ID N° 22823 - Contact Angle Measurement - M4^{s+}

Executed on Mai 25, 2023, by M. Breitwieser

OTGlas

*Screening-Sequenz. Start /Ende mit statischer Messung *** 16:34:41 #Charaterisierung Sequenz A .*

Probe mit Wasser, Tensid und viel Wasser gereinigt, abgetrocknet und mit der Messflüssigkeit auf Zellstoff abgerieben.

- **OTGlas / Isooktan 99.5+%** : (20,0°C, 8,4', 20mm, 0,0498mm/s - static; *Θ-superwetting*)

  $\Theta_{C,s}$ = 0$_{\pm 0°}$ CAH 0°, **$^{a}\bar{E}_s$ = 19,403$_{\pm 0,022}$ mN/m** $^{a}H_s$ 0,017mN/m, **$\bar{B}_{\%,s}$= 103,5%**

Report

1. ===== Introduction ======

Principle: The M4 contact angle measurement using the *modified Wilhelmy method* is based on force measurements on a cuboid or cylindrical solid body brought into contact with a liquid surface. The contact line between the solid, the liquid surface, and the gas phase is called the three-phase boundary line (triple line), and the angle at which the liquid surface meets the three-phase boundary line is the contact angle Θ (theta). The relative position of the three-phase boundary line-above, on, or below the surrounding liquid level-reflects the surface energy characteristics and is indicated by the resulting curvature of the meniscus. The weight of this meniscus curvature is determined gravimetrically, taking buoyancy forces into account, and is related to the length of the three-phase boundary line. With perfect wetting (Θ=0°), this specific force reaches a maximum value, which corresponds to the surface tension of the liquid; with poor wettability (Θ>90°), however, this wetting force becomes negative. Energetic interactions between the solid and liquid phases are thus made visible through the contact angle (normally). When the solid body is immersed, the *triple line scans the solid surface*, yielding the advancing contact angle (Θ_A), and when it is withdrawn, the receding contact angle (Θ_R) is obtained - measured by force of wetting. The difference 'Θ_A-Θ_R' is called the contact angle hysteresis (CAH).

Physically: The Wilhelmy equation $\mathbf{\cos\Theta_{(A|R)} = {}^{a}F / (p{\cdot}\gamma)}$ describes the relationship between the contact angle Θ, the perimeter of the solid p, the wetting force ^{a}F, and the surface tension of the liquid γ. Adhesion tension ^{a}E is defined according $^{a}E_{A,R} = m_{meniscus}{\cdot}g/p = {}^{a}F/p = \gamma{\cdot}\cos\Theta = \gamma_s - \gamma_{sl}$

Practically: In this measurement, after the position of contact of liquid and solid has been determined, the *'OTGlas'* test specimen is moved into and out of the *Isooktan 99.5+%* liquid by incremental movements attended by ***'CLT'***(*Constant-Level-Technic*). This allows the determination of *most accurate static contact angles or rather of adhesion energy* $^{a}E_s$. Furthermore, a defined force stabilization can be maintained before each subsequent movement. This enables *static contact angle* measurement based on the patent DE 4412405, which provides the often required equilibrium measurements in accordance with physical principles. This control technology yields a stabilization time for levelling and for each of the selected 213 measuring positions, the respective contact angle $\Theta_{A,s}$ or $\Theta_{R,s}$ is calculated independently. As relative wettability ($B_{\%,s}$) exeeds the mark +100% this measurement may indicate occurance of super-wetting, where *adhesion energy* $^{a}E_s$ enables further analysis.

Information: The IMETER M4 method description, available at *'https://imeter.de/?view=article&id=46'*, provides information on procedures and calculations.

2. ===== Collection of Measurements in this Series ^{OTGlas}/$_{Isooktan\ 99.5+\%}$ ======

Tabelle 1.2: Conditions and Results

N°	*IDN°* ...erData39	ϑ [°C]	$\Delta\tau$ [min]	$\bar{v}_z$ [mm/s]	$\bar{Ca}$ [1]	$t_{eq.}$ [s]	Θ_M [°]	*CAH* [°]	^{a}H [mN/m]	$^{a}\bar{E}$ [mN/m]	$\pm\sigma$ [mN/m]	$\bar{S}$ [mJ/m²]	$\bar{B}_{\%,Isookta...}$ [%]
1.	**22823$_0$**	**20**	****0****	**»0,0468«**	**-**	***3,19***	***<0>***	***<0>***	**0,017**	**19,403**	**±0,022**	**0,653**	**103,5%**
2.	22824$_1$	20,002	+22,4	10,0	2,65E-4	*5,4*	*<27>*	*<-54>*	16,71	19,44	±0,35	0,690	103,7%
3.	22825$_2$	20,004	+23,4	5,00	1,32E-4	*5,5*	*<32>*	*<-63>*	22,710	19,83	±0,12	1,08	105,7%
4.	22826$_3$	20,004	+24,4	2,50	6,61E-5	*6,4*	*<21>*	*<-42>*	11,161	19,511	±0,038	0,761	104,1%
5.	22827$_4$	20,004	+27,5	1,25	3,31E-5	*5,2*	*<14>*	*<-27>*	5,782	19,562	±0,037	0,812	104,3%
6.	22828$_5$	20,004	+29,0	0,625	1,65E-5	*5,6*	*<8>*	*<-16>*	2,825	19,447	±0,022	0,697	103,7%
7.	22829$_6$	20,003	+31,1	0,313	8,27E-6	*6,1*	*<2>*	*<-3>*	1,439	19,441	±0,016	0,691	103,7%
8.	22830$_7$	20,002	+36,1	0,156	4,13E-6	*72,6*	*<0>*	*<0>*	0,736	19,445	±0,015	0,695	103,7%
9.	22831$_8$	20,007	+42,7	<0,957>	2,53E-5	*4,8*	*<9>*	*<-18>*	4,546	20,081	±0,033	1,33	107,1%
10.	22832$_9$	20,003	+44,3	<0,710>	1,87E-5	*0,1*	*<10>*	*<-21>*	4,569	19,828	±0,035	1,08	105,7%
11.	22833$_{10}$	20,004	+46,2	<0,318>	8,43E-6	*0,2*	*<3>*	*<-6>*	2,245	19,766	±0,079	1,02	105,4%
12.	22834$_{11}$	19,999	+49,3	<0,357>*	9,40E-6	*0,1*	*<1>*	*<-2>*	2,766	20,163	±0,024	1,41	107,5%
13.	22835$_{12}$	20,003	+52,4	<0,422>*	1,11E-5	*0,1*	*<5>*	*<-10>*	2,915	19,896	±0,026	1,15	106,1%
14.	22836$_{13}$	19,999	+55,0	<0,392>*	1,05E-5	*0,1*	*<5>*	*<-9>*	2,504	19,760	±0,039	1,01	105,4%
15.	22837$_{14}$	19,999	+57,7	<1,69>*	4,45E-5	*0,0*	*<22>*	*<-43>*	11,380	19,38	±0,13	0,630	103,4%
16.	22838$_{15}$	20,002	+58,9	<1,93>*	5,10E-5	*5,7*	*<25>*	*<-49>*	15,181	19,800	±0,082	1,05	105,6%
17.	22839$_{16}$	20,003	+60,2	<2,55>*	6,74E-5	*0,0*	*<0>*	*<0>*	1,856	20,279	±0,086	1,53	108,2%
18.	22840$_{17}$	20,004	+61,3	<4,43>*	1,17E-4	*0,0*	*<22>*	*<-44>*	15,34	21,1	±2,4	2,35	112,7%
19.	22841$_{18}$	20,002	+62,3	<6,70>	1,77E-4	*5,0*	*<29>*	*<-58>*	17,66	18,8	±3,9	0,0500	100,1%
20.	22842$_{19}$	20	+63,2	»0,0456«	-	*3,24*	*<0>*	*<0>*	0,0403	19,528	±0,014	0,778	104,1%
21.	22843$_{20}$	20	+80,4	»0,0471«	-	*3,17*	*<0>*	*<0>*	-0,018	19,554	±0,016	0,804	104,3%

*This table provides an overview of the measurements in this series. Each seperate M4 measurement is referenced by IDN°. The highlighted row indicates the data set of the measurement documented below. The column labeled ϑ shows the measurement temperature, $\Delta\tau$ the time interval to previous/following measurements, $\bar{v}_z$ the movement speed - where additional symbols clarify: »**n**« indicates static measurements, <**n**> represents distance-accelerated movement of the triple line, '*' stands for continous acceleration and a number without any symbol indicates a constant movement speed, $\bar{Ca}$ is the capillary number, $t_{eq.}$ is the equilibration time before turnaround - but for static measurements the number denotes the average equilibration time as a levelling time between the measurement points, Θ_M is the mean of the advancing and receding contact angle ('<**n**>' signs "errors"), contact angle hysteresis is given in degrees (**CAH**) and in energy units (^{a}H), $^{a}\bar{E}$ is the mean adhesion energy, and $\pm\sigma$ is the corresponding standard deviation, $\bar{S}$ is the mean of the spreading parameter, and $\bar{B}_{\%,Isookta...}$ indicates the relative wettability ($B_{\%,lq|sl|md...}$= 100%·$^{a}E/\gamma$).*

