NOBLE GASES IN 55 STONE METEORITES: A COMPARISON OF “OLD” AND “NEW” DATA AND IMPLICATIONS FOR EXPOSURE AGE DISTRIBUTIONS.
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Introduction: Between 1963 and 1965 noble gas concentration and isotopic composition of about 170 stony meteorites were measured in Mainz using methods developed by F.A. Paneth and his students. Samples of about 5 to 10 gms were degassed at 1500°C. After purification, the He was separated from Ne by adsorption and desorption on activated charcoal. The concentrations of He and Ne were measured separately with a Pirani gauge. The gas samples were then sealed in glass tubes and their isotopic composition later determined in a mass spectrometer. The data are not published but calculated exposure ages are discussed (e.g. [1]). The data are, however, incorporated into Noble Gas Compilations [2]. During recent years we have re-measured 55 of these samples with our present procedures [3] and compare here the old and new data including the calculated exposure ages.

Results: Concentrations of ^{3}He in old and new analyses generally agree within a few percent, but the ^{21}Ne concentrations are about 20 to 30 % lower in the old measurements, possibly due to incomplete degassing of the old samples. The old Ne isotopic data are systematically biased because they are normalized to values [4] that were revised in 1965 [5]. For this effect – about 2.5% per mass unit favoring the lighter masses – is not corrected in the compilation but is done in this comparison, but even with this correction the old cosmogenic ^{22}Ne/^{21}Ne ratios tend to be too low by a few percent. The reason for this discrepancy is not known.

Discussion: ^{21}Ne is preferred for the calculation of exposure ages because ^{3}He can be effected by diffusive loss due to even moderate solar heating. The cosmogenic ^{22}Ne/^{21}Ne is used as a shielding parameter for production rates [see 6]. Low ^{22}Ne/^{21}Ne ratios will result in high production rates. This effect, together with low ^{21}Ne concentrations results in old analyses displaying a lower exposure age when compared for modern ones. This comparison is shown in Fig. 1.

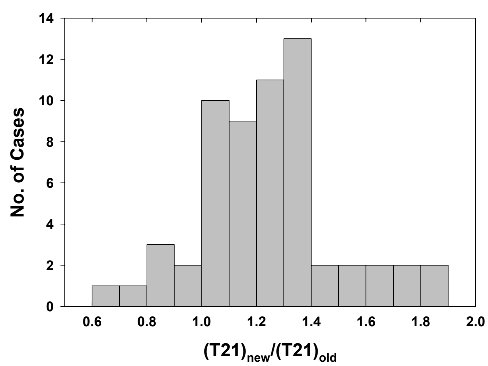

Fig 1: Comparison of exposure ages calculated from old and new analyses.

References: [1] Wänke H. (1968) In: *Origin and Distribution of the Elements*. Pergamon, 411-421. [2] Schultz L. and Kruse H. (1989) *Meteoritics 24*, 155-172 and later editions on CD-ROM. [3] Scherer P. and Schultz L. (2000) *Meteorit. Planet. Sci., 35,* 145-154. [4] Nier A.O. (1950) *Phys. Rev. 79*, 450. [5] Eberhardt P. et al. (1965) *Z. Naturfoschg. 20a*, 623-624. [6] Eugster O. (1988) *GCA 52*, 1649-1662.