

15075
Pigeonite Basalt
 809.3 grams



Figure 1: Photo of NI surface of 15075. NASA S74-28171. Sample is about 7 cm across.

Introduction

15075 was one of several basalt samples collected as a radial sample near the rim of Elbow Crater (15065 – 15085). They all appear to be similar (Ryder 1985). 15077 is interpreted as a “sister” sample to 15076.

15075 is a coarse-grained porphyritic pigeonite basalt with subophitic matrix (figures 2 a,b). It has been dated at 3.4 b.y. and has been exposed on the lunar surface for 265 m.y. (age of Elbow Crater?).

Mineralogical Mode for 15075

	Sample Catalog Butler 1971	Taylor and Misra 1975
Olivine		trace fayalite
Pyroxene	45	~45
Plagioclase	50	~45
Opaques	1	
Pyroxferroite		2-5
Silica		3-5

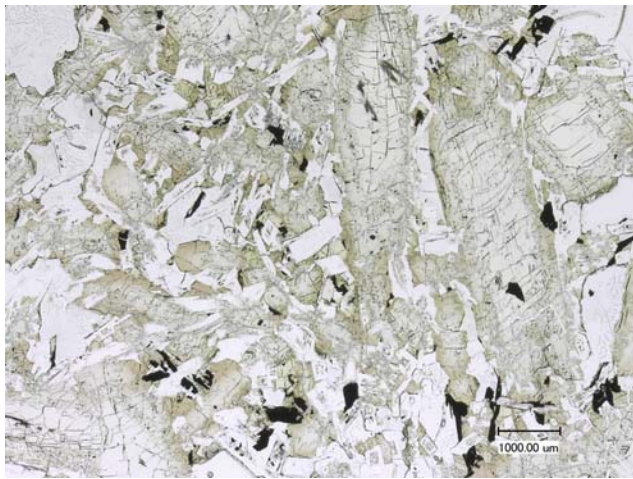


Figure 2a: Photomicrograph of 15075 by C.Meyer @ 50x.

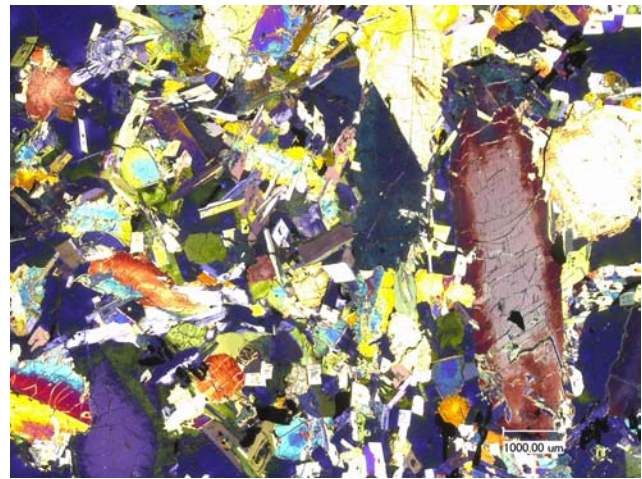


Figure 2b: Photomicrograph of 15075 (crossed polarizers) by C.Meyer @ 50x.

Petrography

Taylor and Misra (1975) and Ryder (1985) described 15075. It is apparently another piece of 15076 (which is well studied). Pyroxenes and plagioclase compose 90% of the rock; accessories include chromite-ulvospinel, pyroxferroite, cristobalite, tridymite, ilmenite, Fe-Ni metal, and fayalite. The pyroxenes are highly zoned (figure 2b, 3) and up to 6 mm long. The mesostasis includes complex intergrowths of fayalite + Ca-rich pyroxene + silica which may be “breakdown products” of pyroxferroite (Ryder 1985).

Lofgren et al. (1975) concluded that 15075 had a cooling rate of about 1 deg C per day. The lunar orientation of 15075 is known from surface photography, but it has not been used for solar, cosmic ray studies.

Mineralogy

Olivine: none

Pyroxene: Large pigeonite grains up to 6 mm in length are chemically zoned (figure 2, 3 and 4). Taylor and Misra (1975) tabulate pyroxene analyses, including pyroxferroite.

Plagioclase: Taylor and Misra (1975) analyzed plagioclase (figure 5).

Chormite: There is complete zoning from chromite to ulvospinel (Taylor and Misra 1975).

Metal: Taylor and Misra (1975) and Taylor et al. (1975) found high Co in Ni-rich iron grains (figure 6).

Chemistry

The bulk chemical composition of 15075 has not been determined, probably because sister sample 15076 has been well analyzed. The K₂O content of 15075 was reported by Schaeffer and Schaeffer (1977) as 0.037 % or 0.051 %, while CaO was found to be 16.8 or 15.9 % (too high). Cripe and Moore (1975) measured 390 ppm S.

Radiogenic age dating

Schaeffer and Schaeffer (1977) dated 15075 by the Ar/Ar plateau technique as 3.45 ± 0.2 b.y.

Cosmogenic isotopes and exposure ages

Schaeffer and Schaeffer (1977) determined two exposure ages (274 and 258 m.y.) for 15075.

