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Exposure history of Shişr 033, RaS 221, and RaS 251 – an analysis of trapped, radiogenic, and cosmogenic noble gases.

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The abundances of noble gas isotopes in the carbonaceous chondrites Shişr 033 (CR), RaS 221 (CV3), and RaS 251 (CV3) were measured to determine their cosmic ray exposure history, the gas retention ages, and to better understand their trapped gas concentrations. CRE ages (5.2 ± 1.4 , 28.3 ± 6.6 , 11.2 ± 11.2 Ma) are consistent with [1] and support the hypothesis of exposure age peaks for CV chondrites [2]. The data indicate large and variable contributions of trapped Q and HL type gases, which could partly be separated using a step-wise heating approach. In addition, RaS 221 and RaS 251 contain high concentrations of radiogenic ^{129}Xe . In contrast, Shişr 033 did not show such an excess, though it can be masked by Xe-HL. $^4\text{He}/^{20}\text{Ne}$ ratios of the trapped components of all three meteorites differ significantly from [1], suggesting the meteorites are inhomogenous across masses of 50-165 mg.

[1] Leya, et al. (2013). *Meteoritics & Planetary Science*, 48:1401-1414.

[2] Scherer and Schultz (2000). *Meteoritics & Planetary Science*, 35:145-153.

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