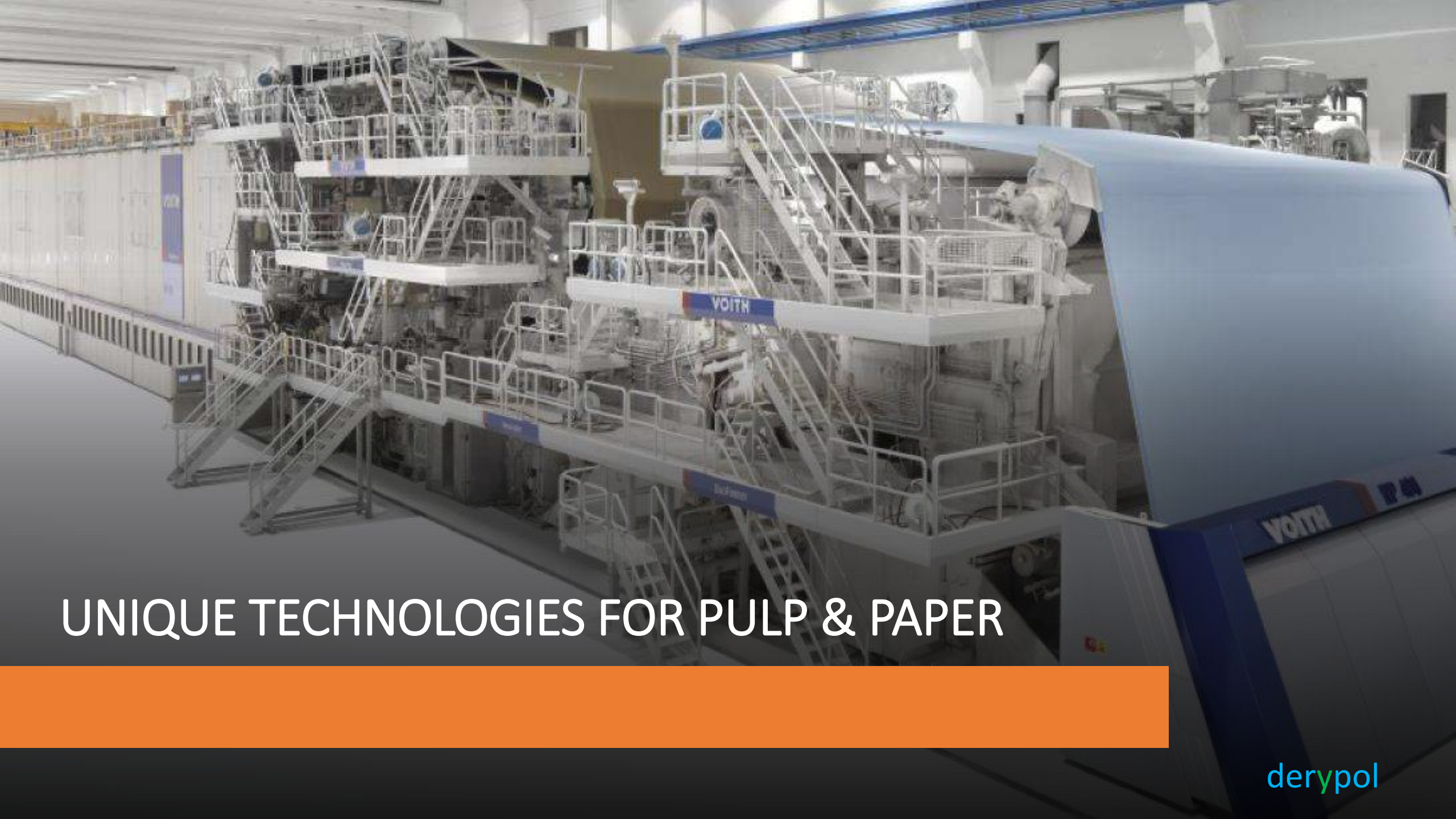


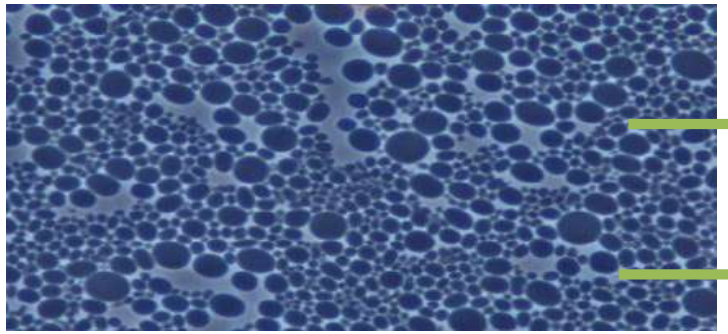
UNIQUE TECHNOLOGIES FOR PULP & PAPER

derypol

INDEX

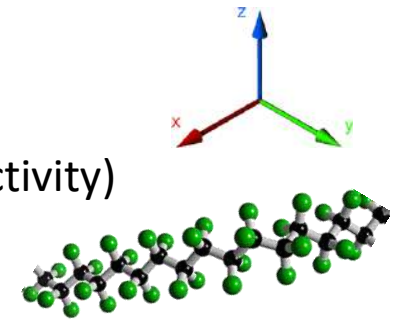
derypol

HIMOLOC Description



Pure Product Solution at 1%

- ✓ Polyacrylamides (PAM) in water dispersion form
- ✓ Free of solvents, oils and surfactants
- ✓ **Appearance**:
  - Pure Product: White milky liquid
  - Solution: Transparent
- ✓ **Ionicity:** Cationic, Anionic, Non Ionic and Amphoteric flocculants
- ✓ **Structure:**
  - Micro polymer 3D structure (charge is very accessible → Increase reactivity)
  - Linear and Cross-Linked polymers

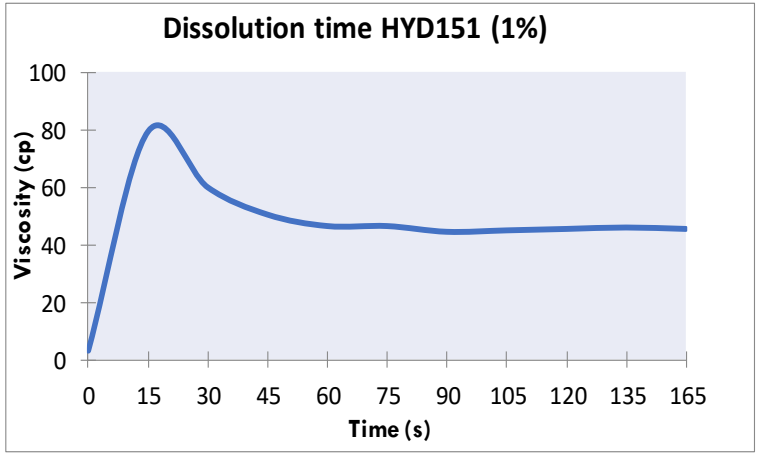


HYDROSOL Description

- ✓ Polymer in polymer solution
- ✓ **Appearance**:
  - Pure Product: Whitish - yellowish viscous liquid
  - Solution: Transparent

Pure Product Solution at 1%

- ✓ **Composition:** CPAM (AAM/ADAMQUAT or AAM/DADMAC) + pDADMAC
- ✓ Very Low Salt Content
- ✓ '**Two in One**': contains **coagulant/ATC** (improves drainage) and **flocculant** (improves retention)
- ✓ Very EASY-TO-USE: Fast Dissolution (Static mixers)



HIMOLOC & HYDROSOL Technologies

❖ Traditionally, high molecular weight **acrylamide based** polymers are found in oil emulsion or powder form. Himoloc and Hydrosol Technologies develop polymers in **water based form**.

•Emulsions

- Contain surfactants and mineral oils
- VOC's emissions
- Expensive make-down equipment

Powders

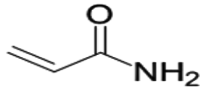
- Small dust particles that can contaminate the atmosphere and be explosive
- Very Expensive make-down equipment

HIMOLOC & HYDROSOL

- Free of solvents, oils and surfactants
- NO VOC's emissions
- Easy make-down equipment

HIMOLOC & HYDROSOL are formulated with…

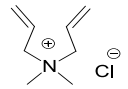
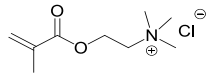
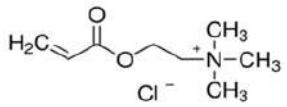
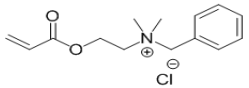
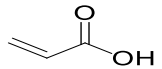
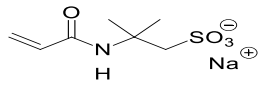
AAM: Acrylamide



