

Refining **more value**

Get more out of your operations with specialty solutions and services

DOW

®



Want to get more out of **your refinery operations?**

Refinery gas treating systems are under more strain from increased availability of heavy and sour crude oils paired with low sulfur requirements in automotive and marine fuels. Many refineries are being challenged to implement amine system equipment upgrades at a high cost to enable processing of additional H₂S produced during operations.

Dow offers an Amine ManagementSM Program which includes a portfolio of specialized solvent blends and analytical and design services to meet challenging requirements and optimize unit performance.



Specialized **products**

UCARSOL™ HS Solvents and UCARSOL™ LE Solvents help minimize amine losses and improve energy efficiency and system capacity when treating a range of liquid hydrocarbon and gas streams.

Our portfolio of specialized solvent blends can help you remove H₂S and additionally:

- Slip or remove CO₂
- Remove COS
- Achieve total sulfur specification
- Attain low H₂S specification in tail gas unit (TGU) treating
- Improve ratio of H₂S to CO₂ selectability in TGU treating

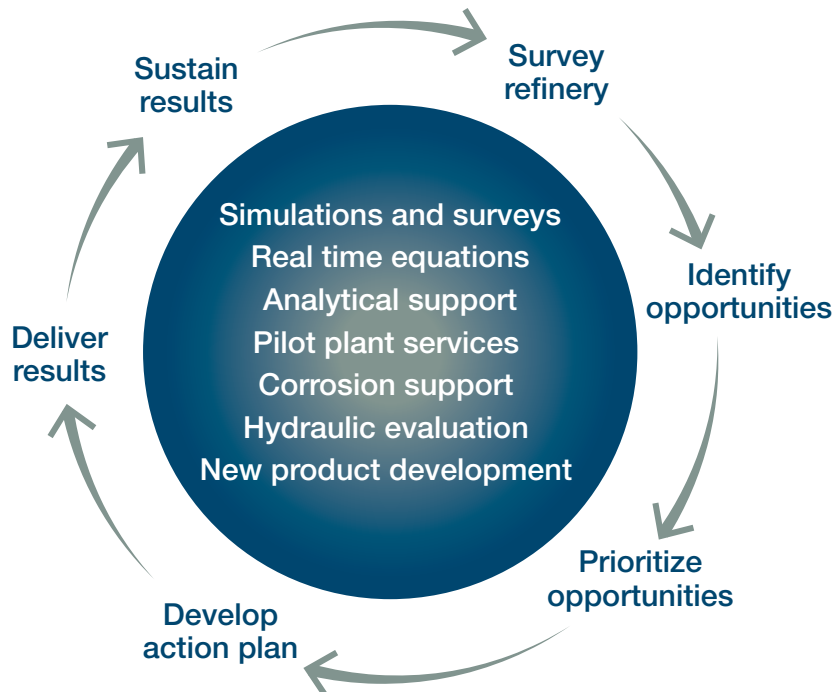
Specialized **services**

Dow provides a complimentary amine unit survey, detailing your specific gas-treating needs and recommending a customized solution to improve gas treating performance. We want to help you select solvents that meet your unique system requirements, whether that includes multiple absorbers, TGU or liquefied petroleum gas (LPG) absorbers.

Contact your Dow representative to take advantage of the products and services available to help you get more out of your refining operations.

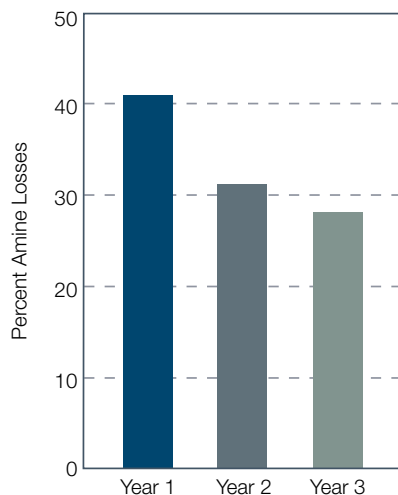
Dow has helped meet customer gas treating needs for more than 65 years. The following case studies highlight the benefits of our products and services in action.

Our Amine Management Program



Optimizing amine losses **across the refinery**

Figure 1: Converting to UCARSOL™ Solvents helps reduce amine losses



Prior to implementing UCARSOL™ HS-104 Solvent as part of the Amine Management™ Program, annual amine losses topped 40 percent per year of the total amine inventory. Within two years of initiating the Dow program, amine losses dropped to 27 percent of the overall amine inventory.

The challenge: Selective and efficient contaminant removal.

