OMNITEK

Kinematic Viscometers According to ASTM D445 & D7279

by M.Onur Diri, International Sales & Marketing Manager

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COMPANY HISTORY

35 YEARS SINCE 1979

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- **1979 Established by William Wagelaar**
  - Scientific glassblowing company
- **1996**
  - Introduction of moisture analyzer according ISO 15512
  - Applied by plastic producers (PA, PET, PBT, PC, Acrylics)
  - Evolution to automated version: AVM 3000

AVM-3000 Moisture Analyzer

- **2002**
  - Introduction of S-Flow kinematic viscometer according ASTM D7279

S-Flow 400

S-Flow 850

S-Flow 1200

S-Flow 3000

- **2011**
  - Introduction of U-Visc automated kinematic viscometer according ASTM D445

Single bath
- U-Visc 110
- U-Vlsc 120

Dual bath
- U-Visc 210
- U-Visc 220

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U-VIsc Series

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Summary of Test Method

Flow time measurement of a fixed volume of liquid to flow under gravity through the capillary of a calibrated viscometer under a reproducible driving head and at a closely controlled and known temperature.

$$v = c.t$$

Where; v = kinematic viscosity of the fluid, mm^2/s (cSt)
c = tube constant, mm^2/s^2
t = flow time of the sample, s

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U-VIsc Series Viscometers

Version		Independent baths	Viscometer tubes per bath	Autosampler capacity per tube	Total Sample Capacity
	U-VIsc 110	1	1	16	16
	U-VIsc 120	1	2	16	32
	Dimensions Weight	38 x 62 x 78 cm (width x depth x height) 54 kg (empty)			

Version		Independent baths	Viscometer tubes per bath	Autosampler capacity per tube	Total Sample Capacity
	U-VIsc 210	2	1	16	32
	U-VIsc 220	2	2	16	64
	Dimensions Weight	75 x 62 x 78 cm (width x depth x height) 92 kg (empty)			

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U-VIsc Series Technical Specifications

Feature	U-VIsc 110 / 120 / 210 / 220
Measuring range	0.5 - 20,000 mm^2/s @ 100°C *)
Temperature range	15 - 110 °C (150 °C option)
Temperature stability	±0.005 °C @ 40°C, ±0.01°C @ 100°C
Timer accuracy	0.005 s
Sample volume	8 ml / 16 ml (single / double)
Sample introduction	Vacuum / Pressure
Solvent consumption	10 - 12 ml per cycle / 12 - 15 ml per cycle (single / double)
Sample throughput	U-VIsc 110 : up to 10 measurements per hour **) U-VIsc 120 : up to 20 measurements per hour **) U-VIsc 210 : up to 20 measurements per hour **) U-VIsc 220 : up to 40 measurements per hour **)
Applicable standards	ASTM D445, D446, D2270, ASTM D789, ASTM D1243, ASTM D2857 , ASTM D3591, ASTM D4603, ASTM D4878, ISO3104, ISO3105, EN ISO 1628, ISO 2909, EN ISO 307, DIN 51562,DIN 53728, DIN 53727, DIN 7744, DIN 7745
Dimensions / Weight	U-VIsc 110 / 120: 38 x 62 x 78 cm (w x d x h) / 54 kg (empty) U-VIsc 210 / 220: 75 x 62 x 78 cm (w x d x h) / 92 kg (empty)
Viscometer type	Modified Ubbelohde
Sensor type	Thermal / Optical
Communication	RS-232C

*) Please consult us for optimal tube selection and flow times
**) Measurements per / hour; depends on viscosity, tube, temperature and solvents chosen