AAm
C_3H_5NO
71.08 g/mol

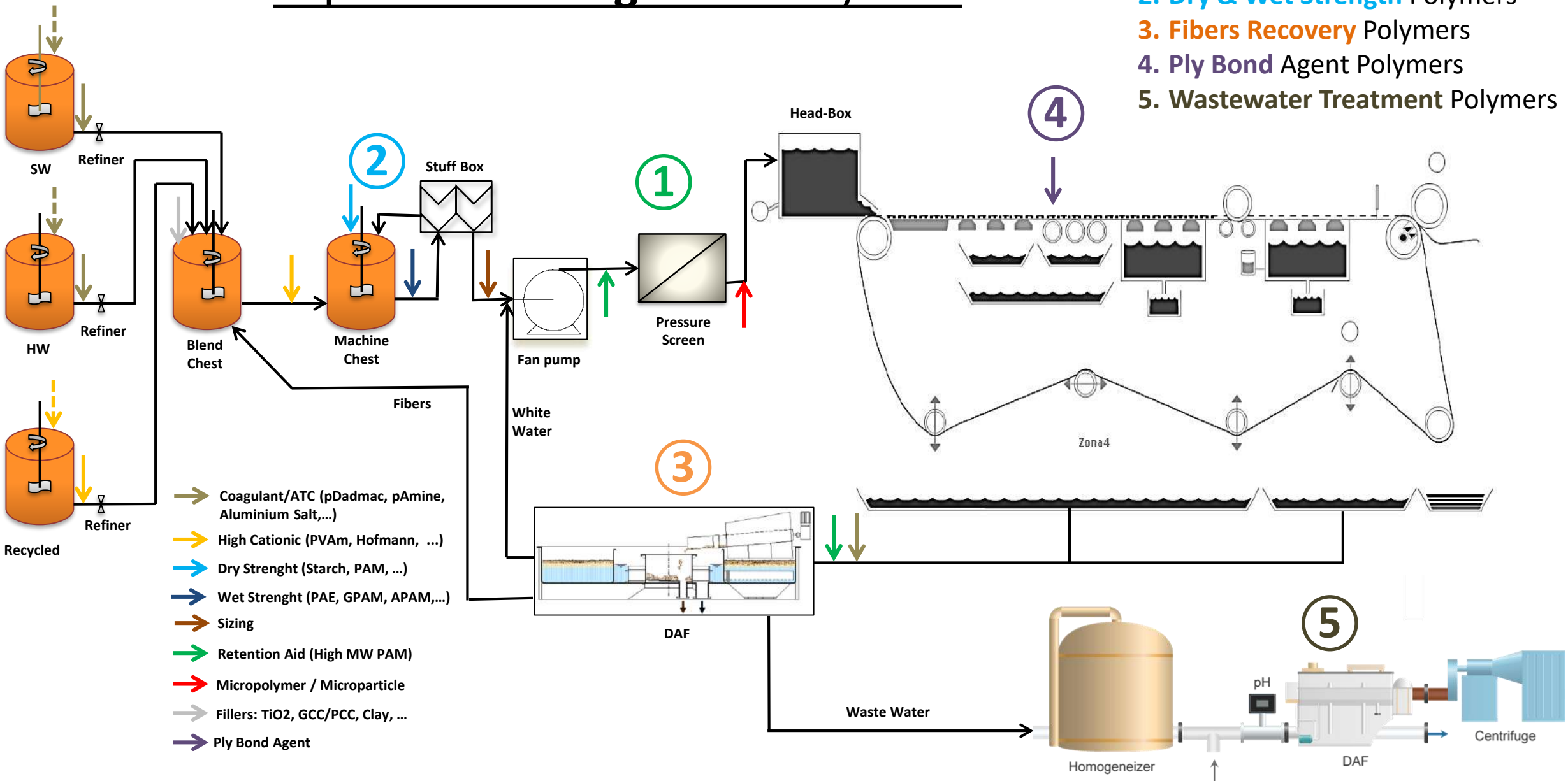
As the **Backbone Monomer** for production of PAM´s

…combined with other monomers to produce Cationic, Anionic, Non Ionic or Amphoteric polymers

CATIONIC MONOMERS				ANIONIC MONOMERS	
DADMAC	**MADAMQUAT**	**ADAMQUAT (MCQ)**	**BZQUAT (BZQ)**	**AA**	**AMPS**
 DADMAC $C_8H_{16}ClN$ 161.67 g/mol	 MADAM o MC75 $C_9H_{18}ClNO_2$ 207.7 g/mol		 BCQ $C_{14}H_{20}ClNO_2$ 269.77 g/mol	 AAC $C_3H_4O_2$ 72.06 g/mol	 AMPS-Na $C_7H_{12}NNaO_4S$ 229.23 g/mol
Neutralizes negatively charged colloidal material	Specially used to achieve very high molecular weights	Specially used to achieve very high molecular weights	**DERYPOL** exclusive monomer; high conductivity, hydrophobic nature	Acrylic acid, Anionic monomer to achieve very high molecular weights	High Hydrolisis Resistant and easy to disperse in water

Paper Mill **Dosing Point** Polymers

1. **Retention & Drainage** Polymers
2. **Dry & Wet Strength** Polymers
3. **Fibers Recovery** Polymers
4. **Ply Bond** Agent Polymers
5. **Wastewater Treatment** Polymers



1. **Retention & Drainage** Polymers
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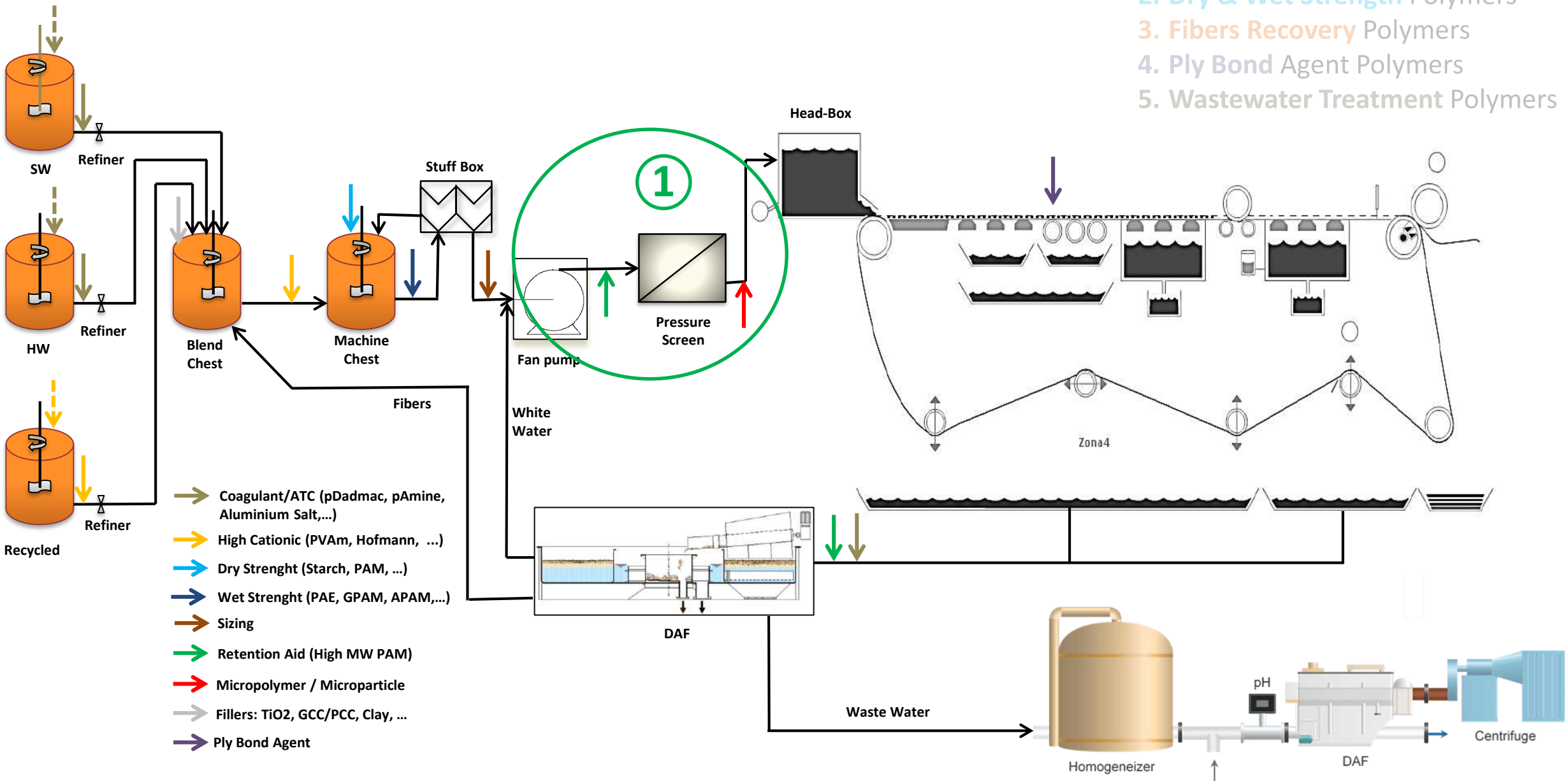


① Retention & Drainage Polymers

Himoloc	Cationicity (%)	Composition	(UL)	Viscosity	Actives
DR2500	10%	AAM/BZQ	3.4	<400 cp	15%
DR525	10%	AAM/BZQ	3.6	<1500 cp	25%
TG325	10%	AAM/MCQ	4.3	<1500cp	20%
TG971	14%	AAM/MCQ	4.5	<1500 cp	20%
HB3522	15%	AAM/MCQ	3.7	<1500 cp	23%
TG22	20%	AAM/MCQ	3.2	<5000 cp	25%
TG992SIM	20%	AAM/MCQ	5.0	<2500 cp	20%

Himoloc	Anionicity (%)	Composition	(UL)	Viscosity	Actives
GO2000	NO IONIC	AAM	3.9	<2000 cp	20%
GO2010	10%	AAM/AAC	5.1	<3000 cp	25%
GO2030	30%	AAM/AAC	5.6	<2000 cp	25%

Hydrosol	Cationicity (%)	Composition	(UL)	Viscosity	Actives
HYD151	10%	AAM/MCQ	3,5	<12000 cp	30%
HYD252	38%	AAM/DADMAC	1,8	<12000 cp	30%

