DEPTH DEPENDENCE OF ^{22}Ne/^{21}Ne IN ORDINARY CHONDRITES AND ABLATION OF METEORITES V.A. Alexeev, *Vernadsky Institute of Geochemistry and Analytical Chemistry, Russian Academy of Sciences, 117975, Moscow, Russia* (aval@icp.ac.ru)

For a correct interpretation of cosmogenic nuclide data in meteorites, the depth and size dependence of the production rates have to be known. The detailed modeling has been carried out by Leya et al. [1]. The authors have irradiated isotropically two spherical targets and have calculated the production rates of the large number of radionuclides and stable isotopes of inert gases. We have analyzed these data and have established the formula for the account of cosmogenic isotope ratios of ^{22}Ne/^{21}Ne$_c$ depending on the depth *d* in a meteorite with the radius R:

^{22}Ne/^{21}Ne$_c$ = Aexp (-*B*d) + *C* (1), where

B = 0.560exp (-0.0105R) - 0.187,

C = 0.170exp (-0.092R) + 1.083, and

A+*C* = 0.150exp (-0.075R) + 1.144

As an example, the result of our accounts for a meteorite with *R* =15 cm is shown in Fig. 1. The obtained data were used for constructing the nomogram (Fig. 2). This nomogram allows one to estimate the ablation according to the found mass of a meteorite and the average measured ratio of ^{22}Ne/^{21}Ne$_c$ in this meteorite. The values of ablation obtained by this method are in agreement with estimations derived by other methods (see Table). For 262 ordinary chondrites, the average (median) value of ablation was found equal to $91.5^{+2.1}_{-2.6}$ %.

The apparent higher average degree of ablation of Í5-chondrites is found [2]. This effect and the peculiarities of Í5-chondrites, marked earlier [3], can be explained by features of evolution of the Í–chondrite parent body. The offered method of estimating the ablation is remarkable for its simplicity and it seems to be the most effective in the case of measurement of the inert gas contents in a few samples of a meteorite. Some of uncertainties of the method are partially smoothed at

the data processing for the large number of meteorites, that can promote revealing the distinctions in the evolution of meteorites of different chemical groups and petrologic types.

References: [1] Leya I. et al. *Meteorit. Planet. Sc*i. 2000, **3**5, 259; 287. [2] Alexeev V.A. *Solar System Research* 2001, **3**5, 458. [3] Alexeev V.A. *Ibid.* 2002 (in press). [4] Bhandari N. et al. *Nucl. Tracks* 1980, 4, 213. [5] Bagolia C. et a*l*. *Nucl. Tracks Detection* 1978, 2, 29. [6] Finkel .C. et al. *GCA* 1978, **4**2, 241. [7] Graf Th. et a*l*. *GCA* 1990, **5**4, 2511. [8] Murty S.V.S. et al. *Meteorit. Planet. Sci*. 1998, **3**3, 1311. [9] Lavrukhina A.K. et a*l*. *Bull. Astron. Inst. Czech.* 1974, **2**5, 122.

