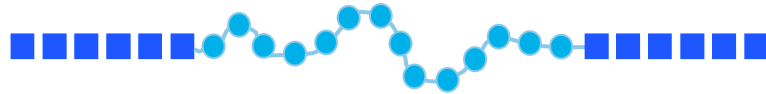


Alternative solution of low molecular weight plasticizer for soft PVC compound

KURARITY business promotion dept.
Elastomer Division

kuraray

Advantages of KURARITY™ as plasticizer of PVC



Kurarity™ as “MAM” structure
-> Made by controlled living anionic polymerization

Features of “MAM”

High molecular weight

Softness

All acrylic structure

Advantages as plasticizer

High Mw Plasticizer
(low migration, low fogging)

High heat aging resistance

Overviewing of our new solution with KURARITY™ (Compare with conventional low Molecular weight (Mw) plasticizers)

	Appearance	Migration and fogging	Heat aging resistance
PVC / KURARITY™ compounds (New solution)	White	++	+
PVC / Plasticizer Compounds (Conventional)	Transparent	-	-

Compared with conventional PVC / low Mw plasticizer compounds,
Our new solution is;

- ✓ (-) Difficult to make transparent CPD
- ✓ (+) Good at migration, fogging and heat aging resistance

Typical properties

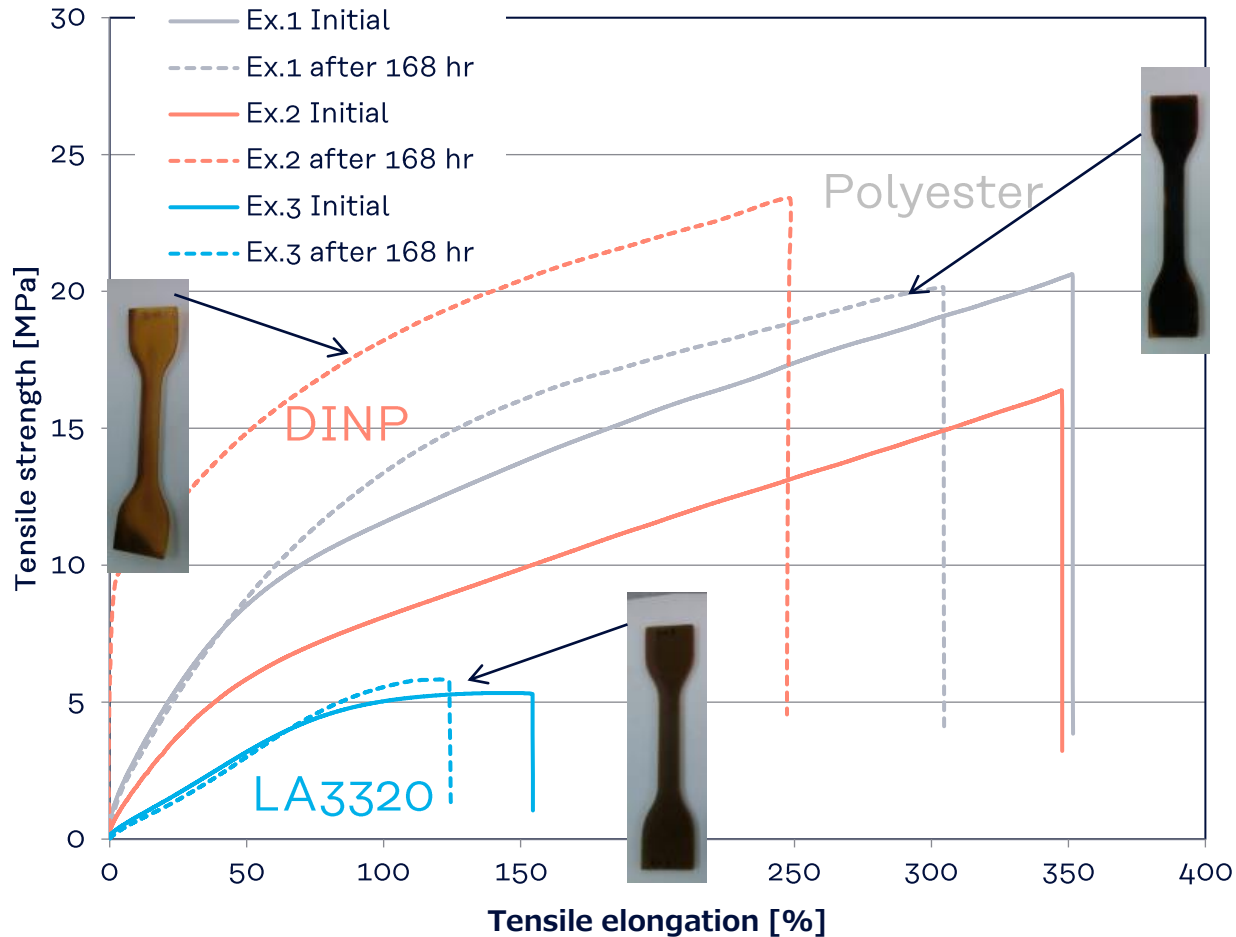
				Ex.1: PVC / DINP	Ex.2: PVC / Polyester	Ex.3: PVC / KURARITY™
PVC	Straight type PVC (k = 67, P = 1,000)			100	100	100
Plasticizer	DINP			60		
	Polyester type (Viscosity at 25 deg.C = 3,000 mPa · s)				60	
	KURARITY™ LA3320					80
Additives*	Acrylic processing aid (METABLEN™ P550A)					10
Items	Methods	Conditions	Units			
Appearance	-	23 deg.C	-	Transparent	Transparent	White
Hardness type A	ISO 7619-1	After 15 sec	-	80	87	68
Tensile strength at break	ISO 37	200 mm / min	MPa	16	21	5.3
Tensile elongation at break			%	350	350	150
Volume resistivity	ISO 2951	-	Ω · cm	1.7 x 10 ¹¹	3.2 x 10 ¹²	3.0 x 10 ¹¹
Embrittlement temp.	ASTM D746	-	deg.C	-42	-17	-22
Migration to PMMA plate	In-house method	70 deg.C, 72 hr	Δwt %	Bonding	0.5-1.0	<0.5
Fogging (glass plate haze)	ISO 6452 reference	100 deg.C, 8 hr	%	30.5	16.8	8.5

