

WHAT IS INSOLUBILIZER ?

- There are many chemically different types of **Insolubilizers or cross-linkers**, but they all have the same function - to add water resistance.
- Water resistance is particularly important in offset printing, but also for wallpaper and in storage of board packages. In double-coated boards, cross-linkers are used in the pre-coating to impart water resistance against the topcoat. The water resistance can be measured as wet rub and wet pick or seen as less pick, print mottle, or binder migration.
- The water sensitivity of paper and board coating originates from the fact that water-soluble binders tend to lose their binding power in contact with water and dissolve. This water sensitivity of binders can be described as the amount of **O-atoms in the molecule (in Hydroxyl and Carboxyl groups)**. The water sensitivity can be decreased by cross-linking the soluble binders together with insolubilizers or by building an insoluble net around the binders.

Classify of Insolubilizer

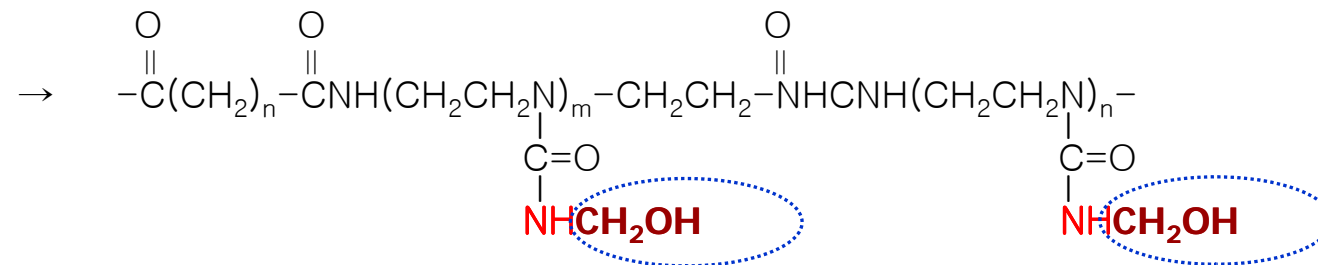
- Has a Methyol Function Group
- Has a Aldehyde Function Group
- Has a Epoxy Function Group
- Polyvalent Metallic Compounds

PAPU Insolubilizer is

- PAPU means

Polyamide Polyurea Resin with Methyol function Group

- Chemical Structure



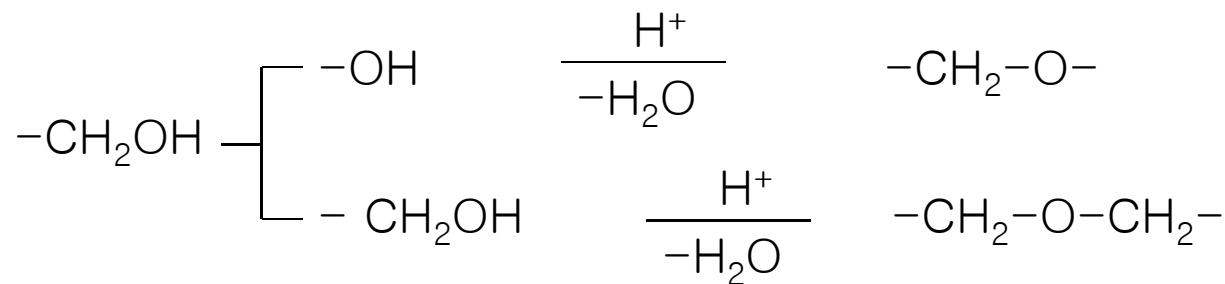
※ **Methyol Function Group in NHCH₂OH** that created above reaction react on Binder

Reaction Mechanism between Binder & Insolubilizer

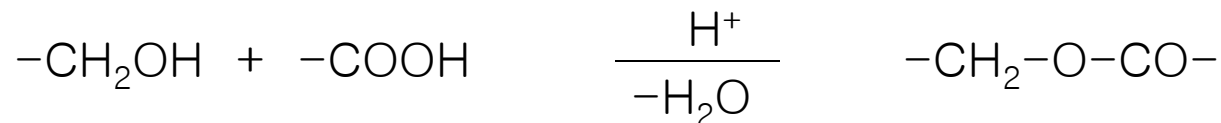
- Effect
 - Bridging reaction between Methylol function group & Hydrophilic Function Group in Binder.
 - Insolubility by self condensation of Insolubilizer
 - Improving bridging Effect.
 - Revealing adhesive strength of Insolubilizer essence.
 - Slightly cation effect for Amino Function Group
 - Prevent of an Ionic bond & Binder migration.

