KOŠICE METEORITE ANALYSIS

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1. Introduction

Meteorite Košice fell down 28th of February 2010 near the Košice and represents an unique find, because the last fall of meteorite was observed in Slovakia at the year 1895. It supposes that for this kind of meteorite the orbit in cosmic space could be calculated. This is one of most important part because until now 13 places of meteorite find are known in the world of which cosmic orbit in space have been calculated [1]. Slovakia is member of international bolide net, dealing with meteorite analysis in Middle Europe .Analysis of Košice meteorite will also concern at the long live and short live nuclides [2]. Results should be a contribution to determination of radiation and formative ages. From structural analysis of meteorite it will be possible to compare it with similar types of meteorites.

In this work Mossbauer spectroscopy will be used for phase analysis from point of view iron contain components with the aim to identify magnetic and non magnetic fractions.

2. Experimental details

The samples were prepared in powder form. Part of the meteorite was burn, probably from the contact with the atmosphere. We scratched the powder step by step from the surface till middle of the sample. Total meteorite sample weight was only 1,5 g, therefore the amount of specimen for the measurement was very low which prolonged recording of the Mössbauer spectra. All spectra were measured by room temperature at the standard Mössbauer spectrometer with the Co^{57}(Rh) source. Mössbauer spectra were evaluated by NORMOS program.

3. Results and discussion

Mössbauer spectrum of Košice meteorite is given on Fig.1.The spectrum consists of components related to iron-bearing phases with different content. After evaluation process we found that magnetic fraction consists of two components and non-magnetic fraction from three components. Values of internal magnetic field induction of hyperfine magnetic splitting (M 1, M 2) and quadrupole splitting (QS 1, QS 2, QS 3) of non-magnetic components are given in Tab.1. Magnetic part creates of approximately 40% and the rest is non-magnetic part. Analysis of early fall meteorites exhibiting similar Mössbauer spectra [3, 4 ,5] also show three doublets and two sextets .The doublet with quadrupole splitting around 3.0 mm/s represents Olivine $(Mg,Fe)_2SiO_4$, second doublet with QS around 2.15 mm/s corresponds to Pyroxene (Ca,Mg,Fe)SiO3. Both these minerals contain iron in the form of Fe^{2+}. The third doublet corresponds to Fe^{3+} component of Pyroxene or to small particles of iron. Its contribution is small, less than 5 %.

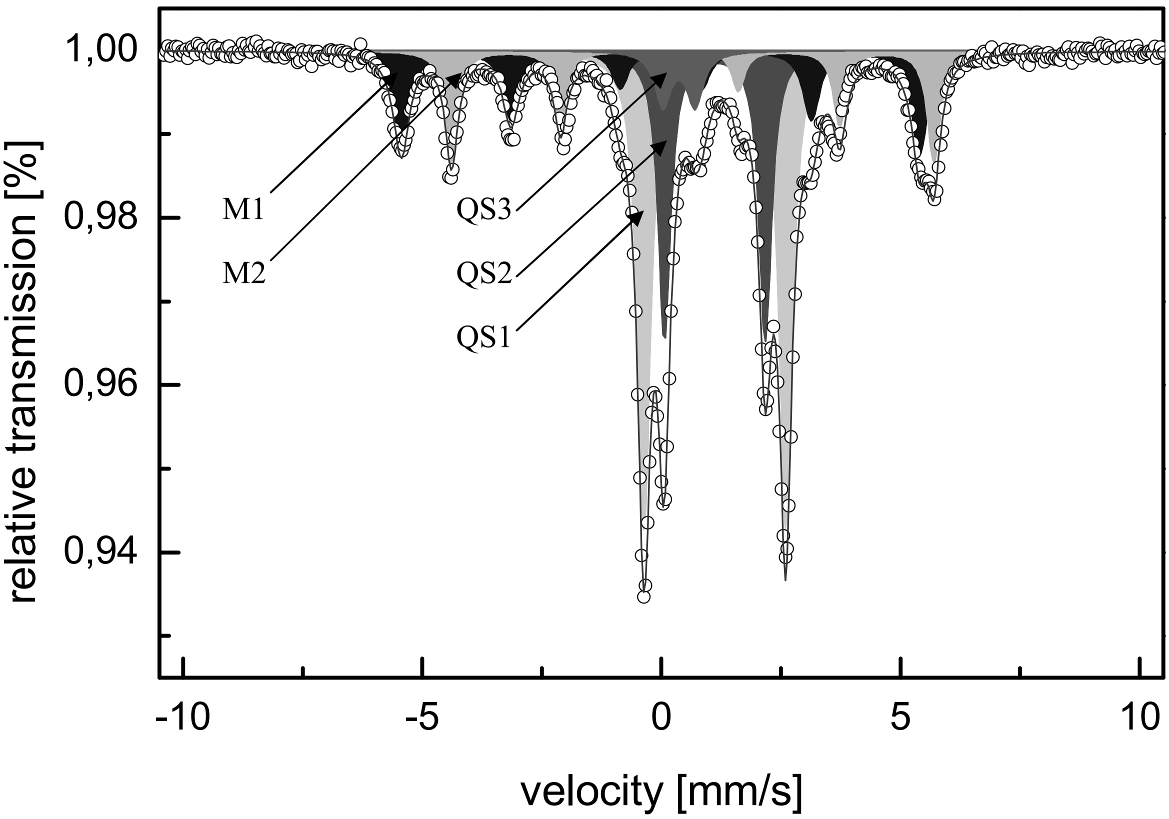

Fig.1: *Mössbauer spectrum of Košice meteorite.*

Tab. 1. *Parameters of Mössbauer spectrum.*

Parameters	values			
	our results		ref.[3,4,5]	
	mm/s	T	mm/s	T
QS 1	2.96		3.00	
QS 2	2.10		2.14	
QS 3	0.66		0.77	
M 1		33.70		33.51
M 2		31.31		32.52

From the analysis of magnetic part we can find [3, 4, 5] that the first sextet with hyperfine magnetic field 33.5 T corresponds to bcc Fe-Ni alloy (kamacite) and second with field 31.5 T to FeS (triolite). Average values of all components are given in Tab.1 in second column. Meteorites with mentioned composition belong to the mineral group of chondrites. Comparing our parameters with results of measurements at the similar meteorites we can conclude that Košice meteorite contains the same components. According all Mössbauer parameters we can also include this meteorite in the mineral group of chondrites.

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