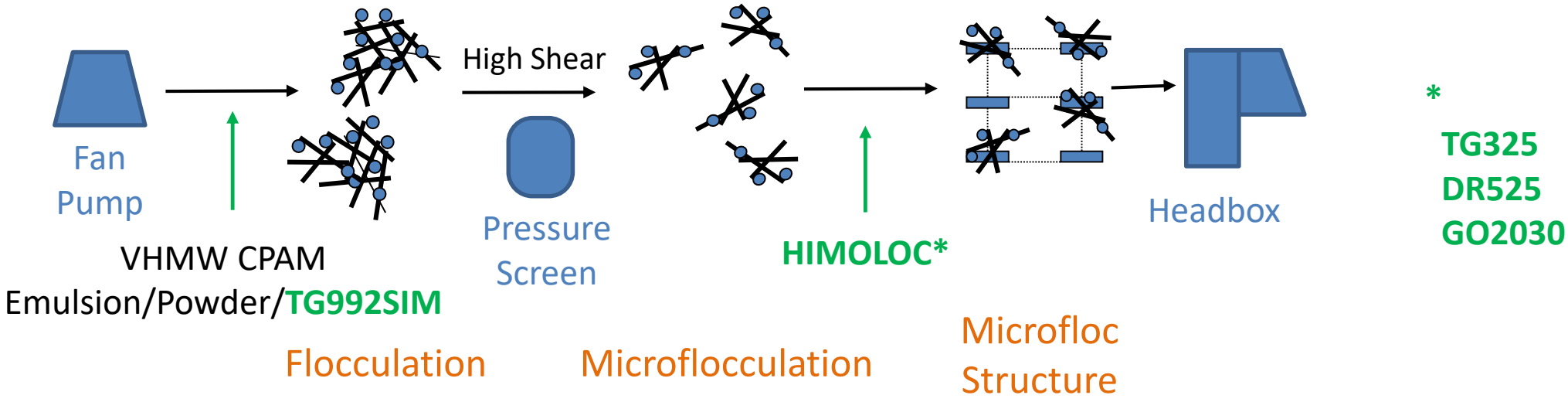
- **TG325**: Cationic Best-Selling Mycropolymer. Specially used in unbleached packaging grades
- **GO2030**: Anionic Best-Selling Mycropolymer. Specially used in printing and writing grades
- **DR Series**: Specially used in circuits with high conductivity (**DR525** Best-Seller)
- **TG22 / HB3522**: Hybrid Polymers
- **HYD151**: Best-Selling Hydrosol. Improves Drainage
- New **TG992SIM**: New SIM Technology. Special designed for improving Drainage
- New **GO2000**: Non Ioinic PAM. Easy to dissolve

① Retention & Drainage Programs with Himoloc & Hydrosol Polymers

Exclusive Programs

1. **Simple Retention System**: 1 Himoloc Polymer
   - ✓ Low conductivity → **TG325 / TG992SIM**
   - ✓ High conductivity (>3500 µm/cm) → **DR525**

2. **Dual Retetion Program**: VHMW CPAM + Himoloc Polymer



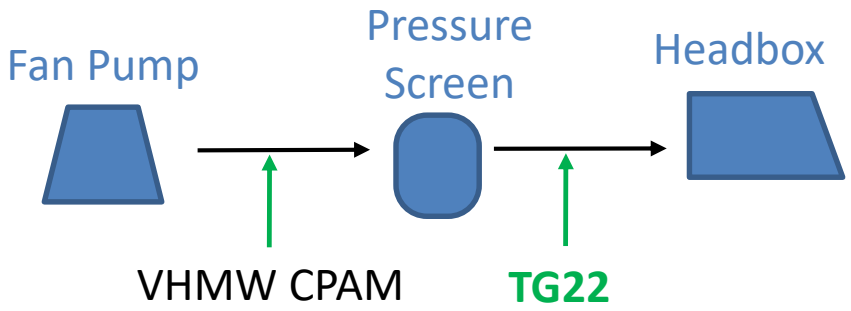
*
TG325
DR525
GO2030

① Retention & Drainage Programs with Himoloc & Hydrosol Polymers

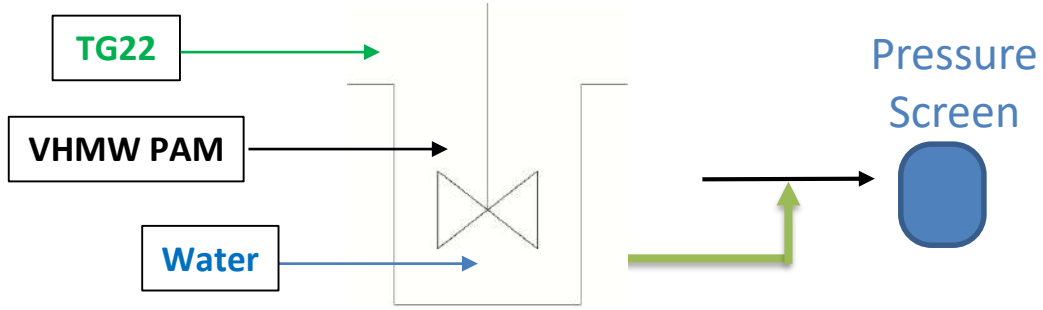
Exclusive Programs

3. **Hybrid Programs**: VHMW CPAM + Himoloc Polymer

   i. VHMW CPAM + Himoloc Hybrid Polymer (**TG22**) → As Dual Retention Program



   ii. One Way Tank: VHMW Powder / Emulsion + Himoloc Hybrid Polymer (**TG22**) → Dissolved in the same tank and dosed before Pressure Screen



   iii. One Way Product: Himoloc Hybrid Polymer (**HB3522**):

   - ✓ Combines VHMW Himoloc and TG22 in one product
   - ✓ Dosed before or after Pressure Screen depending on the System Conditions

① Retention & Drainage Polymers with SIM Technology

Exclusive Technology

- ✓ **TG992SIM** is manufactured under SIM Technology (**Spongeability Inducer Micronet**)
- ✓ Drainage is related with the electrostatic floc volume and resistance, as can be easily understood in the Figure 1
- ✓ Figure 2 shows the maximum Spongeability level reached by **TG992SIM** compare with other similar PAM's

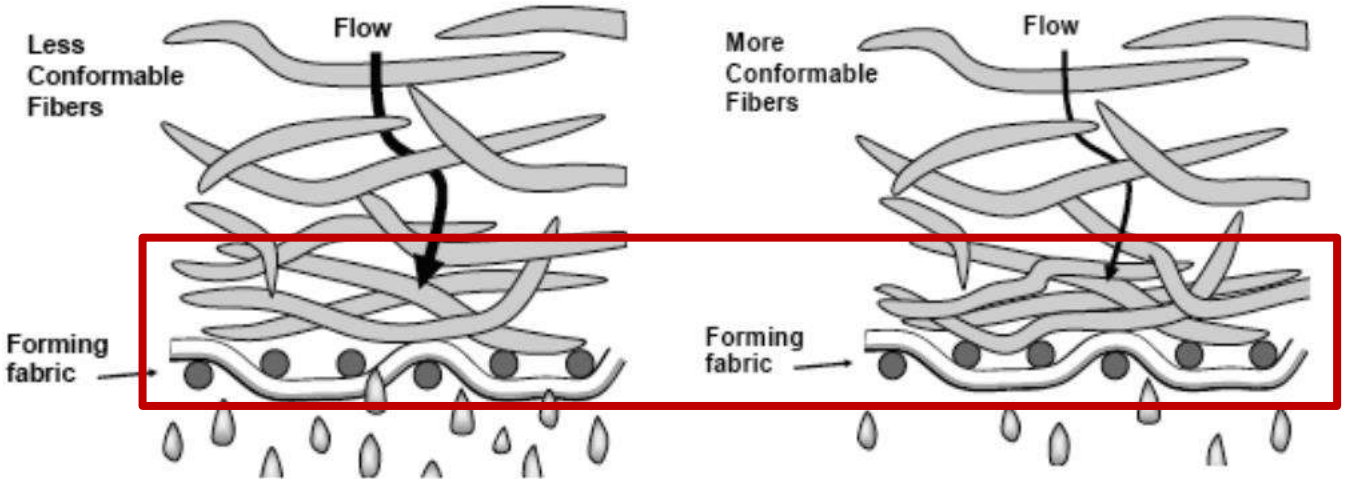


Figure 1

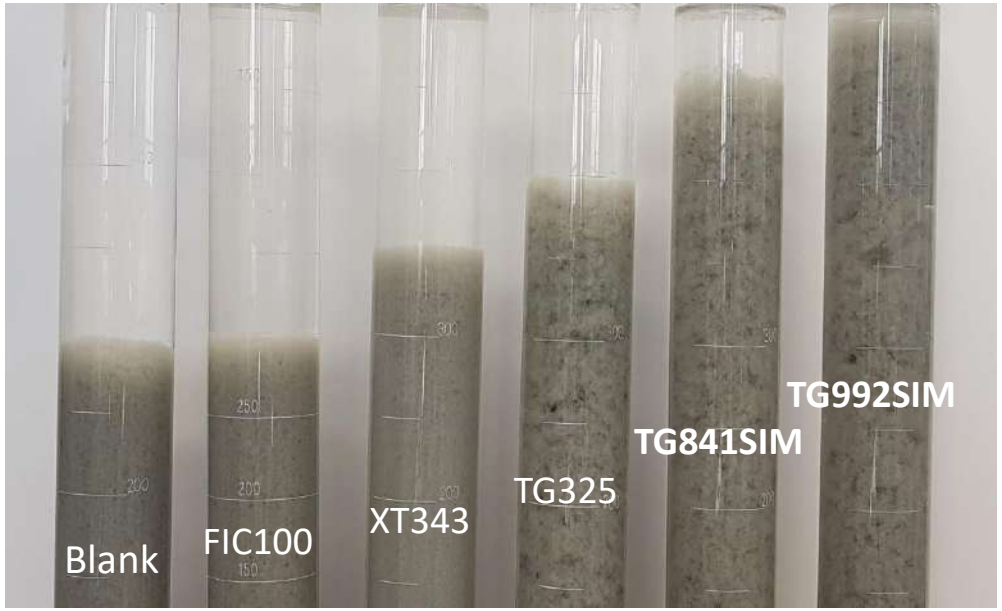


Figure 2 (300 g/Tn Actives)