- In Starch : For Size Press, Pre-Color

: Starch has one Methylol Function Group & two Hydroxy Function Group per Basic unit structure



- In Latex : For Top-Color

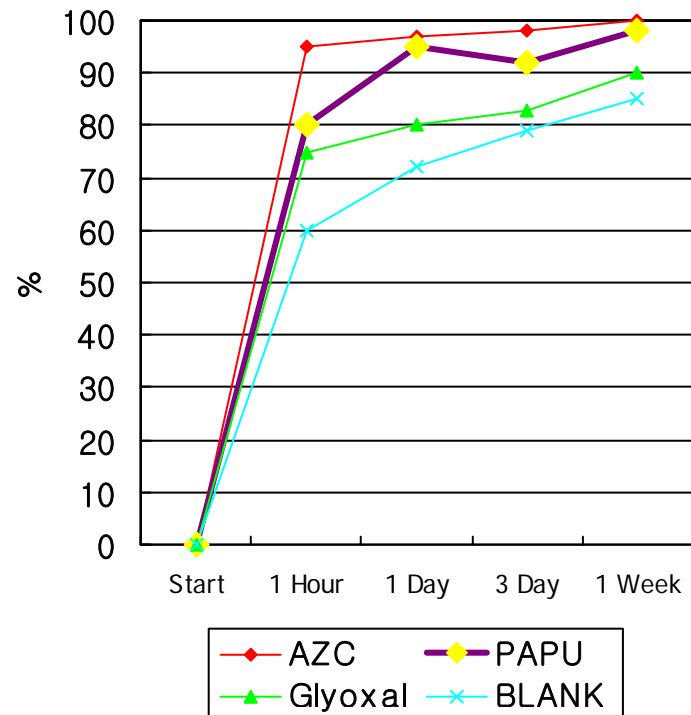


Printability

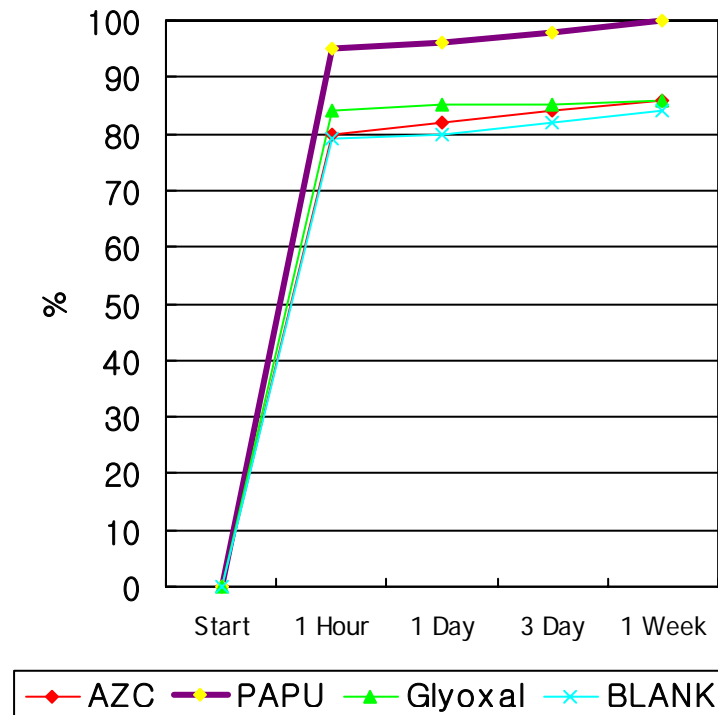
- Effect
 - PAPU's S/Cation character interacts with Binder's Anion character.
: This make micro-porous in coating layer.
 - PAPU insolubilizer causes ionization of coating color to delay through hydrogen bonding with water molecules and enhances liquidity. After drying is started and water is removed, rapid ionic bonding between cationic ion and anionic ion makes floating point lower and binder migration is restricted.
 - Therefore, coating layer becomes thicken and multi-porous. Mottling and blistering resistance are improved and printing effect is maximized.

Comparison

- Insolubility



- Printability



- Others

	PAPU	AZC	Glyoxal
Chemical	Polyamide Polyurea Resin with Methylol Fuction	Ammonium Zirconyl Carbonate	Ethanediol (HCOCHO)
Normal Solid	Around 50 %	30 % (ZrO 20%)	40 %
pH	7-8 (Neutral)	> 10 (Alkali)	< 5 (Acid)
Smell	Normal	Stimulation	Normal
Viscosity	100 – 1,000	< 100	< 100
Water Solubility	Good	Good	Good
Application	Top & Pre Coating	Top & Pre Coating	Pre Coating
Others	-	Expensive than others	-