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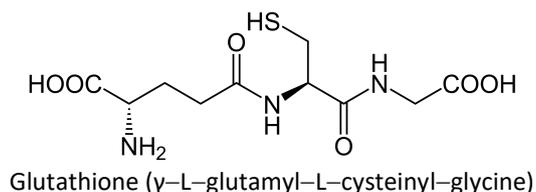
INTERACTION OF BERYLLIUM (II) ION WITH GLUTATHIONE IN AQUEOUS SOLUTION

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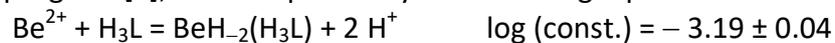
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Beryllium is found naturally into various forms like gemstones, beryl and chrysoberyl. It is also used in the electronics industry as high thermal conductivity material and in nuclear industry for its high neutron moderating ability [1]. Chronic beryllium disease (CBD) is an occupational lung disorder, in exposed industry workers. Recent studies have identified a strong association between CBD and some human leukocyte antigen that contain glutamic acid [2].



The complexation between Be^{2+} ion and glutathione (H_3L) has been studied at 25° C in 0.1 mol dm^{-3} NaClO_4 as ionic media, by potentiometric measurements of the hydrogen ion concentration.

The determination of the equilibrium constants has been carried out by evaluating the quantity Z_{H} , which represents the average number of protons released per glutathione molecule, as a function of the pH. Experimental data for Be^{2+} -glutathione system, processed by *Hyperquad* program [3], are interpreted by the following equilibria:



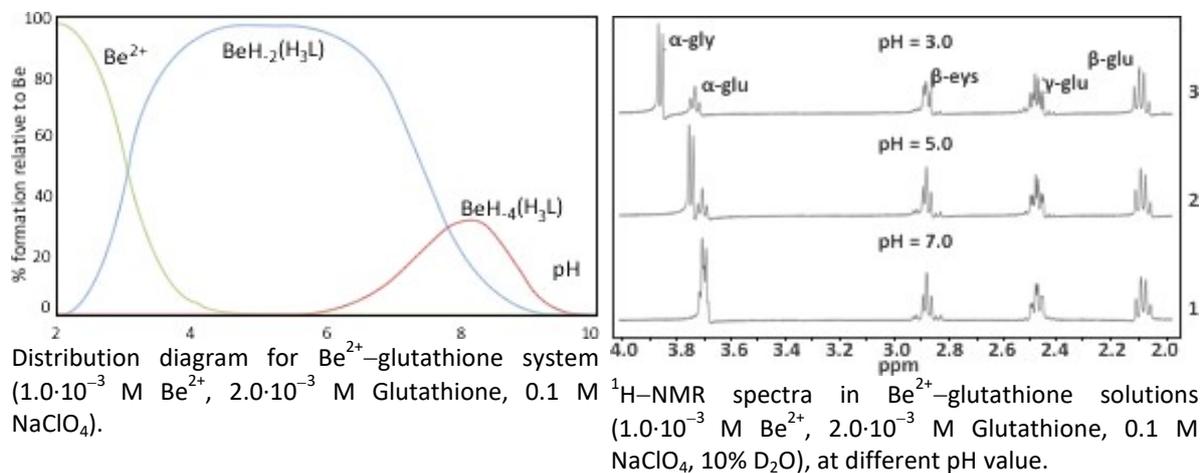
Furthermore, the interaction between Be^{2+} and glutamic acid (H_2A), conducted in the same experimental conditions, has been also considered to understand the role of glutamic acid residues toward the complexation. Measurements are consistent with equilibrium:



To establish which sites of the ligand are involved in the coordination with the beryllium ion, ^1H -NMR spectra are obtained in absence and in presence of metal ion as a function of pH.

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From spectra, recorded at different pH value, is evidence that only glutamic residue is involved in complexation.



References

- [1] G. Nordberg et al., *Handbook on the Toxicology of Metals*, 3rd Edition, Academic Press, 2007.
- [2] R. T. Sawyer and L. A. Maier, *Chronic beryllium disease: an updated model interaction between innate and acquired immunity*, *Biometals*. 2011, 24, 1–17.
- [3] P. Gans, A. Sabatini, A. Vacca, *Investigation of equilibria in solution. Determination of equilibrium constants with the HYPERQUAD suite of programs*. *Talanta*, 43, 1739–1753, 1996.