

ภาคผนวก

เอกสารขึ้นทะเบียนบริษัทวิเคราะห์คุณภาพน้ำทิ้ง



ที่ อก ๐๓๑๐(๑)/ ๒ ๑ ๘

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๒ เขตราชเทวี
กรุงเทพมหานคร ๑๐๔๐๐

๕ มกราคม ๒๕๖๕

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท สเปเชียล แล็บ เอ็นไว แอนด์ คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๓ พฤศจิกายน ๒๕๖๓

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท สเปเชียล แล็บ เอ็นไว แอนด์ คอนซัลแตนท์ จำกัด จำนวน ๒ แผ่น

ตามหนังสือที่อ้างถึง บริษัท สเปเชียล แล็บ เอ็นไว แอนด์ คอนซัลแตนท์ จำกัด ขอต่ออายุ
หนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๓๓๓ สถานที่ตั้งเลขที่ ๔๗/๙๑-๙๓ หมู่ที่ ๓
ตำบลท่าอิฐ อำเภอปากเกร็ด จังหวัดนนทบุรี ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท สเปเชียล แล็บ เอ็นไว แอนด์ คอนซัลแตนท์ จำกัด
ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

- | | |
|----------------------------|-----------------------------|
| ๑) นายนิธิตัน นิเมะ | ทะเบียนเลขที่ ว-๑๓๓๓-ค-๕๒๘๗ |
| ๒) นายมะปารี อาแวก็อจี | ทะเบียนเลขที่ ว-๑๓๓๓-ค-๕๕๗๐ |
| ๓) นางสาวสุวิมล หมวกหมี่ | ทะเบียนเลขที่ ว-๑๓๓๓-ค-๙๑๔๒ |
| ๔) นางสาวอาสมะ แสงเลา | ทะเบียนเลขที่ ว-๑๓๓๓-ค-๙๑๔๓ |
| ๕) นางสาวกัญญาภัทร แซ่เต๋น | ทะเบียนเลขที่ ว-๑๓๓๓-ค-๙๑๔๔ |

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์

- | | |
|--------------------------------|-----------------------------|
| ๑) นางสาวฟาติฮะห์ สุหลง | ทะเบียนเลขที่ ว-๑๓๓๓-จ-๙๑๔๕ |
| ๒) นางสาวอัสวานี-ยูโงะ | ทะเบียนเลขที่ ว-๑๓๓๓-จ-๙๑๔๖ |
| ๓) นางสาวสุไมยะห์ คีอราแม็ง | ทะเบียนเลขที่ ว-๑๓๓๓-จ-๙๑๔๗ |
| ๔) นางสาวนุรไชมะฮ์ ไสสาภา | ทะเบียนเลขที่ ว-๑๓๓๓-จ-๙๑๔๘ |
| ๕) นายเสรี จันทวี | ทะเบียนเลขที่ ว-๑๓๓๓-จ-๙๑๔๙ |
| ๖) นางสาวอรุณรัตน์ เขียวน้ำชุม | ทะเบียนเลขที่ ว-๑๓๓๓-จ-๙๑๕๐ |
| ๗) นางสาวณภัฏภรณ์ ธนะอัมมิตม | ทะเบียนเลขที่ ว-๑๓๓๓-จ-๙๑๕๑ |

ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๒๖ รายการ
ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้...

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒๕ มกราคม ๒๕๖๗ หากประสงค์จะต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อ
กรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นสุดอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

นางจินดา เกษะศรีนหะ
ผู้อำนวยการกองวิจัยและเค้นกับมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเค้นกับมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๒๐๒ ๔๐๐๒ ๐ ๒๒๐๒ ๔๑๔๖

โทรสาร ๐ ๒๓๕๔ ๓๒๐๘ ๐ ๒๓๕๔ ๓๔๑๕

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท สเปเชียล แล็บ เอ็นไว แอนด์ คอนซัลแตนท์ จำกัด เลขทะเบียน ว-๑๓๓