REDUCING OUR carbon FOOTPRINT

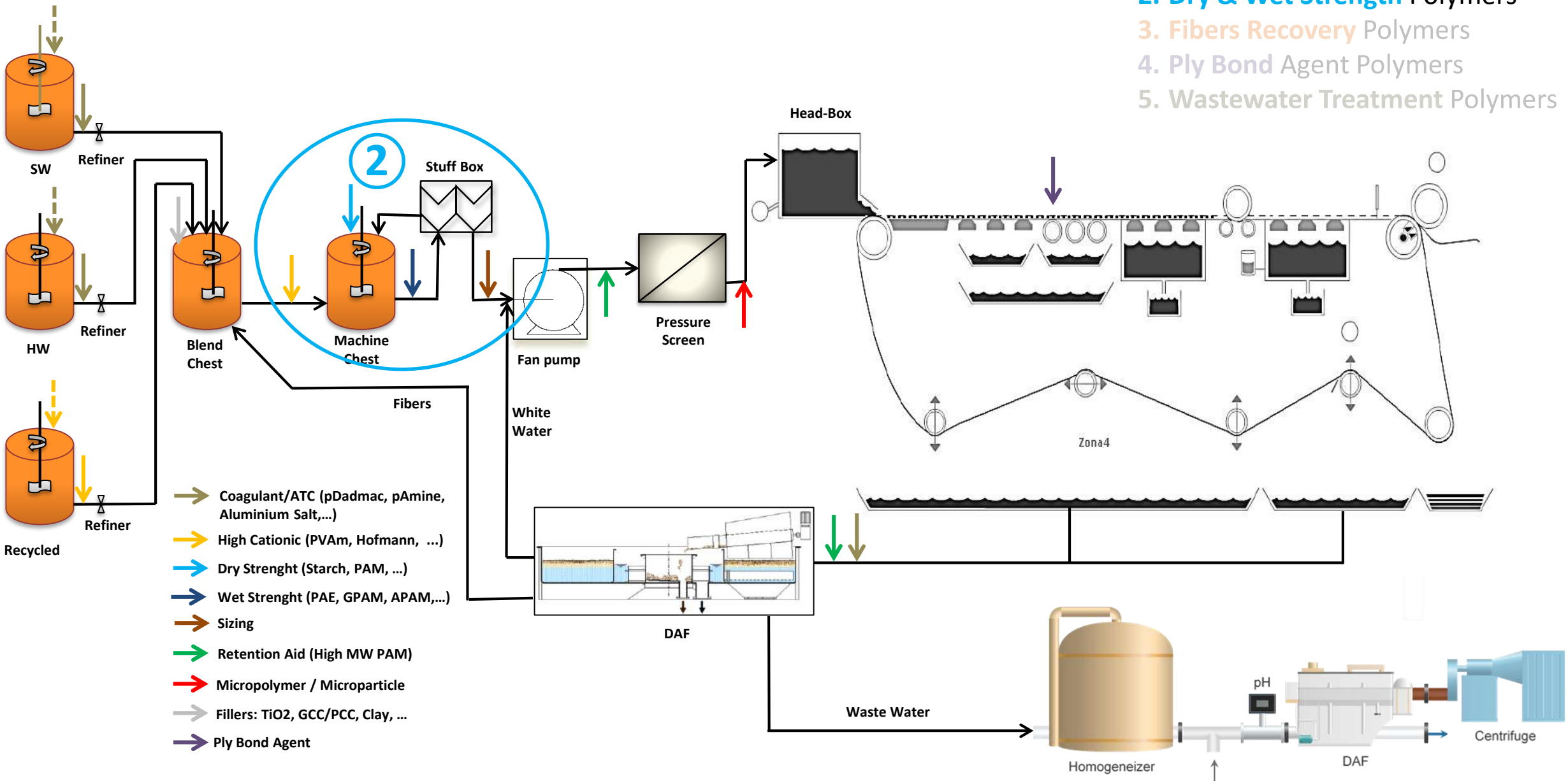
VOC FREE

1 Retention & Drainage Polymers

HIMOLOC & HYDROSOL Technology Benefits:

- ✓ **GREEN** Polymers: Free of VOC's and Mineral Oils
- ✓ **EASY-TO-USE** → Static mixers
- ✓ **Micropolymers** (3D Structure) → charge is very accessible, increasing reactivity
- ✓ **Microflocculation** → Better Sheet formation
- ✓ **Hydrosol: 'Two in One'** → contains coagulant (ATC) and polymer (PAM)
- ✓ **Exclusive Retention & Drainage Programs**
- ✓ **Exclusive SIM Technology**
- ✓ Increases **Retention** of Fibers and Fillers an maximizes **Drainage** without compromising pressing efficiency
- ✓ Improves **Deposit Control** → Cleaner Circuits
- ✓ Improves Fines and Ash Distribution → **better strength** and optical properties

1. Retention & Drainage Polymers
2. Dry & Wet Strength Polymers
3. Fibers Recovery Polymers
4. Ply Bond Agent Polymers
5. Wastewater Treatment Polymers

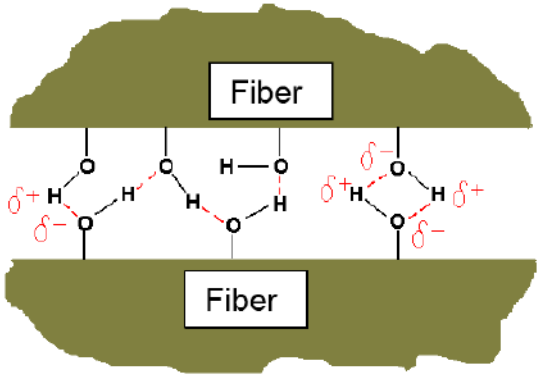


② Dry Strength Polymers

Product	Description	Ionicity	pH	Viscosity	Actives
RS15	PAM (Solution)	Amphoteric	2.0 - 4.0	2000 - 5000 cp	15%
RS19	PAM (Solution)	Amphoteric	3.0 - 5.0	5000 - 15000 cp	16%
RS21A	PAM (Solution)	Anionic	4.0 - 6.0	4000 - 8000 cp	25%

HIMOLOC	Description	Ionicity	pH	Viscosity	Actives
ZW261	PAM (Dispersion)	VL Cat	4.0 - 6.0	<2000 cp	22%
GOX301	PAM (Dispersion)	Medium Anionic	3.0 - 5.0	<2000 cp	25%
GOX101	PAM (Dispersion)	Low Anionic	3.0 - 5.0	<2000 cp	25%

- ✓ Improves **Mechanical Properties** and **Sheet Formation** by increasing strength of **Chemical Bonds** (Hydrogen-Hydrogen, Ionic and Covalent bonds)

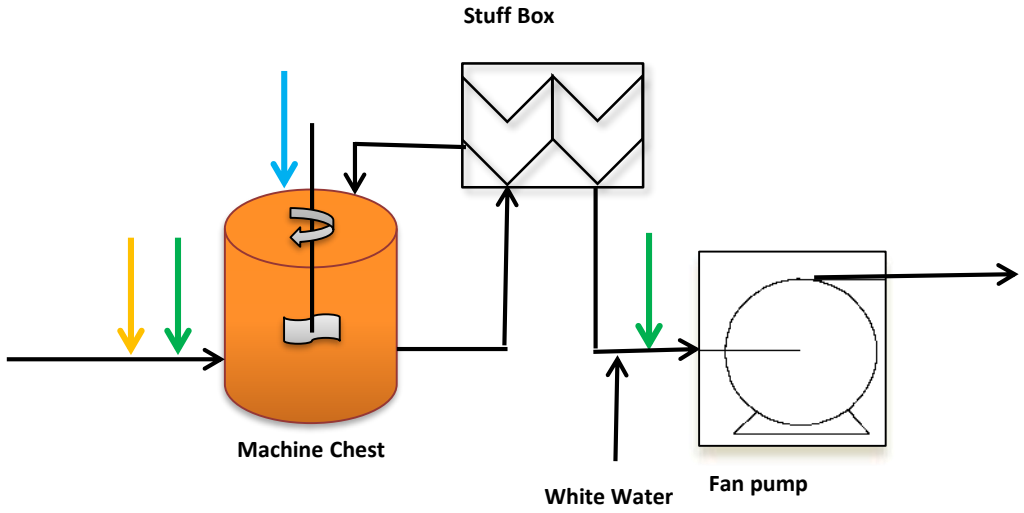


- ✓ Suitable for a wider range of pH and conductivity circuits
- ✓ **Decreases wet-end starch consumption** solving environmental problems (COD) and keeping cleaner circuits
- ✓ **Easy-to-use** Polymers → Pump & Go
- ✓ **Himoloc** Polymers → Higher Actives for Improving Performance/Cost
- ✓ **GOX301 & GOX101**: New & Exclusive DSA's

② Dry Strength Programs

Exclusive Programs

1. **Simple Starch Programs**:
   - ✓ Low conductivity & Acid pH → Alum / Native or Cat Starch + PAM (**ZW261 / RS15 / RS19**)
   - ✓ High conductivity & Neutral pH → Cat Starch + PAM (**RS21A / GOX301 / GOX101**)
2. **Dual Program**: Cationic Promoter (**HYD151**) + PAM (**RS21A / GOX301 / GOX101 / ZW261**)
3. **Full Program**: Native or Cat Starch + Anionic PAM (**RS21A / GOX301 / GOX101**) + Cationic Promoter (**HYD151**)



Recommended Dosage:

- PAM → 1 – 4 Kg/Tn Actives
- Alum (Al^{+3} Salt) → 2 – 5 Kg/Tn Solids
- Starch → 4 – 10 Kg/Tn Solids
- HYD151 → 2 – 8 Kg/Tn as is