Tabelle 2.2: Summary of sample weights in the individual measurements (initial weight W_0 = 5,3947 g)

N°	W_A [g]	ΔW_{A-0} [mg]	W_E [g]	ΔW_{E-0} [mg]	V_{E-0} [µL]	ΔV_{E-A} [µL]
1.	**5,3947**	**0,0**	**5,3954**	**0,7**	**1,0**	**1,0**
2.	5,3954	0,7	5,4016	6,9	10,0	9,0
3.	5,4013	6,6	5,3993	4,6	6,6	-3,3
4.	5,3991	4,4	5,3978	3,1	4,5	-2,2
5.	5,3977	3,0	5,3970	2,3	3,3	-1,2
6.	5,3967	2,0	5,3962	1,5	2,2	-1,2
7.	5,3961	1,4	5,3958	1,1	1,6	-0,58
8.	5,3956	0,9	5,3957	1,0	1,4	-0,14
9.	5,3958	1,1	5,3968	2,1	3,0	1,6
10.	5,3966	1,9	5,3966	1,9	2,7	-0,29
11.	5,3965	1,8	5,3961	1,4	2,0	-0,72
12.	5,3959	1,2	5,3959	1,2	1,7	-0,29
13.	5,3958	1,1	5,3964	1,7	2,5	0,72
14.	5,3962	1,5	5,3963	1,6	2,3	-0,14
15.	5,3963	1,6	5,3980	3,3	4,8	2,5
16.	5,3978	3,1	5,3983	3,6	5,2	0,43
17.	5,3982	3,5	5,3990	4,3	6,2	1,0
18.	5,3988	4,1	5,4006	5,9	8,5	2,3
19.	5,4005	5,8	5,4015	6,8	9,8	1,3

20.	5,4013	6,6	5,3957	1,0	1,4	-8,4
21.	5,3956	0,9	5,3959	1,2	1,7	0,29

Symbols: W_A: Total weight before each measurement, $\Delta W_{0\text{-}A}$: Change in weight from the initial weight W_0 at the start of the series, W_E: Total weight after the measurement (possibly including the weight of any adherent fluid), $\Delta W_{E\text{-}0}$: Change in weight from the initial weight W_0 at the start of the series, $V_{E\text{-}0}$: Weight change interpreted as fluid volume, $\Delta V_{E\text{-}A}$: Fluid volume change calculated as the difference between W_E and W_A. (Automated weighings without contact to the surface of the fluid).

3. ===== Measurement IDN°22823: *Static* Contact Angle ======

OTGlas, cubic plate 25,2×0,9291mm

20mm OTGlas \ Isooktan 99.5+%, γ =18,75mN/m ϑ=20,0°C

Contact Angle, CA Θ_C	**<0 ±0°>**	- superwetting -
Contact Angle Hysteresis, CAH_S	<0°>	

	Advancing $\Theta_{A,S}$	**Receding $\Theta_{R,S}$**	Transition - mm
Contact Angles, Θ_S	**0°**	**0°**	$0°_{adv.} \Rightarrow 0°_{rec.}$
Rated measurements n mm-range	100 0,200 - 20,000mm	113 20,000 - 0,000mm	2 20,000 - 19,951mm
avg. Triple line speed $\bar{v}_z$ [mm/s]	*0,0498* ±0,0700	*-0,0437* ±0,644	
avg. Step distance $\bar{\Delta}h_0$ [mm]	0,200 ±0	-0,178 ±0,0536	
avg. equilibration Time $\bar{t}_{eq.}$ [s]	**3,16 ±0,468**	**3,22 ±0,715**	

Static Contact Angle Measurement: For superwetting - consider adhesion parameters for analysis. The avg. equilibration Time $t_{eq.}$ is the mean of the time between positioning and aquiring the wetting force. The criterion of force equilibrium is defined in the utilized IMPro.

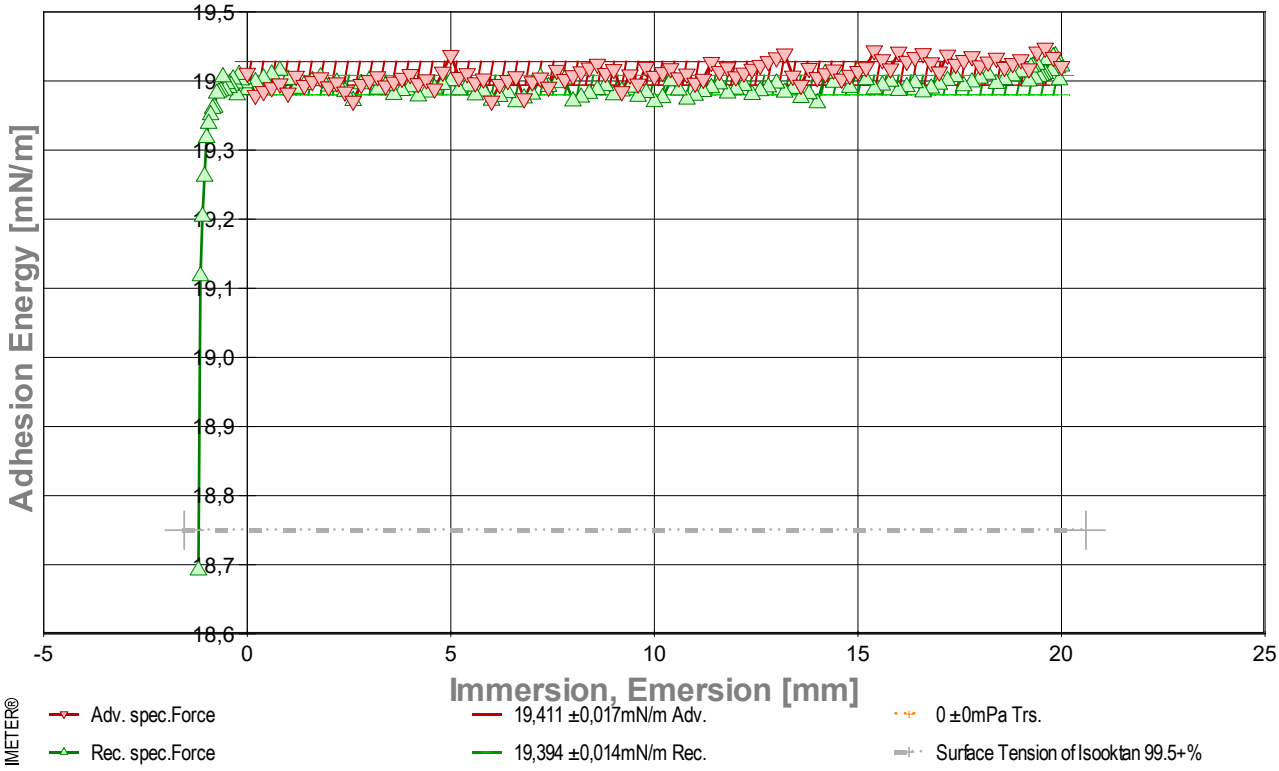
Adhesion Force of the equilibrated Triple Line

Energy of Adhesion, $^a\bar{E}_S=({}^aE_A+{}^aE_R)/2$	**19,403 ±0,022 mN/m**
Hysteresis, $^aH_S = {}^aE_A - {}^aE_R$	0,017 mN/m
Parameter of spreading, $\bar{S}_S = {}^a\bar{E} - \gamma$	0,652 mJ/m²
relative wettability, $\bar{B}_{\%,S}=100\cdot{}^a\bar{E}/\gamma$	103,5% with Isooktan 99.5+%

	Advancing $^aE_{A,S}$	**Receding $^aE_{R,S}$**	Transition - mm
Energy of Adhesion, ^aE_S [mN/m]	**19,411**	**19,394**	$19{,}401_{<adv.>} \Rightarrow 19{,}419_{rec.}$
Standard deviation $^a\sigma$ [mN/m]	±0,017	±0,014	±0
Linear regression, slope [mPa]	*0*	*0*	0
correlation coefficient r^2	-	-	1,0
Relative wettability, $B_{\%,S}$	103,5%	103,4%	

Data has left the region of measurable Contact Angles. resolving a kind of superwetting: $^aE_{A,R} > \gamma\cdot\cos\Theta$ and wettability B>100%

¬ *Diagramm 1.3: 'Triple-line Force²' static forces at the triple line, $\bar{v}_z$=0,047 mm/s*



- Das Diagramm zeigt den Verlauf der Adhäsionsenergie ^aE entlang der Probenoberfläche. Den Messwerte werden bei unbewegtem Pegel des Fluids am Probekörper als statische Gleichgewichtszustände bestimmt. Die roten ∇-Markierungen stehen für adv.-Messwerte (Eintauchen; von links nach rechts aufgezeichnet), grüne Δ-Markierungen gehören zu rec.-Werten (Rückzugsbewegung; von rechts nach links laufend). Die Oberflächenspannung von Isooktan 99.5+% ist als grau gestrichelte Horizontale bei 18,75 mN/m eingezeichnet; sie gibt die *maximale Zugfestigkeit* an, die eine flüssige Isooktan 99.5+%-Oberfläche aushalten kann. Doch, die Adhäsionsenergie zwischen Isooktan 99.5+% und OTGlas übersteigt die Oberflächenspannung. Diese *Überbenetzung* (*Superwetting*) ist gekennzeichnet durch die *Kontaktwinkelproblematik*, gemäß formal *cos(Θ)>1* auftritt. Wenn andere Störeinflüsse (ggf. elektrostatische, rheologische) auszuschließen sind, kommen Grenzschicht- und/oder tribologische Effekte in Frage, die den lokalen Wert der Oberflächenspannung raumgreifend - oder den Wert einer ungeklärten Zusatzkraft an der *Triple Line* - vergrößern und das Geschehen modifizieren könnten.

