



# CCR Technologies Inc.

## Technical Bulletin

### Solvent Quality Guidelines

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When our customers consider reclaiming their gas treating solvent they often ask us what proper solvent quality guidelines should be followed. Because no two amine systems are exactly alike, it is not possible to define quality guidelines that apply for all systems. We have, however, reviewed the published guidelines from the various amine suppliers and the targets that our customers have used for their own guidelines, and have derived what we consider to be the most widely agreed upon solvent quality guidelines.

#### Individual Heat Stable Salt (HSS) Contaminant Guidelines

Individual contaminant guidelines most commonly reported by amine suppliers for amine solutions (based upon maintaining carbon steel corrosion rates < 10 mils per year) are:

#### Specific (HSS) Anion Guidelines

<u>Organic HSS Anions</u>	<u>Limit, ppm</u>	<u>Inorganic HSS Anions</u>	<u>Limit, ppm</u>
Acetate	1000	Chloride	500
Formate	500	Sulfate	500
Oxalate	250	Sulfite	500
Glycolate	500	Thiosulfate	10,000*
Malonate	500	Thiocyanate	10,000
Succinate	1000		

\* Excessive amounts of thiosulfate in solution may lead to oxidative degradation product concerns with the solvent and caution is urged.

The individual anion targets specified appear to be rather low (with the exception of thiosulfate and thiocyanate) and we find that customers do not generally control their systems using single anions target only. Rather our customers tend to use total values of anions and various other contaminants as guidelines to control solvent quality. Even though most published solvent quality guidelines are based on HSS levels, there are many other contaminants in the gas treating solution that need to be considered for proper solvent quality control.

#### Degradation Contaminant Guidelines

While removal of HSS often plays a critical role in optimizing amine system performance, it is important to remember that HSS anions are not the only contaminants that must be removed. Products formed from the degradation of the amine molecule also need to be removed from the solution for optimum unit operations and reliability.

#### MEA – Refining Service - Guidelines

Free Amine (Alkalinity)	20 wt% solution Max
Water	70 wt% solution Min.
HSS Anions Reporting Basis**	
(1) Expressed as Weight Percent of Solution	<1.2 wt% solution - <b>or</b>
(2) Expressed as Weight Percent Amine	<2.5 Expressed as wt% as MEA - <b>or</b>
(3) Expressed as Percent Amine Capacity	<8.0 Percent Amine Capacity
Formamides (MEAF)	<3.0 wt% solution
HEED	<0.5 wt% solution
HEEU	<1.0 wt% solution

#### DGA® – Refining Service - Guidelines

Free Amine (Alkalinity)	50 wt% solution Max
Water	40 wt% solution Min.
HSS Anions Reporting Basis**	
(1) Expressed as Weight Percent of Solution	<1.2 wt% solution - <b>or</b>
(2) Expressed as Weight Percent Amine	<2.5 Expressed as wt% as DGA® - <b>or</b>
(3) Expressed as Percent Amine Capacity	<8.0 Percent Amine Capacity
Formamides (DGAF)	<3.0 wt% solution
BHEEU	<6.0 wt% solution

**DEA – Refining Service - Guidelines**

Free Amine (Alkalinity)	30 wt% solution Max
Water	60 wt% solution Min.
HSS Anions Reporting Basis**	
(1) Expressed as Weight Percent of Solution	<1.2 wt% solution - <b>or</b>
(2) Expressed as Weight Percent Amine	<2.5 Expressed as wt% as DEA - <b>or</b>
(3) Expressed as Percent Amine Capacity	<8.0 Percent Amine Capacity
Formamides (DEAF)	<3.0 wt% solution
THEED	<1.5 wt% solution
Bicine	<1.0 wt% solution

**MDEA – Refining Service - Guidelines**

Free Amine (Alkalinity)	50 wt% solution Max
Water	40 wt% solution Min.
HSS Anions Reporting Basis**	
(1) Expressed as Weight Percent of Solution	<1.2 wt% solution - <b>or</b>
(2) Expressed as Weight Percent Amine	<2.5 Expressed as wt% as MDEA - <b>or</b>
(3) Expressed as Percent Amine Capacity	<8.0 Percent Amine Capacity
MDEA Fragments	<2.5 wt% solution
Bicine	<0.4 wt% solution

\*\*Since there are three bases in common use for reporting HSS anion levels, guidelines are provided for all three reporting bases.

- (1) HSS Anions (Strong Acid Anions) measured as weight percent of the total solution.
- (2) HSS Anions listed as weight percent of the amine. Meaning, if the anion is bound to an amine molecule, what is the amount of amine expressed as weight percent of the total solution.
- (3) HSS expressed as weight percent amine divided by the amine strength (Free Amine or Alkalinity).
- (4) An **example** of these different reporting methods for MDEA:

Amine Strength wt%	30.5
HSS Anions wt%	5.33
HSS Anions as wt% MDEA	13.13
HSS Anions as Percent Amine Capacity	43.05

MDEA MW = 119  
HSS Anion MW = 48.2

**System Specific Guidelines**

The guidelines mentioned above are a basis for developing guidelines for each specific amine system. Each system will respond differently as contaminants and degradation products accumulate in the system, and each system must stay within the parameters set for/by the system. Comparing operation, treating effectiveness, foaming, and corrosion to the historical solvent quality of the system will determine the system specific guidelines.

**Summary**

When evaluating proper solvent quality guidelines remember that HSS anions are not the only issue, and may not even be the biggest issue. The information provided above is intended to guide you in the investigation of your system and the development of solvent quality guidelines specific to your unit. Call on us for any assistance we can provide in helping you with your investigation.

For more information contact CCR Technologies Inc. in Houston at 281-988-5800, or visit us at [www.reclaim.com](http://www.reclaim.com).

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