

# The application of M6 microwave digestion system in RoHS heavy metal detection

## 1. Introduction

The restriction of use certain hazardous substances in electrical and electronic equipment (RoHS) is a mandatory standard established by EU legislation. The restriction aims to eliminate the use of lead, mercury, cadmium, hexavalent chromium and polybrominated biphenyls and polybrominated diphenyl ethers in the electrical and electronic products and reduce the risk for human health. The precise detection of heavy metals is vital for electrical and electronic product producer.

## 2. Instrument and reagent

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



M6 microwave digestion system



HP 16 rotor



G-160 hot block

Reagent:

HNO<sub>3</sub> (GR); HCl (GR), HF (GR)

Sample: ERM-EC681M (Low-Density Polyethylene - Trace elements)

## 3. Experiment method

1. Weigh 0.25 g sample into sample cup.
2. Add nitric acid, hydrochloric acid and hydrofluoric acid into the sample. Then mix the sample by swirling the cup gently.
3. Seal the vessel and set the microwave digestion method as follow:

Table 1: microwave digestion program

Step	Setting temperature(°C)	Ramp time (min)	Temperature holding (min)
1	140	10	5
2	200	8	30

4. Take the rotor out of the cavity when the temperature falls under 60 °C.
5. Open the vessel then filter sample and dilute it with deionized water.

#### 4. Result and discussion

The final digestion solution was tested by ICP-OES as shown in the table below.

Table 2: ICP-OES analysis for ERM-EC681M

Sample	Element	Found value (mg/Kg)	Average (mg/Kg)	Certified value (mg/Kg)
ERM-EC681M	Pb	69.99	70.00	69.7±2.5
		70.00		
	Cd	141.4	144.5	146±5
		147.5		

The result shown in table 2 demonstrates that microwave digestion can meet the sample preparation demands in RoHS detection.

#### 5. Conclusion

Preekem's M6 microwave digestion system coupled with HP 16 high pressure rotor is capable for digesting electric consumables during RoHS determination. HP 16 high pressure rotor provides a closed vessel digestion environment which ensures the accurate determination of national and international regulations control concentrations of heavy metals in electric consumables. With the advanced full vessel IR temperature monitor system and pressure control unit on HP 16 rotor, M6 can ensure the safe and precise sample digestion during the experiment.