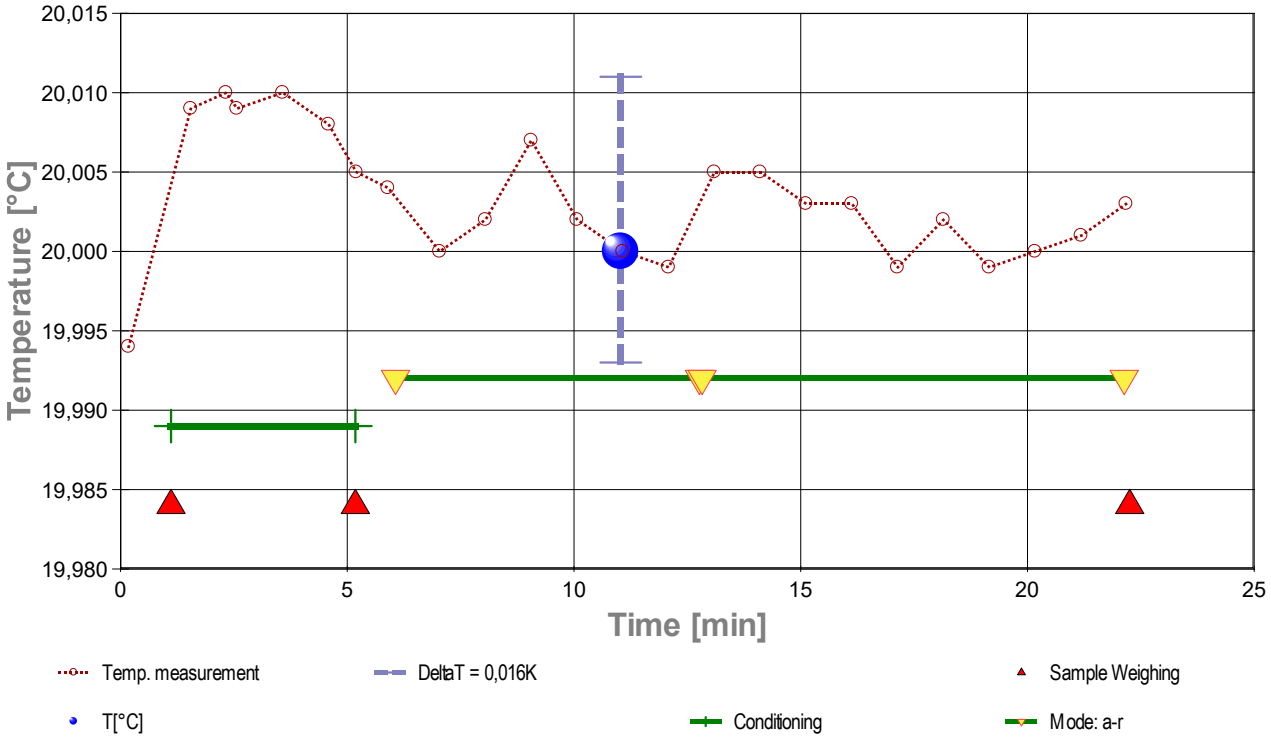
4. ===== Details on the Measurement and Setup ======

Sample: *'OTGlas'*, **Form:** cubic plate, face dimension 25,2 x 0,9291 mm.
Test Liquid: *'Isooktan 99.5+%'* at 20°C: density 0,691908 g/mL, surface tension 18,75 mN/m, viscosity 0,496 mPa·s; Capillary length 1,7 mm.

Suspension/Fixation: *by operator*.
Vessel: *tempered double wall measuring cell, height 140 mm, inclosing sample and liquid at coherent temperature and atmosphere*; Surface area ∞ by *CLT*. - *The 'CLT' Constant-Level-Technic prevents rising/falling of the Isooktan 99.5+%-level in the vessel (surface 1452mm²) through immersion/emersion of the sample volume in the vessel by appropriate pumping of Isooktan 99.5+%.*

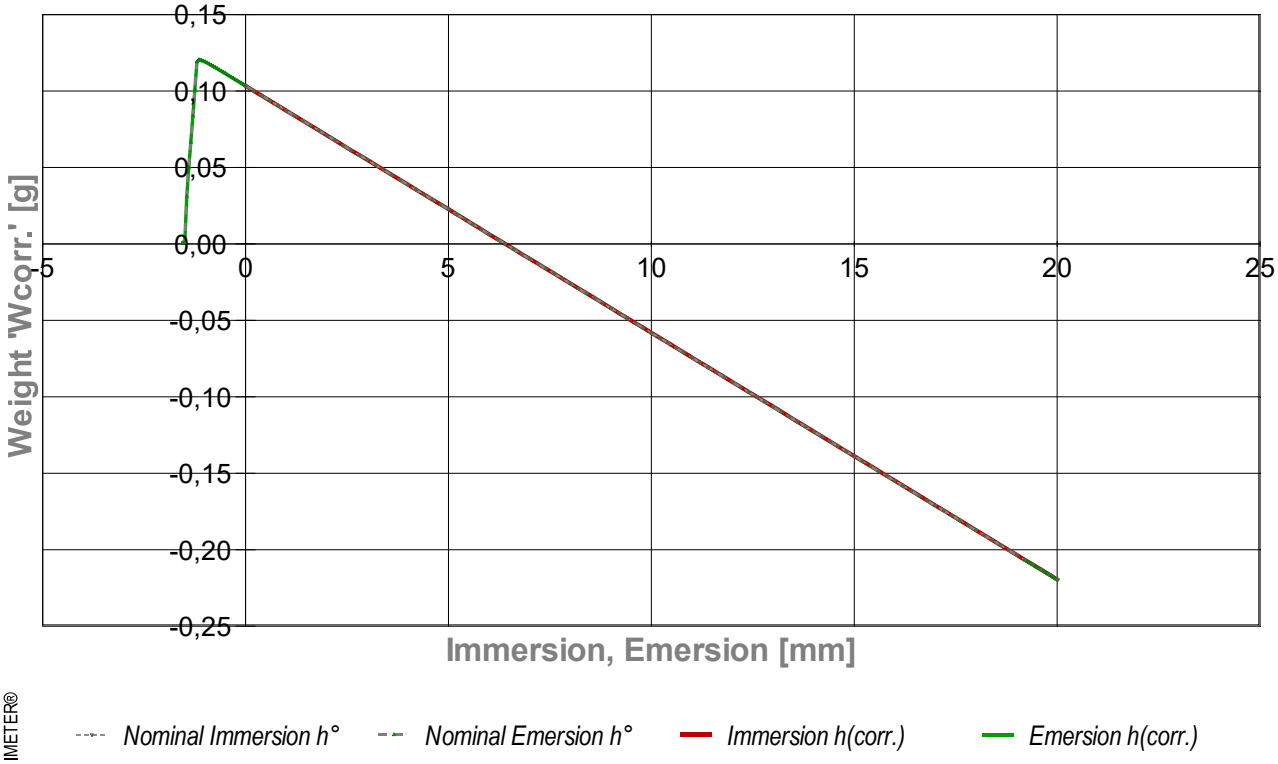
Conditioning: during 3,6 min in the measuring cell above the surface of the liquid.
Sample Weight: at start 5,3947 g, after conditioning 5,3947 g, after the measurement 5,3954 g.
Measurement algorithm: static CA-measurement, acquisition of equilibrated values, stepwise movement. Maximum immersion of 20,000 mm and force equilibration at the inflection point for 3,6 s. Duration for immersion 6,7 min, for emersion 1,7 min.

Time & Temperature: 20 Minuten; Temperaturverlauf blieb im gesamten Zeitraum in etwa isotherm bei 20°C. ¬ *Diagramm 2.4: 'Temperature & Events²' -- Survey on Temperature and Time*



- Das Diagramm "Temperature & Events²" dokumentiert neben der Flüssigkeitstemperatur der Messfluids (Isooktan 99.5+%) die zeitliche Abfolge der Verfahrensschritte. Die Temperaturmesswerte sind als kleine Kreise abgebildet; die kugelförmige Marke gibt die der Messung insgesamt zugeordnete Temperatur an (20°C). Markierungen auf der horizontalen grünen Linie bilden das Zeitintervall der Konditionierung ab, das auf das Einsetzen der Probe folgt. Weitere gelbe Dreiecke auf der grünen Horizontalen bezeichnen die Schaltung jweiliger Messmodi ('a-r' bedeutet *Advancing*- - und *Receding*-Bewegung). Die roten Dreiecke, unten im Diagramm, markieren die Zeitpunkte der Probenwägung von OTGlas (ohne Kontakt zur Fluidoberfläche).