High Cationic Promoter (HYD151)

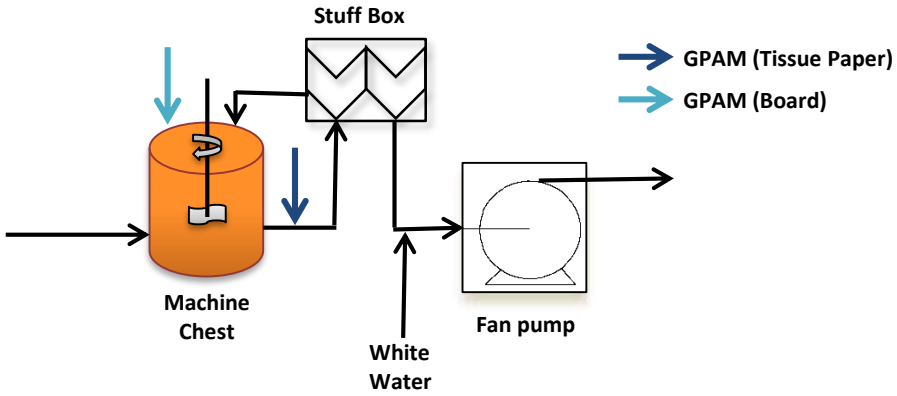
Dry Strenght Polymer (Starch, PAM, …)

Alum (Al^{+3} Salt)

② Dry & Wet Strength Polymer → Cationic Glioxalated PolyAcrylamide (GPAM)

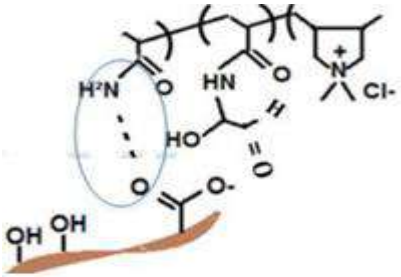
Product	Description	Ionicity	pH	Viscosity	Actives	Shelf Life
ADG1	GPAM (Solution)	Cationic	2.0 - 3.0	<25cp	7%	**< 1 month**

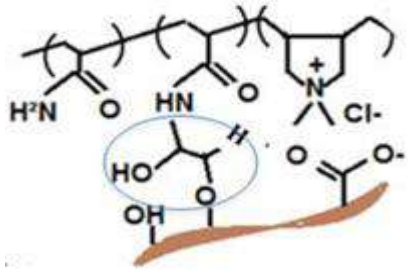
- Recommended Dosage: 1,0 – 2,5 Kg/Tn Actives (15 – 35 Kg/Tn as is)



GPAM Benefits:

- ✓ **Permanent Dry Strength** → The amino group reacts with the hydroxyl groups and carboxyl groups of cellulose forming **hydrogen bonds**
- ✓ **Temporary Wet Strength** → The aldehyde groups react with hydroxyl to form **covalent and hemiacetalic bonds** (transient formation of low grade cross linking)
- ✓ Suitable for 4<pH<7 and conductivity <3000 cp
- ✓ Specially used in Tissue Paper
- ✓ Possibility to Manufacture On Site (Paper Mill)

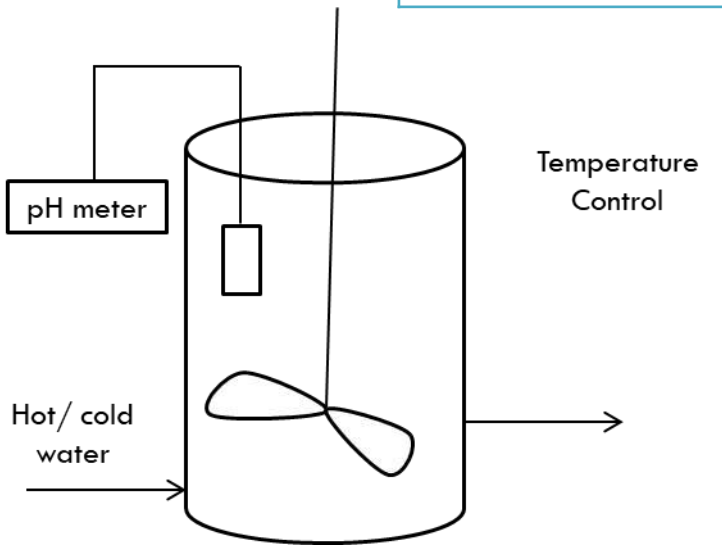




Non-commercially viable → **Technology Transfer**

② Dry & Wet Strength GPAM → Technology Transfer from K244

Product	Description	Ionicity	pH	Viscosity	Actives	Shelf Life
K244	Dadmac /AAm Copolymer	Cationic	4.0 – 6.0	<1500 cp	44%	**12 months**

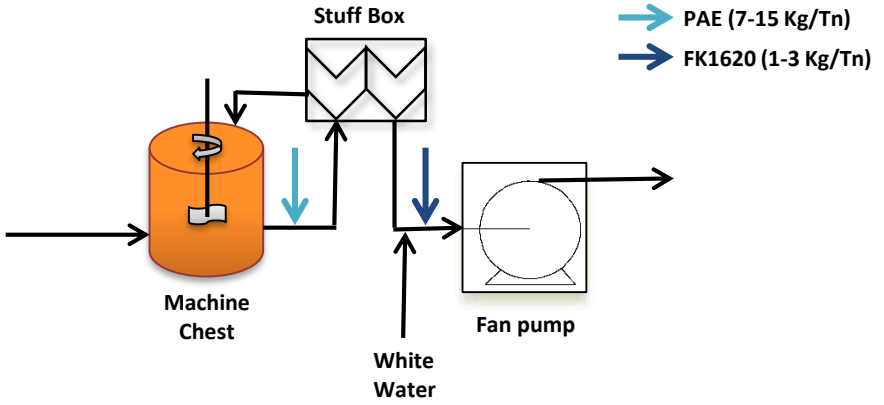


- ✓ On site GPAM has generated renewed interest in an older technology due to increased strength and drainage performance, extended shelf life, and reduced freight costs
- ✓ Cross-linked reaction of our K244 with glyoxal
- ✓ No High-Tech Equipment needed
- ✓ Low manufacturing process cost
- ✓ Different formulations available with different stability and performance
- ✓ Formulation and Procedure are available in Excel format under request
- ✓ Laboratory and Industrial Training available

② Wet Strength Polymer

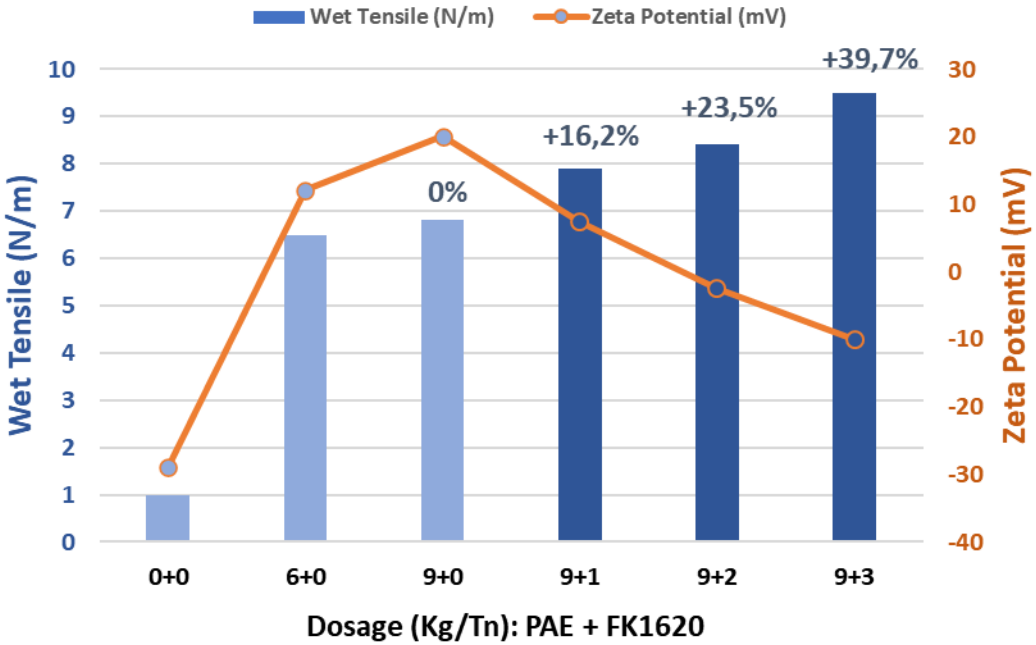
Product	Description	Ionicity	pH	Viscosity	Actives
FK1620	PAM (Solution)	Anionic	3.5 – 5.0	3000-7500 cp	20%