Table. Ablation of some falls of ordinary chondrites

No.	Meteorite	Weight, kg	^{22}Ne/ /^{21}Ne$_c$	Ablation, %	
				Our data	Others
1	Akaba L6	0.779	1.202	72^{+10}_{-12}	$95.8^{+1.4}_{-4.2}$ [4]
2	Ambapur Nagla H5	6.3	1.105	$96.4^{+2.0}_{-3.3}$	$91.0^{+3.0}_{-9.0}$ [4]
3	Aztec L6	2.83	1.139	$91.5^{+3.0}_{-4.0}$	84^{+5}_{-16} [4]
4	Bansur L6	15	1.138	66^{+10}_{-13}	70^{+15}_{-30} [4]
5	Barwell L5	44	1.113	70^{+13}_{-19}	37^{+10}_{-14} [5]
6	Bath Furnace L6	86.3	1.112	54^{+18}_{-25}	(63.9) [4]
7	Baxter L6	0.611	1.166	$93.6^{+2.1}_{-2.7}$	$95.0^{+3.3}_{-10.2}$ [4]
8	Bori L6	8.6	1.121	89^{+5}_{-7}	(84.4) [4]
9	Bruderheim L6	303	1.093	63^{+25}_{-29}	(62.6) [4]
10	Denver L6	0.23	1.200	$90.9^{+2.7}_{-3.4}$	(83) [4]
11	Fayetteville H4	2.358	1.124	$96.1^{+1.7}_{-2.5}$	(94.7) [4]
12	Hamlet LL4	3.705	1.119	$95.7^{+1.3}_{-2.6}$	(96) [4]
13	Harleton L6	8.36	1.136	78^{+9}_{-13}	$90.2^{+3.3}_{-9.8}$ [4]
14	Kernouve H6	80	1.135	14^{+18}_{-14}	(38.5) [4]
15	Kesen H4	135	1.085	92^{+7}_{-21}	(61.4) [4]
16	Knyahinya L/LL5	500	1.100	32^{+26}_{-23}	61^{+10}_{-16} [7]
17	Lost Sity H5	17	1.140	58^{+12}_{-15}	(73) [4]
18	Madhipura L	1	1.166	$90.9^{+3.2}_{-4.2}$	75^{+6}_{-11} [4]
19	Mbale L5/6	108	1.096	77^{+16}_{-32}	83^{+5}_{-7} [8]
20	Nikol'skoe L4-5	6	1.088	$99.2^{+0.7}_{-1.4}$	(91.6) [4]
21	Peace River L6	45.76	1.096	89^{+8}_{-11}	(66) [4]
22	Pribram H5	5.555	1.098	$97.8^{+1.4}_{-2.5}$	$95.0^{+1.7}_{-5.0}$ [4]
					$99.96^{+0.03}_{-0.14}$ [9]
23	Ramsdorf L6	4.682	1.121	$94.5^{+2.5}_{-3.6}$	(88) [4]
24	San Juan Capistrano H6	0.056	1.194	$98.2^{+0.7}_{-0.9}$	$99.2^{+0.4}_{-0.8}$ [6]
25	Sitathali H5	1.6	1.141	$94.5^{+1.9}_{-2.5}$	(97.3) [4]
26	St. Germain-du-Pinel H6	4	1.145	85^{+6}_{-8}	(94.3) [4]
27	Tennasilm L4	28.5	1.141	45^{+13}_{-16}	(64.4) [4]
28	Ucera H5	4.95	1.097	$98.4^{+1.1}_{-2.0}$	(97.8) [4]
29	Udaipur H3	1.2	1.203	61^{+11}_{-13}	89^{+6}_{-11} [4]
30	Walters L6	28	1.084	$98.4^{+1.5}_{-4.8}$	(88.8) [4]

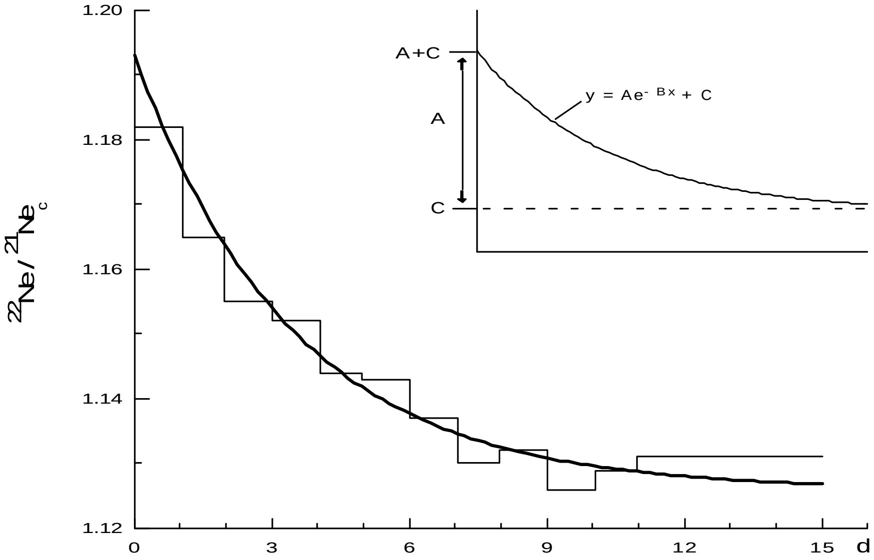

Fig. 1. Dependence of the ratio $^{22}Ne/^{21}Ne_c$ on the depth d (cm) in an ordinary chondrite with the radius R=15 cm. The histogram is based on the data of Leya et al. [1], the curve shows the calculation according to the equation (1). On the insertion the schematic sketch of the curve construction is shown.