¬ *Diagramm 3.4: 'RawData²' -- Acquired weights during immersion and emersion (raw data and immersion corrected lengths)*



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- Im Diagramm "RawData²" werden die Wägewerte zur statischen Kontaktwinkelmessung gegen die Eintauchtiefe der Probe abgebildet. Von den Roh-Wägewerten W_{RAW} wurden Proben- und Aufhängungsgewichte subtrahiert, so dass hier die *Gewichte* der Benetzungs- und Auftriebskräfte abgebildet werden ($W_{corr.}$). Die Kurvenverläufe fallen mit der Eintauchtiefe *h* (*immersion*

depth) ab, indes der Volumenauftrieb des eintauchenden Probekörpers zunimmt. Im Diagramm sind Wägewerte für die advancing- und receding-Bewegung eingetragen, sowohl für nominelle (h_0) und für korrigierte Eintauchtiefen ($h_{corr.}$). Die roten Dreiecke bezeichnen die Messwerte bei $h_{corr.}$ bei der Vorwärtsbewegung (adv.), die grünen Dreiecke gehören zu Auszugsbewegungen (rec.). Durch 'CLT' (die *Constant-Level-Technic*) wird die Pegelveränderung besonders durch das ein- und austauchendes Probenvolumen simultan kompensiert, sodass die nominelle Eintauchtief mit der tatsächlichen identisch ist; die Kurven sind deshalb praktisch deckungsgleich.
Weiterhin zeigt das Diagramm noch Werte zu *negativen Eintauchtiefen*. Diese Wertepaare gehören der *Kapillarbrücke (cb = capillary bridge)* an, die sich beim Herausziehen der Probe über das Flüssigkeitsniveau deutlich ausbilden kann; besonders, wenn das Probenende scharfkantig ist.

5. ===== Table of raw data and results ======

The table below provides the data for each contact angle measuring position in this experiment (n=238). - Within a row the column ***t*** lists the time of the CA-measurement. $t_{eq.}$ is the duration reach the equilibrated force after positioning (static measurement). The nominal distance between the sample bottom flatface and the liquid surface is given by h_0, whilst $h_{corr.}$ shows the corrected immersion depth- *due to CLT the values are the same*. With W_{RAW} the final total weight of the sample, sample holder, wetting force and buoyancy is written. The $W_{corr.}$-values* are former weighing values when the weight of the sample and its holder is subtracted. After buoyancy- correction, ^{a}F is the force excerted on the triple line. The Energy of Adhesion $^{a}E_{A,R} = {}^{a}F/p$ is the force of adhesion per meter of the circumference (p) of the sample. Θ is the Contact Angle. The last column indicates by **chr** the **a**dvancing resp. **r**eceding state; **cb** tags values of a '**c**apillary **b**ridge' above the surface-level.

(Resolving static force of wetting from $^{a}F = (W_{Raw}\text{-}W_0\text{-}W_{Buoy.})\cdot g + F_{Buoy.air}$ *)* *$W_{corr.} = W_{Raw}\text{-}W_0$ *(with* W_0*= 5,3947 g).*

Tabelle 3.5: Data table

N°	t [min]	$t_{eq.}$ [sec]	h_0 [mm]	$h_{corr.}$ [mm]	W_{RAW} [g]	$W_{corr.}$ [g]	^{a}F [mN]	$^{a}E_{A,R}$ [mN/m]	Θ [°deg]	chr --
1.	0,00	2,8	0,000	0,000	5,4981	0,1034	1,0144	19,41	0	a
2.	0,06	3,0	0,200	0,200	5,4947	0,1000	1,0127	19,38	0	a
3.	0,13	3,0	0,400	0,400	5,4915	0,0968	1,0130	19,39	0	a
4.	0,19	3,4	0,600	0,600	5,4883	0,0936	1,0133	19,39	0	a
5.	0,26	3,0	0,800	0,800	5,4851	0,0904	1,0136	19,40	0	a
6.	0,33	3,0	1,000	1,000	5,4818	0,0871	1,0129	19,38	0	a
7.	0,39	3,0	1,200	1,200	5,4787	0,0840	1,0142	19,41	0	a
8.	0,45	4,1	1,400	1,400	5,4754	0,0807	1,0135	19,39	0	a
9.	0,53	3,0	1,600	1,600	5,4722	0,0775	1,0138	19,40	0	a
10.	0,60	3,4	1,800	1,800	5,4690	0,0743	1,0141	19,40	0	a
11.	0,67	3,0	2,000	2,000	5,4657	0,0710	1,0134	19,39	0	a
12.	0,73	3,1	2,200	2,200	5,4625	0,0678	1,0137	19,40	0	a
13.	0,80	3,0	2,400	2,400	5,4592	0,0645	1,0130	19,38	0	a
14.	0,86	3,5	2,600	2,600	5,4559	0,0612	1,0123	19,37	0	a
15.	0,93	3,0	2,800	2,800	5,4528	0,0581	1,0136	19,40	0	a
16.	1,00	3,2	3,000	3,000	5,4496	0,0549	1,0139	19,40	0	a
17.	1,06	3,0	3,200	3,200	5,4464	0,0517	1,0141	19,41	0	a
18.	1,13	3,0	3,400	3,400	5,4431	0,0484	1,0135	19,39	0	a
19.	1,19	4,5	3,600	3,600	5,4399	0,0452	1,0137	19,40	0	a
20.	1,28	3,0	3,800	3,800	5,4367	0,0420	1,0140	19,40	0	a
21.	1,35	3,0	4,000	4,000	5,4335	0,0388	1,0143	19,41	0	a
22.	1,41	3,0	4,200	4,200	5,4302	0,0355	1,0136	19,40	0	a
23.	1,48	3,0	4,400	4,400	5,4270	0,0323	1,0139	19,40	0	a
24.	1,54	2,9	4,600	4,600	5,4237	0,0290	1,0132	19,39	0	a
25.	1,60	5,8	4,800	4,800	5,4206	0,0259	1,0145	19,41	0	a
26.	1,72	3,0	5,000	5,000	5,4175	0,0228	1,0158	19,44	0	a
27.	1,78	2,6	5,200	5,200	5,4141	0,0194	1,0141	19,41	0	a
28.	1,84	3,0	5,400	5,400	5,4109	0,0162	1,0144	19,41	0	a
29.	1,90	5,3	5,600	5,600	5,4076	0,0129	1,0137	19,40	0	a
30.	2,00	3,7	5,800	5,800	5,4044	0,0097	1,0140	19,40	0	a
31.	2,08	3,4	6,000	6,000	5,4010	0,0063	1,0123	19,37	0	a
32.	2,15	3,0	6,200	6,200	5,3979	0,0032	1,0136	19,40	0	a
33.	2,21	3,0	6,400	6,400	5,3947	0,0000	1,0139	19,40	0	a
34.	2,28	3,0	6,600	6,600	5,3915	-0,0032	1,0142	19,41	0	a
35.	2,34	3,0	6,800	6,800	5,3881	-0,0066	1,0125	19,37	0	a
36.	2,41	3,0	7,000	7,000	5,3850	-0,0097	1,0138	19,40	0	a
37.	2,47	3,0	7,200	7,200	5,3818	-0,0129	1,0141	19,40	0	a
38.	2,53	2,8	7,400	7,400	5,3785	-0,0162	1,0134	19,39	0	a
39.	2,59	2,9	7,600	7,600	5,3754	-0,0193	1,0146	19,42	0	a
40.	2,66	3,5	7,800	7,800	5,3721	-0,0226	1,0139	19,40	0	a
41.	2,73	3,0	8,000	8,000	5,3689	-0,0258	1,0142	19,41	0	a
42.	2,79	3,0	8,200	8,200	5,3657	-0,0290	1,0145	19,41	0	a
43.	2,85	3,0	8,400	8,400	5,3625	-0,0322	1,0148	19,42	0	a
44.	2,92	3,1	8,600	8,600	5,3593	-0,0354	1,0151	19,42	0	a
45.	2,98	3,0	8,800	8,800	5,3560	-0,0387	1,0144	19,41	0	a
46.	3,06	3,0	9,000	9,000	5,3528	-0,0419	1,0147	19,42	0	a
47.	3,13	3,0	9,200	9,200	5,3494	-0,0453	1,0130	19,38	0	a
48.	3,19	3,0	9,400	9,400	5,3463	-0,0484	1,0143	19,41	0	a
49.	3,25	3,0	9,600	9,600	5,3430	-0,0517	1,0136	19,40	0	a
50.	3,32	3,0	9,800	9,800	5,3399	-0,0548	1,0149	19,42	0	a
51.	3,38	3,4	10,000	10,000	5,3366	-0,0581	1,0142	19,41	0	a
52.	3,46	3,0	10,200	10,200	5,3334	-0,0613	1,0145	19,41	0	a
53.	3,52	3,0	10,400	10,400	5,3302	-0,0645	1,0148	19,42	0	a
54.	3,58	3,0	10,600	10,600	5,3269	-0,0678	1,0141	19,40	0	a
55.	3,65	3,9	10,800	10,800	5,3237	-0,0710	1,0143	19,41	0	a
56.	3,73	3,0	11,000	11,000	5,3204	-0,0743	1,0137	19,40	0	a
57.	3,79	2,9	11,200	11,200	5,3172	-0,0775	1,0140	19,40	0	a
58.	3,85	3,0	11,400	11,400	5,3141	-0,0806	1,0152	19,43	0	a
59.	3,92	3,0	11,600	11,600	5,3108	-0,0839	1,0145	19,41	0	a
60.	3,98	3,0	11,800	11,800	5,3076	-0,0871	1,0148	19,42	0	a
61.	4,04	3,2	12,000	12,000	5,3043	-0,0904	1,0141	19,41	0	a
62.	4,11	3,0	12,200	12,200	5,3011	-0,0936	1,0144	19,41	0	a
63.	4,18	3,0	12,400	12,400	5,2979	-0,0968	1,0147	19,42	0	a
64.	4,24	3,0	12,600	12,600	5,2947	-0,1000	1,0150	19,42	0	a
65.	4,30	3,0	12,800	12,800	5,2915	-0,1032	1,0153	19,43	0	a
66.	4,37	3,0	13,000	13,000	5,2883	-0,1064	1,0156	19,43	0	a
67.	4,43	3,0	13,200	13,200	5,2851	-0,1096	1,0159	19,44	0	a
68.	4,50	3,5	13,400	13,400	5,2817	-0,1130	1,0142	19,41	0	a
69.	4,57	3,0	13,600	13,600	5,2784	-0,1163	1,0135	19,39	0	a
70.	4,63	3,0	13,800	13,800	5,2753	-0,1194	1,0148	19,42	0	a
71.	4,70	3,0	14,000	14,000	5,2720	-0,1227	1,0141	19,41	0	a
72.	4,76	3,4	14,200	14,200	5,2688	-0,1259	1,0144	19,41	0	a

