime powder added on the blocks This results in strength increase due to additional binder produced by the mineral admixtures when they react with lime and alkali present in blocks. The strength of the mix with mineral admixtures results in a higher strength when compared with ordinary blocks.

Phosphogypsum is composed mainly of calcium sulfate dihydrate (gypsum) and contains small amounts of other elements such as phosphorus, fluorine, and radium. It is usually stored in large piles near fertilizer plants or is disposed of in mines or other designated areas. It will be a source of environmental pollution due to the presence of radium, a radioactive element that can cause health problems if it accumulates in soil or water. Therefore, its disposal requires careful management and regulation to ensure that it does not contaminate the environment.

4. Conclusion

After detailed study on this project results and discussion are done

- In this study Cement were partially replaced with phosphogypsum on the hollow blocks.
- By addition of Alccofine and phosphogypsum in various proportions can attain strength of blocks.
- 30% of phosphogypsum acceptable to replacement for a cement as a binding material.
- Compressive strength of blocks may increase and water absorption of the blocks may decrease

References

[1]. IS 2185-1 (2005): Concrete masonry units, Part 1: Hollow and solid concrete blocks.

[2]. Ajam, L., Ouezdou, M. B., Felfoul, H. S., & El Mensi, R. (2009). Characterization of the Tunisian phosphogypsum and its valorization in clay bricks. Construction and Building Materials, 23(10), 3240-3247.

[3]. Ajam, L., Ouezdou, M. B., Felfoul, H. S., & El Mensi, R. (2009). Characterization of the Tunisian phosphogypsum and its valorization in clay bricks. Construction and Building Materials, 23(10), 3240-3247.

[4]. Alcordo, I. S., & Rechcigl, J. E. (1993). Phosphogypsum in agriculture: a review. Advances in agronomy, 49, 55-118.

[5]. Altun, İ. A., & Sert, Y. (2004). Utilization of weathered phosphogypsum as set retarder in Portland cement. Cement and Concrete Research, 34(4), 677-680.

[6]. Bumanis, G., Zorica, J., Bajare, D., & Korjakins, A. (2018). Technological properties of phosphogypsum binder obtained from fertilizer production waste. Energy Procedia, 147, 301-308.

[7]. Calderón-Morales, B. R., García-Martínez, A., Pineda, P., & García-Tenório, R. (2021). Valorization of phosphogypsum in cement-based materials: Limits and potential in eco-efficient construction. Journal of Building Engineering, 44, 102506.

[8]. Chen, Q., Zhang, Q., Qi, C., Fourie, A., & Xiao, C. (2018). Recycling phosphogypsum and construction demolition waste for cemented paste backfill and its environmental impact. Journal of Cleaner Production, 186, 418-429.

[9]. Chernysh, Y., Yakhnenko, O., Chubur, V., & Roubík, H. (2021). Phosphogypsum recycling: a review of environmental issues, current trends, and prospects. Applied Sciences, 11(4), 1575.

[10]. Colombel, J. H. (1978). Utilisation du phosphogypse en assises traitées aux liants hydrauliques, chapitre II: le phosphogypse: utilisation d'un sous produit industriel en technique routière. LPC, numéro spécial VII, Paris.