*All formulation contains following additives; Stabilizer: Dioctyltin maleate 1.0 phr and Dioctyltin mercapto type 1.0 phr, Lubricant: Calcium stearate 0.5 phr
METABLEN™ is a registered trademark of Mitsubishi Chemical Corporation

KURARITY™ can soften PVC as high Mw plasticizer

To make good compatibility with PVC, we recommend adding [acrylic processing aid](#)

Heat aging resistance



Heat aging condition: 136 deg.C, 168 hr

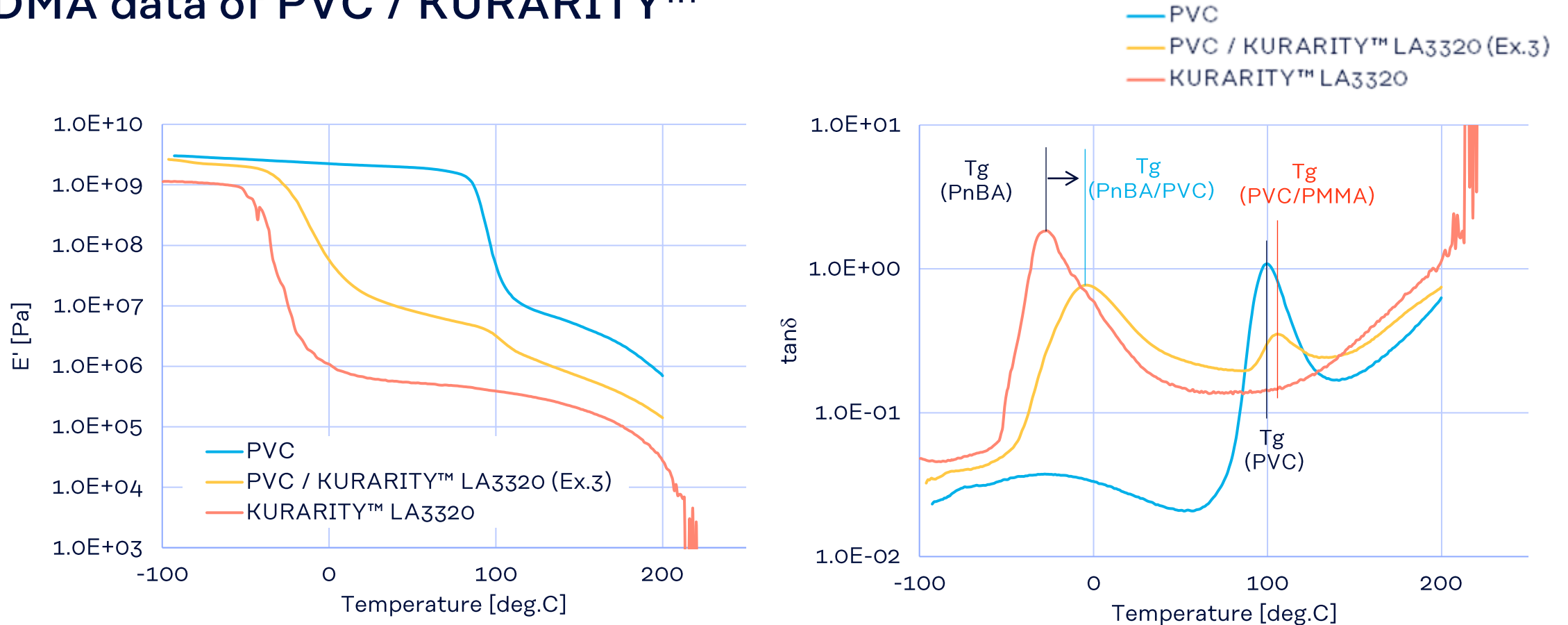
Sample: ISO type1 dumbbell (Before / After heat aging test)

Measurement: Weight, Tensile strength / elongation

Change ratio	Ex.1 PVC /DINP	Ex.2 PVC /Poly ester	Ex.3 PVC /KURARITY™
Weight	-19 %	-3.5 %	-1.9 %
Tensile strength at break	+44 %	-2.0 %	+9.4 %
Tensile elongation at break	-29 %	-11 %	-20 %

PVC / KURARITY™ shows better heat aging resistance compare to PVC / DINP and PVC / Polyester formulations

DMA data of PVC / KURARITY™



KURARITY™ (PnBA phase and PMMA phase) and PVC phase are miscible.
 -> PVC / KURARITY™ compound shows soft feelings at room temperature.

Test methods

Compounding conditions (Data on page 4)

Kneading conditions

Batch mixer kneading

Rotation rate: 30-50 rpm

Temperature: 160 deg.C

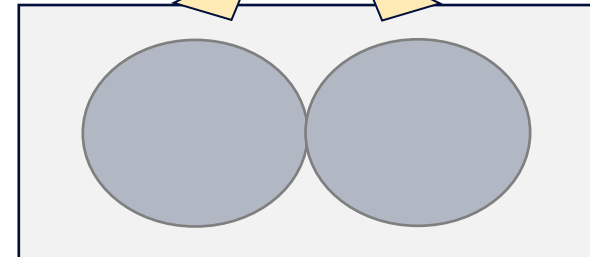
Kneading time: 5 min

1st step

Feed into mixer materials
at rotation rate 30 rpm.
(Materials: PVC, KURARITY™ or
Plasticizer, Additives
and Stabilizer)

2nd step

After feeding,
rotation rate is set 50 rpm.
Kneading for 5 min.



- Other kneading process such as pressure kneader, twin screw extruder can be applied.