A refinery in the Midwest region of the United States required an amine solvent that could be used refinery-wide to remove as much carbonyl sulfide (COS) as possible in the primary units and LPG contactors, while also providing sufficient CO₂ slip in the two tail gas units.

Dow's solution: Dow technical experts analyzed the refinery's integrated system and developed tailored recommendations for the customer's complex system. Dow also supplied a formulated amine solvent that allowed the refinery to use its two primary regenerators as backup to the TGU regenerators. UCARSOL™ HS-104 Solvent was developed specifically for this application.

Prior to the introduction of UCARSOL™ HS-104 Solvent, the refinery operated at a solvent strength of 27 percent to keep amine losses to a minimum. Even so, more than 40 percent of the refinery's total amine inventory was lost per year (see Figure 1). Under the Amine Management™ Program, improvements were made, the amine losses were closely tracked and losses were reduced by 40 percent, saving the refinery up to 140,000 pounds per year of additional solvent purchases.

In addition, UCARSOL™ HS-104 concentration was slowly increased to 35 percent, which resulted in a reduction in amine regenerator duties of up to 30 percent and a total net savings in operating costs of \$1.1 million per year.

Dow continues to closely monitor the refinery's amine system conditions as part of the Amine Management™ Program to ensure the refinery is running optimally.



Saving energy and solvent

The challenge: Low-cost corrosion control.

A U.S. Gulf Coast refinery needed a replacement for its current diethanolamine (DEA) solvent that would allow the refinery to maintain product specifications, but at lower operating costs and with a lower overall corrosion rate.

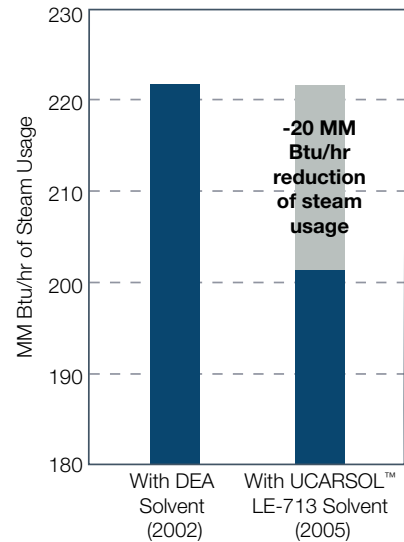
Dow's solution: The first step in replacing the refinery's original solvent was identifying UCARSOL™ LE-713 Solvent as a suitable amine upgrade for the system. Upon implementing the new solvent, energy consumption was reduced by nine percent, amine losses were reduced by 17 percent and amine circulation rates were reduced by 900 barrels per hour (BPH). UCARSOL™ LE-713 Solvent also reduced overall corrosion rates and provided lower amine velocities, below four feet per second, lowering erosion-induced corrosion risk.

The challenge: Gas stream upgrade.

Several years after the first upgrade, the customer required a solvent that could help reduce the CO₂ concentration as a result of the change in their specifications for fuel gas.

Dow's solution: Dow conducted simulation and pilot studies to develop a suitable solvent to meet this requirement. Once the solvent performance was validated, UCARSOL™ LE-801 Solvent was recommended. Upon its introduction, the new solvent reduced the product CO₂ levels to consistently operate below specification requirements. In addition, all operational gains realized from the conversion to UCARSOL™ LE-713 Solvent were maintained.

Figure 2: Steam usage by Sulfur Recovery Unit (SRU) regenerators



Among the savings realized by the switch to UCARSOL™ LE-713 Solvent, the refinery saved \$1.7 million in steam usage annually.



We work to maximize
value for our
customers through
extensive industry
knowledge and
chemistry expertise.

A note about **product safety**

When considering the use of any Dow products in a particular application, you should review the latest Material Safety Data Sheets from Dow and ensure that they are intended for safe use. For other products mentioned in the text, you should obtain the current Material Safety Data Sheet and other available product safety information when reviewing and take necessary steps to ensure safety of use before handling.

No chemical should be used as or in a food, drug, medical device or cosmetic, or in a product or process in which it may contact a food, drug, medical device or cosmetic until the user has determined the suitability and legality of the use. Since government regulations and use conditions are subject to change, it is the user's responsibility to determine that this information is appropriate and suitable under current, applicable laws and regulations.

Dow requests that the customer read, understand, and comply with the information contained in this publication and the current Material Safety Data Sheet(s). The customer should furnish the information in this publication to its employees, contractors and customers, or any other users of the product(s), and request that they do the same.



Experience **you can trust**

Dow has been helping customers meet their gas treating needs for more than 65 years. **Backed by more than 1,000 global references in gas treating**, we work to maximize value for our customers through extensive industry knowledge and chemistry expertise.



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