

Technical information

- Kuraray Carboxylic Acid Containing PVOH -

1. Grade List

Table 1 Grade List of Carboxylic Acid Containing Grade

Grade	Viscosity 4% at 20degC (mPa x s)	Degree of Hydrolysis (mol%)	Max Ash Content (%)	Max Volatile Content (%)
KL-118	29.0 – 34.0	95.0 - 99.0	Not specified	5.0
KL-318	20.0 – 30.0	85.0 – 90.0	Not specified	5.0
OTP-5	6.0 – 7.0	85.0 – 90.0	Not specified	5.0
KL-506	5.2 – 6.2	74.0 – 80.0	Not specified	5.0
SD-1000	2.3 – 3.4	83.0 – 88.0	Not specified	5.0

2. General characteristics

“Carboxylic acid” can add additional hydrophilic character to polyvinyl alcohol (PVOH) and the polymer shows “higher water solubility”, “less foaming character” and “higher stability in salting out effect (higher salt resistance)” than standard PVOH.

Obtained film is more flexible mainly because of less crystallinity and higher moisture content, and shows higher tearing strength (Table 2).

Low degree of hydrolysis grade (e.g. KL-506) shows really good adhesion to hydrophobic surface (Table 3) and well used as sizing agent for synthetic fibers like polyester.

Even though the polymer itself is more hydrophilic (less water resistance), carboxylic acid can be utilized as “cross-linking site” with aluminum compounds (e.g. aluminum sulfate) and epoxy type chemicals (e.g. polyamide - epichlorohydrin resin) and well used in the application water resistance is requested.

The polymer is also used as dispersant in various applications utilizing the ion repulsion.

Applications;	
Water soluble film	- Packaging for detergent, agricultural chemicals etc...
Textile Sizing	- Sizing agent for polyester fiber
Paper	- Sizing agent especially for acidic paper with aluminum sulfate
IJ printing media	- Ink absorbing layer
Thermal printing paper	- Over coated layer with cross-linking agent - Dispersant of leuco dye
Adhesives	- A component of water based adhesives - Protective colloid (dispersant) of emulsions

Table 2 Film character (20 degC, 65% R.H.)

	KL-318	Ref.; PVA-217 Standard partially hydrolyzed grade	KL-118	Ref.; PVA-117 Standard fully hydrolyzed grade
Equilibrium Moisture Content (%)	10.50	8.1	10.3	7.0
Tensile Rupture Strength (kg/mm ²)	3.6	4.7	4.5	5.5
Tensile Yield Strength (kg/mm ²)	1.4	3.1	2.0	4.3
Elongation (%)	190	220	220	220
Tearing Strength (kg / cm)	> 200	67	> 200	60

Table 3 Adhesion to hydrophobic substrate
(180 deg. peel strength, g/cm)

Substrate	KL-506	Ref.; PVA-205 Standard partially hydrolyzed grade	KL-318	Ref.; PVA-217 Standard partially hydrolyzed grade
Polypropylene	7	0		
Polyethylene	10	0		
Polystyrene	35	1		
Nylon 6	35	1		
Polyester	127	10	50	10
Cellulose acetate	150	10		

3. Aqueous solution

Carboxylic acid containing grades are almost soluble at the room temperature but heating up the temperature is recommended for the complete dissolution.

<Dissolving procedure>

1. PVOH is charged into water slowly at room temperature with agitation (100 – 200 rpm).
2. Temperature is heated up to 80 degC with keeping agitation.
3. After 0.5 – 2 hours at 80 degC, all the PVOH would be completely dissolved. If the capacity of agitator is low, further agitation may be required until complete dissolving.
4. Agitation speed is reduced (50 – 100 rpm) and the temperature is cooled down gradually. Rapid cooling may cause a hazy solution.

<Viscosity Information>

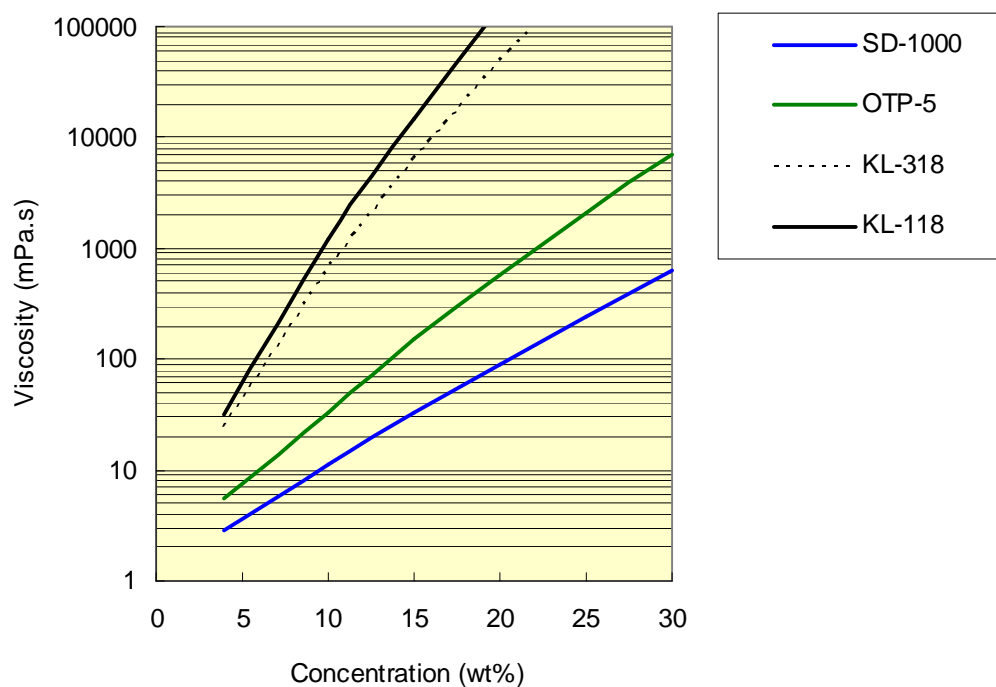


Fig.1 Relationship between concentration and viscosity at 20 degC