Turning sewage sludge into concrete

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The disposal of sludge from sewage water treatment is a big issue for wastewater plants in Malaysia. While studies show that the volume of sludge is expected to rise, disposal options are limited due to stricter environmental regulations including a ban on burying sludge in soil due to its high heavy metal content that could cause adverse impacts to the environment. Meanwhile, the construction sector is seeking economic and ecological cement replacement materials in order to meet an increasing demand for concrete.

In a study published in the *Pertanika Journal of Science and Technology*, researchers from Universiti Teknologi MARA investigated the potential of sludge as an alternative cement material for making concrete.

To find out, the researchers first produced domestic waste sludge powder (DWSP). The team dried and burnt wet sludge cake to remove moisture, and then ground and sieved the dried sludge cake to make DWSP. Using different proportions of DWSP (3, 5, 7, 10 and 15%), the researchers mixed it with cement to produce different types of concrete (normal strength Grade 30 and higher strength Grades 40 and 50). They then compared each DWSP concrete mixture with normal concrete in terms of their compressive strength, water absorption, water permeability and rapid chloride ion penetration (i.e. permeability to salt).

The team found that the compressive strengths of DWSP concrete decreased as the proportion of DWSP increased in concrete mix, with the exception of Grade 40 concrete containing 7% DWSP. Also, both water absorption and water permeability increased as the percentage of

DWSP increased. However, normal concrete was more permeable than DWSP concrete of Grade 40, suggesting that DWSP enhanced the durability of this concrete. Additionally, the resistance to chloride permeability increased for concretes with up to 15% DWSP.

"Overall, there is potential for using DWSP as a partial cement replacement. However, more detailed research should be conducted to yield methods for producing quality powder," the researchers concluded.

More information: The paper is available online: www.pertanika.upm.edu.my/Pertanika %20PAPERS/JST%20Vol.%2023%20(2)%20Jul.%202015/04%20JST-0464-2013%20Rev1.pdf

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