The observation and measurement of the track density was carried out for the polished surfaces of the olivine grains by optical microscope at ~ 600-fold magnification. Results obtained for specimens (weight of each ~ 1g) for five different meteorite fragments are given in Table 1. It was studied from 11 to 63 olivine crystals sizes of which were not more than ~ 150 μm. The total track density interval of $(0.6\text{-}5.4)\cdot 10^4$ cm^{-2} was obtained that reflects apparently the different shielding depth of the fragments in the meteoritic body.

Table 1
Tracks in olivine crystals of Tsarev chondrite

Sample	Number of crystals	Number of tracks	Total surface cm^2	Track density cm^{-2}
15380	16	7	1.2×10^{-3}	0.6×10^4
15384	11	17	3.0×10^{-3}	0.6×10^4
15387	53	28	5.2×10^{-4}	5.4×10^4
15388	63	41	9.8×10^{-4}	4.2×10^4
15391	51	4	5.8×10^{-4}	0.7×10^4

The ^{26}Al activity in 81,3 g sample 15384 was found to be (16 ± 1) dpm kg^{-1}. The ^{39}Ar activity was measured in the FeNi-phase. The 1.35 g metallic phase was separated and purificated from the same meteorite sample. The value of ^{39}Ar activity for the β-counter background of $(0{,}035 \pm 0{,}002)$ dpm was not detectable. We have obtained ^{39}Ar activity value of 6 dpm kg^{-1} of FeNi-phase (at 26 criterion). The obtained values of ^{26}Al and ^{39}Al activities are essentially smaller than those for other chondrites. Evidently the sample 15384 has a big shielding depth in the meteorite body and (or) the Tsarev chondrite has very short radiation age.

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TRACE ELEMENTS IN REFRACTORY INCLUSIONS FROM THE MURCHISON C2 CHONDRITE

I. Kawabe, L. Grossman, T. Tanaka and A.M. Davis, *University of Chicago, Chicago, IL 60637*

Refractory inclusions in Murchison show a variety of refractory element enrichment patterns, some of which are not seen in Allende. As discussed in Tanaka *et al.* (1980), BB-3, a hibonite-, spinel-rich blue spherule, has a Group III REE pattern like some Allende inclusions but, in contrast to them, Re and Os, the most refractory siderophiles, are enriched relative to slightly less refractory Ir and Ru by a factor of 1.7 compared to C1 chondrites. This suggests separation of BB-3's REE-bearing and siderophile-bearing components from the solar nebula at a higher temperature than most Allende coarse-grained inclusions, which are uniformly enriched in all refractories. BB-5, a corundum-rich inclusion (Grossman *et al.*, 1980), shows a large negative Yb anomaly, unaccompanied by a similar Eu anomaly, and striking depletions of refractory siderophiles relative to refractory lithophiles, *e.g.* the enrichment factor for Ir relative to C1's is < 0.06, while that for light REE ~ 30. MUM-3, a melilite-rich inclusion like MUM-1 (MacPherson *et al.*, 1980), is very similar to BB-3 in REE. MUM-3 is less enriched in Os relative to Ir and Ru than BB-3. A fragment of a blue hibonite crystal, DJ-2, is enriched in light REE by a factor of 100 relative to C1's, but enrichment factors for Yb and Lu are lower by more than a factor of ten. DJ-2 is enriched in refractory siderophiles by a factor of 300 and depleted in volatiles by a factor of 100 relative to C1's. SP-2 is a pale blue spinel octahedron containing 3000 ppm V, 1000 ppm Fe and 900 ppm Cr. As discussed in Hutcheon *et al.* (1980), a hibonite-rich sample from MUCH-1, a hibonite-perovskite-calcite inclusion, has a large negative Yb anomaly with no Eu anomaly. It is depleted in refractory siderophiles relative to REE by a factor of 10 compared to C1's. SH-4 is a heavily-altered, thickly-rimmed, hibonite-bearing inclusion (Hutcheon *et al.*, 1980). It is depleted in heavy relative to light REE and shows positive Eu and Yb anomalies. Refractory siderophiles are enriched by a factor of ~ 15 and light REE by a factor of ~ 10 relative to C1's.

