# NATIONAL STANDARD OF THE

# PEOPLE'S REPUBLIC OF CHINA

# GB/T 3780.8-2019

## Carbon black -- Part 8: Determination of heating loss

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## 1 Scope

This Part of the GB/T 3780 stipulates the determination of carbon black heating loss by oven method (method A), moisture balance method (method B), and infrared moisture meter method (method C), of which method A is the arbitration method.

This Part applies to carbon black for use in rubber products, acetylene carbon black and colour carbon black, and also applies to the preparation of sample drying conditions for carbon black prior to other tests.

Note: The loss of heating loss is mainly water, and may also be other traces of volatile substances.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies to this document. For undated references, the latest edition (including any amendment) applies to this document.

GB/T 3778, Carbon black for use in rubber products

GB/T 3782, Acetylene black

GB/T 7044, Colour carbon black

GB/T 8170, Rules of rounding off for numerical values & expression and judgment of limiting values

### 3.1 Principle

Spread a certain amount of carbon black evenly on the bottom of the weighing bottle;

heat it in an oven at 125 °C for 1 h; then, place the weighing bottle in a desiccator to cool to room temperature and weigh; calculate the heating loss.

### 3.2 Instruments and equipment

3.2.1 Oven, gravitational convection, temperature controlled at (125+/-1) °C, temperature uniformity <= +/-5 °C.

### 3.2.2 Weighing bottle, short, 30 mm in height, 60 mm in diameter, equipped with a

ground glass cover. When the test requires more samples, an open container shall be used, and the sample thickness shall not exceed 10 mm during the heating process.

### 3.3.1 Different types of carbon black shall be sampled according to the provisions of

GB/T 3778, GB/T 3782 or GB/T 7044, respectively.

### 3.3.2 The collected samples shall be placed in a closed sample container, and the

samples shall be brought to room temperature before the test.

### 3.4.2 Put the weighing bottle and the cap in an oven at 125 °C; open the cap and dry

for 30 minutes. Then, move the weighing bottle and the cap into a desiccator and cool to room temperature. Weigh the mass (m0) of the bottle and the cap, accurate to 0.1 mg.

### 3.4.3 Spread about 2 g of carbon black for use in rubber products or colour carbon

black (1 g of acetylene carbon black or powdered carbon black) evenly on the bottom of the weighing bottle; cover and weigh (m1), accurate to 0.1 mg.

### 3.4.5 Cover the weighing bottle cap and transfer it to a desiccator; remove the cap and

cool to room temperature; cover the cap and re-weigh (m2), accurate to 0.1 mg. When taking the weighing bottle out of the oven or desiccator, or during the transfer process, the bottle cap shall be covered to avoid loss of carbon black due to air flow.

**4.3.1 Different types of carbon black shall be sampled according to the provisions of**

GB/T 3778, GB/T 3782 and GB/T 7044, respectively.

**4.3.2 The collected samples shall be placed in a closed sample container, and the**

samples shall be brought to room temperature before the test.

**4.4.1 Install the moisture balance according to the instrument manual, and set the**

temperature to 125 °C. At the set temperature, dry the empty weighing plate for 30 min and cool to room temperature before proceeding to the sample determination.

**4.4.2 Spread about 10 g of carbon black for use in rubber products or colour carbon**

black (2 g of acetylene carbon black or powdered carbon black) evenly on the weighing plate of the moisture balance, and weigh the mass (m3), accurate to 1 mg.

**4.4.3 Gently close the upper cover of the moisture balance, and start the instrument to**

start heating the sample.

**4.4.4 Under this drying condition, after continuing to dry for a period of time, if the**

mass change displayed on the moisture balance display within 30 s is less than 1 mg, the sample has been dried, stop heating and record the mass value (m4) on the display.

**4.5.1 The heating loss H of carbon black is expressed in mass fraction, and the value**

is expressed in percentage (%), calculated by Formula (2):

Where:

m3 - the numerical value of sample mass before heating, in grams (g);

m4 - the numerical value of sample mass after heating, in grams (g).

**4.5.2 Keep two decimal places for the calculation results; round off the value**

according to the provisions of GB/T 8170.

**4.5.3 The reading of the result can also be read according to the displayed value of the**

instrument, and rounded off according to the provisions of GB/T 8170.

Figure 1 - Schematic diagram of infrared moisture meter

**5.3.1 Different types of carbon black shall be sampled according to the provisions of**

GB/T 3778, GB/T 3782 and GB/T 7044, respectively.

**5.3.2 The collected samples shall be placed in a closed sample container, and the**

samples shall be brought to room temperature before the test.

**5.4.2 Install the infrared moisture meter according to the instrument manual, and set**

the temperature to 125 °C.

**5.4.3 Spread about 10 g of carbon black for use in rubber products or colour carbon**

black (2 g of acetylene black or powdered carbon black) evenly on the sample plate of the infrared moisture meter, accurate to 1 mg.

**5.4.4 Place the sample plate under the 185 W infrared lamp of the infrared moisture**

meter, so that the distance between the upper edge of the sample plate and the center of the lamp surface is 75 mm +/- 2 mm.

**5.4.5 Start the instrument and irradiate the sample with infrared rays.**

5.4.6 When the value displayed on the digital display drops by <=0.05% per minute, irradiate for another 2 minutes, and the displayed value is the heating loss.

**5.5 Test data processing**

Express the heating loss of carbon black by the value displayed on the digital display, take the average value, and round off the value according to the provisions of GB/T 8170.

**5.6 Precision**

The difference between the two determination results shall not exceed 11.71% of the