ที่ ออก ๐๓๑๐(๑)/ ๒ ๑ ๙

ลงวันที่ ๐๕ มกราคม ๒๕๖๔

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๖ รายการ

น้ำเสีย จำนวน 26 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Arsenic	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[2]
2	Barium	Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[2]
3	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method ^[2] 2) 5-Day BOD Test, Membrane Electrode Method ^[2]
4	Cadmium	Digestion, Direct Air-Acetylene Flame Method ^[2]
5	Chemical Oxygen Demand	Closed Reflux, Colorimetric Method ^[2]
6	Color	ADMI Weighted-Ordinate Spectrophotometric Method ^[2]
7	Copper	Digestion, Direct Air-Acetylene Flame Method ^[2]
8	Cyanide	Distillation, Colorimetric Method ^[2]
9	Formaldehyde	Distillation, Colorimetric Method ^[1]
10	Free Chlorine	DPD Colorimetric Method ^[2]
11	Hexavalent Chromium	Colorimetric Method ^[2]
12	Lead	Digestion, Direct Air-Acetylene Flame Method ^[2]
13	Manganese	Digestion, Direct Air-Acetylene Flame Method ^[2]
14	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[2]
15	Nickel	Digestion, Direct Air-Acetylene Flame Method ^[2]
16	Oil & Grease	Liquid-Liquid, Partition-Gravimetric Method ^[2]
17	pH	Electrometric Method ^[2]
18	Phenols -	1) Distillation, Chloroform Extraction Method ^[2] 2) Distillation, Direct Photometric Method ^[2]
19	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[2]
20	Sulfide	ZnS Precipitation, Iodometric Method ^[2]
21	Temperature	Laboratory and Field Methods ^[2]
22	Total Dissolved Solids	Dried at 180 °C ^[2]
23	Total Kjeldahl Nitrogen	Macro Kjeldahl Method ^[2]
24	Total Suspended Solids	Dried at 103-105 °C ^[2]
25	Trivalent Chromium	Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation ^[2]
26	Zinc	Digestion, Direct Air-Acetylene Flame Method ^[2]

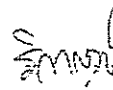
(นางริกาญจน์ อัครสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
และทะเบียนห้องปฏิบัติการ

เอกสารอ้างอิง...

เอกสารอ้างอิง

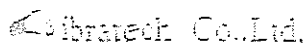
1. สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4. กรุงเทพฯ: เรือนแก้วการพิมพ์, 2547.
2. APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 23rd ed. Washington, DC: APHA, 2017.



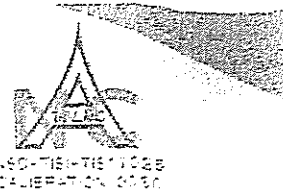
(นางริกาญจน์ อัครสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
และทะเบียนห้องปฏิบัติการ

หนังสือรับรองห้องปฏิบัติการ



1. I hereby certify that the foregoing is a true and correct copy of the original as the same appears in the records of the Department of the Interior.



Certificate No. : 64-400532-1

Page : 1 of 2

Submitted by : Special Lab. Engr. and Consultant Co., Ltd.

47-91 Map 3 Thantel Tha-n. Palice, Nonthaburi 11120

Equipment : Water Bath

Manufacturer : Laramer

Model : W2B22

Range : 14 C

Resolution 0.1 C

Serial No. : 2520.0201

ID No. : 1B-EJ-041

Environment : The calibration was carried out at the Laboratory, Special Lab Envt and Consultant Co., Ltd

Ambient Temperature : (29.0 to 31.0) °C

Relative Humidity : (55 to 60) %

Line Voltage : (226.0 to 226.5)V

Date of Received : 19 October 2021

Date of Calibration : 26 October 2012

Date of Issue : 26 October 2021

Calibrated by : Perrapon Champa

Calibration Method : This instrument was calibrated by In-house method CAL-M4006 based on ASTM E715-00
The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Digital Thermometer with RTD probe

<u>ID No.</u>	<u>Corr. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400029 & 400031	54-400453-1	07 Apr 2022	National Institute of Metrology, Thailand (NIMT)

Approved by _____

(Bunjerd Magni)

Supervisor

The uncertainties are for a confidence probability of approximately 95%.

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CALIBRATECH Co., Ltd.

100-2-5 Submarine Road P.O. Box 100, P.O. Box 100, P.O. Box 100, P.O. Box 100, P.O. Box 100
 Tel: 02-440-55-55 Fax: 02-440-55-55 Email: calibratech@calibratech.co.th, calibratech.co.th@hotmail.com

