DEPARTMENT OF COMMERCE

Bureau of Standards

Certificate

FOR

STANDARD CALORIMETRIC SAMPLE No. 38b

NAPHTHALENE

The total heat of combustion at constant volume, of standard sample No. 38b of naphthalene, per gram weight in air against brass weights, has been found to be

9,614 calories $_{20}°$

The total heat of combustion at constant volume of a substance containing only the elements carbon, hydrogen, and oxygen is defined as the number of heat units liberated by the combination in an inclosure of constant volume, of unit quantity of the substance, with oxygen, to form gaseous carbon dioxide and liquid water, the substance and the oxygen being initially at the same temperature, and the products of combustion being cooled to the initial temperature. A discussion of this definition may be found in B. S. Scientific Paper No. 230. In using the standard sample, it is desirable to observe the following procedure:

1. The charge should not be too large for complete combustion in the bomb in which it is to be burned, usually from 0.8 to 1.2 g. The charge should be placed in the bomb immediately after weighing.

2. The charge should be fired by a short length of iron wire of about No. 34 B. & S. gage (about 0.15 mm diameter) and a correction (1,600 calories per gram) should be applied for the heat of combustion of the wire. A battery of 3 to 5 storage cells or 6 to 10 dry cells in series should be used for ignition. A toy transformer with secondary voltage of about 10 is more convenient, if alternating current is available.

3. The charge should be burned in pure oxygen or in commercially pure oxygen, containing preferably not over 5 per cent of nitrogen and no combustible gases. To secure complete combustion the total quantity of oxygen should be not less than three times that required to combine with the combustible charge. This usually requires a pressure of from 20 to 40 atmospheres in the bomb.

4. The acid formed during combustion should be determined by titration and in the calculation should be considered as nitric acid. A correction of 230 calories per gram of nitric acid formed should be applied.

5. This standard sample No. 38b, while suitable for use as a standard calorimetric sample, is *not* 100 per cent naphthalene.

6. Most fuels can be burned without briquetting, and platinum wire may be used for ignition in place of iron wire; otherwise the conditions specified above, as well as the details of observing and of computing results, should be as nearly as possible identical in fuel combustions and in calibration observations.

George K. Burgess

Director.

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