SULFIDE NODULES OF BURKHALA IRON METEORITE. L.P. Migdysa,
A.A. Yaroshesvsky, N.I. Zaslavskaya. V.I. Vernadsky Institute of
Geochmistry and Analytical Chemistry, Academy of Sciences,
Moscow, U.S.S.R.

Burkhalra meteorite is anomalous fine octahedrite with many
sulfide nodules of various forms and mineral compositions [1].
Most of nodules are comprised by mineral association of troilite-
aubreelite-alabandite proportion of which changes consider-
able by nodule-to-nodule; some nodules include other mineral:
sphalerite, rutile, Mn-chromite, olivme (Fa 0.6-2.2), Ca-rich
pyroxene (Fs 1.5; Wo 43.3); on sphalerite nodule is found in
kamacite.

Composition of minerals in 12 nodules was studied by elec-
tron microprobe analysis. Troilite is almost pure FeS; main ad-
mixtures are Mn (from 0.02 to 0.36%), Cr (from 0.13 to 0.80%)
and Zn (from 0.02 to 0.87%) (fig.1). Higher Mn contents are
found in troilite near large alabandite grains; high content of
Cr is found near daubreelite lamellas; abnormally high Zn con-
tent is found in one troilite grain in sphalerite nodule. Da-
breelite is usually almost pure FeCr2S4; main admixture is Mn
(from 0.34 to 2.12%) (figs.2 and 3). In association with spa-
herite is found Zn-daubreelite (3.55 and 5.02% Zn). Higher Mn con-
tent is observed in daubreelite lamellas in troilite (from 1.55
to 2.12%); individual grains of daubreelite, usually intergrowth
with alabandite, contain lower Mn concentrations (from 0.64 to
1.14%). Alabandite has the composition of binary solid solutions
MnS-FeS with various proportions of Mn and Fe; minor component
is Cr (from < 0.02 to 0.46%). Coarse grains of alabandite are
richer of Fe (from 5.36 to 6.83%) than fine grains (from 3.45 to
4.74%). Higher Cr contents (from 0.17 to 0.46%) are found in a-
labandite grains on the contact with daubreelite. Sphalerite has
the compositions of ternary solid solutions ZnS-FeS-CoS with ad-
mixture of Cr. Most "pure" sphalerite (Mn from 0.41 to 0.72%; Cr
< 0.02%) is found as individual nodule and grain in kamacite.
Sphalerite with higher Mn (15.2% and 15.7%) and Cr (0.46%) con-
centrations is found on the contact with troilite nodule contain-
ing daubreelite and alabandite.

We emphasize follow important implications from the mineral
compositions of nodules and from the composition of their min-
erals.

1. Variations of mineral composition of nodules and mineral
proportions in the nodules result to wide variations of bulk che-

© Lunar and Planetary Institute • Provided by the NASA Astrophysics Data System
nodule in result from crystallization of single parental sulfide melt.

3. Recognizable correlation between element concentrations in co-existing minerals and mineral composition of associations is found however admixture element contents are significantly lower of mixing limits of phases at temperatures considerably below solidus (<400°C). It may be result only from diffusion mixing of mineral components "quenched" on some intermediate stage.

We believe that these facts indicate that the sulfide nodules of Burkhala meteorite (and of other iron meteorites enriched by sulfides - Munarabilla [2], Waterville [3], Odessa [4]) are the product of reheating, melting and quickly quenching and solidification of precursor solid sulfide grain aggregates (with silicate admixtures) without equilibration in each individual nodule and in meteorite at the whole. The formation mechanism and environment conditions are possible have been the same for sulfide nodules of iron meteorites and for chondrules of unequilibrated ordinary chondrites.