

The results of an experimental determination of the specific heat at constant pressure of  $\beta$ -cyanopropionic aldehyde are given; calculated values of the specific heats at constant pressure and constant volume, and of the velocity of sound, are also given.

The direct heating method [1, 2] was used to measure the specific heat at constant pressure of  $\beta$ -cyanopropionic aldehyde at atmospheric pressure in the temperature range 220–370°K. An analysis of the initial data and an estimate of the error of the single measurement of  $C_p$  showed that the rms error was  $\pm 0.5\%$ .

On the basis of experimental data for the density (Table 2), which was investigated by the hydrostatic weighing method with an error of 0.1%, we obtained an equation of state that accurately represents the P, v, T data:

$$P = \sum_{i=0}^3 a_i T^i \rho^2 + \sum_{i=0}^3 b_i T^i \rho^3.$$

Using the selected empirical equation of state and the known thermodynamic relation we calculated the specific heats at constant pressure and volume, and the velocity of sound, at temperatures 220–370°K and pressures 1–1000 bar with an error of 4–5%.

TABLE 1. Experimentally Determined Specific Heat at Constant Pressure ( $C_p$ ) of  $\beta$ -Cyanopropionic Aldehyde

$T, K$	$C_p,$ J/kg·deg	$T, K$	$C_p,$ J/kg·deg
220	1922	322	2080
223	1929	325	2081
227	1931	329	2082
273	2002	362	2153
277	2012	668	2240
280	2015	370	2299

TABLE 2. Density of  $\beta$ -Cyanopropionic Aldehyde ( $\rho \cdot 10^5, g/cm^3$ )

$T, K$	$P, MPa$							
	0,1	5,0	9,9	19,7	29,5	39,3	49,1	58,9
290,4	9999	10028	10060	10105	10165	10220	10268	10314
314,8	9773	9808	9842	9903	9969	10028	10080	10135
333,7	9607	9640	9678	9749	9818	9884	9937	9994
372,3	—	9288	9336	9414	9503	9577	9645	9709
404,9	—	8984	9043	9137	9235	9315	9395	9463
427,3	—	8776	8840	8942	9054	9138	9226	9300
463,0	—	8417	8485	8616	8744	8847	8941	9030
505,0	—	7955	8051	8220	8368	8495	8600	8705

TABLE 3. Calculated Values of  $C_p$ ,  $C_v$  (J/cal·deg) and Velocity of Ultrasound  $w$  (m/sec) for  $\beta$ -Cyanopropionic Aldehyde at Different Temperatures and Pressures

T, K	P, bar					
	1	200	400	600	800	1000
$C_p$						
220	1922	1874	1827	1780	1733	1685
240	1952	1894	1836	1779	1721	1664
260	1982	1913	1844	1775	1706	1638
280	2011	1930	1849	1768	1688	1609
300	2040	1946	1853	1760	1668	1577
320	2072	1965	1859	1754	1650	1574
340	2107	1986	1867	1749	1633	1519
360	2146	2010	1877	1747	1618	1492
370	2167	2023	1883	1746	1612	1479
$C_v$						
220	1919	1873	1825	1778	1731	1684
240	1949	1892	1834	1777	1719	1662
260	1978	1910	1841	1772	1704	1636
280	2007	1926	1846	1765	1686	1606
300	2036	1942	1849	1757	1666	1575
320	2068	1961	1855	1751	1647	1544
340	2103	1982	1863	1746	1630	1515
360	2142	2006	1874	1743	1615	1489
370	2163	2020	1880	1743	1608	1476
$w$						
220	1579	1632	1682	1730	1775	1819
240	1483	1539	1593	1644	1692	1738
260	1393	1454	1511	1565	1616	1664
280	1309	1374	1435	1492	1546	1598
300	1232	1302	1367	1427	1484	1538
320	1160	1236	1305	1369	1498	1484
340	1095	1176	1249	1316	1379	1437
360	1035	1122	1119	1270	1335	1395
370	1007	1096	1176	1248	1315	1376

These quantities were determined as in [3, 4]. The calculated values of  $C_p$ ,  $C_v$ , and  $w$  are given in Table 3.

#### LITERATURE CITED

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