CHEMICAL AND MOSSBAUER ANALYSES OF SOME SEDIMENT SAMPLES OF THE ROMANIAN SHORE

Iulia I. GEORGESCU, Polytechnic Inst., Bucharest (Romania),
Dänilá BARB, Lucian DIAMANDESCU, Mircea MORARIU, and
M. DEMETRESCU, Inst. of Atomic Physics, Bucharest (Romania)

ABSTRACT

Sediment samples prelevated at different depth on the Black Sea Romanian shore at Constantza site, by chemical and Mössbauer spectroscopic methods, were analyses. Hematite and magnetite lattices as well as different hydrated oxydes were identified.

RESUME

Echantillons des sédiments prélevés a des diverses profondeurs sur la cote Roumaine, dans la région de Constantza ont été analysés par des méthods chimiques et de spectrometric Mössbauer. Des parametres Mössbauer charactéristiques: champ magnétique, champ élecrtique quadrupolaire et déplacement isomerique, on a identifié le fer tri et divalent avec environnement magnétique au noyau de fer. Les réseaux crystallins de l'hématite et de la magnétite ont été mis en évidence. Un grand pourcentage d'oxydes de fer hydratés ont été identifiés, seulement aux plus grandes profondeurs.

INTRODUCTION

Due to the high natural abundance of ^{57}Fe (2.19%) on which Mössbauer effect is observable, it is possible to obtain information on the structural

positions of iron atoms in the lattice. In previous works, sediments collected at different distances offshore in the aerobe as well as in the anerobe zones on the bottom of the Black Sea, have been studied (1), (2). In the present work there are investigated rocks sampled from 585 to 1262 meters depth on the shore of the Black Sea, at Constantza site.

METHODS

By usual chemical and spectral analyses, some basic information about the macro and microelements contents, has been obtained. About 200 mg of each fine powdered sample, at 300°K for Mössbauer spectrometry were investigated making use of an ELRON type installation and a ^{57}Co source of 5 mCi embedded in a copper lattice. The Mössbauer spectra were carried out with a speed of 12 mm/s on 400 channals. The experimental data in an IBM-370/135 computer and in FORTRAN-IX code, were computed.

CONCLUSIONS

At 585 and 720 m depth, the samples are made of pure hematite (α - Fe_2O_3) characterized by Hn = (520-0.3) KOe, $\triangle$EQ = (-0.241 $\pm$ 0.004) mm/s and C.S. = (0.128 $\pm$ 0.004) mm/s; at 604 and 1262 m depth of 49 – 55.1% magnetite (Fe_3O_4) with Hn = (464 $\pm$ 0.1) KOe, $\triangle$EQ = (0.01 $\pm$ 0.014) mm/s and C.S. = (0.430 $\pm$ 0.019) mm/s. At 602 m depth, 20% while at 1262 m depth 46% hydrated iron oxydes were found.

Diagrams of Mössbauer spectra carried out at room temperature, tables with Mössbauer data and chemical analyses, are illustrating these conclusions.

REFERENCES

1. I.I. GEORGESCU, D. BARB, and L. DIAMANDESCU: Mössbauer spectroscopy applied to the study of some sediments sampled from the Black Sea. Rapp. Comm. int. Mer Médit., XXIV^{e} Congres-Monaco, 6-14 Déc. (1974). Under press.
2. I.I. GEORGESCU, M. MORARIU, and L. DIAMANDESCU: Contributions to the study of the Fe-Mn modules from the Black Sea, by Mössbauer Sepctroscopy. Revue Roumaine de Physique, 18, No. 3 (1973) pp. 401-404.

21. Georgescu I.I., Barb D., Diamandescu L., Morariu M., Demetrescu M. Chemical and Mössbauer analyses of some sediment samples of the Romanian shore.

Discussion

Bilinski H.(Yougosl.) : Is it possible that manganese is present in the sediments as MnO, as it is known that MnO_2 is the most thermodinamically stable solid phase ? MnO_2 is usually found at the sea bottom.

Demetrescu M. : We have determined the Mn content and calculated MnO values.

Guegueniat P. (France) : Have you made experiment on sediment in toto and on the same sediment after elimination of adsorbed iron ?

Demetrescu M. : We made experiment on sediment in toto.

Sommenfeld P. (Canada) : Were the iron oxides calculated or observed ? In an aqueous environment it would be difficult to envisage a stable hematite or magnetite which would not rust to göthite or limonite. In anaerobic environments one would expect pyrite or hydrotroilite. Similarly, anthophyllite and amphibole are minerals of short life span in an aqueous environment.

Demetrescu M. : We analysed samples of rocks. By chemical analysis we determined Fe^{2+} and Fe^{3+} and calculated Fe_2O_3. But with Mössbauer spectroscopy we determined hematite, magnetite and amphibole.