Comments on "Stability Constants of Vanadium(V) with Glycine and Alanine in Acid Solution" (Gharib, F.; Zare, K.; Khorrami, S. A. *J. Chem. Eng. Data* 1995, *40*, 186−189) and "Stability Constant of Vanadium(V) with Glycine at Different Ionic Strengths" (Khorrami, S.; Bayat, H.; Sharafi, S.; Shafai, M.; Gharib, F. *J. Chem. Eng. Data* 1996, *41*, 1322−1324)†

I. Grenthe

Department of Chemistry, Inorganic Chemistry, The Royal Institute of Technology,
S-10044 Stockholm, Sweden

Gharib et al. (1995, 1996) have discussed the stability constants of vanadium(V) with glycine in two recent publications. The experimental data (Gharib et al., 1995) have been made in the pH range 1.44 to 2.49 at total concentrations of glycine ranging from 10^{-2} M to 4×10^{-2} M, at a constant total concentration of vanadium(V) equal to 10^{-4} M. They interpret their results in terms of the following two equilibria

$$H^{+} + Y^{-} \Leftrightarrow HY \qquad \text{where HY is glycine}$$

and

$$VO_2^{+} + Y^{-} \Leftrightarrow VO_2Y$$

I have misgivings about the results presented. The authors do not seem to be aware that glycine HY is a "zwitterion" $^{+}NH_3CH_2COO^{-}$ which can be protonated to form H_2Y^{+}. The equilibrium constant for the reaction

$$HY + H^{+} \Leftrightarrow H_2Y^{+}$$

can be found in the literature, e.g., Perrin (1979). The value of log K is approximately 2.4; i.e., the relative amounts of HY and H_2Y^{+} (the concentration of Y^{-} is insignificant) will change in the pH range investigated by Gharib et al. The zwitterion may form complexes through its carboxylate end, while H_2Y^{+} should not form complexes (Perrin, 1979). This means that the mass balance for the ligand (eq 7 in the 1995 paper) is erroneous and very likely also the stoichiometry of the complex proposed. When looking at the experimental data in Tables 3−5 in the 1995 paper, one observes that the absorbance is very nearly independent of pH. It is then difficult to understand how the authors can use the slope (eq 8 in the 1995 paper), which is very close to zero, to determine that *one* proton is involved in the reaction studied. From a chemical point of view one would expect the predominant reaction under the conditions used by Gharib et al. to be

$$VO_2^{+} + HY \Leftrightarrow VO_2HY^{+}$$

Literature Cited

Gharib, F.; Zare, K.; Khorrami, S. A. Stability Constants of Vanadium(V) with Glycine and Alanine in Acid Solution. *J. Chem. Eng. Data* **1995**, *40*, 189.

Khorrami, S. A.; Bayat, H.; Sharafi, S.; Shafai, M.; Gharib, F. Stability Constant of Vanadium(V) with Glycine at Different Ionic Strengths. *J. Chem. Eng. Data* **1996**, *41*, 1322−1324.

Perrin, D. D. *Stability Constants of Metal-Ion Complexes. Part B. Organic Ligands*; IUPAC Chemical Data Series 22; Pergamon Press: Oxford, 1979.

Received for review December 17, 1996. Accepted March 11, 1997.

JE960497L

---

† The authors of these papers have not availed themselves of the opportunity to respond to this Comment.

S0021-9568(96)00497-9 CCC: $14.00