

Gas Treating Products & Services

Heat Stable Salt Management

Introduction

Amine based gas treating systems can have problems with Heat Stable Amine Salts (HSAS). HSAS cause corrosion, reduced amine capacity poor unit operations, reduced solvent life and solvent disposal problems. The Dow Chemical Company has developed a program that minimizes the problems associated with HSAS, maximizes solvent life, and restores operational reliability. Dow's Heat Stable Salt Management Program is based on a low total cost approach to treat HSAS, reduce HSAS contamination, and minimize the corrosion from HSAS. It is a part of Dow's AMINE MANAGEMENTSM Program.

Benefits of Heat Stable Salt Management

The problems associated with unmanaged HSAS can substantially increase costs and reduce amine system equipment performance and reliability. The Heat Stable Salt Management Program allows the operator to effectively control HSAS and:

- Reduce corrosion and equipment replacement costs
- Reduce or eliminate solvent disposal and associated environmental costs
- Optimize amine system capacity for acid gases and avoid unit shutdowns
- Minimize maintenance costs due to system cleanings and frequent filter changeouts
- Avoid high energy and solvent usage

Heat Stable Salt Management Program Elements

Monitoring and Prediction

Solvent analyses determine the HSAS profile and predict when remedial action is necessary.

Control Strategies

System configuration is studied to determine if operations can be adjusted to reduce the formation of contaminants or to achieve more effective removal of contaminants upstream of the amine system.

Neutralization Technology

Dow has developed and tested in both the field and laboratory a cost-effective means of controlling HSAS via neutralization. The resulting neutralized salt is substantially less corrosive than the amine salt. Therefore, the solvent can tolerate a higher level of HSAS-forming anions, and amine solution life is extended significantly, if not indefinitely. UCARSOLTM DHMTM Neutralizer has been developed to easily and effectively neutralize HSAS. Dow's technical representatives will assist in organizing a neutralization and monitoring program specific to your HSAS problem.

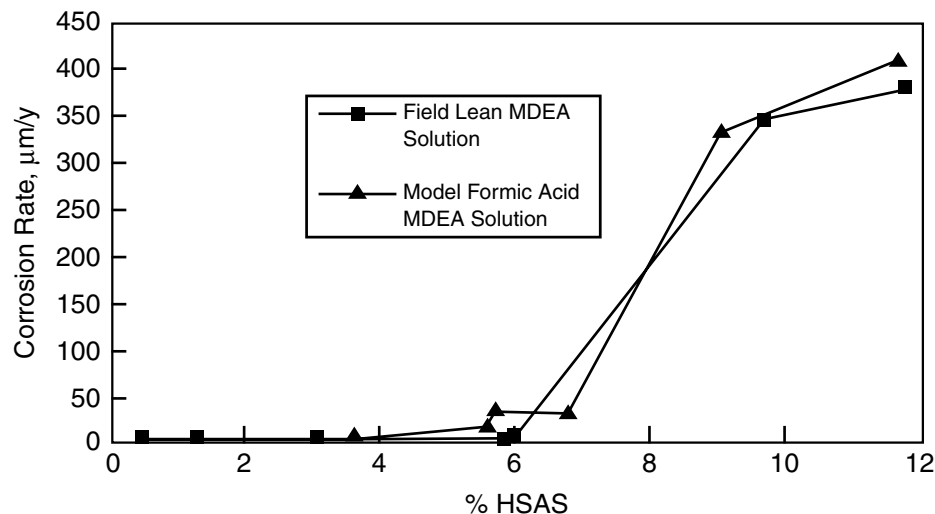
Removal

The system might eventually require some type of solvent purification, especially if solvent losses are low. Purging the solvent to remove HSAS loses valuable amine and is no longer economically or environmentally justifiable. Dow has developed a more cost-effective and cleaner method of solvent purification: the patented UCARSEP™ Amine Reclamation System for on-site and on-line salt removal. This process has been used to clean up UCARSOL, MDEA, and DEA solvents without interruption of amine system operations. For more information, call Dow at the numbers on the back cover of this brochure.

Corrosion Effects of Heat Stable Salts

Figure 1 shows how corrosion rate increases with increasing formate ion concentration in two MDEA solutions. Some other common anions have similar effects.

