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An Experimental Investigation on Properties of Concrete by Partial Replacement of Cement with Sulfur

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Abstract: *Knowing how long Mars has been around A new planet has been designated as a "sulfur-rich planet." simulation-based building material The development of Martian soil and molten sulfur. in addition to the availability of raw materials for Creating sulfur concrete, while maintaining its strength achieves levels comparable to traditional cementations materials concrete, low temperature, quick curing resistance to acid and salt in the environment,100% recyclability is a desirable feature. The developed Martian Concrete's properties Different sulfur percentages are tested in this study. The best mixing proportions were investigated. To determine strength development, strength variability, and failure mechanisms, three-point bending, unconfined compression, and splitting tests were used 7days 28 days. The results are compared to sulfur concrete made with ordinary sand. The particle size distribution is found to have a significant impact on the final strength of the mixture. Furthermore, because Martian soil is metal-rich, high-temperature mixing produces sulphates and, possibly, polysulfates, which contribute to the high strength. Due to the difference in gravity between Mars and Earth, the optimal mix developed as Martian Concrete has an unconfined compressive strength of above 50 MPa, which corresponds to a roughly 150 MPa concrete on Mars.*

Keywords: Sulfur Concrete, Martian Soil.

REFERENCES

[1]. J.A Ober *Materials Flow of Sulfur.* U.S. Geological Surevey; Reston, VA, USA: 2002. pp. 1258–2331.

[2]. M.M., VlahovicS.P. Martinovic, T.D., Boljanac P.B., Jovanic Volkov-Husovic T.D. Durability of sulfur concrete in various aggressive environments. *Constr. Build.*

[3]. J.J., Fontana L.J., FarrellJ., AlexandersonH.P., Jr., BallJ.J., BartholomewM., Biswas D.J., Bolton P.D., Carter J., Jr., Chrysogelos Clapp T.R., et al. *Guide for Mixing and Placing Sulfur Concrete in Construction.* ACI; Farmington Hills, MI, USA: 1988.

[4]. . Toutanji H.A., Evans S., Grugel R.N. Performance of lunar sulfur concrete in lunar environments. Constr.Build. Mater. 2012; 29:444–448. doi: 10.1016/j.conbuildmat.2011.10.041.

[5]. Leutner B., Diehl L. Manufacture of Sulfur Concrete. No. 4,025,352. *U.S. Patent.* 1977 May 24;

[6]. Li, Q.; Wang, M.; Sun, H.; Yu, G. Effect of heating rate on the free expansion deformation of concrete during the heating process. J. Build. Eng. 2020, 34, 101896.

[7]. Shui, Z.; Xuan, D.; Chen, W.; Yu, R.; Zhang, R. Cementitious characteristics of hydrated cement paste subjected to various dehydration temperatures. Constr. Build. Mater. 2009, 23, 531–537.

[8]. Wang, G.; Zhang, C.; Zhang, B.; Li, Q.; Shui, Z. Study on the high-temperature behavior and rehydration characteristics of hardened cement paste. Fire Mater. 2015, 39, 741–750.