14168,33

Coarse-grained Basalt

0.94 grams

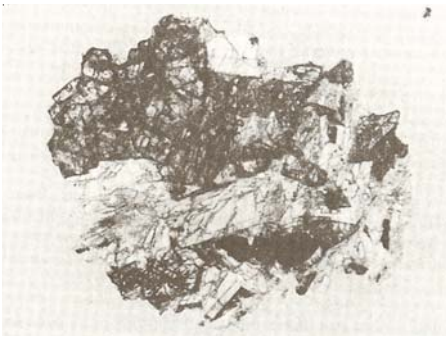


Figure 1: Thin section of 14168,33 (Warner et al. 1980).

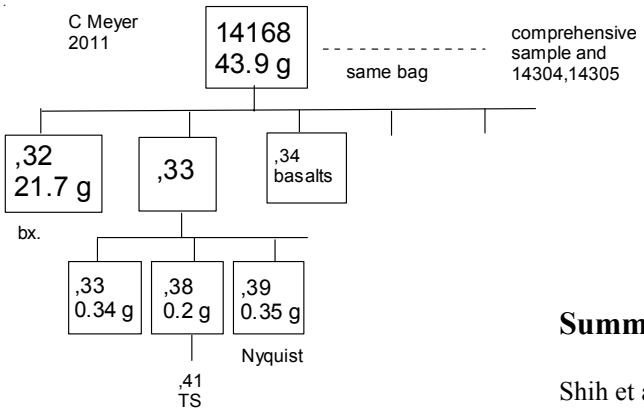
Introduction

14168 is a collection of coarse-fines (4-10 mm) from the bag (1027) that held the football-sized rocks (14303-14305) and smaller rocks apparently derived from the breakup of the larger samples (14169-14188). A small amount of soil was also placed in this bag (14165). Most of the coarse-fine particles were probably derived from these breccia samples.

One of the particles (,33) was found to be a rare basalt (Kramer and Twedell 1977). It has been dated by Shih et al. (1986) at about 3.9 b.y.

Petrography

Warner et al. (1980) described 14168,33 as a high-K mare basalt with abundant small grains of K-feldspar (figure 1). Pyroxenes are typical of mare basalt (figure 2). Accessory minerals include olivine, chromite, metal and troilite.



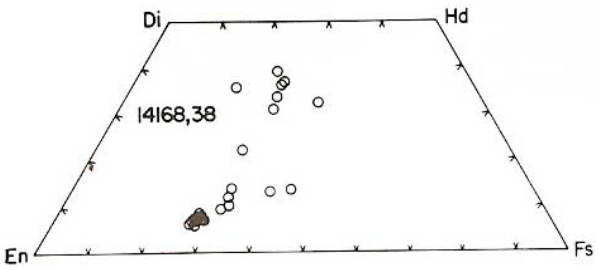


Figure 2: Composition of pyroxene in 14168,33 (Warner et al. 1990).

Chemistry

14168,33 has low Ti, high Al, high K and a slightly bow-shaped REE pattern.

Radiogenic age dating

Shih et al. (1986) determined the age of this fragment (figure 3).

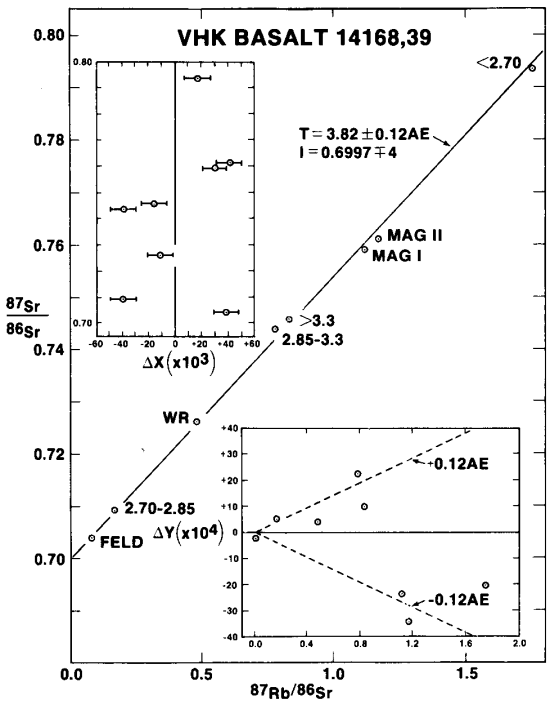


Figure :3 Rb/Sr isochron for VHK basalt 14168,39 (Shih et al. 1986).

Summary of Age Data for 14168,39

	Rb/Sr	Ar/Ar	Sm/Nd
Shih et al. 1986	3.82 ± 0.12 b.y.	3.85 ± 0.05 b.y.	3.91 ± 0.16 b.y.

Table 1. Chemical composition of 14168,33.

reference	Warner80		Shervais90	
weight	mare clast		Shih 86	
SiO2 %			47.8	
TiO2	1.7	(a)	1.7	
Al2O3	12.4	(a)	12.4	
FeO	15.5	(a)	15.5	
MnO	0.215	(a)	etc	
MgO	11	(a)		
CaO	9.9	(a)		
Na2O	0.366	(a)		
K2O	0.57	(a)		
P2O5				
S %				
sum				
Sc ppm	52	(a)		
V	139	(a)		
Cr	3722	(a)		
Co	31	(a)		
Ni	40	(a)		
Cu				
Zn				
Ga				
Ge ppb				
As				
Se				
Rb			9.76	(b)
Sr			58.8	(b)
Y				
Zr	80	(a)		
Nb				
Mo				
Ru				
Rh				
Pd ppb				
Ag ppb				
Cd ppb				
In ppb				
Sn ppb				
Sb ppb				
Te ppb				
Cs ppm				
Ba	100	(a)		
La	5.2	(a)		
Ce	14	(a)		
Pr				
Nd	11	(a)		
Sm	3.4	(a)		
Eu	0.71	(a)		
Gd				
Tb	0.8	(a)		
Dy	5.4	(a)		
Ho				
Er				
Tm				
Yb	3.6	(a)		
Lu	0.53	(a)		
Hf	2.4	(a)		
Ta	0.6	(a)		
W ppb				
Re ppb				
Os ppb				
Ir ppb				
Pt ppb				
Au ppb				
Th ppm	0.7	(a)		
U ppm				

technique: (a) INAA, (b) IDMS

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