

78255
Shocked Norite
48.31 grams (two pieces)

DRAFT □



Figure 1: PET photo of 78255 showing relict zap pits on underside of boulder. Cube is 1 cm. Photo # S73-15190

Introduction

Samples 78255-78256 were chipped off the bottom of the Station 8 boulder after had been rolled over by the astronauts (Jackson et al. 1975). The pieces fell in the soil where they were collected. Sample 78256 was found to fit 78255, so they were numbered together as 78255 (48.31 grams).

Although 78255 was chipped from the bottom of the boulder, it was found to have numerous zap pits (figure 1) indicating that it had been the top surface sometime in the past. Indeed, the astronauts noted that it was very easy to roll the boulder. Cosmic ray studies (below) showed 78255 to be less exposed than 78235. However, it still had elevated radioactivity and hence the boulder has rotated during its history.

Petrography

Perhaps the only petrographic description of 78255 is given in a footnote by Warren and Wasson (1978). The rock is, of course, the same as 78235.

Mineralogy

Pyroxene: Bersch (1991) analyzed the pyroxene.

Chemistry

Warren and Wasson (1978, 1979) analyzed two different chips of 78255 (table 1 and figure 2) and found them to be relatively low in siderophile elements, hence “pristine” by their definition. The pieces they analyzed were more feldspathic than 78235, which they attribute to the small size of their sample and the coarse grain size of the rock.

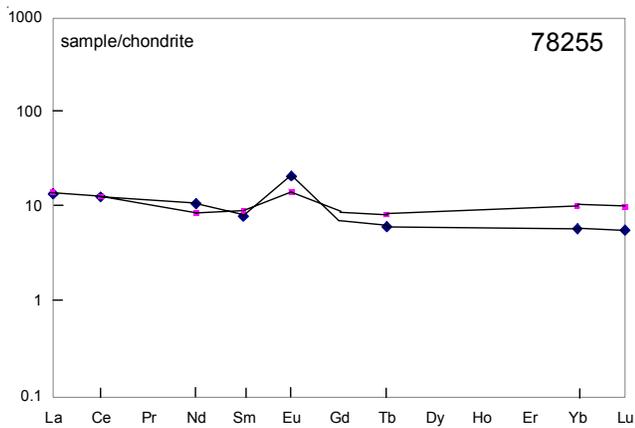


Figure 2: Normalized rare-earth-element diagram for 78255 (data from Warren et al. 1978 , 1979).

Radiogenic age dating

The age of this sample is given in the section on 78235.

Cosmogenic isotopes and exposure ages

Keith et al. (1974) determined the cosmic ray and solar flare induced activity from the large solar flare of August 1972 using the top and bottom of this boulder (table 2). The bottom of the boulder (78255) was shielded from the recent solar flare, but not completely from neutrons produced by high energy cosmic rays.

Processing

List of Photos #

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Table 2: Solar flare activity (Keith et al. 1974).

sample	78135	78235	78255
dpm/Kg			
²⁶ Al	42 ± 4	77 ± 7	65 ± 6
²² Na	74 ± 5	111 ± 8	50 ± 5
⁵⁴ Mn	180 ± 20	55 ± 8	10 ± 5
⁵⁶ Co	240 ± 20	52 ± 9	30 ± 20
⁴⁶ Sc	76 ± 5	1.4 ± 0.9	<15
⁴⁸ V	18 ± 5	<12	

Table1. Chemical composition of 78255.

<i>reference weight</i>	Warren 78	Warren 79	Keith 74
SiO2 %	47.29		
TiO2	0.068		
Al2O3	27.4		
FeO	2.64		
MnO	0.046		
MgO	5.98		
CaO	14.98		
Na2O	0.446		
K2O	0.084		0.071 (c)
P2O5			
S %			
<i>sum</i>			
Sc ppm	4.6	10.7	
V			
Cr	990	2210	
Co	22.6	31	
Ni	21.7	22	
Cu			
Zn	0.95	1.6	
Ga	5.1	4.3	
Ge ppb	58	61	
As			
Se			
Rb			
Sr			
Y			
Zr			
Nb			
Mo			
Ru			
Rh			
Pd ppb			
Ag ppb			
Cd ppb	4.2	4.6	
In ppb	0.05	0.39	
Sn ppb			
Sb ppb			
Te ppb			
Cs ppm			
Ba	86	65	
La	3.3	3.4	
Ce	7.8	8	
Pr			
Nd	5	4	
Sm	1.2	1.36	
Eu	1.21	0.83	
Gd			
Tb	0.23	0.31	
Dy			
Ho			
Er			
Tm			
Yb	0.98	1.7	
Lu	0.14	0.25	
Hf	0.67	1	
Ta	0.086	0.1	
W ppb			
Re ppb	21	54	
Os ppb			
Ir ppb	0.43	0.71	
Pt ppb			
Au ppb	0.107	0.17	
Th ppm	0.44	0.53	0.83 (c)
U ppm	0.19	0.14	0.227 (c)

technique (a) INAA, (b) RNAA, (c) radiation counting