

M6 microwave digestion system in the digestion of boron nitride (BN)

1. Introduction

Boron nitride is an industrial ceramic material of limited by important applications, principally in electrical insulators and cutting tools. It is made into two crystallographic forms, hexagonal boron nitride (H-BN) and cubic boron nitride (C-BN). Cubic boron nitride has the structure similar to the carbon analogous, diamond, which makes it second only to diamond in hardness. However, H-BN is a platy powder consisting, with the structure similar to the graphite makes it a soft lubricious material. Unlike graphite, H-BN is noted for its low electric conductivity and high thermal conductivity. It is frequently molded and then hot-pressed into shapes such as electrical insulators and melting crucibles. H-BN can react with fluorine, and hydrogen fluoride (HF), which forms BF_3 and NH_4BF_4 respectively during the reaction.

2. Instrument and reagents

Instrument:

The digestions were carried out with M6 microwave digestion system and HP16 high pressure digestion vessels.



M6 microwave digestion system



HP16 rotor



G-160 hot block

Reagent:

HNO_3 (GR) ; HF (GR)

Sample: BN

3. Method

1. Weigh 0.2 g BN into sample cup.
2. Add certain amount of HNO_3 and HF into the sample cup. Then swirl the cup to mix the sample and acid thoroughly.
3. Seal the vessel and place the rotor into the cavity.
4. Set the microwave digestion program as shown in the following table.

Table 1. Microwave digestion method

Step	Setting temperature($^{\circ}\text{C}$)	Ramp time (min)	Temperature holding (min)
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1	140	10	2
2	210	10	30

5. Take the vessels out of the cavity when the temperature falls under 60 °C.
6. Dilute the sample with deionized water when the temperature of the sample cools to room temperature.

4. Result and conclusion

The final digestion solution for BN is clear and transparent as shown in the figure below.



Fig.1 BN digestion solution

The result shows that M6 coupled with HP 16 high pressure rotor can digest BN into a clear solution. The total microwave digestion process is controlled in 1 h which is a proof for M6, the microwave digestion system, can provide a fast and precise sample preparation procedure. Thanks to the advanced full vessel IR R-temp and precise pressure control unit, M6 can ensure a safe and precise sample digestion during the experiment.