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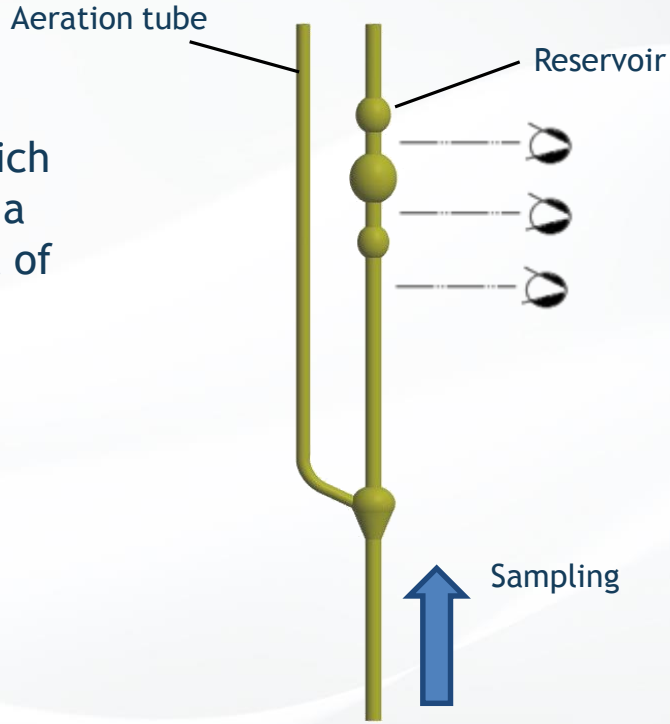
U-VIsc Series Tube Design – Modified Ubbelohde

The liquid is suspended in the capillary which it fills completely. This suspension ensures a uniform driving head of liquid independent of the quantity of sample charged into the viscometer, which makes the viscometer constant independent of temperature and filling volume.



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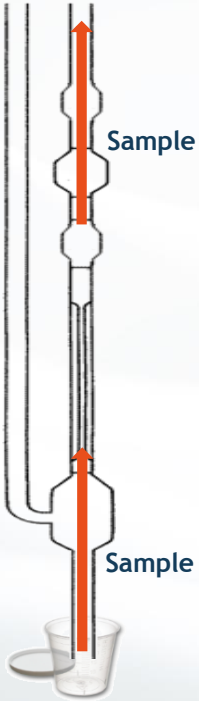
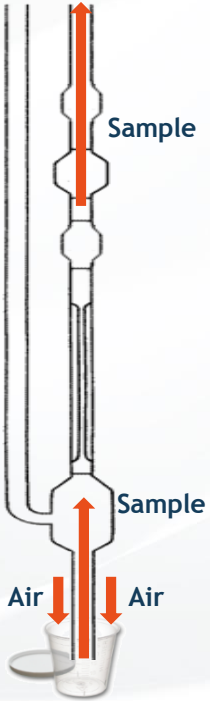
U-VIsc Series Features – Sampling

- Sampling by Vacuum



- Sampling by Pressure

(for samples containing high level of volatiles)



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U-VIsc Series Features – Easy Tube Exchange

In 3 steps within less than 10 minutes without draining the bath;

1. Remove gently the side and upper cover of the instrument

2. Unscrew the injector block (white blocks) of the tube you want to replace

3. Push tube gently from bottom with the help of stopper

Bottom view of the tube

Stopper

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U-VIsc Series Features – Wide Measuring Ranges

100-fold range tubes			
Tube Constants	Measuring range (cSt)		
0.003	0.2	-	20
0.01	0.5	-	50
0.02	1.0	-	100
0.03	1.5	-	150
0.05	2.5	-	250
0.10	5.0	-	500
0.20	10	-	1000
0.30	15	-	1,500
0.50	25	-	2,500
1.00	50	-	5,000
2.00	100	-	10,000
5.00	500	-	20,000