- Recommended Dosage: 1 – 3 Kg/Tn as is

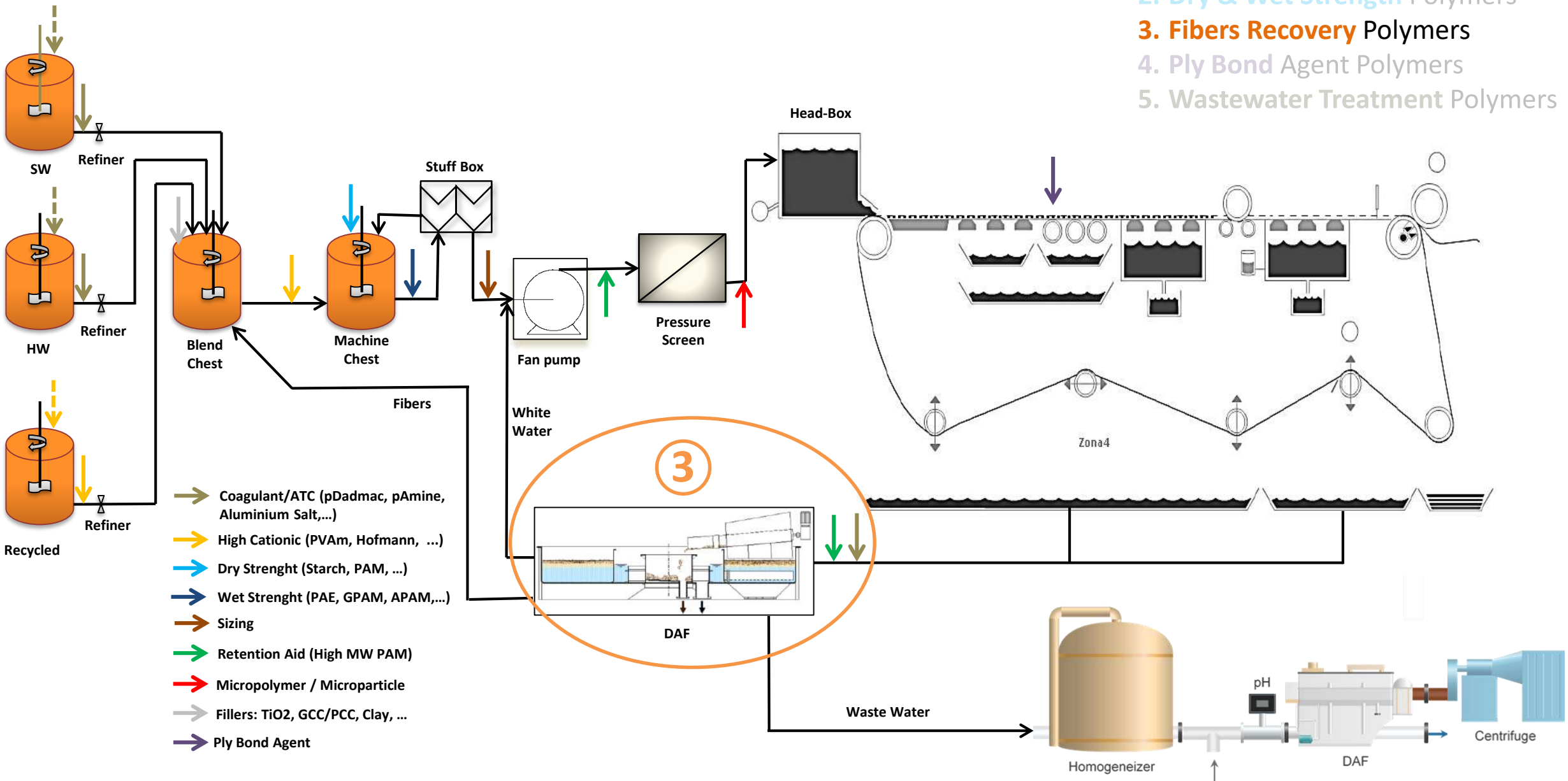


Benefits:

- ✓ FK1620 reverses the fiber charge to anionic, providing extra sites for retention of cationic WSR → Improves **PAE (Polyamino Polyamide Epichlorohydrin) Fixation**
- ✓ Increases **Dry and Wet Tensile**
- ✓ **Reduces PAE dosage** up to 30%
- ✓ Helps to **Control Zeta Potential**
- ✓ **Reduces Defoamer** dosage up to 40%
- ✓ **Enhances Creping control** increasing Yankee speed
- ✓ Improves Machine runnability and Production rate
- ✓ Easy-to-use → **Pump & Go**
- ✓ **Economical Savings**

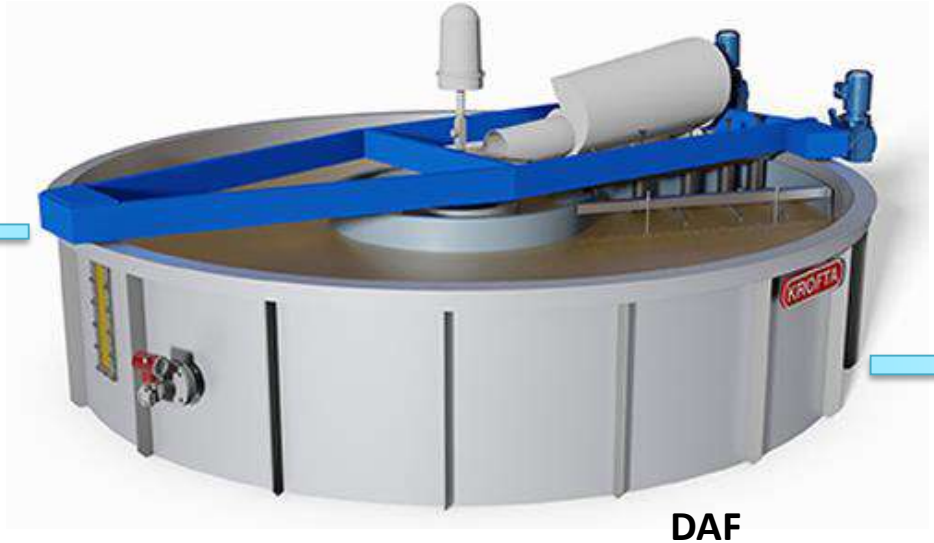


1. Retention & Drainage Polymers
2. Dry & Wet Strength Polymers
3. Fibers Recovery Polymers
4. Ply Bond Agent Polymers
5. Wastewater Treatment Polymers



③ Fibers Recovery Polymers

Blend Chest ← Recovered Fibers



DAF (KROFTA, CELLOFLOT, …)

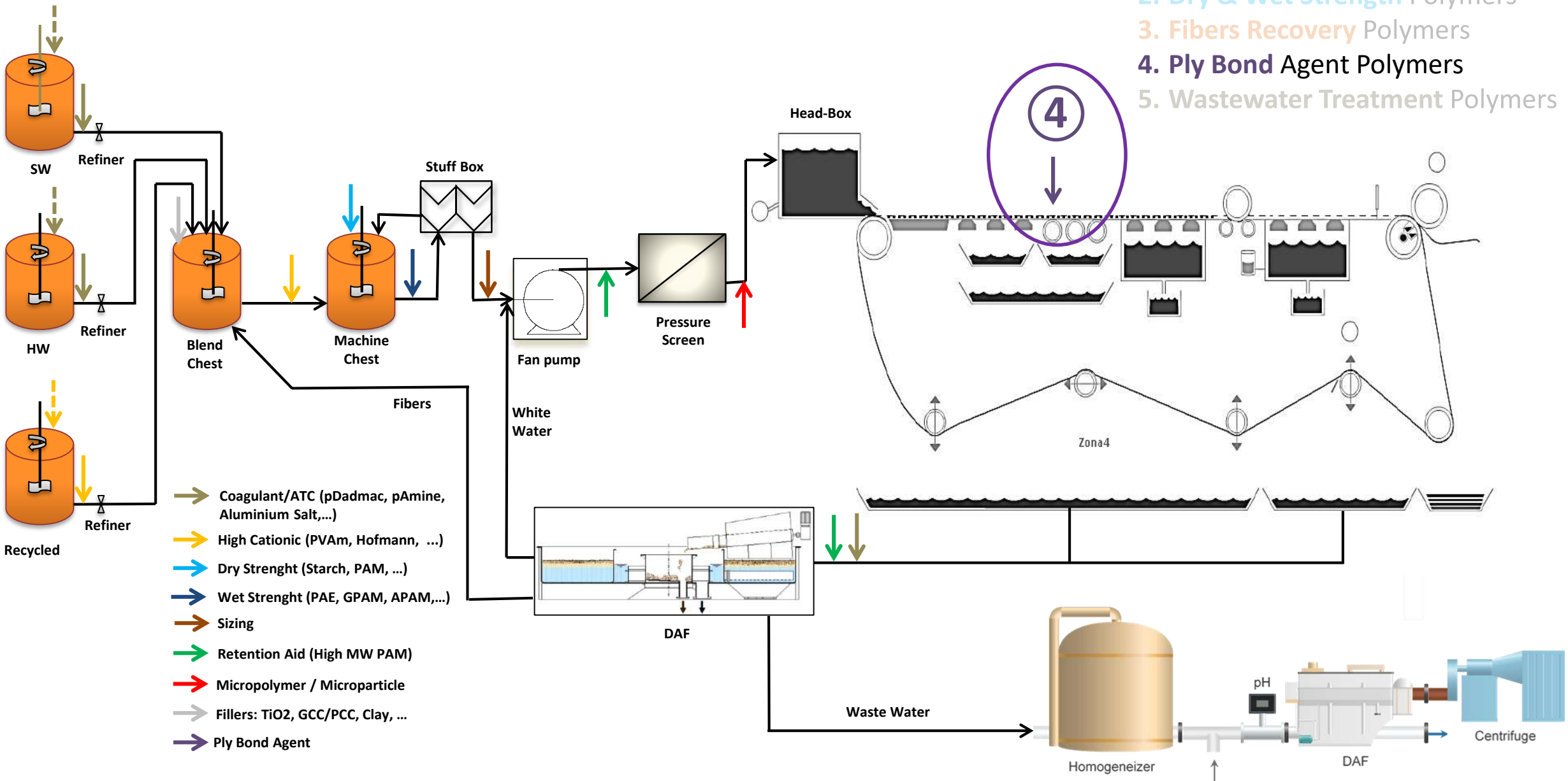
White Water → Dilution (Fan Pump)