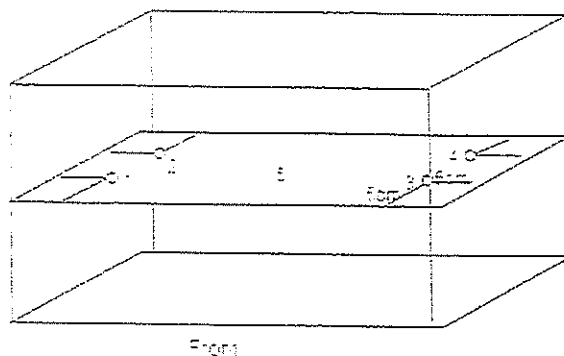
Certificate No. : 04-400532-1

Page : 2 of 2

Result of Calibration : Without Adjustment

U/C Condition As-Received : Good

Function : Temperature measurement



Temp Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (C1-5 Sensor No					Uncertainty (± °C)	Measured Uniformity (°C)	Measured Stability (°C)
			1	2	3	4	5			
10.0	10.0	10.0	10.03	10.03	10.03	10.02	10.02	0.03	0.02	0.04
15.0	15.0	15.0	15.05	15.05	15.05	15.02	15.07	0.05	0.00	0.05
15.0	15.0	15.0	15.05	15.05	15.02	15.00	15.05	0.05	0.00	0.05
100.0	100	100.2	100.65	100.74	100.65	100.52	100.60	0.24	0.27	0.14

Remark: The uncertainty is not combine uniformity of the water bath

This result of calibration was found accurate as shown on date and place of calibration only

This reported uncertainty of measurement is based on a standard uncertainty multiplied by a coverage factor k = 2
 providing a level of confidence of approximately 95%

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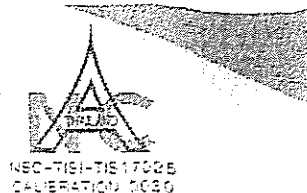


CAL

Calibratech Co.,Ltd.

111 Moo 3, Tambol Tha-lu, Pakkret, Nonthaburi 11120

Tel : 02-511-8211 Fax : 02-511-8215 e-mail : calibratech.co.th@yahoo.com, calibratech.co.th@gmail.com



111 Moo 3, Tambol Tha-lu, Pakkret, Nonthaburi 11120

Certificate No. : 64-210396-1

Page : 1 of 2

Submitted by : Special Lab Envt And Consultant Co.,Ltd.

47/91 Moo 3, Tambol Tha-lu, Pakkret, Nonthaburi 11120

Equipment : Weight

Manufacturer : LS

Material : Stainless Steel

Weight size : 1 g

ID No. : LB-Eq-034

Assumed density of weight : 7950 kg / m³

Assumed Air density : 1.2 kg / m³

Environment : Ambient Temperature : (20 ± 2) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1007.7 mbar

Date of Received : 24 August 2021

Date of Calibration : 26 August 2021

Date of Issue : 26 August 2021

Calibrated by : Wutichai Swatphong

Calibration Method : In-house method CAL-M2101 based on OIML R 111-1 : 2004(E)

Reference Standard Instruments : The certification is traceable to the International System of Units

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E2413-E2425	111-0060-14	27 Mar 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Signature)
Suracha Promthong

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%.

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CAL-F0031-03





Calibratech Co., Ltd.

111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

Tel: 064-1211 Fax: 021-941110 E-mail: calibratech.co@bt.com, calibratech.co@bt.com

Level of Calibration

Certificate No. : 64-210396-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

No.	Nominal Value	Id. Mark	Conventional mass Value	Measuring Uncertainty
1	g	none	1 g -0.041 mg	± 0.023 mg

This result of calibration was found accurate as shown on date and place of calibration only.

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

- o0o -

11/11





Calibratech Co., Ltd.

111 Moo 2, Subhachakarn 3 Rd., Bangkruai, Pathum Thani 11120

Tel: 0-904-211 721, 0-904-9115 e-mail: calibratech.co@ yahoo.com, calibratech.co@ hotmail.com



Certificate of Calibration

Certificate No. : 64-210396-2

Page : 1 of 2

Submitted by : Special Lab Equip And Consultant Co., Ltd.

47/91 Moo 3, Tambol Tha-li, Pathum Thani 11120

Equipment : Weight

Manufacturer : LS

Material : Stainless Steel

Weight size : 100 g

ID No. : LB-Eq-015

Assumed density of weight : 7950 kg/m³

Assumed Air density : 1.2 kg/m³

Environment : Ambient Temperature : (20 ± 2) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1005.1 mbar

Date of Received : 24 August 2021

Date of Calibration : 28 August 2021

Date of Issue : 28 August 2021

Calibrated by : Wutthichai Sarnphong

Calibration Method : In-house method CAL-MC101 based on OIML R 111-1 : 2004(E)

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Weights

ID No	Cert. No.	Due Date	Traceability
E2413-E2425	64-210396-15	17 Mar 2022	National Institute of Metrology (Thailand) (NIMT)

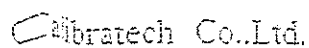
Approved by :

Surachai Promthong
Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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~ 1940 O. S. Thompson; E. R. Ransome; Placed, Portland 1910

Tel: 024-0241 Fax: 024-94-5181 e-mail: cal@caltech.edu, cal@caltech.edu, cal@caltech.edu