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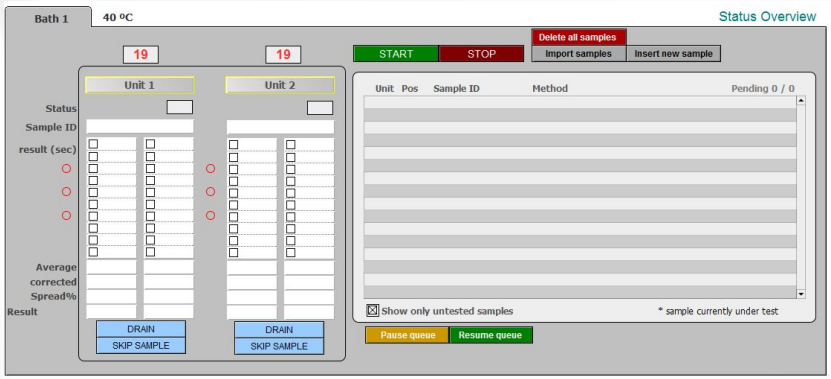
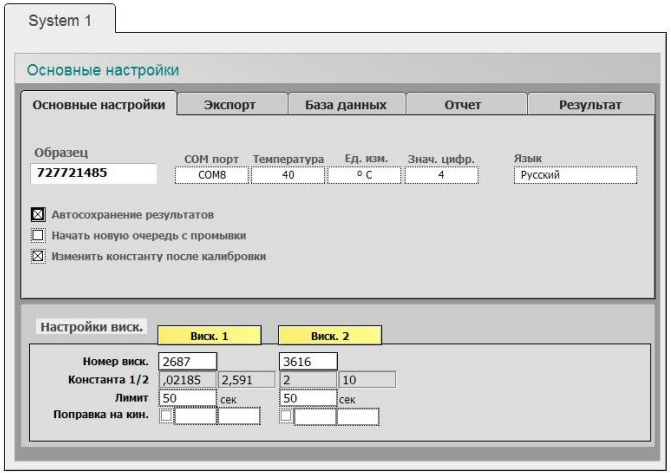
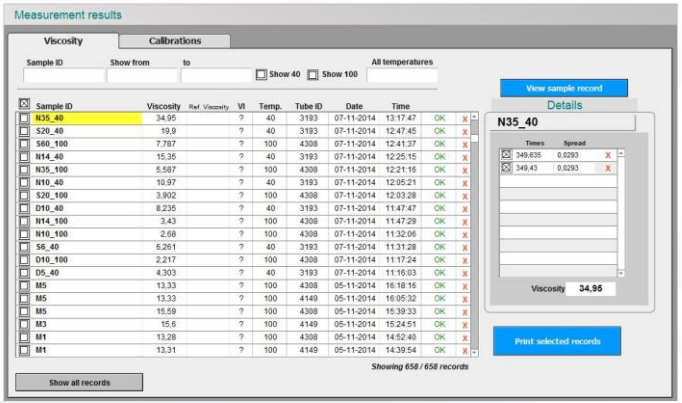
U-VIsc Series Features – Multilingual Data Tracking







Software in Different Languages;

- English
- Russian
- Chinese
- Spanish
- Dutch
- Turkish
- Polski (w przygotowaniu)