White Water ↓ WWT Plant

Himoloc	Ionic Charge	Ionicity (%)	Composition	(UL)	Viscosity
DR2200	Cationic	4%	AAM/BZQ	3.3	<1000 cp
DR2500	Cationic	10%	AAM/BZQ	3.4	<400 cp
DR525	Cationic	10%	AAM/BZQ	3.6	<1500 cp
TG992SIM	Cationic	20%	AAM/MCQ	5.0	<2500 cp
GO2000	No Ionic	0%	AAM	3.9	<2000 cp
GO2010	Anionic	10%	AAM/AAC	5.1	<3000 cp
GO2030	Anionic	30%	AAM/AAC	5.6	<2000 cp
GO7130	Anionic	30%	AAM/AAC/AMPS	6.2	<500 cp
ZW111	Amphoteric	30%/15%	AAM/BZQ/AAC/MCQ	2.9	<1500 cp
ZW322	Amphoteric	50%/20%	AAM/BZQ/AAC/MCQ	3.0	<1500 cp

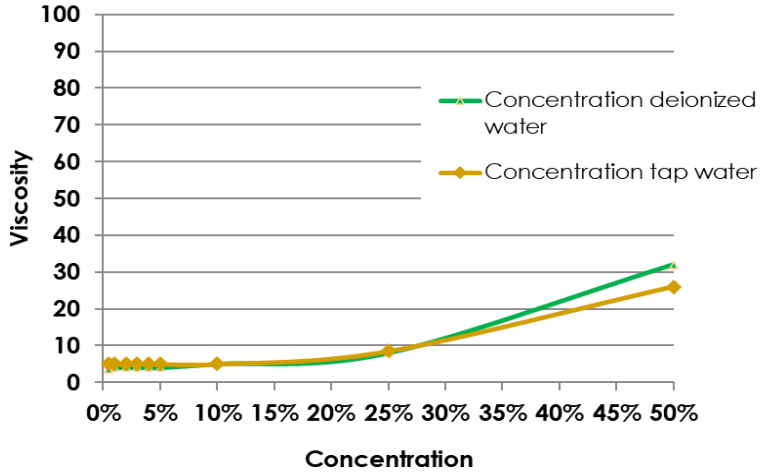
- DR525: Cationic Best-Selling Mycropolymer
- GO2030: Anionic Best-Selling Mycropolymer
- DR's: Specially used in circuits with high conductivity
- ZW's: Amphoteric PAM
- Exclusive SIM Technology

1. Retention & Drainage Polymers
2. Dry & Wet Strength Polymers
3. Fibers Recovery Polymers
4. **Ply Bond** Agent Polymers
5. Wastewater Treatment Polymers



4 Ply Bond Agent Polymer

Himoloc	Description	Ionicity	MW	pH	Viscosity
MJ480	PAM (Dispersion)	Anionic	Very High	2.0 – 4.0	<1500 cp



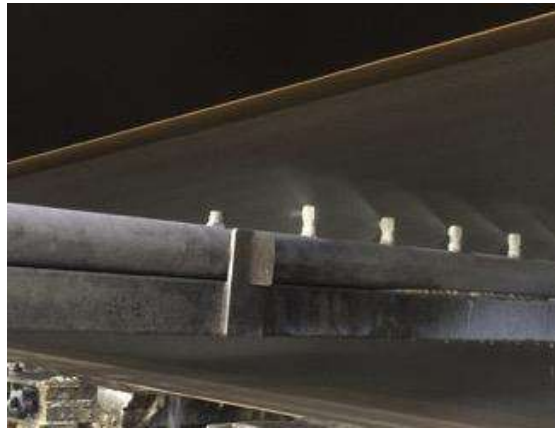
Benefits:

- ✓ **Replaces** partially **native starch** as ply bond (it can replace up to 50% with 1:10 replacement ratio)
- ✓ **Improves Mechanical Properties (Scott Bond, Burst, CMT,…)**
- ✓ Reducing starch consumption **decreases COD in Waste Water and keeps cleaner circuits**
- ✓ Decrease Steam Consumption and Improves Runnability: **Lower Tg**
- ✓ **Green Chemical** Polymer (HIMOLOC)
- ✓ Better **Environmental** Image: Decrease Footprint
- ✓ **Easy-to-use:** Dose directly to starch slurry tank without increasing final viscosity
- ✓ **ECONOMICAL SAVINGS**

