

YAMATO-74662 METEORITE: A CARBONACEOUS CHONDRITE TYPE II

Keizo YANAI

National Institute of Polar Research, Kaga 1-chome, Itabashi-ku, Tokyo 173

and

Hiroshi HARAMURA

Geological Institute, Faculty of Science, University of Tokyo,

Hongo 7-chome, Bunkyo-ku, Tokyo 113

Abstract: Preliminary chemical analysis of Yamato-74662 meteorite suggests that this meteorite belongs to carbonaceous chondrite Type II. No other meteorites of this type have been found among Antarctic meteorites which run to about one thousand. Yamato-74662 meteorite was collected from the surface of bare ice in the Meteorite Ice Field near southern Yamato Mountains, Antarctica on December 30, 1974.

The bulk chemical composition of Yamato-74662 meteorite in weight % is as follows: 29.18% SiO₂, 0.22% TiO₂, 2.38% Al₂O₃, 22.53% FeO, 7.38% FeS, 0.22% MnO, 19.29% MgO, 1.70% CaO, 0.28% Na₂O₂, 0.04% K₂O, 1.56% H₂O(-), 13.26% H₂O(+), 0.23% P₂O₅, 0.85% NiO, 0.52% Cr₂O₃, 0.05₉% Co.

1. Introduction

A new specimen of the Yamato meteorites, Yamato-74662, has been chemically analyzed by one of the authors (H.H.). The bulk chemical composition of this meteorite suggests that it belongs to carbonaceous chondrite Type II, though the carbon content has not been determined as yet. This is the first meteorite to be identified as carbonaceous chondrite Type II among the nearly one thousand specimens hitherto found in Antarctica.

Yamato-74662 is one of the Yamato-74 meteorites, numbering 663 specimens, collected in 1974 on the surface of the bare ice in the Motoi Nunatak (71°47'28.1"S, 36°12'12.2"E, 2,254 m), Meteorite Ice Field, southern Yamato Mountains in East Antarctica. It was found on December 30, 1974. The results of the chemical analysis and initial data are preliminarily described.

2. Initial Data and Features of Yamato-74662 Meteorite

The initial data of Yamato-74662 are as follows:

Name	Yamato-74662
Kind	Find
Initial number	74123009
Date of finding	December 30, 1974

Original weight	150.9 grams
Original size	5.5×5.0×3.5 cm
Location	Latitude 71°48'S Longitude 36°10'E Motoi Nunatak, Meteorite Ice Field southern Yamato Mountains in East Antarctica
Occurrence	Found lying on the surface of the bare ice

Yamato-74662 meteorite is friable. As shown in Fig. 1, Yamato-74662 looks like consolidated soil or coal of poor quality. The meteorite is somewhat massive in shape with some flat planes, and black to dark grey in color. Although the fusion crust is recognized on the surface, almost half of the crust was lost by weathering, exposing the inner part. This meteorite body is not compact, and many fissures either parallel or intersecting can be recognized on the surface.