Other Studies

Simmons et al. (1975) studied microcracks in 15075.

Processing

In 1973, a slab was cut through the middle of 15075 (figure 8). Pieces of 15075 are used for public displays at the Ontario Science Center, Canada and the NASA AMES Research Center, California (figure 9).

There are 15 thin sections.

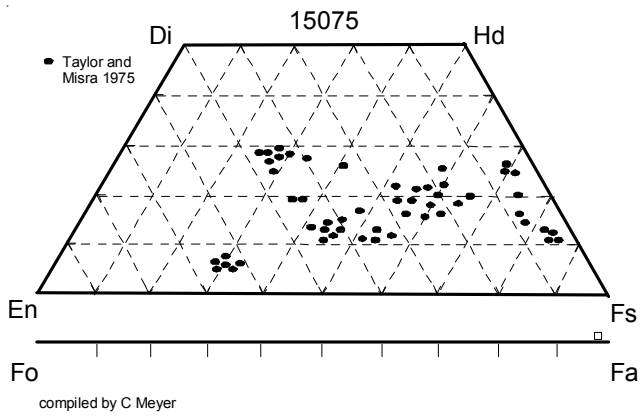


Figure 3: Pyroxene composition of 15075 (from Taylor and Misra 1975).

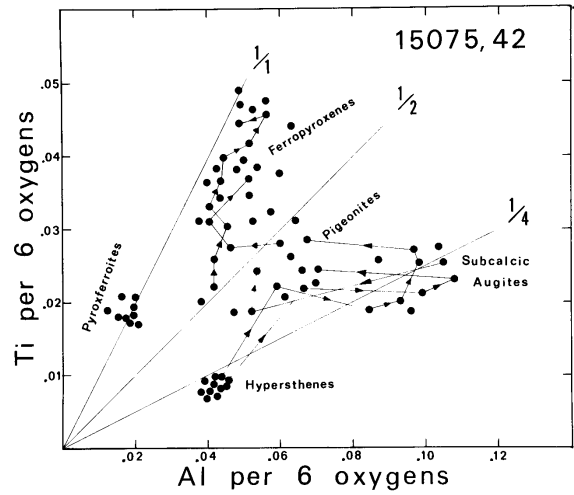


Figure 4: Trace element content of pyroxene in 15075 (from Taylor and Misra 1975).

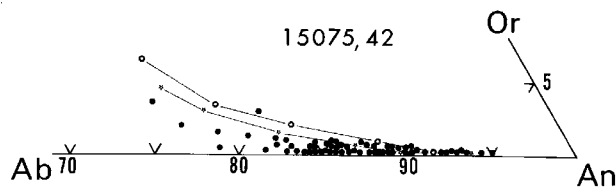


Figure 5: Plagioclase composition of 15075 (from Taylor and Misra 1975).

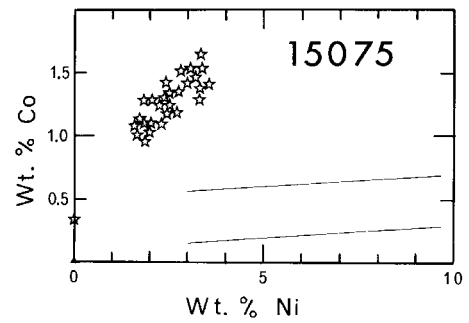


Figure 6: Ni and Co content of small metallic iron grains in 15075 (from Taylor and Misra 1975).

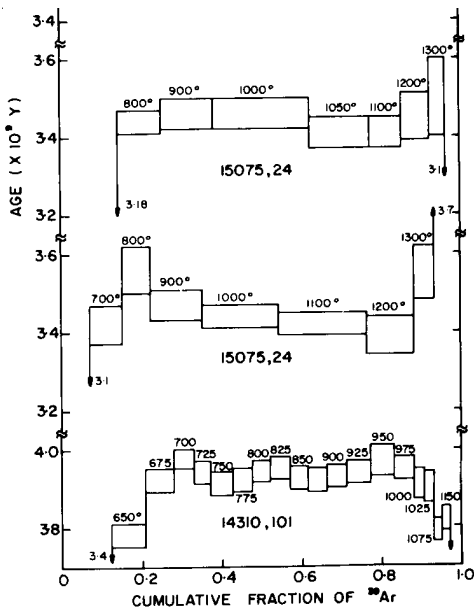


Figure 7: Argon release pattern for 15075 (Schaeffer and Schaeffer 1977).

Summary of Age Data for 15075

	Ar/Ar
Schaeffer and Schaeffer 1977	3.45 ± 0.2 b.y.
	3.45 ± 0.2

Note: decay constant ?