④ Ply Bond Agent Polymers

Simple Dosing System

SLURRY

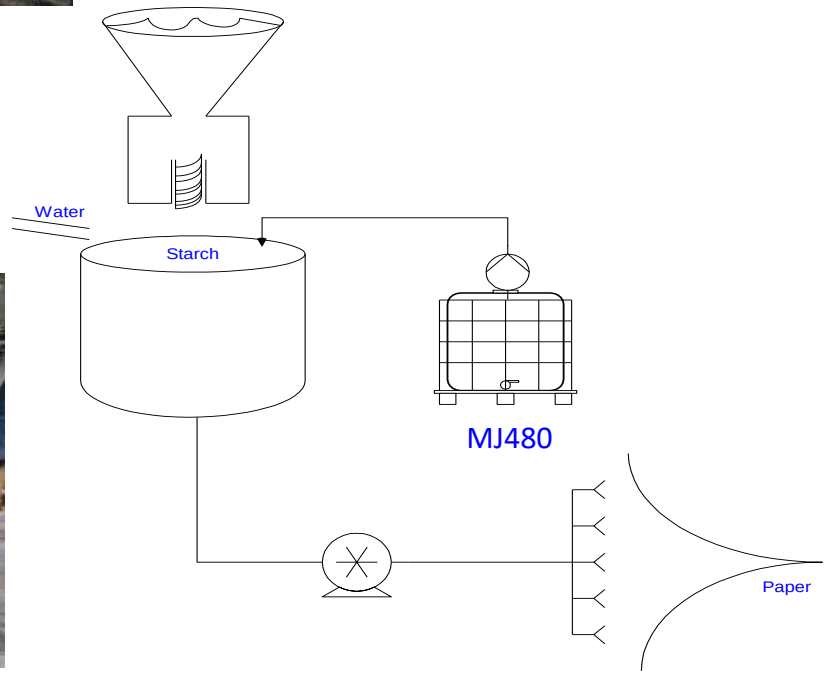


SLURRY SPRAY DOSING

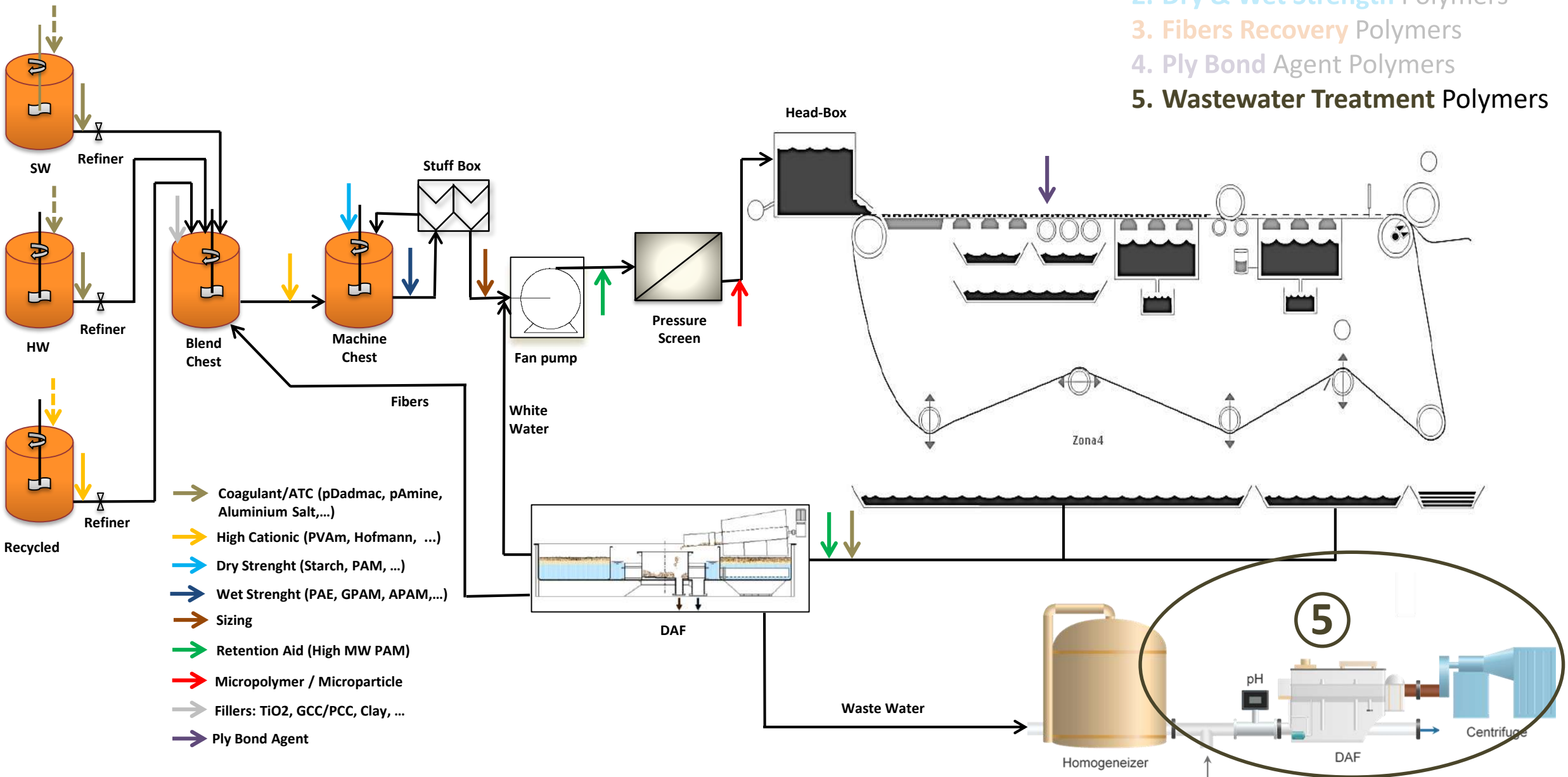
MIXER

STARCH

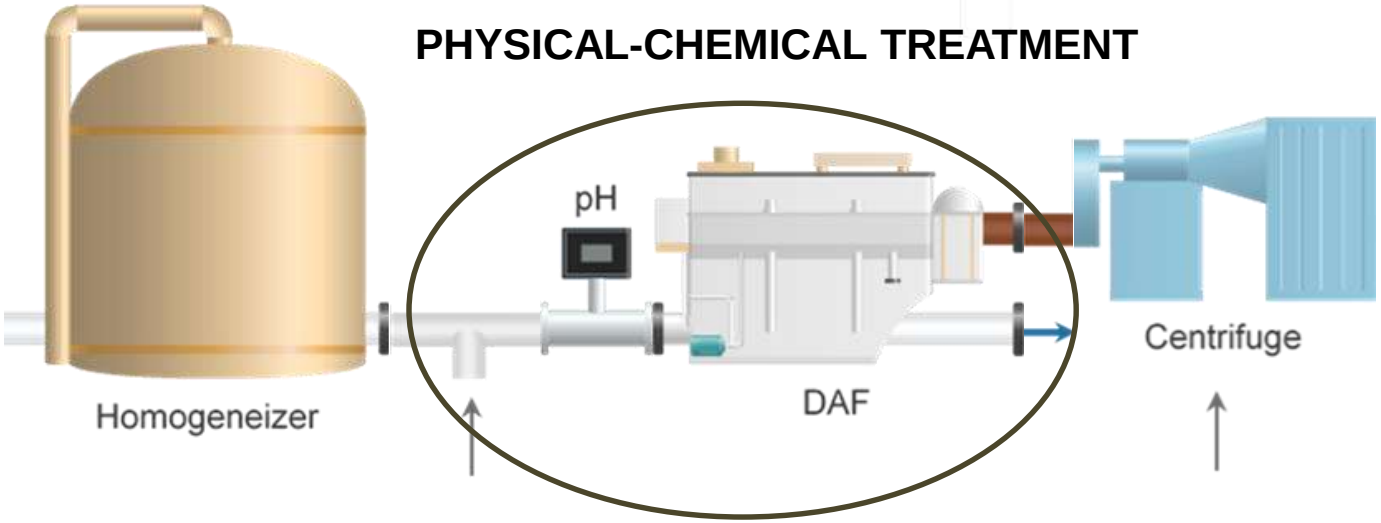
MJ480



1. Retention & Drainage Polymers
2. Dry & Wet Strength Polymers
3. Fibers Recovery Polymers
4. Ply Bond Agent Polymers
5. **Wastewater Treatment** Polymers



⑤ Waste Water Treatment

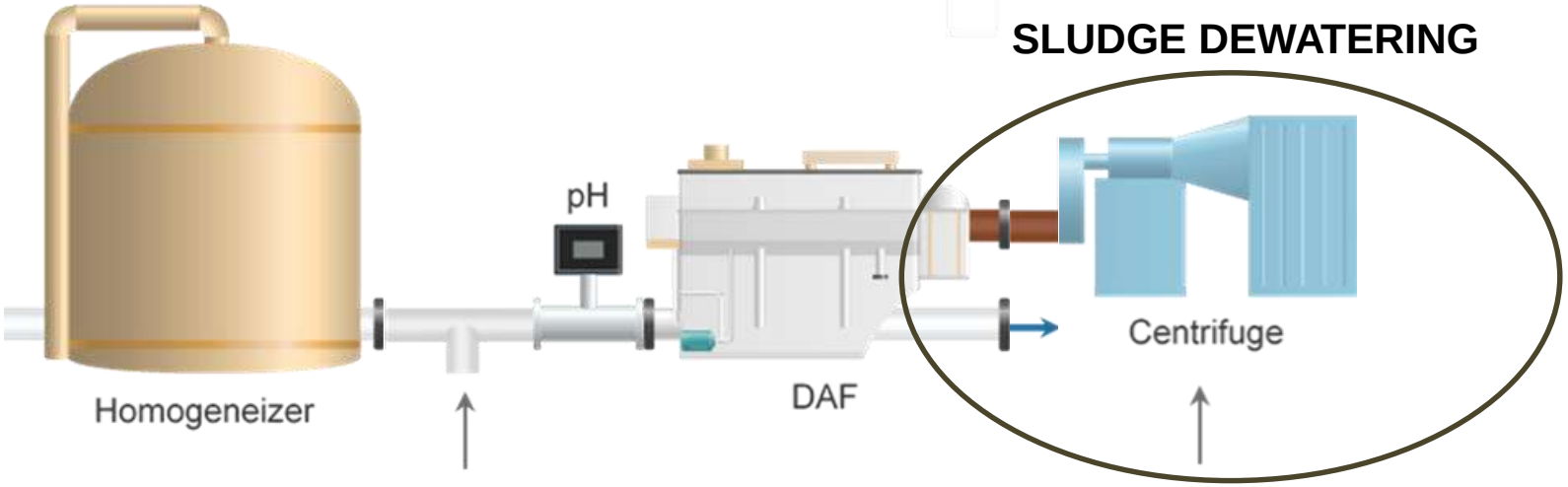


Himoloc	Ionic Charge	Ionicity (%)	Composition	(UL)	Viscosity
DR2200	Cationic	4%	AAM/BZQ	3.3	<1000 cp
DR525	Cationic	10%	AAM/BZQ	3.6	<1500 cp
TG992SIM	Cationic	20%	AAM/MCQ	5.0	<2500 cp
TG30	Cationic	35%	AAM/MCQ/BZQ	3.6	<1000 cp
TG823	Cationic	35%	AAM/MCQ/BZQ	3.6	<2500 cp
TG995	Cationic	50%	AAM/MCQ/BZQ	5.0	<2000 cp
TG60	Cationic	64%	AAM/MCQ/BZQ	3.8	<2000 cp

Himoloc	Ionic Charge	Ionicity (%)	Composition	(UL)	Viscosity
GO2000	No Ionic	0%	AAM	3.9	<2000 cp
GO2010	Anionic	10%	AAM/AAC	5.1	<3000 cp
GO2030	Anionic	30%	AAM/AAC	5.6	<2000 cp
GO7130	Anionic	30%	AAM/AAC/AMPS	6.2	<500 cp
ZW111	Amphoteric	30%/15%	AAM/BZQ/AAC/MCQ	2.9	<1500 cp
ZW322	Amphoteric	50%/20%	AAM/BZQ/AAC/MCQ	3.0	<1500 cp

- ✓ DR's: Specially used in circuits with high conductivity
- ✓ ZW's: Amphoteric PAM
- ✓ Exclusive SIM Technology

5 Waste Water Treatment



Linear PAM for Screw Press, Belt Press, ...

Himoloc	Ionic Charge	Ionicity (%)	Composition	(UL)	Viscosity
TG992SIM	Cationic	20%	AAM/MCQ	5.0	<2500 cp
TG30	Cationic	35%	AAM/MCQ/BZQ	3.6	<1000 cp
TG823	Cationic	35%	AAM/MCQ/BZQ	3.6	<2500 cp
TG995	Cationic	50%	AAM/MCQ/BZQ	5.0	<2000 cp
TG60	Cationic	64%	AAM/MCQ/BZQ	3.8	<2000 cp
TG998	Cationic	80%	AAM/MCQ/BZQ	5.0	<2000 cp

Crosslinked PAM for Centrifuge, Filter Press, Screw Press, …

Himoloc	Ionic Charge	Ionicity (%)	Composition	MW (UL)	Crosslinke degree	Viscosity
TX950	Cationic	50%	AAM/MCQ /BZQ	2.0	Very high	<2500 cp
TX9550	Cationic	50%	AAM/MCQ /BZQ	3.5	Medium-High	<2500 cp
TX7360	Cationic	64%	AAM/MCQ /BZQ	3.7	Medium	<2500 cp
TX980	Cationic	80%	AAM/MCQ /BZQ	2.5	Very high	<2000 cp
TX9880	Cationic	80%	AAM/MCQ /BZQ	3.8	Medium	<2500 cp

Benefits:

- ✓ Free of Solvents and Surfactants → Final Sludge and Water with lower VOC's
- ✓ Easy make-down equipment → Static Mixer

REGULATORY

- **Standard HIMOLOC** established <250 ppm residual AAM
- **Nordic Swan / Ecolabel** - We can provide any of our products under these requirements
- **AB series** - We can provide any of our products with residual Acrylamide Below customer's demand
- **Acrylamide Free** - We also have Acrylamide Free polymers

BfR
Risiken erkennen – Gesundheit schützen

FDA

Product	FDA	BfR	GB9685
ADG1	X	√	√
DR2500	X	√	X
DR525	X	√	X
FK1620	√	√	√
GO2000	√	√	√
GO2010	√	√	√
GO2030	√	√	√
GOX301	√	√	√
GOX101	√	√	√
GO7130	X	X	X
HB3522	X	√	√
HYD151	√	√	√
HYD252	√	√	√
K244	√	√	√
MJ480	√	√	√
RS15	X	√	X
RS19	X	X	X
RS21A	√	√	√
TG22	X	√	X
TG325	√	√	√
TG971	X	√	X
TG992SIM	X	√	√
ZW261	X	X	X

5 key ideas to remember:

1. Unique Technology
2. Green Technology
3. Increases productivity and paper quality
4. Improves Retention & Drainage & Mechanical Properties
5. Deliver Exclusive & Innovative Programs

HIMOLOC & HYDROSOL

When chemistry takes care of the environment and your business

derypol

THANK YOU

"Our business grows …

…together with you"

derypol