Procedure of Calibration

Certificate No. : 64-210396-2

Page : 2 of 2

Result of Calibration : Without Adjustment

ULC Condition As-Received : Good

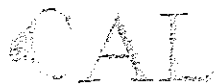
No.	Nominal Value	Id Mark	Conventional mass Value	Measuring Uncertainty
1	100 g	none	100 g -417 mg	= 0.11 mg

T The result of calibration was found accurate as shown on date and place of calibration only.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

- 500 -

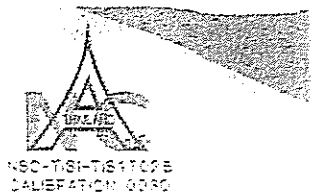
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Calibratech Co.,Ltd.

110/111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

Tel : 02-644-6211 Fax : 02-644-6215 e-mail : calibratech.co.ltd@calibratech.co.ltd, calibratech.co.ltd@hotmail.com



Certificate of Calibration

Certificate No. : 64-210396-3

Page : 1 of 2

Submitted by : Special Lab Envs And Consultant Co.,Ltd.
47/91 Moo 3, Tambol Tha-lu, Pakkret, Nonthaburi 11120

Equipment : Weight
Manufacturer : LS Material : Stainless Steel
Weight size : 200 g
ID No. : LB-Eq-036

Assumed density of weight : 7950 kg/m³

Assumed Air density : 1.2 kg/m³

Environment : Ambient Temperature : (20 ± 2) °C
Relative Humidity : (50 ± 10) %
Air Pressure : 1005.0 mbar

Date of Received : 24 August 2021

Date of Calibration : 28 August 2021

Date of Issue : 28 August 2021

Calibrated by : Wutichai Srisiphong

Calibration Method : In-house method CAL-M2101 based on OIML R 111-1 : 2004(E)

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Weights

ID No	Cert. No.	Due Date	Traceability
E2413-E2425	NSQ-TS1-TS17525	27 Mar 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0033-05





Calibratech Co. Ltd.

Plot 10, Phase 2, Suburb of Accra, P.O. Box 10000, Accra, Ghana
Tel: +233 (0) 31 211 1000 Fax: +233 (0) 31 211 1001 e-mail: calibratech@calibratech.com calibratech@calibratech.com

Certificate of Calibration

Page : 2 of 2

Certificate No. : 04-210396-3

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

No	Nominal Value	In Mark	Conventional mass Value	Measuring Uncertainty
1	200 g	none	200 g - 0.20 mg	± 0.15 mg

This result of calibration was found accurate as shown on date and place of calibration only.

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

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12/5

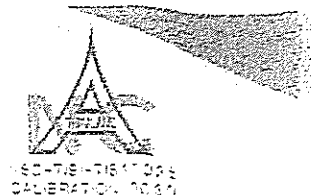


CAL

Calibratech Co., Ltd.

100/10 Ploenchit Road, Bangkok, Thailand 10330

Tel: +662-254-1111 Fax: +662-254-1112 Email: info@calibratech.co.th



CAL-1000-1000-1000-1000

Certificate No. : 05-400224-1

Page : 1 of 2

Submitted by : Special Lab. Eng. and Consultant Co., Ltd.

47/91 Moo 3, Tambon Thon-Buri, Pathum Thani 11120

Equipment : Digital Thermometer with TC probe
Temperature Indicator

Manufacturer : Thermo Scientific

Model : TEMP 10K

Range : -150 °C to 1372 °C

Resolution : 0.1 °C

Serial No. : 4000935

ID No. : LB-Eq-012

Environment : Ambient Temperature : 23 ± 2 °C

Relative Humidity : 50 ± 15 %

Line Voltage : 220 ± 22 VAC

Date of Received : 27 April 2021

Date of Calibration : 03 May 2021

Date of Issue : 03 May 2021

Calibrated by : Chontip Samanrakon

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4003 by compared with PRT in the liquid bath at the constant controlled temperature.

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

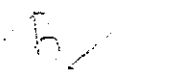
1. Platinum Resistance Thermometer (PRT)

ID No.	Certificate No.	Due Date	Traceability
4000935	TT-001-011	07 Feb 2024	National Institute of Metrology, Thailand (NIMT)
4000936	TT-002-012	08 Feb 2024	National Institute of Metrology, Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Certificate No.	Due Date	Traceability
4000935	TT-001-011	07 Feb 2024	National Institute of Metrology, Thailand (NIMT)
4000936	TT-002-012	08 Feb 2024	National Institute of Metrology, Thailand (NIMT)

Approved by


Bunjerd Maeng
Supervisor

The Uncertainties are for a confidence probability of approximately 95%.

