

THE METAL CONTENT OF COMMON CHONDRITES

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Metallographic and compositional studies have been made of the metal of 20 common chondrites mainly of petrological classes 5 and 6. The main FeNi alloys, kamacite and taenite, are universally present but in high variable amounts; kamacite being common as large interstitial grains in H and L chondrites but as very small, *e.g.* 10 μm , grains which are minor second phases in the taenite of the LL chondrites. The taenite similarly varies in each group. In LL chondrites it usually has a characteristic uniformly etched appearance with only a narrow clear γ rim to indicate the presence of an M-profile. In the H and LL chondrites it is often distinctly zoned.

In addition to kamacite and taenite, which may also occur in the clear form described by Taylor and Heymann, the metal also occurs as very small (mean of 36 is 25 μm) simply shaped zoneless plessite grains, Fig. 1. These are always trapped inside silicate grains which appear to be chondrules or chondrule fragments. Their composition and lack of an M-profile seem to indicate isolation prior to the final equilibration of the kamacite and taenite.

The metal grains show remarkable fractionations in their cobalt content, Fig. 2 and Table 1. In H and L chondrites the Co content of the

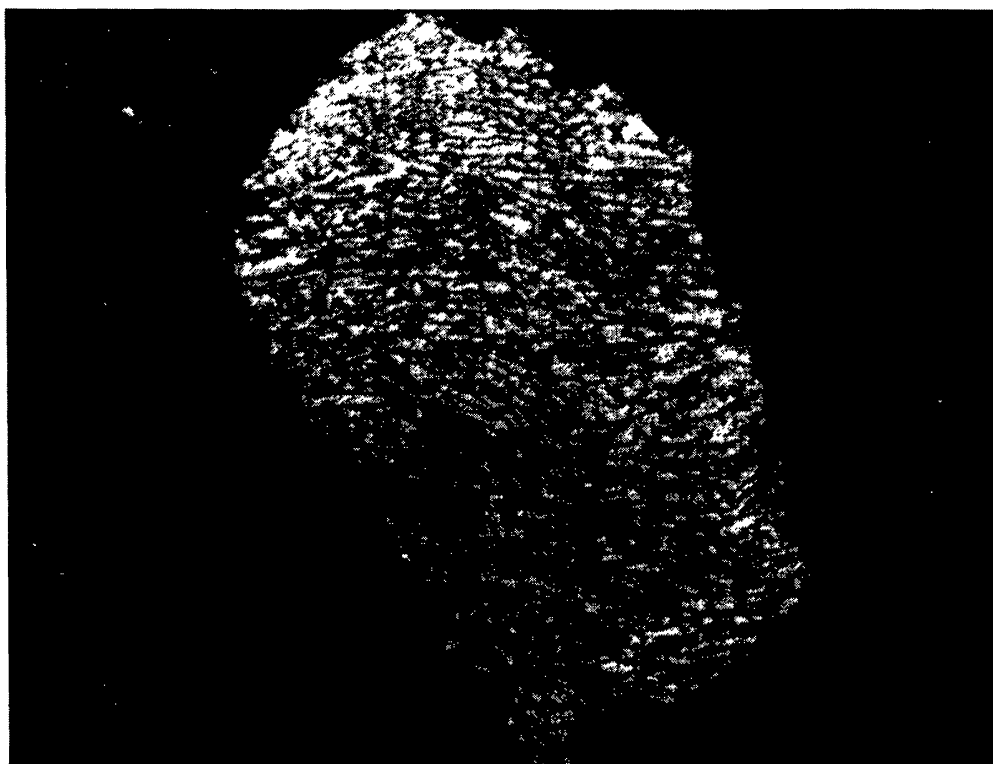


Fig. 1 Particularly large zoneless plessite grain (50 μm wide) from the Barwell L-chondrite.

Table 1

	Kamacite		Taenite	
	Ni	Co	Ni	Co
Av. four H chondrites	5.82	0.55	31.1	0.22
Av. ten L chondrites	5.50	0.87	31.4	0.31
LL chondrites:				
Soko Banja	4.61	2.06	36.5	0.58
Aldsworth	5.76	2.25	32.6	0.73
Dhurmsala	5.23	2.31	28.6	0.98
Olivenza	4.35	4.45	36.2	1.60
Khanpur	4.53	3.83	33.1	1.42
Jelica	4.50	11.0	47.2	1.92

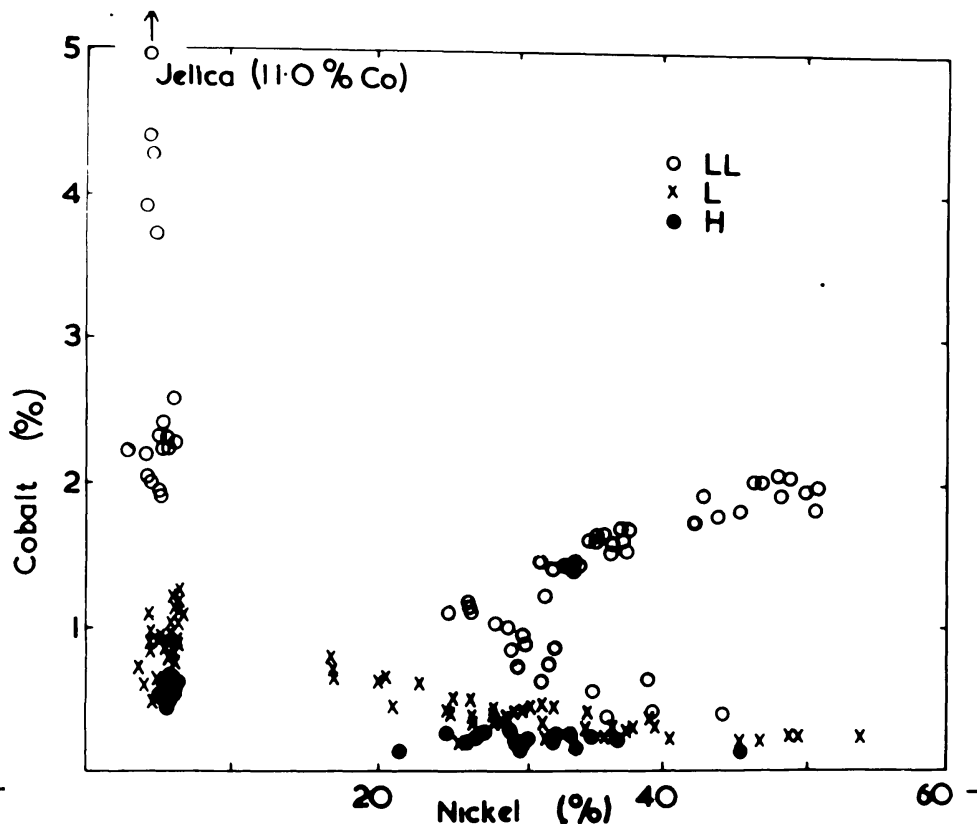


Fig. 2 Cobalt-nickel diagram for 275 metal grains from 20 common chondrites.

kamacite clusters around 0.55 and 0.87 wt % (respectively) with a small but definite hiatus. LL chondrite-kamacite, however, is very high in cobalt going from 2% (3 meteorites) to 11% for Jelica with Olivenza and Khanpur having about 4%. Similar trends are shown in the taenite. In kamacite nickel shows smaller trends in the opposite sense to cobalt but in H and L chondrite-taenite another factor (*e.g.* size) is clearly present.