73.	4,83	3,0	14,400	14,400	5,2656	-0,1291	1,0147	19,42	0	a
74.	4,90	3,0	14,600	14,600	5,2623	-0,1324	1,0140	19,40	0	a
75.	4,96	3,0	14,800	14,800	5,2591	-0,1356	1,0143	19,41	0	a
76.	5,02	4,4	15,000	15,000	5,2559	-0,1388	1,0145	19,41	0	a
77.	5,11	2,9	15,200	15,200	5,2527	-0,1420	1,0148	19,42	0	a
78.	5,18	2,9	15,400	15,400	5,2496	-0,1451	1,0161	19,44	0	a
79.	5,24	3,5	15,600	15,600	5,2463	-0,1484	1,0154	19,43	0	a
80.	5,31	3,0	15,800	15,800	5,2430	-0,1517	1,0147	19,42	0	a
81.	5,37	3,0	16,000	16,000	5,2399	-0,1548	1,0160	19,44	0	a
82.	5,44	3,0	16,200	16,200	5,2366	-0,1581	1,0153	19,43	0	a
83.	5,50	3,0	16,400	16,400	5,2334	-0,1613	1,0156	19,43	0	a
84.	5,57	3,1	16,600	16,600	5,2302	-0,1645	1,0159	19,44	0	a
85.	5,63	3,0	16,800	16,800	5,2269	-0,1678	1,0152	19,43	0	a
86.	5,70	3,1	17,000	17,000	5,2236	-0,1711	1,0145	19,41	0	a
87.	5,76	3,0	17,200	17,200	5,2205	-0,1742	1,0158	19,44	0	a
88.	5,83	3,0	17,400	17,400	5,2172	-0,1775	1,0151	19,42	0	a
89.	5,89	3,0	17,600	17,600	5,2140	-0,1807	1,0154	19,43	0	a
90.	5,96	3,0	17,800	17,800	5,2108	-0,1839	1,0157	19,44	0	a
91.	6,02	4,2	18,000	18,000	5,2075	-0,1872	1,0150	19,42	0	a
92.	6,10	3,0	18,200	18,200	5,2043	-0,1904	1,0153	19,43	0	a
93.	6,17	2,9	18,400	18,400	5,2011	-0,1936	1,0155	19,43	0	a
94.	6,23	3,0	18,600	18,600	5,1978	-0,1969	1,0149	19,42	0	a
95.	6,30	3,0	18,800	18,800	5,1946	-0,2001	1,0151	19,43	0	a
96.	6,36	3,0	19,000	19,000	5,1914	-0,2033	1,0154	19,43	0	a
97.	6,42	3,0	19,200	19,200	5,1881	-0,2066	1,0147	19,42	0	a
98.	6,49	3,0	19,400	19,400	5,1850	-0,2097	1,0160	19,44	0	a
99.	6,55	3,1	19,600	19,600	5,1818	-0,2129	1,0163	19,45	0	a
100.	6,62	4,0	19,800	19,800	5,1785	-0,2162	1,0156	19,43	0	a
101.	6,70	3,0	20,000	20,000	5,1752	-0,2195	1,0149	19,42	0	a
102.	*6,76*	*3,0*	*19,951*	*19,951*	*5,1759*	*-0,2188*	*1,0139*	*19,40*	*0*	*r*
103.	*6,82*	*3,1*	*19,901*	*19,901*	*5,1768*	*-0,2179*	*1,0148*	*19,42*	*0*	*r*
104.	6,88	3,0	19,851	19,851	5,1777	-0,2170	1,0157	19,44	0	r
105.	6,94	3,0	19,801	19,801	5,1785	-0,2162	1,0156	19,43	0	r
106.	7,00	3,0	19,751	19,751	5,1792	-0,2155	1,0146	19,41	0	r
107.	7,05	3,5	19,701	19,701	5,1801	-0,2146	1,0155	19,43	0	r
108.	7,12	2,6	19,651	19,651	5,1809	-0,2138	1,0154	19,43	0	r
109.	7,17	3,0	19,601	19,601	5,1816	-0,2131	1,0144	19,41	0	r
110.	7,23	3,0	19,551	19,551	5,1824	-0,2123	1,0143	19,41	0	r
111.	7,29	2,5	19,501	19,501	5,1832	-0,2115	1,0142	19,41	0	r
112.	7,34	3,0	19,451	19,451	5,1840	-0,2107	1,0141	19,41	0	r
113.	7,40	3,0	19,401	19,401	5,1849	-0,2098	1,0150	19,42	0	r
114.	7,46	2,5	19,351	19,351	5,1856	-0,2091	1,0140	19,40	0	r
115.	7,52	3,0	19,301	19,301	5,1865	-0,2082	1,0149	19,42	0	r
116.	7,57	3,1	19,251	19,251	5,1873	-0,2074	1,0148	19,42	0	r
117.	7,63	3,4	19,201	19,201	5,1880	-0,2067	1,0138	19,40	0	r
118.	7,71	2,6	19,001	19,001	5,1913	-0,2034	1,0145	19,41	0	r
119.	7,76	3,0	18,801	18,801	5,1945	-0,2002	1,0142	19,41	0	r
120.	7,83	3,5	18,601	18,601	5,1977	-0,1970	1,0139	19,40	0	r
121.	7,90	3,0	18,401	18,401	5,2009	-0,1938	1,0136	19,40	0	r
122.	7,96	3,0	18,201	18,201	5,2042	-0,1905	1,0143	19,41	0	r
123.	8,03	3,0	18,001	18,001	5,2074	-0,1873	1,0140	19,40	0	r
124.	8,11	3,0	17,801	17,801	5,2106	-0,1841	1,0137	19,40	0	r
125.	8,17	3,0	17,601	17,601	5,2138	-0,1809	1,0134	19,39	0	r
126.	8,23	4,0	17,401	17,401	5,2171	-0,1776	1,0141	19,41	0	r
127.	8,32	3,0	17,201	17,201	5,2203	-0,1744	1,0138	19,40	0	r
128.	8,38	4,0	17,001	17,001	5,2235	-0,1712	1,0135	19,39	0	r
129.	8,46	3,0	16,801	16,801	5,2267	-0,1680	1,0133	19,39	0	r
130.	8,52	2,6	16,601	16,601	5,2299	-0,1648	1,0130	19,38	0	r
131.	8,58	3,0	16,401	16,401	5,2332	-0,1615	1,0137	19,40	0	r
132.	8,65	3,5	16,201	16,201	5,2364	-0,1583	1,0134	19,39	0	r
133.	8,72	3,0	16,001	16,001	5,2396	-0,1551	1,0131	19,39	0	r
134.	8,78	3,0	15,801	15,801	5,2429	-0,1518	1,0138	19,40	0	r
135.	8,85	3,0	15,601	15,601	5,2461	-0,1486	1,0135	19,39	0	r
136.	8,91	3,0	15,401	15,401	5,2493	-0,1454	1,0132	19,39	0	r
137.	8,97	3,0	15,201	15,201	5,2526	-0,1421	1,0139	19,40	0	r
138.	9,04	3,1	15,001	15,001	5,2559	-0,1388	1,0146	19,41	0	r
139.	9,12	3,0	14,801	14,801	5,2590	-0,1357	1,0133	19,39	0	r
140.	9,18	3,0	14,601	14,601	5,2623	-0,1324	1,0140	19,40	0	r
141.	9,25	3,0	14,400	14,400	5,2655	-0,1292	1,0137	19,40	0	r
142.	9,31	3,0	14,200	14,200	5,2688	-0,1259	1,0144	19,41	0	r
143.	9,38	2,9	14,000	14,000	5,2718	-0,1229	1,0121	19,37	0	r
144.	9,44	3,0	13,800	13,800	5,2751	-0,1196	1,0128	19,38	0	r
145.	9,51	3,5	13,600	13,600	5,2783	-0,1164	1,0125	19,38	0	r
146.	9,58	3,1	13,400	13,400	5,2816	-0,1131	1,0132	19,39	0	r
147.	9,65	4,4	13,200	13,200	5,2848	-0,1099	1,0129	19,38	0	r
148.	9,73	3,1	13,000	13,000	5,2881	-0,1066	1,0136	19,40	0	r
149.	9,80	3,0	12,800	12,800	5,2913	-0,1034	1,0133	19,39	0	r
150.	9,86	2,6	12,600	12,600	5,2945	-0,1002	1,0131	19,39	0	r
151.	9,92	3,0	12,400	12,400	5,2977	-0,0970	1,0128	19,38	0	r
152.	9,99	3,1	12,200	12,200	5,3010	-0,0937	1,0135	19,39	0	r
153.	10,05	3,1	12,000	12,000	5,3042	-0,0905	1,0132	19,39	0	r
154.	10,13	3,0	11,800	11,800	5,3074	-0,0873	1,0129	19,38	0	r
155.	10,20	3,0	11,600	11,600	5,3107	-0,0840	1,0136	19,40	0	r
156.	10,26	5,8	11,400	11,400	5,3139	-0,0808	1,0133	19,39	0	r
157.	10,37	2,6	11,200	11,200	5,3171	-0,0776	1,0130	19,38	0	r
158.	10,43	3,0	11,000	11,000	5,3203	-0,0744	1,0127	19,38	0	r
159.	10,49	3,0	10,800	10,800	5,3235	-0,0712	1,0124	19,37	0	r
160.	10,56	3,0	10,600	10,600	5,3268	-0,0679	1,0131	19,39	0	r
161.	10,62	7,5	10,400	10,400	5,3301	-0,0646	1,0138	19,40	0	r
162.	10,76	6,0	10,200	10,200	5,3332	-0,0615	1,0125	19,38	0	r
163.	10,88	3,0	10,000	10,000	5,3364	-0,0583	1,0122	19,37	0	r
164.	10,94	3,0	9,800	9,800	5,3397	-0,0550	1,0129	19,38	0	r
165.	11,01	3,1	9,600	9,600	5,3429	-0,0518	1,0126	19,38	0	r
166.	11,07	3,6	9,400	9,400	5,3462	-0,0485	1,0133	19,39	0	r
167.	11,15	3,0	9,200	9,200	5,3494	-0,0453	1,0130	19,39	0	r
168.	11,21	2,6	9,000	9,000	5,3526	-0,0421	1,0127	19,38	0	r
169.	11,27	3,0	8,800	8,800	5,3559	-0,0388	1,0134	19,39	0	r
170.	11,34	3,0	8,600	8,600	5,3591	-0,0356	1,0131	19,39	0	r
171.	11,40	3,1	8,400	8,400	5,3623	-0,0324	1,0129	19,38	0	r
172.	11,47	2,5	8,200	8,200	5,3655	-0,0292	1,0126	19,38	0	r
173.	11,52	3,4	8,000	8,000	5,3687	-0,0260	1,0123	19,37	0	r
174.	11,59	3,0	7,800	7,800	5,3721	-0,0226	1,0140	19,40	0	r
175.	11,66	3,0	7,600	7,600	5,3753	-0,0194	1,0137	19,40	0	r

