THE HEAT OF COMBUSTION OF TETRAHYDROPYRAN

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Abstract

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THE HEAT OF COMBUSTION OF TETRAHYDROPYRAN

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In Thermochemical Bulletin* No. 3 for 1957, values of the heat of combustion of tetrahydrofuran and tetrahydropyran obtained in two laboratories were published.

Tetrahydrofuran (l) 598.8
Tetrahydropyran " 753.2 } Springall, Mortimer, and Fletcher (England)

Tetrahydrofuran 598.0
Tetrahydropyran 750.1 } Skuratov, Kozina (USSR) **

For tetrahydrofuran the difference is comparatively small, but for tetrahydropyran it amounts to 0.5%. Such a difference cannot be explained by errors of calorimetric measurements, but is apparently a consequence of insufficient purity of the substance.

Table 1

No. of experiments	Charge (weight in vacuo)	$\frac{CO_2 \text{ found}}{CO_2 \text{ calculated}}$	ΔH_c^0 kcal/mole
1	0.4946	0.9996	750.45
2	0.4780	1.0004	750.42
3	0.5305	0.9997	750.50
4	0.5143	0.9997	750.63
5	0.5940	1.0002	750.71
6	0.5953	1.0005	750.54
7	0.6342	1.0004	750.45
8	0.4877	0.9998	750.32
9	0.5334	0.9997	750.67
Mean	–	1.0000 ∓ 0.0001	750.52 ∓ 0.04

As a result of correspondence with the English authors, we decided to carry out repeated determinations of the heat of combustion of tetrahydropyran in both laboratories. In this repeated determination, the English authors obtained a

heat of combustion of tetrahydropyran of 752.8 ± 0.9 kcal/mole ([2]), i.e., practically coinciding with the value given in the Thermochemical Bulletin. The authors note that the preparation used by us was apparently contaminated.

In the present communication we give the results of our repeated determination of the heat of combustion of tetrahydropyran. Tetrahydropyran

* The Bulletin is published annually by the Subcommission on Experimental Thermodynamics of the International Union of Pure and Applied Chemistry and has as its aim the informing of leading laboratories about various thermochemical works. It may contain data of a preliminary nature.

** See ([1]).

was purified by us by various methods (bromination, boiling with dilute hydrochloric acid, freezing; all samples before combustion were carefully dried and fractionated over metallic sodium). The heats of combustion of the samples obtained agreed within the limits of experimental error. The main criterion of the purity of the preparation used was the close agreement between the amount of carbon dioxide found analytically in the combustion products (accuracy of the analysis 0.01%) and the amount of carbon dioxide calculated from the weighed portion of the initial substance. The results obtained are given in Table 1. Column 4 of Table 1 gives the standard heat of combustion of tetrahydropyran in the liquid state. As can be seen from the data presented, the tetrahydropyran used by us could be considered sufficiently pure. The error of the calorimetric measurements and gas analyses was estimated as the root-mean-square deviation. The value obtained by us agrees closely with that published by us earlier ([1]) and differs from the number given in ([2]) by 0.3%.

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CITED LITERATURE

[1] S. M. Skuratov, A. A. Strepikheev, M. P. Kozina, DAN, **117**, No. 3, 452 (1957).
[2] R. C. Cass, S. E. Fletcher et al., J. Chem. Soc., **1958**, 1406.

Note: Figure translations are in progress. See original paper for figures.