A NEW STREWNFIELD OF SPLASH-FORM IMPACT GLASSES IN ATACAMA, CHILE: A MÖSSBAUER STUDY.

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Recently, tektite-like glasses were discovered in the Atacama desert (Chile) and named atacamaites [1]. The discovery of this new strewnfield allows us to extend the impact glass database and the understanding concerning these natural glasses. A systematic study is underway and the atacamaites are being characterized by several analytical techniques, including magnetometry [2]. In this work, we report preliminary ^{57}Fe Mössbauer results on atacamaites. All isomer shifts are given relative to α-Fe at RT. Two samples (JG2h and PT7B) were selected for the analysis, the former representing the standard material and the latter an anomalously magnetic and impactor-rich sample, with 8 and 16% FeO, respectively. Spectral analysis was performed with the two-dimensional extended Voigt-based fitting method [3].

The Mössbauer spectra were fitted with two components described as distribution 1 (D1) and distribution 2 (D2), no magnetic phases at RT were detected. The main distribution D1 presents average isomer shift $\langle\delta\rangle \sim 1.00 - 1.02$ mm/s and average quadrupole splitting $\langle\Delta\rangle \sim 2.00 - 2.07$ mm/s that is usually associated to Fe^{2+} in octahedral coordination. In contrast, distribution D2 with $\langle\delta\rangle \sim 0.52 - 0.56$ mm/s and $\langle\Delta\rangle \sim 0.80 - 0.83$ mm/s is more likely to be Fe^{3+} in octahedral coordination. Usually, Fe^{3+} in tektites exhibits $\langle\Delta\rangle \sim 0.00$ mm/s, however, some impact glasses (e.g. Irghizite) show iron species with appreciable quadrupole splitting that is very much Fe^{3+}-like [4]. In this sense, the Mössbauer data of our samples PT7B and JG2h have much more in common with the impact glasses. In addition, D1 and D2 may contain small contributions due to tetrahedrally coordinated iron (Fe^{2+} or Fe^{3+}) [5]. Although the occurrence of electron delocalization has not been reported for previously studied tektites [3], this effect cannot be neglected in our samples - electron delocalization results in average value of isomer shift (0.5 – 0.9 mm/s) that can be assigned to $Fe^{2.5+}$. Despite this issue, if D1 and D2 are assigned as Fe^{2+} and Fe^{3+}, respectively, an estimate for Fe^{3+}/Fe^{2+} ratio for the studied samples could be determined if we take into account the relative areas for D1 and D2. For PT7B we have $Fe^{3+}/Fe^{2+} \sim 0.563$ while for JG2h, $Fe^{3+}/Fe^{2+} \sim 0.351$. These ratios are considerably higher than the ones already reported for tektites, whose Fe^{3+}/Fe^{2+} ratios range up to 0.046 [6]. This confirms other evidences indicating that atacamaites are not alike typical tektites and ressemble other impact glasses like irghizites. In order to confirm these preliminary data, more Mössbauer analysis as well as diffraction studies are in progress.

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