176.	**11,72**	**3,0**	**7,400**	**7,400**	**5,3785**	**-0,0162**	**1,0134**	**19,39**	**0**	**r**
177.	**11,79**	**2,9**	**7,200**	**7,200**	**5,3818**	**-0,0129**	**1,0141**	**19,40**	**0**	**r**
178.	**11,85**	**3,0**	**7,000**	**7,000**	**5,3849**	**-0,0098**	**1,0128**	**19,38**	**0**	**r**
179.	**11,91**	**4,4**	**6,800**	**6,800**	**5,3881**	**-0,0066**	**1,0125**	**19,38**	**0**	**r**
180.	**12,00**	**2,9**	**6,600**	**6,600**	**5,3913**	**-0,0034**	**1,0122**	**19,37**	**0**	**r**
181.	**12,06**	**3,9**	**6,400**	**6,400**	**5,3946**	**-0,0001**	**1,0129**	**19,38**	**0**	**r**
182.	**12,15**	**3,0**	**6,200**	**6,200**	**5,3978**	**0,0031**	**1,0126**	**19,38**	**0**	**r**
183.	**12,22**	**3,0**	**6,000**	**6,000**	**5,4010**	**0,0063**	**1,0123**	**19,37**	**0**	**r**
184.	**12,28**	**3,0**	**5,800**	**5,800**	**5,4043**	**0,0096**	**1,0130**	**19,39**	**0**	**r**
185.	**12,35**	**5,0**	**5,600**	**5,600**	**5,4075**	**0,0128**	**1,0127**	**19,38**	**0**	**r**
186.	**12,44**	**3,5**	**5,400**	**5,400**	**5,4108**	**0,0161**	**1,0134**	**19,39**	**0**	**r**
187.	**12,52**	**2,6**	**5,200**	**5,200**	**5,4140**	**0,0193**	**1,0131**	**19,39**	**0**	**r**
188.	**12,58**	**3,0**	**5,000**	**5,000**	**5,4173**	**0,0226**	**1,0138**	**19,40**	**0**	**r**
189.	**12,64**	**3,1**	**4,800**	**4,800**	**5,4205**	**0,0258**	**1,0135**	**19,39**	**0**	**r**
190.	**12,71**	**3,1**	**4,600**	**4,600**	**5,4237**	**0,0290**	**1,0132**	**19,39**	**0**	**r**
191.	**12,77**	**3,0**	**4,400**	**4,400**	**5,4269**	**0,0322**	**1,0130**	**19,38**	**0**	**r**
192.	**12,84**	**3,0**	**4,200**	**4,200**	**5,4301**	**0,0354**	**1,0127**	**19,38**	**0**	**r**
193.	**12,90**	**4,0**	**4,000**	**4,000**	**5,4334**	**0,0387**	**1,0134**	**19,39**	**0**	**r**
194.	**12,98**	**3,0**	**3,800**	**3,800**	**5,4366**	**0,0419**	**1,0131**	**19,39**	**0**	**r**
195.	**13,05**	**3,0**	**3,600**	**3,600**	**5,4398**	**0,0451**	**1,0128**	**19,38**	**0**	**r**
196.	**13,11**	**3,6**	**3,400**	**3,400**	**5,4431**	**0,0484**	**1,0135**	**19,39**	**0**	**r**
197.	**13,18**	**3,0**	**3,200**	**3,200**	**5,4463**	**0,0516**	**1,0132**	**19,39**	**0**	**r**
198.	**13,25**	**4,9**	**3,000**	**3,000**	**5,4496**	**0,0549**	**1,0139**	**19,40**	**0**	**r**
199.	**13,34**	**3,5**	**2,800**	**2,800**	**5,4528**	**0,0581**	**1,0136**	**19,40**	**0**	**r**
200.	**13,42**	**3,5**	**2,600**	**2,600**	**5,4559**	**0,0612**	**1,0123**	**19,37**	**0**	**r**
201.	**13,49**	**3,0**	**2,400**	**2,400**	**5,4592**	**0,0645**	**1,0130**	**19,38**	**0**	**r**
202.	**13,55**	**3,9**	**2,200**	**2,200**	**5,4625**	**0,0678**	**1,0137**	**19,40**	**0**	**r**
203.	**13,63**	**3,1**	**2,000**	**2,000**	**5,4657**	**0,0710**	**1,0134**	**19,39**	**0**	**r**
204.	**13,69**	**3,0**	**1,800**	**1,800**	**5,4690**	**0,0743**	**1,0141**	**19,41**	**0**	**r**
205.	**13,76**	**3,0**	**1,600**	**1,600**	**5,4722**	**0,0775**	**1,0138**	**19,40**	**0**	**r**
206.	**13,82**	**4,0**	**1,400**	**1,400**	**5,4754**	**0,0807**	**1,0135**	**19,39**	**0**	**r**
207.	**13,90**	**2,5**	**1,200**	**1,200**	**5,4786**	**0,0839**	**1,0132**	**19,39**	**0**	**r**
208.	**13,96**	**3,1**	**1,000**	**1,000**	**5,4819**	**0,0872**	**1,0139**	**19,40**	**0**	**r**
209.	**14,02**	**2,9**	**0,800**	**0,800**	**5,4852**	**0,0905**	**1,0146**	**19,42**	**0**	**r**
210.	**14,09**	**4,4**	**0,600**	**0,600**	**5,4884**	**0,0937**	**1,0143**	**19,41**	**0**	**r**
211.	**14,18**	**3,1**	**0,400**	**0,400**	**5,4916**	**0,0969**	**1,0140**	**19,40**	**0**	**r**
212.	**14,24**	**3,0**	**0,200**	**0,200**	**5,4948**	**0,1001**	**1,0137**	**19,40**	**0**	**r**
213.	**14,31**	**1,7**	**0,000**	**0,000**	**5,4980**	**0,1033**	**1,0132**	**19,39**	**0**	**r**
214.	**14,35**	**1,6**	**-0,050**	**-0,050**	**5,4989**	**0,1042**	**1,0137**	**19,40**	**0**	**cb**
215.	14,39	1,8	-0,100	-0,100	5,4997	0,1050	1,0140	19,40	0	cb
216.	14,43	1,7	-0,150	-0,150	5,5005	0,1058	1,0139	19,40	0	cb
217.	14,47	3,8	-0,200	-0,200	5,5013	0,1067	1,0143	19,41	0	cb
218.	14,55	2,0	-0,250	-0,250	5,5020	0,1073	1,0127	19,38	0	cb
219.	14,60	3,8	-0,300	-0,300	5,5029	0,1082	1,0136	19,40	0	cb
220.	14,68	3,7	-0,350	-0,350	5,5037	0,1090	1,0139	19,40	0	cb
221.	14,75	1,6	-0,400	-0,400	5,5045	0,1098	1,0135	19,39	0	cb
222.	14,79	1,6	-0,450	-0,450	5,5053	0,1106	1,0133	19,39	0	cb
223.	14,83	3,3	-0,500	-0,500	5,5061	0,1114	1,0136	19,40	0	cb
224.	14,90	3,8	-0,550	-0,550	5,5069	0,1122	1,0131	19,39	0	cb
225.	14,98	1,6	-0,600	-0,600	5,5078	0,1131	1,0141	19,41	0	cb
226.	15,02	2,4	-0,650	-0,650	5,5085	0,1138	1,0130	19,39	0	cb
227.	15,07	2,4	-0,700	-0,700	5,5093	0,1146	1,0130	19,38	0	cb
228.	15,13	4,7	-0,750	-0,750	5,5101	0,1154	1,0129	19,38	0	cb
229.	15,22	2,1	-0,800	-0,800	5,5108	0,1161	1,0118	19,36	0	cb
230.	15,27	1,7	-0,850	-0,850	5,5116	0,1169	1,0117	19,36	0	cb
231.	15,31	2,1	-0,900	-0,900	5,5124	0,1177	1,0112	19,35	0	cb
232.	15,36	1,6	-0,950	-0,950	5,5131	0,1184	1,0106	19,34	0	cb
233.	15,40	1,6	-1,000	-1,000	5,5138	0,1191	1,0095	19,32	0	cb
234.	15,44	1,6	-1,050	-1,050	5,5143	0,1196	1,0066	19,26	0	cb
235.	15,48	1,6	-1,100	-1,100	5,5148	0,1201	1,0036	19,20	0	cb
236.	15,52	1,5	-1,150	-1,150	5,5152	0,1205	0,9991	19,12	0	cb
237.	15,56	3,7	-1,200	-1,200	5,5137	0,1190	0,9768	18,69	4,51	cb
238.	15,64	3,8	-1,250	-1,250	5,4958	0,1011	0,7933	-	35,94	cb