Test method (Migration) (Data on page 4)

Test conditions

- The sample was stacked as following figure.
- Migration condition: 70 deg.C, 72 hr
- Weight change of PMMA plate was measured.

PMMA plate
(100 mm x 100 mm x 0.2 mmt)



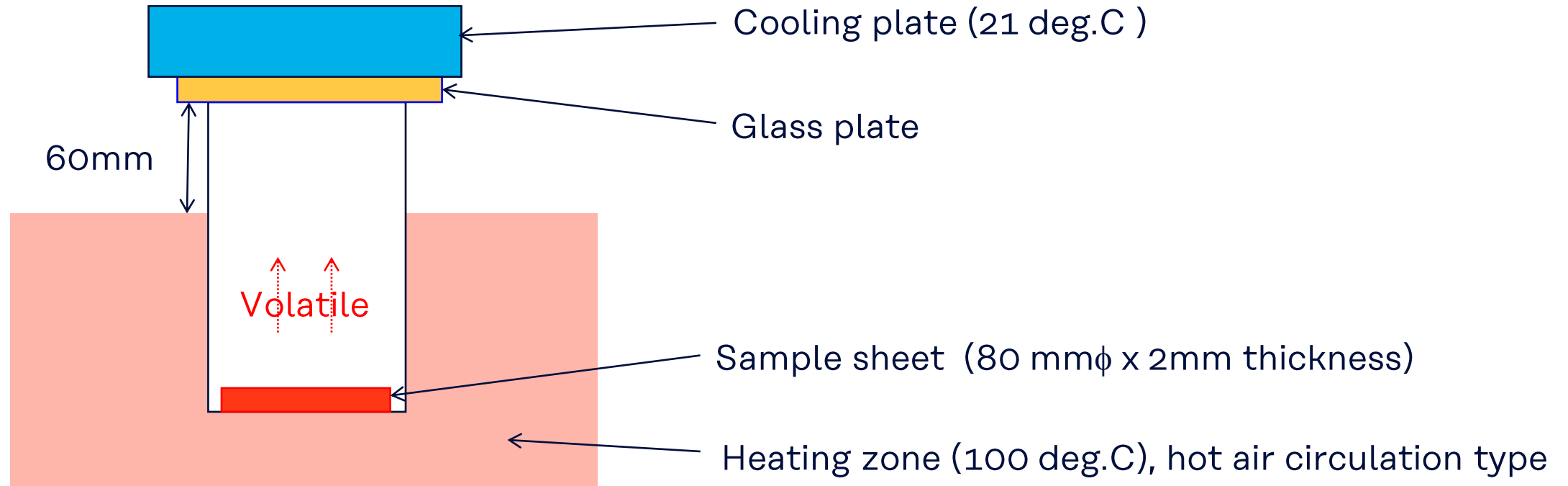
Glass plate

PVC/Plasticizer or KURARITY™

sample sheet

(100 mm x 100 mm x 2 mmt)

Test method (Fogging) (Data on page 4)



Test conditions (ISO 6452 reference)

- Fogging condition: 100 deg.C, 8 hr
- After the test, we measured haze of the glass plate below the cooling plate to compare fogging degree.

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Precautions should be taken in handling and storage. Please refer to the appropriate Safety Data Sheet for further safety information. In using SEPTON™, HYBRAR™ and KURARITY™, please confirm related laws and regulations, and examine its safety and suitability for the application.

For medical, health care and food contact applications, please contact your Kuraray representative for specific recommendations. Even so, users must conduct their own assessment, revisions, registrations as well rely in their own technical and legal judgment to establish the safety and efficacy of their compound and/or end product with SEPTON™, HYBRAR™ and KURARITY™ for any application. SEPTON™, HYBRAR™ and KURARITY™ should not be used in any devices or materials intended for implantation in the human body. Nothing contained herein constitutes a license to practice under any patent and it should not be construed as an inducement to infringe any patent and the user is advised to take appropriate steps to be sure that any proposed use of the product will not result in patent infringement.

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