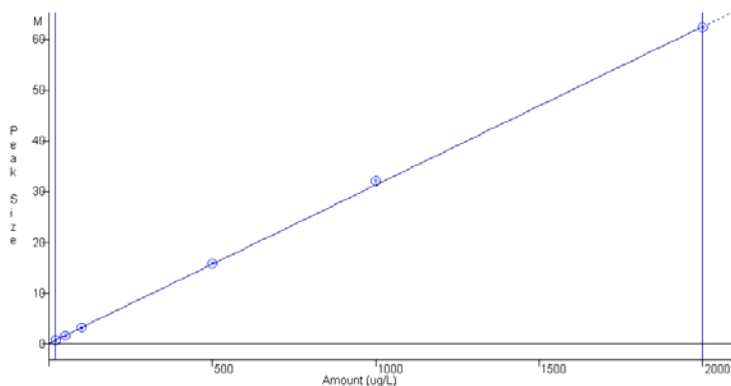
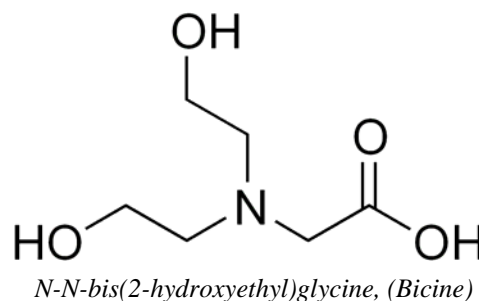


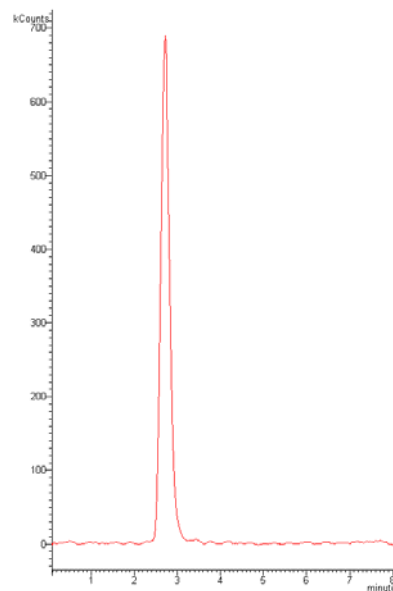


## Determination of Bicine in Gas Treating Amine Solutions

As a degradation product of alkanolamine and alkylalkanolamine solutions, N-N-bis(2-hydroxyethyl)glycine, also known as bicine, is commonly found in gas treating amine solutions. The proposed pathways for the formation of bicine in amine solutions are all from alkanolamines and alkylalkanolamines such as DEA and MDEA. For example, some possible pathways are by either reacting DEA with glyoxal or through direct oxidation of DEA, MDEA, or TEA by O<sub>2</sub> or SO<sub>2</sub><sup>(1)</sup>. Studies have shown that high levels of bicine contribute to the formation of Heat Stable Amine Salts (HSAS), and to the corrosion of amine plant equipment<sup>(2,3)</sup>. HSAS have been shown to contribute to the corrosivity of amine solutions when present in concentrations of 1000 to 250 ppm<sup>(2)</sup>, and bicine itself has been identified as a chelator which can initiate a rapid corrosion process in the presence of H<sub>2</sub>S<sup>(3)</sup>. An effective removal system combined with frequent testing are important aspects of reducing costs associated with gas treating. Weck Labs has developed an efficient, robust, and precise method for the determination of bicine in gas treating amine solutions as low as 20 mg/L (ppm) by ion chromatography coupled with tandem quadrupole mass spectrometry.



*Bicine, 20-2000 ppm, r<sup>2</sup>=0.9998*



*Bicine, 100 ppm*

Analyte	RL <sup>(4)</sup> (mg/L)	Accuracy		Precision	
		Mean (%)	Acceptance <sup>(5)</sup> (%)	RSD (%)	Acceptance <sup>(5)</sup> (%)
N-N-bis(2-hydroxyethyl)glycine	20	101	70-130%	1.97	<30

Notes: (1) Bosen, S.F., Bedell, S.A., "The Relevance of Bicine in the Corrosion of Amine Gas Treating Plants", Laurance Reid Gas Conditioning Conference, Norman, OK (2003).  
 (2) Rooney, P.C., Bacon, T.R., DuPart, M.S., "Effect of heat stable salts on MDEA solution corrosivity", Laurance Reid Gas Conditioning Conference, Norman, OK (1997).  
 (3) Pearson, H., Shao, J., Norton, D., Dandekar, S., "Case Study of Effects of Bicine In CO<sub>2</sub> Only Amine Treater Service", Eco-Tec Technical Paper 174 (2005).  
 (4) Reporting Limit. The instrument detection limit is 0.020 mg/L, but a routine 1000x dilution is made due to the expected analyte concentration and sample matrix.  
 (5) Temporary limits until lab generated acceptance limits based on historical values are established