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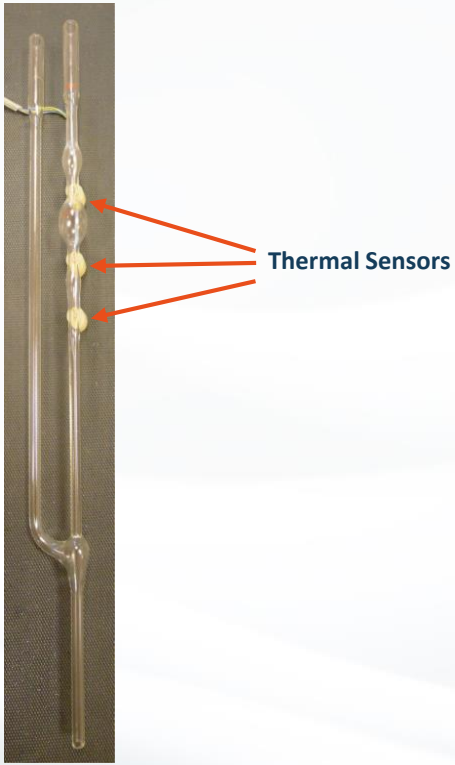
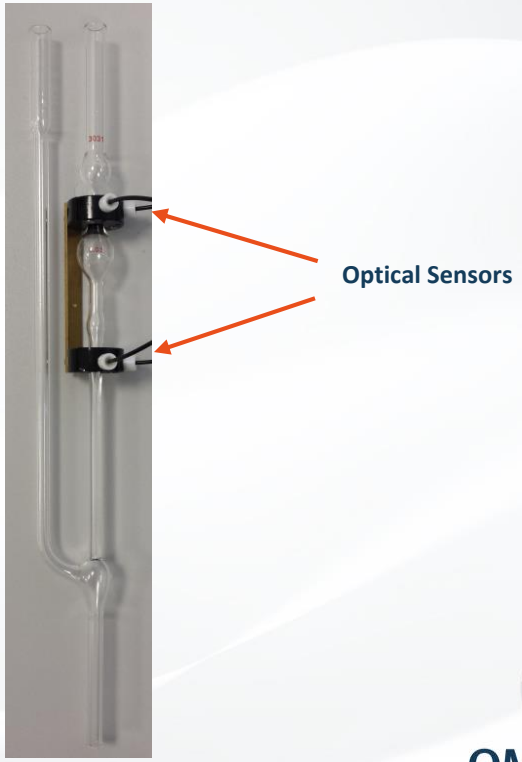
U-VIsc Series Features – Alternative Sensor Options

Thermal Sensors



Optical Sensors



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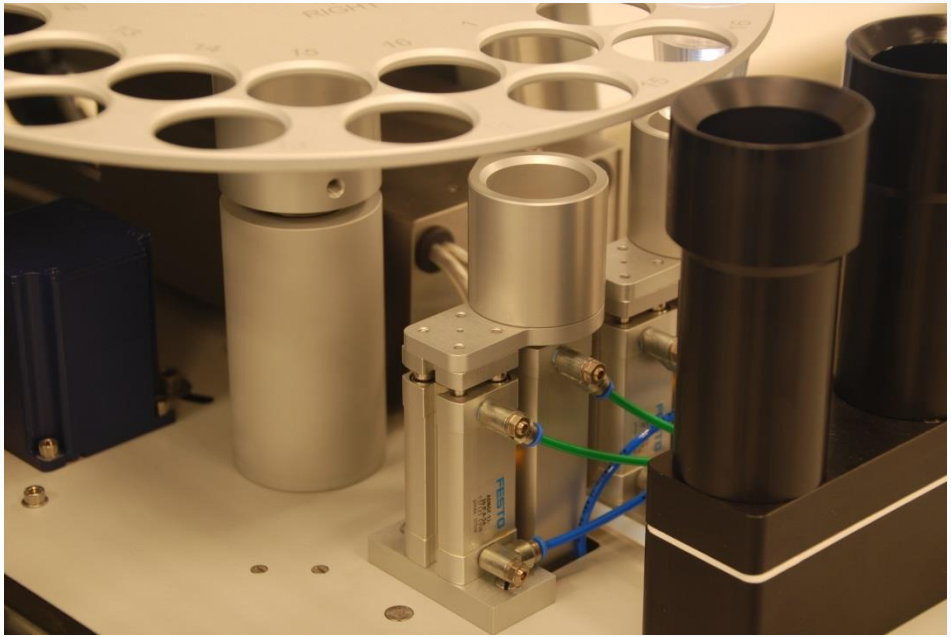
U-VIsc Series Features – Preheating



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U-VIsc Series Features- Dual Solvent

