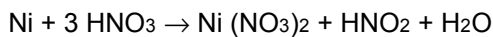


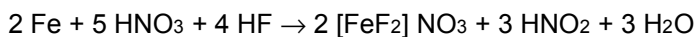
Applications of Hydrogen Peroxide

Hydrogen Peroxide for Prevention of Nitrogen Oxides Emission

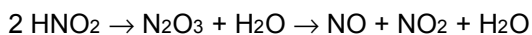
Hydrogen peroxide brings exceptional reductions in NO_x emission levels in the pickling of stainless steel and stripping of heavy metals. In these applications the emission of NO_x is suppressed at its source rather than removed from the gas phase by injecting H₂O₂ directly into the NO_x generating solution, i.e., into the stainless steel pickling liquors. These liquors are usually made up of nitric acid or a combination of nitric and hydrofluoric acid (HNO₃/HF). In heavy metal stripping the metals, e.g. nickel or copper, are dissolved in nitric acid according to the following equation:



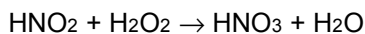
In stainless steel pickling rust and scale is removed from sheets, coils and wire in mixed acid according to



The nitrous acid formed in eq. 1 and 2 is unstable and decomposes via the intermediate N₂O₃ into NO and NO₂ which dissipate as NO_x gases:



The NO_x however, is easily prevented from forming by addition of hydrogen peroxide into the bath. Any nitrous acid or NO_x formed is oxidized in-situ to nitric acid as shown.



The reaction is simple, quick and economical. In this instance, 34 g of 100 % hydrogen peroxide remove 47 g of nitrous acid. However, it is crucial to assure maximum mixing efficiency between hydrogen peroxide and the pickling bath. To facilitate mixing, hydrogen peroxide is preferably injected into the pickling liquor recirculation system. Besides excellent NO_x suppression rates the application of hydrogen peroxide leads to significant reductions in nitric acid consumption as NO_x is oxidized in-situ to HNO₃. No additional treatment like a scrubber system for off-gas is necessary.

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