CRYSTAL STRUCTURE OF THE LEPTOTHRIX BIO BACTERIA. LEPTOTHRIX AS ABSORPTION OF HEAVY METALS AND NATURAL RADIOACTIVE ELEMENTS

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At present, due to the increase in the anthropogenic load on the environment, the search for new natural sorbents for wastewater treatment both in the natural environment and under production conditions becomes relevant. Methods for cleaning the environment using microorganisms are of great interest in solving scientific and technological problems. Iron-forming bacteria of the genus Leptothrix are of great interest, since in the course of their growth they produce extracellular formations containing iron oxides and oxyhydroxides, which can be used for environmental purposes. It is from this aspect that structural analyzes were performed on the Leptothrix. Structural characterization and phase composition of the samples was carried out by X-ray diffraction (XRD). The XRD measurements were done at 40 mA current and 40 kV voltage at room temperature on EMPYREAN Cu LFF DK408191 diffractometer, with CuKα radiation, λ= 1.540598 Å. For Rietveld analysis of X-ray and neutron diffraction spectra, the FullProf software package was employed. Figure 1 shows the X-ray diffraction spectrum of Leptothrix and Rietveld analysis performed using the FULLPROF software package.



Figure 1. X-ray diffraction and Rietveld fit of the Leptothrix.

(542.36139 Å3), (297.01447 Å3), (49.10815 Å3) and (726.02924 Å3) crystal volume were found for Leptothrix. All peaks found are consistent with literature results. Experimental results show that Leptothrix is ​​formed in cubic (Fd-3m) and trigonal (R-3c) space groups with lattice parameters a=b=c=8.1551 Å, and a=b=5.01140 Å, c=13.65619 Å, respectively. At the same time, Fe with cubic and orthorhombic lattice parameters a=b=c=3.66200 Å, and a=b=5.54080 Å, c=23.64880 Å was determined in (Fm-3m) and (Ibam) space groups (Table 1.).

Table 1. The structure parameters of the Leptothrix

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Title of phases | Space group | Lattice parameters | | | Volume of crystal, Å3 |
| a, Å | b, Å | c, Å |
| Fe3O4 | F d -3 m  Cubic | 8.15511 | 8.15511 | 8.15511 | 542.36139 |
| Fe2O3 | R -3 c  trigonal | 5.01140 | 5.01140 | 13.65619 | 297.01447 |
| Fe | F m -3 m  Cubic | 3.66200 | 3.66200 | 3.66200 | 49.10815 |
| Fe | I b a m  orthorombic | 5.54080 | 5.54080 | 23.64880 | 726.02924 |