MÖSSBAUER AND X-RAY STUDY OF SYNTHETIC LANDAUITE ($FE_2TI_2O_7$)

Khramov D.A., Glazkova M.A., Rusakov V.S., Urusov V.S.
khramov@geokhi.ru
Tel.: (095) 939-70-53

Herald of the Earth Sciences Department RAS, № 1(20)′2002
URL: *http://www.scgis.ru/russian/cp1251/h_dgggms/1-2002/informbul-1.htm#term-16.engl*

The oxidation mechanism of ilmenite $FeTiO_3$ causes an essential interest as for understanding mineral evolution processes as well for producing new inorganic materials. The experimental modeling at the controlled *T, P,* f_{O2} – conditions allows one to reconstruct the mineral formation and its successive transformations.

In this work the mechanisms of oxidation at T = 400 – 950° C in air atmosphere were studied by ^{57}Fe Mössbauer spectroscopy (MS) and X-ray powder diffraction for the sample of ilmenite. The sample were synthesized at T = 1150° C, which is characteristic of the igneous formation processes.

In the temperature interval T = 600-700° C the ilmenite structure is completely destroyed. At T = 700°C the landauite ($Fe_2Ti_2O_7$) [1] is formed in the system besides hematite and rutile.

The isomer shift of landauite is characterized for Fe^{3+} ions in the octahedral coordination (0.35-0.36 mm/s relative to metal iron).

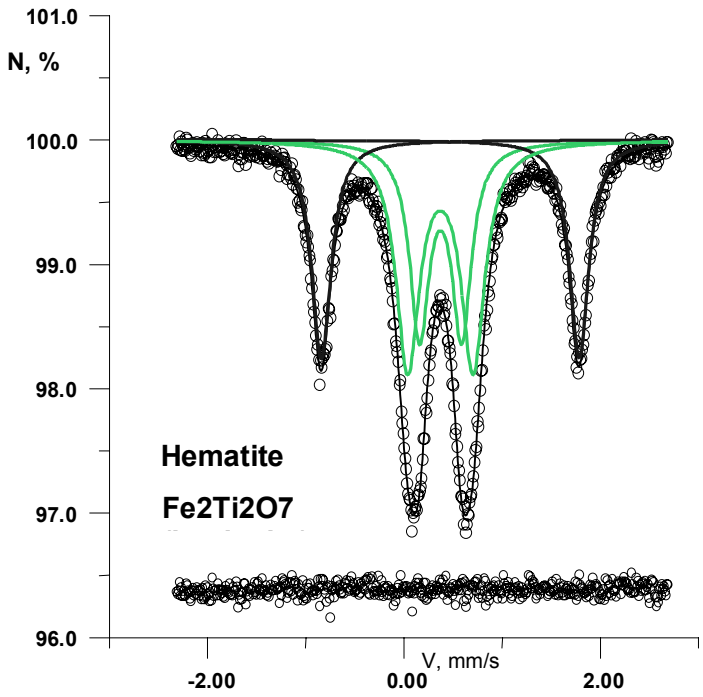

Fig. 1. Mössbauer spectrum of landuite (internal doublet) and hematite (3, 4 lines)

Table 1

X-ray parameters of landauite

$[Zn_{0.39}Mn_{0.15}Fe_{0.38}][Ti_{2.87}Fe_{0.13}]O_7$, [1]			$Fe_2Ti_2O_7$	
d, Å	***I/I$_o$***	***hkl***	***d, Å***	***Hkl***
3.36	60	021	3.39	021
3.13	20	220	3.08	220
3.02	60	$22\bar{1}$	-	-
2.83	100	130	2.88	130
2.72	40	$33\bar{1}$	-	-
2.59	40	$13\bar{1}$	-	-
2.45	60	221	2.42	221
2.21	70	$311,13\bar{2}$	-	-
2.11	90	330	2.12	330
1.946	10	$202,13\bar{2}+$	-	-
1.78	80	$33\bar{2},\bar{4}24+$	-	-
1.747	10	510,150+	-	-
1.688	50	$15\bar{1}$	-	-
1.647	10	$24\bar{2},31\bar{3}+$	1.646	$24\bar{2}, 31\bar{3}+$
1.582	80	$44\bar{1}$	-	-
1.535	10	$11\bar{3}$	-	-
1.498	50	133	-	-
1.456	10	$33\bar{1},\bar{6}21+$	-	-
1.429	80	-	1.433	
1.244	10	-	-	-

Reference

1. *Portnov A.M., Nikolaeva L.E., Stolyarova T.N.* // Docl. Acad. Sci. SSSR. 1966. V.166. N 6. P.1420.