





## CORROSION INHIBITION OF REINFORCING STEEL BY USING HYDRAZINE HYDRATE\*

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**Abstract**--The effectiveness of hydrazine hydrate as a corrosion inhibitor for reinforcing steel in alkaline media (lime water) has been investigated. It has been found that the critical concentration for inhibition increases with the increase of the aggressive ion concentration. The mechanism of the corrosion inhibition was discussed in terms of competitive adsorption between the aggressive ion and hydrazine at relatively low concentrations of hydrazine. Higher concentrations of hydrazine caused instantaneous passivation of the steel even more readily than that obtained in pure lime water.

### INTRODUCTION

IN AN earlier paper<sup>1</sup> it has been shown that the behaviour of hydrazine is similar to normal anodic inhibitors<sup>2,3</sup> rather than to that of sodium sulphite<sup>4</sup> as believed by several authors.<sup>5,6</sup> A sharp ennoblement of potential occurred at a concentration of  $10^{-2}$  M in distilled water, accompanied by the inhibition of the steel.<sup>1</sup> The mechanism of inhibition by hydrazine is suggested to be due to its preferential adsorption on the local anodes thus inducing anodic polarization.

This paper reports on further studies on the corrosion inhibition of steel by hydrazine, with a special emphasis on the effect of hydrazine on the anodic oxidation of steel in alkaline medium. The experiments were carried out in lime water, simulating the aqueous phase of cement, with the aim of evaluating hydrazine as a corrosion inhibitor for steel in concrete.

### EXPERIMENTAL

Reinforcing steel rods 0.6 cm in diameter and composition 0.20% C, 0.07% S, 0.50% Mn and 0.057% P were used. The rods were cut into electrodes having a length 6 cm and welded to a hard copper wire then fixed in a glass tube by a neutral wax leaving the active electrode area only outside the tube. Just before the measurements the electrode was abraded successively with 0, 00 and 000 grade emery paper and then degreased with acetone.

The electrolyte was lime water of pH  $\sim$  12.5. Calcium chloride and hydrazine (98%) were added to the water in the required concentration. All chemicals used were of c.p. grade.

A galvanostatic polarization technique was utilized in this study, static potential and visual observation were also carried out. A description of the instrumentation has been given elsewhere.<sup>2</sup> All potential values mentioned in this paper are with respect to the saturated calomel electrode.

### RESULTS

Three sets of experiments were performed; each one was carried out using a

\*Manuscript received 28 August 1974.