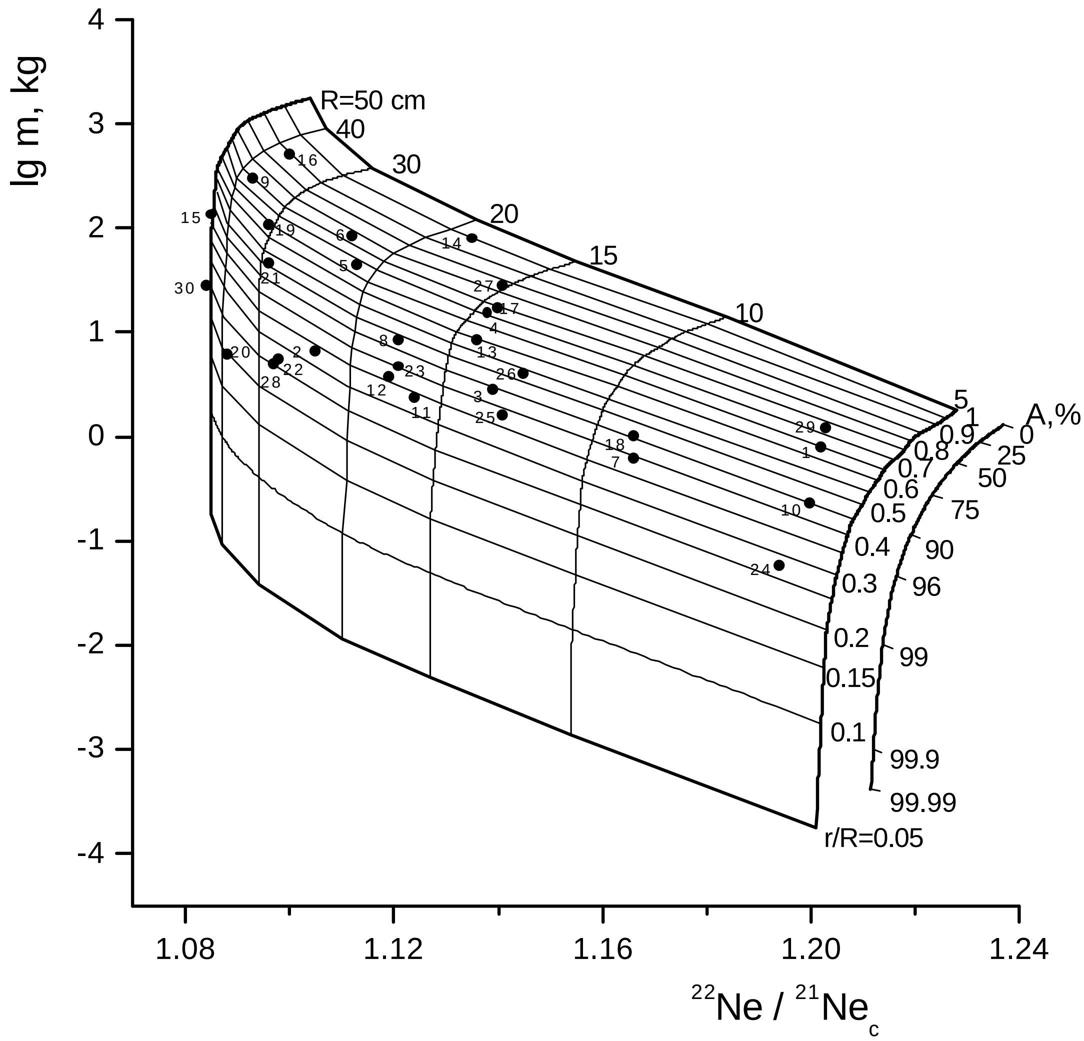

Fig. 2. Nomogram for the estimation of the ordinary chondrite ablation according to the average value of the $^{22}Ne/^{21}Ne_c$ ratio in a meteorite with the found mass m (the effective radius is r). R is the pre-atmospheric radius of a meteorite. The numbers near points correspond to the Table.