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S-flow Series

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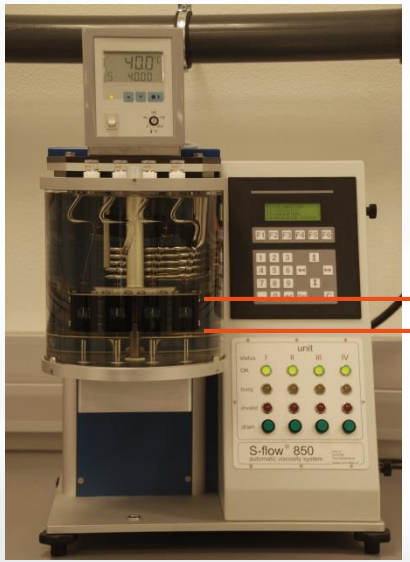
Summary of Test Method

The kinematic viscosity is determined by measuring the time taken for a sample to fill a *calibrated volume* at a given temperature.

Sample is manually injected at top of viscometer, warms up and travels down through capillary. When sample is reached the first detection point, timer is activated, and timer is stopped when sample is reached the second detection point.



1st detection point
2nd detection point

The kinematic viscosity is calculated using the formula:

$$v = c.t$$

Where; v = kinematic viscosity of the fluid, mm^2/s (cSt)
c = tube constant, mm^2/s^2
t = flow time of the sample, s

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S-flow Series Viscometers

	S-flow 400L	S-flow 850	S-flow 1200	S-flow 3000
Versions				
Time Measurement	manual	automatic	automatic	automatic
Injection Solvent	manual	manual	automatic	automatic
Injection Sample	manual	manual	manual	manual
Robotic Sample Injection	no	no	optional	optional
Built-in pump	no	yes	yes	yes
Nr. of Tubes	4	4	4	8
Optional Dual Solvent	no	no	yes	yes
Display Results	no	yes	yes	yes
Calibration Mode	no	yes	yes	yes
Optional PC Software	no	yes	yes	yes
Optional Printer	no	yes	yes	yes
Viscosity Index	no	no	no	yes

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S-flow Series Technical Specifications

Feature	S-flow 400L / 850 / 1200 / 3000 VI
Standard methods	Complies to ASTM D7279, D2270 and Correlates to ASTM D445, ISO 3104
Measuring range	1 – 3,000 @ 40 °C mm^2/s (cSt)
Temperature range	20 – 120°C for automatic models; 20 – 150°C for S-flow 400L *)
Temperature stability	± 0.01 @ 40 °C, 0.03 @ 100 °C
Timer resolution	0.0025 s (for automatic models)
Sample volume	0.3 – 1.0 ml
Solvent consumption	2 – 3 ml per cycle (for automatic models)
Sample throughput	Up to 80 samples per hour per bath (S-flow 1200 and 3000 VI models)
Viscometer type	Houillon
Sensor type	Optical
Communication	RS-232C

*) For temperatures around ambient, cooling coil and cooling circulator are required

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U-VIsc Series Tube Design - Houillon

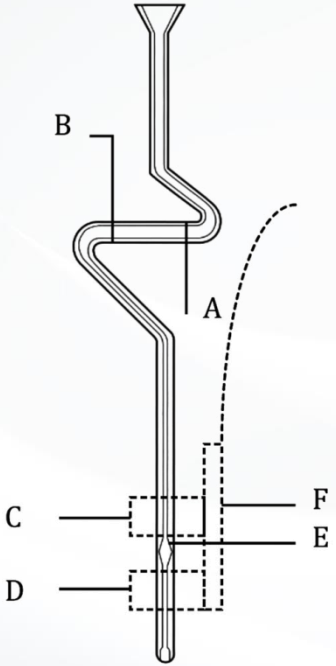

Figure refer to ASTM D7279

A and B = sample reservoir
C and D = calibrated volume—measurement zone
E = bulb
F = detection cell

The filling volume is OK when:

At the beginning of a measurement:
Sample lower meniscus is on C (start timing)
Sample upper meniscus should be below A

At the end of a measurement:
Sample lower meniscus is on D (stop timing)
Sample upper meniscus should be above B