Meldungen

Die Rückzugs- bzw. Receding- Bewegung ist aus 3 Zügen zusammengesetzt.

Temperaturangaben *beziehen sich auf die Skala der ITS-90.* ***Standardabweichungen:*** *Verschiedentlich werden Regressionsfunktionen mit Standardabweichungen bzw. Varianzen qualifiziert. Diese Angaben werden berechnet aus der Summe der Quadrate der Abweichungen der Einzelwerte zu jeweils berechneten Funktionswerten dividiert durch die Anzahl der Werte weniger 1. Sofern nicht anders bezeichnet, werden für ±(Standardmess-)Unsicherheiten einfache Standardabweichungen - ohne Erweiterungsfaktoren - angegeben, d.h. die Überdeckung betrifft 67% der Werte.*

IMPro

Execution & Audit-Trail

Data created during execution of the IMPro *"ContactAngle_atConstantLevel, 24.05.23, 104997"*, type 4/4. Time Period of the Accomplishment: Mai., 25. 2023 between 16:34:31 and 16:56:53, elapsed time: 20 minutes. IMPro finished as projected. The complete Report first was presented on Mai., 26.23 at 01:31. Audit-Log: The Original data is unchanged, nevertheless there are entries to the Log, made while the IMPro was executing:

Start of this IMPro 16:40:33, - **Backup of the IMPro configuration:**
Time **Variables**: Abs. Positions/Way: Immersion_Depth 20mm, Platform_StartPosition 85mm.
Rel. Positions/Way: FeedRateAdv 0,2mm, FeedRateRec -0,2mm, FeedRate_for_adv_rec_turn -0,050mm.
Others: Determin_0_at_Repetition -1 [Y/N].StirringTime 0s. Stirrer-Speed 0rps. Record_Air_Density -1, Temperature-Outside-Warning 0, Automatic_Thermostat_available -1.
ab 8. Wdh mit Entnahme und Abtupfung ....*
#Wilhelmy-Plate-Sequence (erstes statisch, dann speed-up dyn): 1x stat, dann v=v'*1.5 ... mm/s dyn, Beschl.g = 43 [%]: Sequ.N° 1/21: _Equi_Time: 0,350s, _Equi_Crit: 0,0001g, _Equi_loops: 5s, _Equi_loopsRepeater: 2 [n]×. Immersion_Depth: 20mm, ConditioningTime: 180s.$v_{5,95}$=152µL,
Measurement : CLT STATIC, PumpN°1 [n], Vol. 2,50 [cm^3], FüllVolumen 0,5 [cm^3], FreiVolumen 2 [cm^3], VolBilanz 0,3482, PFlussRate 11,7µL/s, DichteDerFlüssigkeit 0,691906 [g/cm^3].
$v_{6,07}$=-4,67µL,$v_{6,13}$=-4,67µL,$v_{6,20}$=-4,67µL,$v_{6,27}$=-4,67µL,$v_{6,33}$=-4,67µL,$v_{6,40}$=-4,67µL,$v_{6,46}$=-4,67µL,$v_{6,54}$=-4,67µL,$v_{6,60}$=-4,67µL,$v_{6,68}$=-4,67µL,$v_{6,74}$=-4,67µL,$v_{6,81}$=-4,67µL,$v_{6,87}$=-4,67µL,$v_{6,94}$=-4,67µL,$v_{7,00}$=-4,67µL,$v_{7,07}$=-4,67µL,$v_{7,14}$=-4,67µL,$v_{7,20}$=-4,67µL,$v_{7,29}$=-4,67µL,$v_{7,35}$=-4,67µL,$v_{7,42}$=-4,67µL,$v_{7,48}$=-4,67µL,$v_{7,55}$=-4,67µL,$v_{7,61}$=-4,67