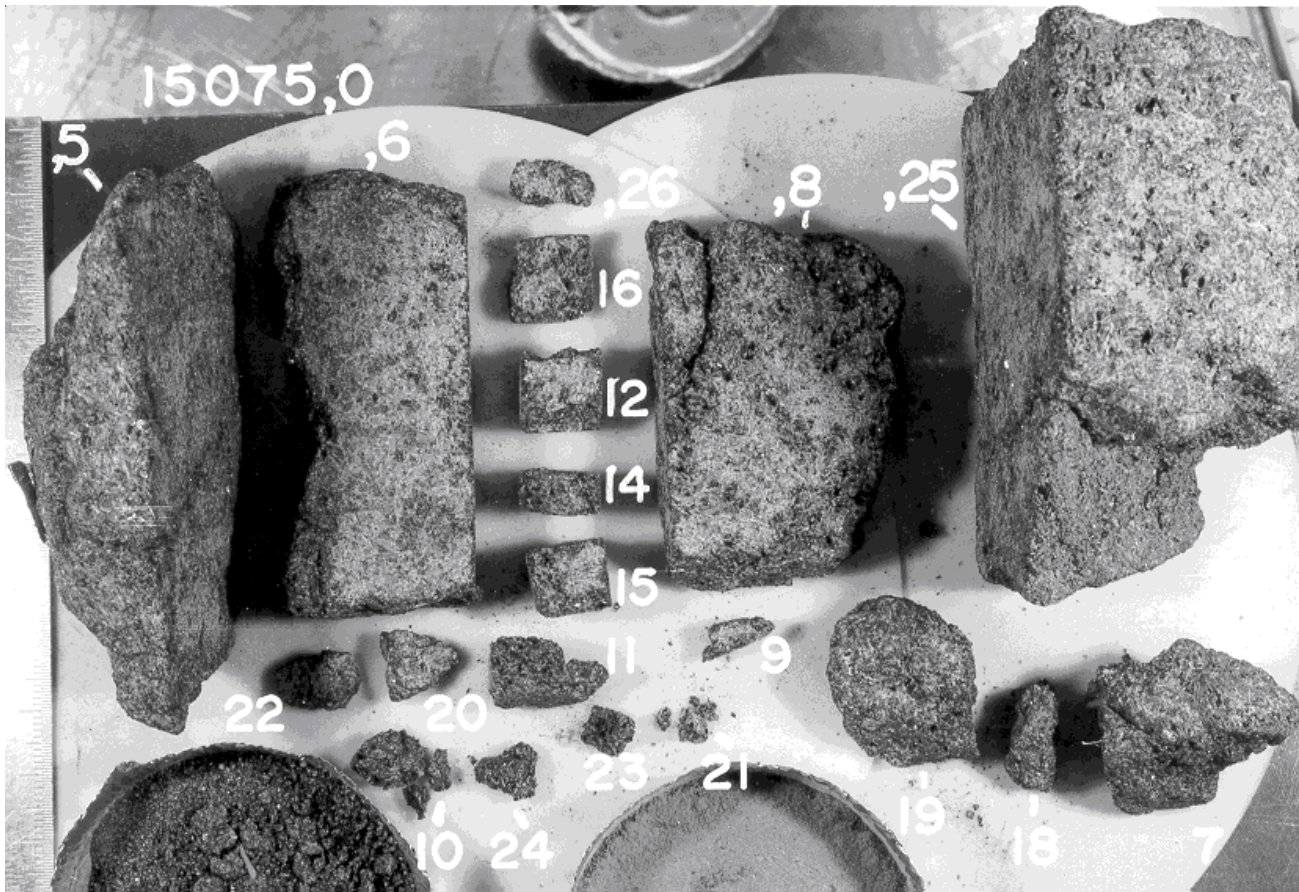


Figure 8: Exploded parts diagram of 15075. NASA S74-31232. Note the scale marked in mm/cm.

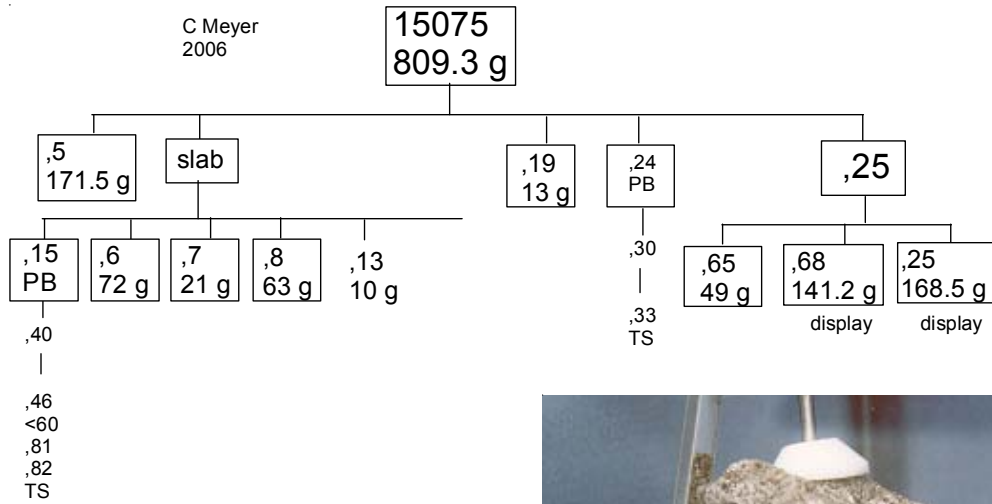


Figure 9: 15075,68 on display. NASA S92-44059.

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