

# Mitigation of Internal Expansive Reaction: the Role of Tungsten Mine Sludge

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## Abstract

The concrete degradation caused by internal expansive reaction (IER) is a problem that affects many structures in the world. These reactions, which include the alkali-silica reaction (ASR) and the internal sulphate reaction (ISR) related with delayed ettringite formation, are very dangerous, due the expansive behavior of products formed, that cause the cracking of concrete. So it is urgent to find preventive methods to avoid or mitigate the onset of these reactions in new structures.

This work aims to show the applicability of sludge from a tungsten mine in the mitigation of the IER. To evaluate the effect of sludge in the mitigation of ASR and ISR, mortar and concrete mixes were produced with 30% (%in mass) of cement replacement. The results obtained so far allow stating that tungsten mine sludge as Portland cement replacement could be effective in the ASR and ISR mitigation.

**Keywords:** alkali-silica reaction, delayed ettringite formation, mitigation, tungsten mine sludge, concrete