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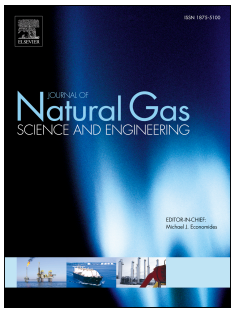

Reduction of chloride ions in the diethanol amine cycle and improvement of the natural gas sweetening

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Reduction of chloride ions in the diethanol amine cycle and improvement of the natural gas sweetening

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Abstract

This study investigates the effects of a continuous decline in chloride ion concentration in the diethanol amine (DEA) solution of a sweetening natural gas system, including the effects on corrosion of the internal surfaces of carbon steel equipment, and on frequently observed problems resulting from an inefficient amine system for the liquefied petroleum gas plant. In this study, output solution samples of DEA from the regeneration tower were analyzed. It was observed that, the number of chloride anions was increased to 350 mg/L; consequently, the concentration of iron ions were also enhanced up to 14 mg/L. These changes confirmed that the internal corrosion rate of the towers and exchangers increases in contact with DEA solution containing a higher concentration of chloride anions and iron ions. In order to reduce the corrosive properties of the DEA solution within the gas sweetening system, continuous removal of chloride anions was accomplished in an ion exchange system based on a strong anionic resin (4200CL- Utilized in water treatment packages). The results showed a decrease of the chloride and iron ion amounts in the diethanol amine solution, which reduced the internal corrosion rate of carbon steel, consequently decreasing non-routine maintenance. The more these heat stable salts (chlorides) decreased the more stability the unit operation gained. According to this study's findings, the plant improved its process of operations and reduced energy consumption.

Keywords: heat stable salts, chloride ion, diethanol amine, corrosion rate, ion exchange resin, gas sweetening system

1. Introduction

The phenomenon of corrosion in the oil and gas industry results in high costs every year; in the United States, corrosion costs have been reported at 5.1 billion dollars per year. About 70% of corrosion costs cannot be reduced, because decomposition of materials, due to corrosion, is inevitable in most cases and prevention efforts may not be economical. The remaining corrosion-associated costs can be reduced through corrosion prevention efforts, which are possible through improved technology [1]. Improvement of the amine system process can play an important role in controlling the damage caused by corrosion of oil and gas equipment, which improves the useful life of the equipment [2, 3]. This process