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CAL-10031-02





Calibratech Co., Ltd.

100/101, 5th Floor, 101/102, New Engineering Building, 100/101, 5th Floor, 101/102

100/101, 5th Floor, 101/102, New Engineering Building, 100/101, 5th Floor, 101/102

100/101, 5th Floor, 101/102, New Engineering Building, 100/101, 5th Floor, 101/102

Certificate No. : 05-400224-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement with Thermocouple probe Type K

Model : Type K Sheath Material : Teflon
Diameter : 3 mm Length : 1500 mm
Serial No. : 10-A ID No. : SL-20

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
150	100.0	100.0	0.0	0.15
100	100.0	100.0	0.0	0.15
50	100.0	100.0	0.0	0.15
25	100.0	100.0	0.0	0.15
12.5	100.0	100.0	0.0	0.15

Model : AD-218-23 Sheath Material : Stainless
Diameter : 3.5 mm Length : 200 mm
Serial No. : 10-A ID No. : SL-20

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
125	100.0	100.0	0.0	0.15
125	100.0	100.0	0.0	0.15

Remark

UUC: Under Calibration

This result of calibration was found accurate as shown on date and place of calibration only.

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$.

providing a level of confidence of approximately 95 %.





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
100/101-102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000



Cert.No.: 21CH1146

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Certificate of Calibration

Equipment : pH Meter
Manufacturer : Eutech
Model : pH 700
Serial No. : 2858459
ID No. : LB-Eq-027
Condition As-Received: Used Item
Received Date : 23 August 2021
Calibration Date : 9 September 2021
Reference : 2108-0665WIN-1
Submitted by : Special Lab Envi And Consultant Co.,Ltd
47/91-93 Moo 3 Tambon Tha-ri, Pakkret
Nonthaburi 11120
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In-house method
- CP-CH5 by direct measurement with standard
voltage calibrator and direct measurement with
certified reference material (CRM)

Calibrated by : Saithip Meangmai

Approved by :

Approved Signatory

- () Malee Butkruea
- () Saithip Meangmai
- () Warakorn Lergagirikul

Issue Date : 9 September 2021

The Uncertainties are for a confidence probability of approximately 95%

For more details, please refer to the certificate of calibration and testing services.
Technology Promotion Association (Thailand-Japan) Calibration and Testing Services

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Cert. No.: 21CH1146

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Condition of this calibration result1. Reference Standard Instrument :-

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	43160066	160RC092	21E1223/1	27 Apr 2022

This certification is traceable to the International System of Unit maintained at:-

- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board Accredited No. AR-1835

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.008	CPA chem	754026	28 June 2023
pH 6.866	CPA chem	679462	12 Mar 2022
pH 9.181	CPA chem	754031	20 July 2022

3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration ResultsFunction : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,9)

<u>Unit Under Calibration</u>	<u>Standard pH Buffer Solution</u>	<u>Actual pH Reading</u>	<u>Actual mV Reading (mV)</u>	<u>Uncertainty of pH measurement (±)</u>	<u>Coverage factor k</u>
pH Electrode S/N: 3034419	4.008	4.01	169.2	0.0071	2.00
	6.866	6.87	0.6	0.0062	2.00
	9.181	9.18	-134.9	0.013	2.00

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Cert.No.: 21CH1146

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Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4,7,9)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (\pm mV)	Coverage factor <i>k</i>
	pH	mV	mV	pH		
pH Meter S/N: 2358459	0.00	414.12	414	0.02	0.58	2.00
	1.00	354.96	355	1.02	0.58	2.00
	2.00	295.80	296	2.02	0.58	2.00
	3.00	236.64	237	3.01	0.58	2.00
	4.00	177.48	177.4	4.01	0.058	2.00
	5.00	118.32	118.3	5.01	0.058	2.00
	6.00	59.16	59.1	6.00	0.058	2.00
	6.86	8.28	8.3	6.86	0.058	2.00
	7.00	0.00	0.0	7.00	0.058	2.00
	8.00	-59.16	-59.1	8.00	0.058	2.00
	9.00	-118.32	-118.3	9.00	0.058	2.00
	9.18	-128.97	-129.0	9.18	0.058	2.00
	10.00	-177.48	-177.5	10.00	0.058	2.00
	11.00	-236.64	-237	11.00	0.58	2.00
	12.00	-295.80	-296	12.00	0.58	2.00
	13.00	-354.96	-355	13.00	0.58	2.00
	14.00	-414.12	-414	14.00	0.58	2.00

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95 %.

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