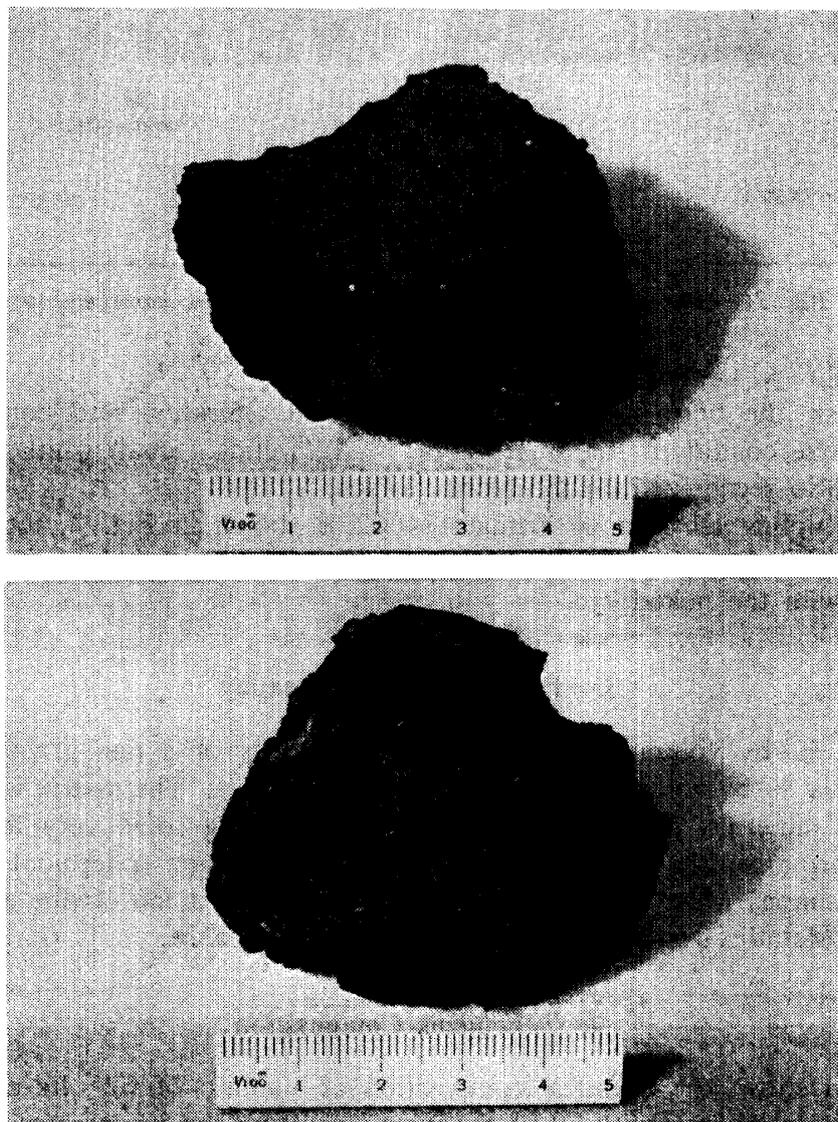


Fig. 1. Photographs of Yamato-74662 meteorite, 150.9 grams.

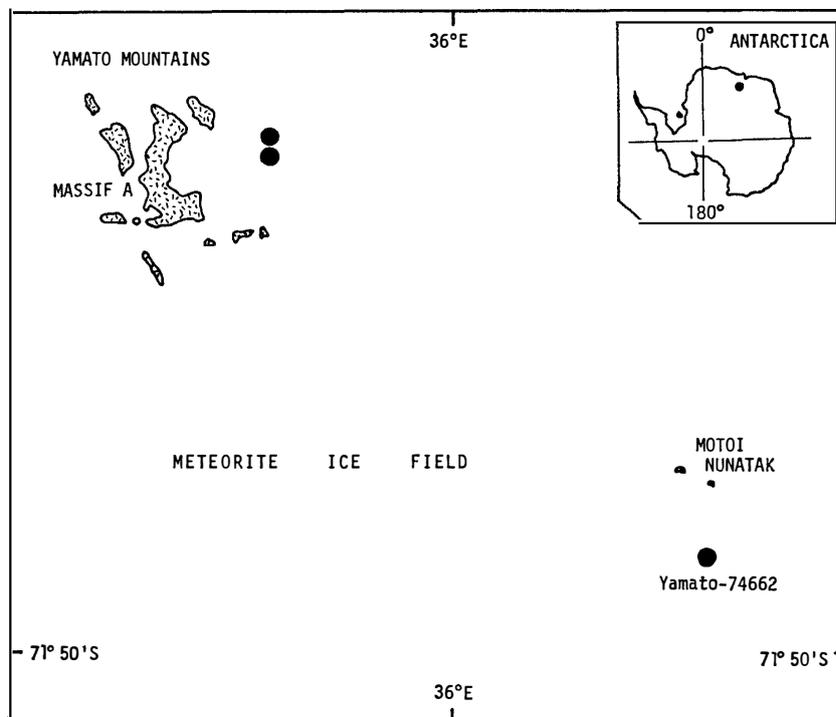


Fig. 2. Map showing the locations of Yamato-74 carbonaceous chondrites.

Nevertheless, the body has been protected from alteration and contamination by the unique conditions for preservation in Antarctica. Small white and brown spots are also recognized on the black surface.

The sampling location of Yamato-74662 is shown in Fig. 2, together with the locations of two more Yamato-74 carbonaceous chondrites which were identified with the naked eye.

3. Preliminary Petrography

Ninety % by volume of Yamato-74662 consists of a fine grained mineral mass. A few % by volume is represented by chondrules. The matrix is composed of opaque minerals, olivine, and plagioclase, including some very fine grained opaque and greenish colored minerals. Chondrules are spheroidal and fragmental in shape. Most of them are composed of fine grained olivine and opaque minerals. Metallic iron exists in extremely low abundance.

4. Chemical Composition

Table 1 shows the chemical composition of Yamato-74662. Its carbon content is expressed in H₂O(+) component, because the abundance of carbon content is not yet analyzed directly. In the table, 13.26% H₂O(+) includes

Table 1. Chemical composition of the Yamato-74662 meteorite.

	wt. (%)
SiO ₂	29.18
TiO ₂	0.22
Al ₂ O ₃	2.38
FeO	22.53
FeS	7.38
MnO	0.22
MgO	19.29
CaO	1.70
Na ₂ O	0.28
K ₂ O	0.04
H ₂ O(-)	1.56
H ₂ O(+)*	13.26
P ₂ O ₅	0.23
NiO	0.85
Cr ₂ O ₃	0.52
Co	0.05 ₉
Total	99.69 ₉

* Contains the volatile components lost during heating up to 1,100°C.

various volatile components that are lost during heating up to 1,100°C.

The chemical composition corresponds to that of Type II carbonaceous chondrite and discriminates the specimen from Type I and Type III.

Acknowledgments

We wish to thank Professors I. KUSHIRO and H. TAKEDA, University of Tokyo, for their assistance in chemical analysis. We are also grateful to Professor Y. YOSHIDA, National Institute of Polar Research, for his critical reading of the manuscript.

(Received October 18, 1977)