SH-2 is a 1 mm sugary-textured blue and white inclusion. Its REE pattern shows large negative Eu and Yb anomalies and enrichment of heavy relative to light REE. Relative to C1 chondrites, the

Tb/Sm, Dy/Sm, Ho/Sm and Lu/Sm ratios are 2.0, 2.7, 3.6 and 13.0, resp. This pattern would be required of the component containing the most refractory REE which is postulated to have been lost prior to formation of Group II REE patterns (Boynton, 1975; Davis and Grossman, 1979). The heavy REE component in this inclusion must have condensed at a higher temperature than that in MH-115 (Boynton *et al.*, 1980) in which Lu, Ho and Dy are nearly uniformly enriched. Previously, Boynton *et al.* (1980) claimed that MH-115 is the most refractory condensate found in meteorites, based in part on its enrichment in heavy relative to light REE by a factor of 3 relative to C1 chondrites. Although enrichments of some of the heavy relative to light REE are not as great in SH-2 as in MH-115, a large fraction of the light REE may have been added to this inclusion in a second component, as in Group II patterns (Davis and Grossman, 1979). Os/Ru and Ir/Ru ratios in SH-2 are 16.8 and 9.5 times the C1 ratios, resp., indicating a very high temperature of isolation for the siderophile component as well.

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THE YBBSITZ — METEORITE

W. Kiesl and F. Kluger, *Institute for Analytical Chemistry, University of Vienna*

The Ybbsitz-Chondrite was found by Dr. Schnabel from the Geologische Bundesanstalt (Wien) in 1977 during field investigations near Ybbsitz in Lower Austria.

In the paper presented data for major-, minor- as well as trace elements for the pure metal- and "silicate"-fraction of the meteorite, obtained after a magnetic phase separation, were discussed. The mode of calculation has been published already in a paper by Kluger and Weinke in 1974.

The fraction of the silicate-phase was determined to be 83.2 wt %. Since most of the troilite is found in this phase, the composition of the latter is the sum of the pure silicate — and sulphide — phase.

Results show a remarkable deviation from the chondritic norm values with respect to Ca and Na — slightly underabundant — as well as REE pattern. A slight increase in La ($\times 4$) with respect to the chondritic norm followed by a decrease down to the norm value near Sm is observed.

Concerning trace element data of the pure metal- and "silicate"-fraction, Cu, Ga, Mo, Zn as well as Ir show distribution factors between metal and silicate of about 30 (Ir) to about 3 (Mo), whereas As, Os, Ru, Re and Au are concentrated predominantly in the metal ($D > 60$), Se, Rb, Cs, Cl, Br and J in the so called "silicate"-fraction ($D < 10^{-4}$).

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CORRELATION BETWEEN SOLAR WIND ^{4}He DISTRIBUTION AND NOBLE GAS FRACTIONATION IN LUNAR ILMENITES

J. Kiko, N. Mahninger, W. Rittershausen and T. Kirsten, *Max-Planck-Institut fur Kernphysik, 6900 Heidelberg, Germany*

Solar wind implanted ^{4}He concentration profiles measured in lunar ilmenites with the Gas Ion Probe (Kiko *et al.*, 1979a) reveal a relatively broad variation with respect to their position and shape compared to the other constituents of the lunar regolith (Warhaut *et al.*, 1979). This behavior is interpreted as the result of the difficulty to induce radiation damage in ilmenite as compared to common silicates (Kiko *et al.*, 1979b). If it is true that redistribution of implanted atoms is largely influenced by irradiation damage and that mass fractionation is dominated by diffusive redistribution,