

The Inhibition of Steel Corrosion and Hydrogen Entry into Metal in the Mineralized Media Containing Carbon Dioxide

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The influence of the technological mixture of the polyaminoamides and polyaminoimidazolines dissolved in the specific mixed organic solvent (AMDOR-IK-3) on the suppression of CO₂ corrosion of carbonaceous steel and hydrogen diffusion into the steel membrane in the slightly acidic (pH = 2 – 6) mineralized (0.25 – 25 g/l NaCl) solutions has been studied. The HCl solutions (0.005 – 0.05 mole/l) containing NaCl and saturated with CO₂ (P = 0.03 – 2 atm) have been used.

The molecules of the inhibiting mixture having several adsorption centers are capable to be protonated on the aminogroups. A portion of the protonated particles increases with decreasing pH.

The protective action increases with increasing inhibitor concentration (50 – 200 mg/l) and lowering pH from 6 to 2. Depending on conditions the inhibitor slows down the anodic process (pH = 6) or both partial electrodic reactions (pH = 2). But the maximum protective action does not exceed 73%.

Retardation of hydrogen permeation into the steel membrane reaches 40 (P(CO₂) = 1 atm) – 70 (P(CO₂) = 0.03 atm)% when pH = 6. In conditions of pH = 2 the flow of hydrogen diffusion into the metal is lowered ten times (P(CO₂) = 0.03 atm) or the process is suppressed practically completely (P(CO₂) = 1 atm).