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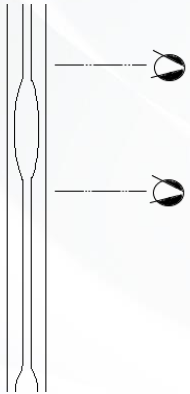
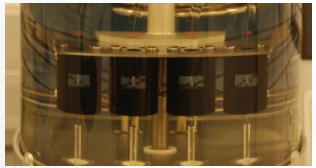
U-VIsc Series Features - Different Tube Options

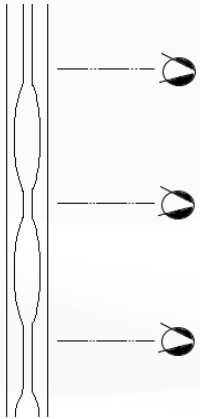
Different Measurement Portions

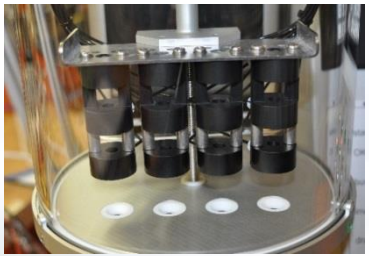
Single Measurement



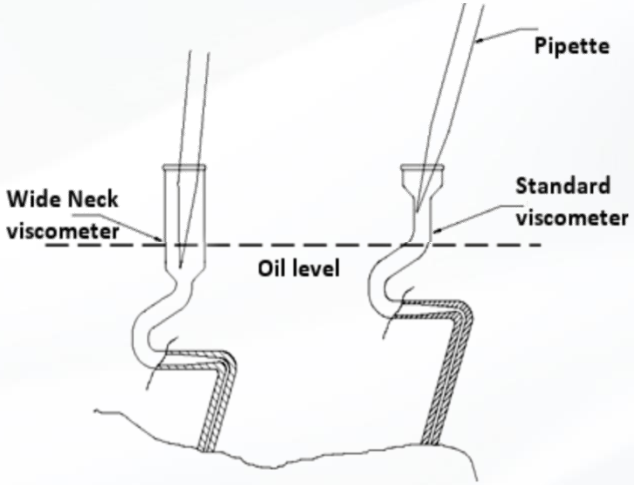


Duplo Measurement





Different Type Injection Necks



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U-VIsc Series Features – Easy Tube Exchange

In 2 steps within less than 5 minutes without draining the bath

No need for re-aligning sensors

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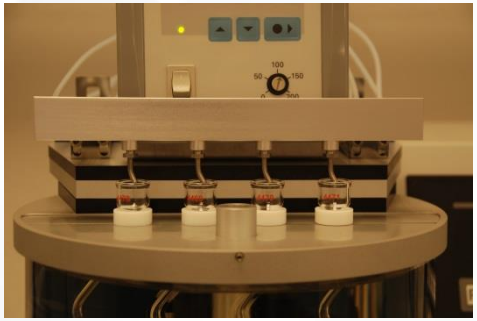
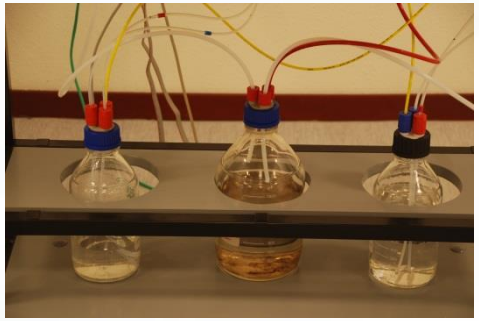
U-VIsc Series Features - Easy Tube Cleaning

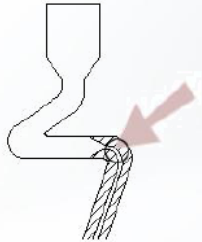
Automatic solvent injection



Dual Solvent



Back flush



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U-VIsc Series Features - Robotic Autosampler

- Customer oriented autosampling solutions

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THANK YOU !!!

RADOSŁAW WOŹNIAK

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