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Apollo 11 and 12 crystalline rocks contain only very small trapped gas components, which are masked by abundant in situ produced spallation and radiogenic components. Therefore, no information on the isotopic abundances of the trapped lunar xenon in these rocks has been obtained. The trapped gases in soils and soil-breccias, although sometimes altered by lunar-surface processes, are predominantly of solar origin. Several authors ((1), (2), (3), (4), (5)) have reported large trapped and fission xenon components in some Apollo 14 breccias. A knowledge of the isotopic composition of trapped xenon is not only important in a spectral decomposition of xenon in lunar breccias but it may yield information on the genesis of breccias and the moon in general. A study of trapped xenon will be most successful when applied to samples with short exposure ages. Marti et al.(3) have investigated breccia 14321, an ejecta from Cone crater, and the youngest (exposure age) Apollo 14 material available. They observed in 14321 a trapped xenon component which is distinct from solar xenon and strongly mass fractionated, resembling terrestrial xenon. Subsequently, the Apollo 16 breccia 60025 was investigated because the cosmic-ray exposure age was found to be only 2-3 m.y. Recently, we have studied another Apollo 16 anorthositic breccia (62255) with a similar exposure age.

In Table 1, we report the total xenon contents and isotopic compositions in several rocks. It is apparent that the spallation component is predominant in crystalline rocks, but quite small in anorthositic breccias. This does not only reflect the abundances of the major target elements for spallation, Ba and REE, which vary considerably, but also the fact that the exposure ages of the investigated anorthositic breccias are all relatively short. Since their spallation components are small, it was possible to obtain accurate data for the trapped components in breccias 60025 and 62255. Trapped xenon is found to be the same in all temperature fractions, and its isotopic composition is consistent with that found in 14321. The fission component is small; therefore, relative abundances of the heavy isotopes can be well determined. In sample 62255, there is a small solar-type component, which affects the He, Ne and Ar isotopes, but not Xe. The temperature release characteristics show that these trapped lunar gases are tightly held and are only released at high temperatures together with the spallation gases. A particularly intriguing problem is the similarity in the fine structure at mass 129 of lunar and terrestrial xenon, when compared to solar xenon. The question of the origin of trapped lunar xenon is of obvious importance; several alternatives must be considered.

Crater ages: A comment on crater age assignments appears to be in order, since crater ages have been suggested in the literature which are based on single rock or soil analysis. Table 1 contains 3 rocks returned from the rim of Buster crater which are described as ejecta from Buster, but their exposure ages are all different, ranging from 2 to 300 m.y.! At the Apollo 16 site, in our opinion, the only well documented crater age is that of North

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Ray which is 49 m.y. It is possible, but not certain, that the four available 2-3 m.y. exposure ages obtained from rocks 68815 and 69935, by Behrmann et al. (6), and from 60025 and 62255, in this abstract, do date the South Ray crater. The exact age, and the question of whether or not they are identical, depend on the choice of trapped krypton.

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Table 1: Xenon concentrations and isotopic abundances in lunar rocks.

Sample	Rock-type	Sample Size (grams)	^{132}Xe concentration (10^{-12}cc STP/g)	^{124}Xe	^{126}Xe	^{128}Xe	^{129}Xe	^{130}Xe	^{131}Xe	^{132}Xe	^{134}Xe	^{136}Xe
15455,70B	breccia-dark phase	0.248	82	42.2	76.2	121.3	155.2	88.0	531	100	20.30	13.01
60025,83T	cataclastic anorthosite	0.246	69	0.393	0.357	7.27	98.3	15.14	78.8	100	38.8	33.1
62235,25	basalt	0.410	95	34.9	64.0	104.3	142.9	76.6	517	100	28.9	20.06
62255,17*	white breccia	0.228	35	0.369	0.382	7.37	98.1	15.24	79.4	100	38.9	33.0
62295,33	crystalline	0.262	58	39.5	70.9	113.6	153.0	81.9	480	100	19.14	11.56
67015,14	breccia-light matrix (clast)	0.287	1.4	39.5	66.3	99.9	134.4	67.8	248	100	36.2	34.2
67075,8	anorthosite	0.214	8.7	1.70	2.67	10.75	97.0	17.29	84.2	100	38.6	32.5
67915,13	breccia-dark matrix	0.349	4.5	16.11	28.09	47.5	110.9	39.5	156.3	100	35.2	31.3
67915,34	breccia-dark matrix	0.346	2.8	16.56	29.38	50.41	116.6	40.9	158.5	100	38.8	34.6
67915,36	breccia-dark matrix	0.306	4.1	19.46	34.09	56.76	117.7	44.4	169.8	100	37.4	33.5
70030,2F	basalt	0.207	10.9	50.14	82.6	126.1	169.6	81.5	399	100	16.52	10.16
76010,2F	breccia-clast	0.150	15.0	20.21	34.63	56.82	115.2	41.22	171.1	100	46.78	45.66
Atmospheric				0.3575	0.3331	7.14	98.3	15.15	78.8	100	38.81	32.98

* Includes only temperature fractions ≤ 1300°C