THERMAL STABILITY OF THERMOLUMINESCENCE IN A TYPE 5 AND TYPE 3.4 ORDINARY CHONDRITE. **Fouad A. Hasan, Munir Haq and Derek W.G. Sears. Department of Chemistry, University of Arkansas, Fayetteville, AR 72701.**

Since natural TL levels are determined by thermal and radiation history, they are influenced by terrestrial age and orbits (1-4). Such data are relevant to the major questions of (i) whether the meteorite flux remained constant over long periods of time and (ii) whether the relative flux of different types of meteorite is constant or whether different source regions are being sampled at different times?. The Antarctic meteorites, which have terrestrial ages of 10^5-10^6 years, suggest that this might be the case since they differ from the non-Antarctic meteorites in composition (5), induced TL properties (6), and the relative proportions of various classes (7). However, to fully explore the significance of the natural TL variations, a better understanding of TL kinetics is desireable. Here we report on a study of the TL kinetics for a type 3.4 (Allan Hills A77214) and a type 5 (Bruderheim) ordinary chondrite; these were chosen since they are thought to contain feldspar, the TL phosphor, in the low and high temperature forms, respectively (8). We have previously shown that meteorites which are thought to have feldspar in the low-form, lose their natural TL in an anomalous, but temperature-dependent, manner (9).

Non-magnetic powder fractions, which had been given a dose of (natural+) 50-100 krad from a Sr-90 beta source, were annealed in a thermostatically controlled oven at 120 and 140^{o}C (+/- 5^{o}C) for 1-20 h. The TL remaining between 210-330^{o}C was then normalized to the high-temperature (410^{o}C) TL to remove the effects of TL sensitivity and heterogeneity.

The results are shown in Fig. 1. As observed in previous studies (2,10,11), the decay is not exponential. Either the decay is non-first-order or more than one trapping level is involved. A graphical decomposition of the curve into two components is possible, one with a half-life around 2 h and another with a half life around 40 h. Within the experimental uncertainties, we see no difference between the TL kinetics for the two meteorites.

The present data suggest that the same trapping levels are present in both meteorites. This is difficult to reconcile with our previous observation that while the low form shows anomalous fading, the high form does not. It could be that different traps have similar half-lives by a fortiutous combination of trapping parameters (E and s), or that the present experiment is incapable of distinquishing similar but different traps. Either way, the present data add to the data base on which to interpret natural TL data for Antarctic meteorites.

1) Sears & Durrani (1980) EPSL 46, 159; 2) Melcher (1981a) EPSL 52, 39; 3) McKeever & Sears (1980) Mod.Geol. 7, 137; 4) Melcher (1981b) GCA 45, 615; 5) Dennison et al (1986) Nature 319, 390; 6) Haq et al. (1986) GCA, submitted; 7) Lipschutz (1986) LPI Tec.Rpt. 86-01, 68; 8) Guimon et al. (1985) GCA 49, 1515; 9) Hasan et al. (1986) J. Luminescence 34, 327; 10) Sears & Mills (1974) Meteoritics 9, 47; 11) McKeever (1982) EPSL 58, 419.

KINETICS OF NATURAL TL
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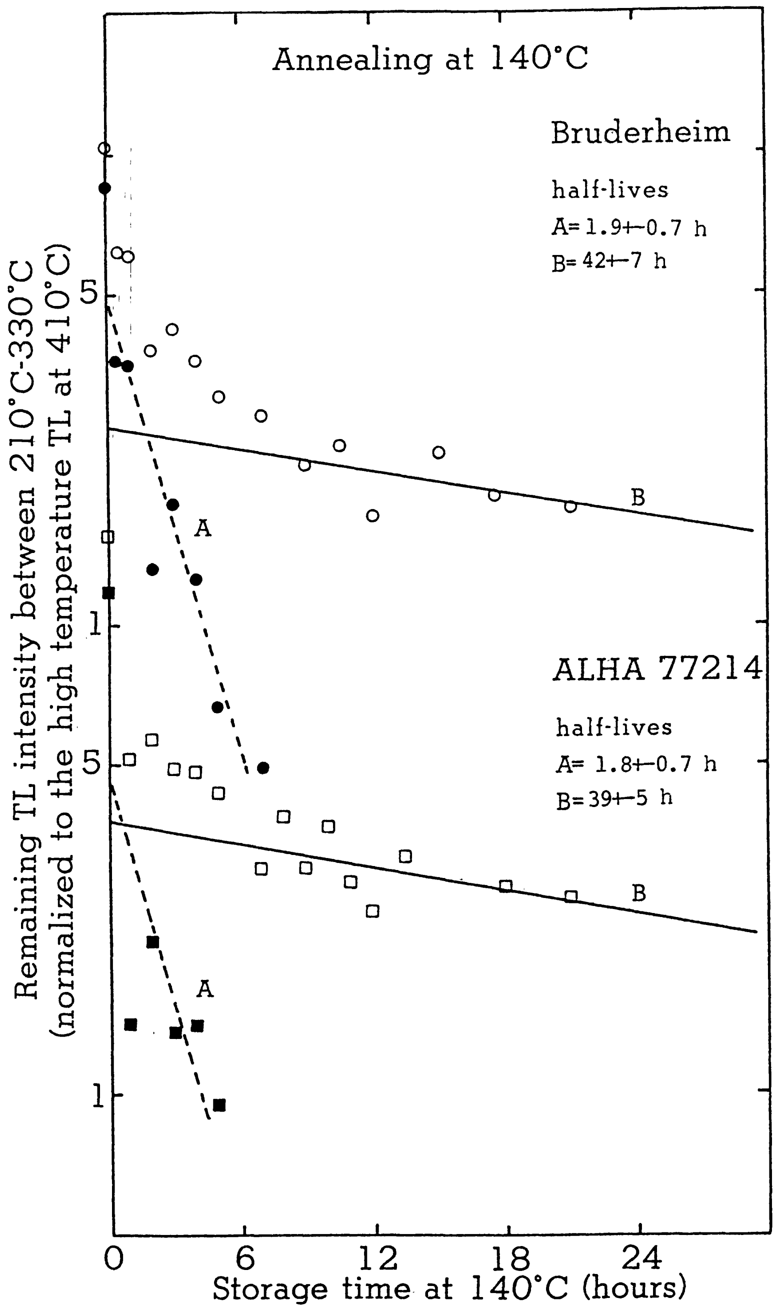

Fig. 1. Natural TL as a function of time for samples of type 3.4 and 5 ordinary chondrites annealed at 140^{o}C. The decay kinetics of the two meteorites are very similar; both curves are resolvable into two components with half-lives of about 2 and 40 hours.