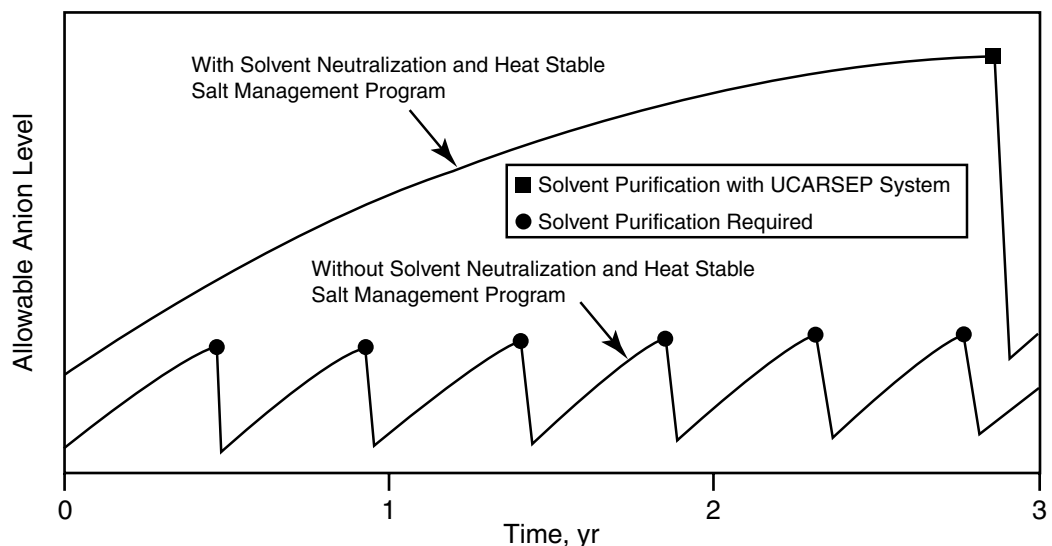
Figure 1 • Effect of Formate HSAS on Corrosion Rate of Field and Model MDEA Solutions



Effect of Neutralization

Heat stable amine salt management/neutralization reduces the operating and corrosion problems associated with HSAS. This control increases the capacity of the solvent for the allowable HSAS anions and greatly reduces the frequency of solvent purification, reclamation, or disposal. Figure 2 provides a dramatic illustration of the effectiveness of Dow's Heat Stable Salt Management Program, with a reduction in solvent purification and cost while maintaining low corrosion and smooth operations.

Figure 2 • Effect of Neutralization



Performance

Plant operating conditions and efficiencies are maintained at consistent and predictable levels with the Heat Stable Salt Management Program. Actual operating parameters — heat exchanger efficiency, heat exchanger pressure drop, and absorber pressure drop — before and after neutralization are shown in Figures 3 and 4, respectively.

