

**Interferences in Prompt  $\gamma$  Analysis of corrosive contaminants in concrete**  
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**Abstract:** An accelerator-based Prompt Gamma Neutron Activation Analysis (PGNAA) setup has been developed to measure the concentration of corrosive chloride and sulfate contaminants in concrete. The Minimum Detectable Concentration (MDC) limit of chlorine and sulfur in the concrete depends upon the  $\gamma$ -ray used for elemental analysis. For more interfering  $\gamma$ -rays, the MDC limit is higher than that for less interfering  $\gamma$ -rays. The MDC limit of sulfur in concrete measured for the KFUPM PGNAA setup was calculated to be  $0.600.19 \pm 1$  wt%. The MDC limit is equal to the upper limit of sulfur concentration in concrete set by the British Standards. The MDC limit of chlorine in concrete for the KFUPM PGNAA setup, which was calculated for less interfering 1.165 MeV  $\gamma$ -rays, was found to be  $0.0750.025 \pm 1$  wt%. The lower limits of the MDC of chlorine in concrete was 73% higher than the limit set by American Concrete Institute. The limit of the MDC can be improved to the desired standard by increasing the intensity of neutron source. For more interfering 5.715 and 6.110 MeV chlorine  $\gamma$ -rays the MDC limit was found to be 2-3 times larger than that of 1.165 MeV  $\gamma$ -rays. When normalized to the same intensity of the neutron source, the MDC limits of chlorine and sulfur in concrete from the KFUPM PGNAA setup are better than MDC limits of chlorine in concrete obtained with the  $^{241}\text{Am}$ -Be source-based PGNAA setup. This study has shown that an accelerator-based PGNAA setup can be used in chlorine and sulfur analysis of concrete samples. 2006 © Elsevier B.V. All rights reserved.