



# ***The CONTACTOR™***

Published Monthly by Optimized Gas Treating, Inc.  
Volume 18, Issue 1, January 2024

## **Gas Treatment with Contaminated Solvents**

A commercial solvent consisting of a water-solution of a single chemically pure amine (or maybe two pure amines in the case of blended or formulated solvents) is a figment of the imagination. Every process for making amines produces a mixture of amines as well as other biproducts, so the best one can say is that the amine is predominately this or that species, not that it is pure.

Commercial amine solvents used for gas sweetening, such as amine solutions like monoethanolamine (MEA), diethanolamine (DEA), or methyl diethanolamine (MDEA), are indeed not chemically pure compounds. They are typically mixtures of various amine species and may contain other impurities as well. Selective solvents like MDEA are especially sensitive to the presence of reactive species like DEA and MMEA as these can have an enormously negative effect on selectivity. So, even virgin solvents are impure. When this is combined with the fact that the gas being treated is itself impure, contaminated solvents are the norm right from the start.

As the solvent continues to be used, it is cyclically exposed to temperature extremes and often to oxygen, factors which thermally and chemically degrade it, and to various other chemical species in the raw gas which can be the source of heat stable salts (HSSs). Commonly present in refinery gases, HSSs are acidic, and they titrate permanently with the amine. However, as will be discussed more fully later, their effect goes far beyond just the accompanying loss of amine strength.

In natural gas processing (as distinct from refinery gases) common contaminants are methanol and glycols, or other additives used to prevent the formation of gas hydrates. Hydrates

can completely plug gas transmission lines, especially during transportation from the wellhead to the gas treating plant. Because they are of relatively low volatility, glycols tend to accumulate in the treating solvent. However, methanol is more volatile. It becomes trapped by the regenerator's overhead condenser so it too will accumulate in the solvent.

It is common to use solvents that are purposely comprised of significant concentrations of two amines (so-called blends). In such cases, the solvent is not referred to as contaminated because both amines are intended to be present. We will not deal further with blended solvents. However, in the next few issues of *The Contactor™*, we will examine various kinds of contamination from the viewpoints of their sources, effect, mitigation, and, where possible, solvent reclaiming.

Competent gas engineers and plant operators must be prepared to troubleshoot gas treatment operations by being cognizant of all the ways in which treating solvents can become contaminated, how various kinds of contamination can manifest, and how to deal with contamination including ways to recover the solvent's original usefulness.

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To learn more about this and other aspects of gas treating, plan to attend a *ProTreat®* workshop in your region. For details, visit [www.protreat.com/seminars](http://www.protreat.com/seminars).

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**Conference Alert:** OGT will be a proud exhibitor at the 6th annual SulGas conference in Mumbai, from 31 Jan to 2 Feb 2024. SulGas is a technical conference on Sulphur and Gas Processing with an emphasis on South Asia. OGT and 310i will jointly be presenting a paper titled: ***Kinetics-Based Sulfur Plant Models: Advancing Process Understanding***. The conference is currently accepting delegate registrations and has special rates for women engineers and group participation. Details can be found at [www.sulgasconference.com](http://www.sulgasconference.com).