Figure 3 • Plant Operating Parameters vs. Time Before Neutralization

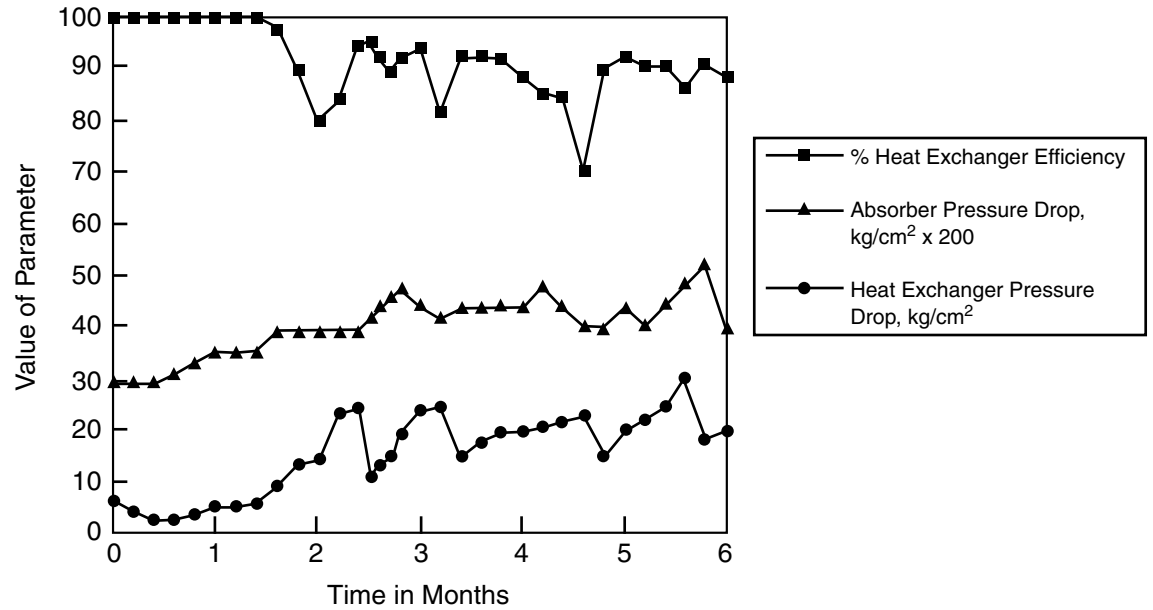


Figure 4 • Plant Operating Parameters vs. Time After Neutralization with UCARSOL DHM Neutralizer

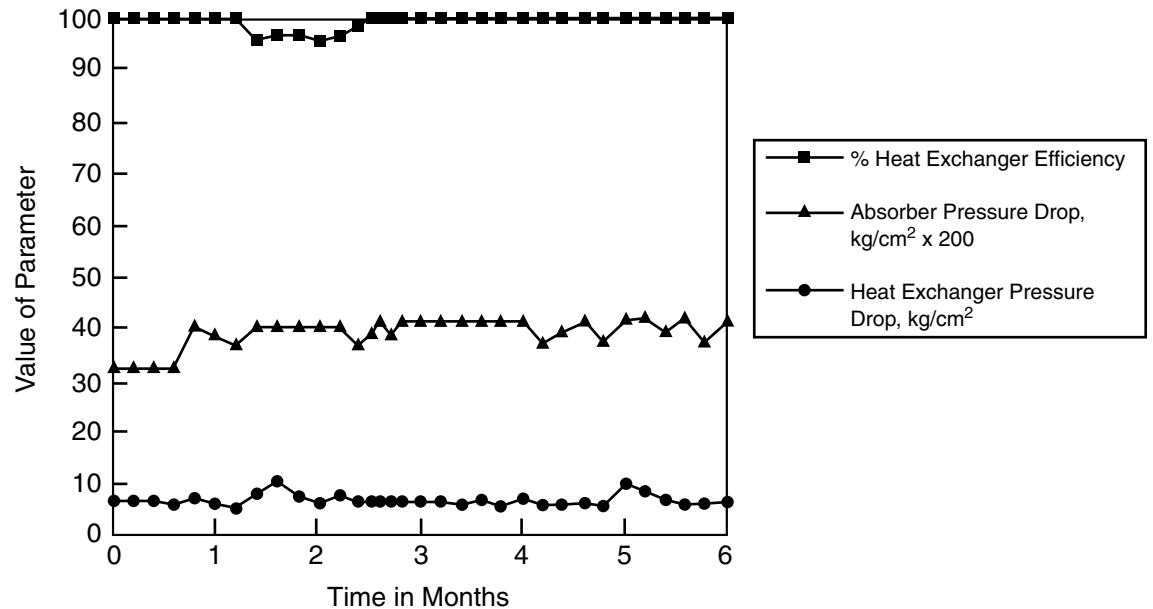


Table 1 summarizes the reduction in actual maintenance requirements over six-month intervals before and after neutralization.

Table 1 • Maintenance Before and After Neutralization of a Refinery UCARSOL Solution with UCARSOL DHM Neutralizer

Type of Maintenance	6 Months Before Neutralization	6 Months After Neutralization
Number of Heat Exchanger Water Washes	4	0
Number of Absorber Tray Water Washes	10	0
Number of Particulate Filter Changes	16	5

AMINE MANAGEMENT Program

The Heat Stable Salt Management Program is part of Dow's overall AMINE MANAGEMENT Program. It is specifically designed to address HSAS problems and can be used in conjunction with amine management for total low cost amine system operation or by itself to provide operators with a focused, low-cost approach to HSAS problems.

The Dow Chemical Company
Midland, Michigan 48674 U.S.A.

In the United States and Canada: call 1-800-UCARSOL or 1-800-447-4369 • fax 1-989-832-1465

In Europe: call toll-free +800 3 694 6367 • +32 3 450 2240 • fax +32 3 450 2815

In the Pacific: call +852 2879 7260 • fax +852 2827 5881

In other Global Areas: call 1-989-832-1560 • fax 1-989-832-1465

Or visit us at www.dow.com

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