µL,$v_{7,72}$=-4,67µL,$v_{7,79}$=-4,67µL,$v_{7,85}$=-4,67µL,$v_{7,91}$=-4,67µL,$v_{8,01}$=-4,67µL,$v_{8,09}$=-4,67µL,$v_{8,16}$=-4,67µL,$v_{8,22}$=-4,67µL,$v_{8,29}$=-4,67µL,$v_{8,35}$=-4,67µL,$v_{8,41}$=-4,67µL,$v_{8,48}$=-4,67 µL,$v_{8,54}$=-4,67µL,$v_{8,60}$=-4,67µL,$v_{8,66}$=-4,67µL,$v_{8,74}$=-4,67µL,$v_{8,80}$=-4,67µL,$v_{8,86}$=-4,67µL,$v_{8,93}$=-4,67µL,$v_{8,99}$=-4,67µL,$v_{9,07}$=-4,67µL,$v_{9,13}$=-4,67µL,$v_{9,20}$=-4,67µL,$v_{9,26}$=-4,67 µL,$v_{9,33}$=-4,67µL,$v_{9,39}$=-4,67µL,$v_{9,46}$=-4,67µL,$v_{9,53}$=-4,67µL,$v_{9,59}$=-4,67µL,$v_{9,65}$=-4,67µL,$v_{9,73}$=-4,67µL,$v_{9,80}$=-4,67µL,$v_{9,86}$=-4,67µL,$v_{9,92}$=-4,67µL,$v_{9,99}$=-4,67µL,$v_{10,05}$=-4,67 µL,$v_{10,12}$=-4,67µL,$v_{10,18}$=-4,67µL,$v_{10,25}$=-4,67µL,$v_{10,31}$=-4,67µL,$v_{10,38}$=-4,67µL,$v_{10,44}$=-4,67µL,$v_{10,50}$=-4,67µL,$v_{10,58}$=-4,67µL,$v_{10,64}$=-4,67µL,$v_{10,70}$=-4,67µL,$v_{10,77}$=-4,67 µL,$v_{10,84}$=-4,67µL,$v_{10,90}$=-4,67µL,$v_{10,97}$=-4,67µL,$v_{11,03}$=-4,67µL,$v_{11,12}$=-4,67µL,$v_{11,18}$=-4,67µL,$v_{11,25}$=-4,67µL,$v_{11,32}$=-4,67µL,$v_{11,38}$=-4,67µL,$v_{11,45}$=-4,67µL,$v_{11,51}$=-4,67 µL,$v_{11,57}$=-4,67µL,$v_{11,64}$=-4,67µL,$v_{11,70}$=-4,67µL,$v_{11,77}$=-4,67µL,$v_{11,83}$=-4,67µL,$v_{11,90}$=-4,67µL,$v_{11,96}$=-4,67µL,$v_{12,03}$=-4,67µL,$v_{12,11}$=-4,67µL,$v_{12,18}$=-4,67µL,$v_{12,24}$=-4,67 µL,$v_{12,30}$=-4,67µL,$v_{12,37}$=-4,67µL,$v_{12,43}$=-4,67µL,$v_{12,50}$=-4,67µL,$v_{12,56}$=-4,67µL,$v_{12,63}$=-4,67µL,$v_{12,71}$=-4,67µL,$v_{12,77}$=1,17µL,$v_{12,83}$=1,17µL,$v_{12,89}$=1,17µL,$v_{12,95}$=1,17µL,$v_{13,01}$= 1,17µL,$v_{13,07}$=1,17µL,$v_{13,13}$=1,17µL,$v_{13,19}$=1,17µL,$v_{13,24}$=1,17µL,$v_{13,30}$=1,17µL,$v_{13,36}$=1,17µL,$v_{13,42}$=1,17µL,$v_{13,47}$=1,17µL,$v_{13,53}$=1,17µL,$v_{13,59}$=1,17µL,$v_{13,65}$=1,17µL,$v_{13,71}$= 4,67µL,$v_{13,77}$=4,67µL,$v_{13,84}$=4,67µL,$v_{13,91}$=4,67µL,$v_{13,97}$=4,67µL,$v_{14,04}$=4,67µL,$v_{14,11}$=4,67µL,$v_{14,18}$=4,67µL,$v_{14,24}$=4,67µL,$v_{14,32}$=4,67µL,$v_{14,39}$=4,67µL,$v_{14,47}$=4,67µL,$v_{14,53}$= 4,67µL,$v_{14,59}$=4,67µL,$v_{14,65}$=4,67µL,$v_{14,72}$=4,67µL,$v_{14,79}$=4,67µL,$v_{14,85}$=4,67µL,$v_{14,92}$=4,67µL,$v_{14,98}$=4,67µL,$v_{15,05}$=4,67µL,$v_{15,13}$=4,67µL,$v_{15,19}$=4,67µL,$v_{15,26}$=4,67µL,$v_{15,32}$= 4,67µL,$v_{15,38}$=4,67µL,$v_{15,45}$=4,67µL,$v_{15,51}$=4,67µL,$v_{15,59}$=4,67µL,$v_{15,65}$=4,67µL,$v_{15,74}$=4,67µL,$v_{15,81}$=4,67µL,$v_{15,87}$=4,67µL,$v_{15,93}$=4,67µL,$v_{15,99}$=4,67µL,$v_{16,06}$=4,67µL,$v_{16,14}$= 4,67µL,$v_{16,20}$=4,67µL,$v_{16,27}$=4,67µL,$v_{16,38}$=4,67µL,$v_{16,44}$=4,67µL,$v_{16,50}$=4,67µL,$v_{16,56}$=4,67µL,$v_{16,63}$=4,67µL,$v_{16,77}$=4,67µL,$v_{16,88}$=4,67µL,$v_{16,95}$=4,67µL,$v_{17,01}$=4,67µL,$v_{17,08}$= 4,67µL,$v_{17,16}$=4,67µL,$v_{17,22}$=4,67µL,$v_{17,28}$=4,67µL,$v_{17,34}$=4,67µL,$v_{17,41}$=4,67µL,$v_{17,47}$=4,67µL,$v_{17,53}$=4,67µL,$v_{17,60}$=4,67µL,$v_{17,67}$=4,67µL,$v_{17,73}$=4,67µL,$v_{17,79}$=4,67µL,$v_{17,86}$= 4,67µL,$v_{17,92}$=4,67µL,$v_{18,01}$=4,67µL,$v_{18,07}$=4,67µL,$v_{18,16}$=4,67µL,$v_{18,23}$=4,67µL,$v_{18,29}$=4,67µL,$v_{18,36}$=4,67µL,$v_{18,45}$=4,67µL,$v_{18,53}$=4,67µL,$v_{18,58}$=4,67µL,$v_{18,65}$=4,67µL,$v_{18,71}$= 4,67µL,$v_{18,78}$=4,67µL,$v_{18,84}$=4,67µL,$v_{18,91}$=4,67µL,$v_{18,99}$=4,67µL,$v_{19,05}$=4,67µL,$v_{19,12}$=4,67µL,$v_{19,19}$=4,67µL,$v_{19,25}$=4,67µL,$v_{19,35}$=4,67µL,$v_{19,42}$=4,67µL,$v_{19,50}$=4,67µL,$v_{19,56}$= 4,67µL,$v_{19,64}$=4,67µL,$v_{19,70}$=4,67µL,$v_{19,77}$=4,67µL,$v_{19,83}$=4,67µL,$v_{19,91}$=4,67µL,$v_{19,97}$=4,67µL,$v_{20,03}$=4,67µL,$v_{20,09}$=4,67µL,$v_{20,18}$=4,67µL,$v_{20,25}$=4,67µL,$v_{20,32}$=4,67µL,$v_{20,36}$= 0,00µL,$v_{20,40}$=1,24µL,$v_{20,44}$=1,21µL,$v_{20,49}$=1,16µL,$v_{20,56}$=1,23µL,$v_{20,61}$=0,939µL,$v_{20,69}$=1,30µL,$v_{20,76}$=1,21µL,$v_{20,80}$=1,10µL,$v_{20,85}$=1,14µL,$v_{20,91}$=1,21µL,$v_{20,99}$=1,10µL,$v_{21,03}$= 1,32µL,$v_{21,09}$=1,01µL,$v_{21,14}$=1,16µL,$v_{21,23}$=1,16µL,$v_{21,28}$=1,01µL,$v_{21,32}$=1,16µL,$v_{21,37}$=1,10µL,$v_{21,41}$=1,07µL,$v_{21,45}$=1,01µL,$v_{21,49}$=0,737µL,$v_{21,53}$=0,723µL,$v_{21,57}$=0,506 µL,$v_{21,65}$=-2,11µL,$v_{21,72}$=-25,9µL,$v_{21,80}$=-25,1µL,$v_{21,87}$=-25,0µL,$v_{21,95}$=-23,7µL,$v_{22,03}$=-27,5µL,$v_{22,10}$=-43,8µL,$v_{22,14}$=0,0867µL,

The Number **22823** refers to the Recordset in the Database ***'imeterData39'*** where all Information can be retrieved at any time.

Prüfmittel

Das Wägesystem (WZA224) wurde 2,0 Stunden vor dieser Messung von Augsburg-Lab justiert. Die letzte vollständige Prüfung der Positioniervorrichtung von ***IMETER*** (ID23903733) erfolgte am 26.08.18. Technische Daten: Auflösung des Wägesystems 0,1 mg, Messunsicherheit (Linearität) 0,2 mg, Dichte der Justiermasse ρ_{cal} 8,00 g/cm^3, Luftdichte ρ_{air} vgl. Tabelle unten; Schwerebeschleunigung g 9,80769 m/s^2. Pt100-Temperaturmessung: Auflösung 0,001 K, Messunsicherheit ±0,01 K, $R°$ 100.0056 Ω, Kalibrierintervall 30 min (BN°1, -41/200°C, 3S, FS15,8, Korrekturfunktion: -0,0054 +0,997591·ϑ+2,20165E-05·ϑ^2-4,78431E-08·ϑ^3). Die Messauflösung der sekundären Temperaturmessung beträgt 0,01 K, die Unsicherheit 0,03 K. Akquisitions-Softwareversion IMETER 7.4.21, LizenzN° *3037-4759*, W. 6.2,9200- Betriebssystem auf PC Ser.N°6995684 (C, SSD).

Meteorologische Angaben, Luftdichte:

Time [min]	ϕ [%]	T_a [°C]	p_a [kPa]	ρ_{air} [kg/m^3]
0,1	47,57	24,52	96,501	1,12323

Obige Zusammenstellung gibt die Aufzeichnung der Atmosphärendaten für den Aufstellort wieder; darin bedeuten ϕ relative Luftfeuchte (r.H.), T_a Lufttemperatur und p_a absoluter Luftdruck, ρ_{air} die Luftdichte; Die Luftdichte wird dabei aus den Druck-, Temperatur- und Luftfeuchtewerten berechnet.
