

Wet-End Conductivity Rise: Separate Salt from Charge Demand

By VCYCLETECH Technical Team • 21 October 2026

A wet-end conductivity rise is a reason to investigate the changed water and furnish, not an instruction to increase a fixative. Conductivity describes the electrical response of dissolved ions; charge demand describes the response of a defined sample to a particular titration method. They can move together, separately or in opposite directions. For a recycled-fiber mill, first verify the measurement, then compare matched source, stock and white-water samples for conductivity, pH, hardness, charge demand and fines or ash. Identify whether the change is primarily ionic loading, dissolved or colloidal material, solids loading, or additive preparation and contact. Only then decide whether to correct the source or process, screen fixation chemistry, or revalidate retention under the changed conditions.

TL;DR Keep conductivity, charge demand and solids on separate trend lines. Confirm the instrument, temperature convention, sample fraction and timing before comparing a new furnish with the previous stable run. If conductivity changes without a comparable charge-demand shift, trace the ion sources and test the existing program in that water rather than automatically adding a trash catcher. If a reproducible filtrate-demand change appears, locate the contributing stream before screening fixation. If fines or ash change, investigate the stock and separation balance. Preserve addition order, preparation and shear in the comparison. Accept a correction only when white water, drainage, retention, formation and deposits remain workable together.



Photograph: Michellecornelison, CC BY-SA 4.0; IPST/Georgia Tech workshop, 2013. Resized. Fiber-preparation context only, not a commercial recycled-fiber machine or a conductivity test.

Read conductivity, charge demand and fines as different signals

The useful question is not whether the conductivity number is high in isolation. It is what changed, where it changed, and whether that change explains the operating problem. A new recovered-paper blend, a different dilution-water supply, altered washing, or an additive preparation change can occur during the same shift. Labeling the whole event “more anionic trash” removes distinctions that determine the next intervention. Keep the previous stable grade and its ordinary variation as the comparison, rather than borrowing another machine's alarm setting.

Conductivity responds to dissolved ions and their mobility. Identifying the ions, counting fines and measuring titratable anionic demand require separate tests. Record temperature and the instrument's compensation convention. Compare hardness and relevant ion analyses where source changes suggest them; waters with equal conductivity may contain different calcium, magnesium or other ion concentrations. The purpose is to trace a credible change in the water matrix, not to turn conductivity into a complete chemical analysis.

Charge demand is also not an independent material identity. A result belongs to a sample fraction, titrant and endpoint procedure. The NCSU DCS review discusses both sample-dependent contributions and salt-related measurement difficulties. When an endpoint changes with the ionic environment, ask whether the method still supports comparison before treating the difference as additional contaminant mass. Fiber zeta potential is another measurement, not an interchangeable unit for filtrate demand. Avoid solving an uncertain measurement by chasing a universal zero.

Fines and ash introduce a third branch. More suspended material can change the surfaces presented to an additive and the solids circulating in white water even when a filtrate result looks steady. A clear filtrate can therefore coexist with a changed stock problem. Preserve whole-stock consistency, ash and the mill's appropriate fines characterization alongside the water-phase observations. Different grades and recovered-fiber supplies need their own comparison; a reading from washed laboratory pulp cannot stand in for the full circulating furnish.

Build matched baselines before making a chemical change

Start with an event sheet that places the furnish delivery or blend change, broke use, dilution-water switch, pH adjustment, and chemical preparation batches on the same clock as the machine trends. Record where each sample was collected and how long it took to reach the laboratory. Samples from different parts of a circulating system should describe the same process event as closely as practical. An upstream grab and an unrelated downstream grab can create a difference that belongs to timing rather than treatment.

Use the existing safe sampling points: relevant furnish or thick-stock stream, dilution water, a defined mixed-stock point, and white water. Include the suspected source before and after it joins the system. At each point, distinguish the measurements made on stock from those made on an operationally defined filtrate. Document the separation procedure, handling, pH and temperature. Do not silently change filtration or dilute only the troublesome sample; those adjustments can change the question answered by the charge test.

A compact baseline includes grade and furnish mix, broke contribution, total and ash consistency, pH, conductivity, temperature, hardness where relevant, and charge demand using the agreed method. Add white-water solids, drainage and sheet observations from the same operating interval.

Note which additives were prepared, their dilution-water source, feed calibration, addition location and contact sequence. BTG's instrument descriptions distinguish charge, fiber-surface and drainage/retention testing; choose the test for the question instead of treating the instruments as substitutes.



Editorial illustration generated with AI: generic white-water screening, not a measured charge-demand or retention result.

Choose the first investigation from the combination of changes

Different signal patterns call for different first checks

Observed pattern	Compare first	Possible next action	What the pattern does not prove
Conductivity rises; comparable filtrate demand is steady	Water source, ion composition, hardness, temperature convention and preparation water	Trace or moderate the source change; test the existing program in the changed matrix	That more fixative is needed, or that every polymer will fail
Filtrate demand changes reproducibly; conductivity changes little	Recovered-fiber or broke source, sample fraction, pH and additive carryover	Locate the demand contribution, then screen a supported fixation route	Which contaminant or product family is responsible
Fines or ash increase; water-phase readings look similar	Stock blend, recovery returns, consistency, solids losses and sampling	Correct the solids disturbance or revalidate particle-retention conditions	That a lower filtrate-demand number solves drainage or formation
All indicators change together	Event timing, separate source samples and mixing before first chemical contact	Restore a comparable operating window and test one plausible cause at a time	That the largest numerical change is the dominant cause
Readings are similar; response changes after a preparation/feed change	Make-down water, preparation history, actual feed, contact and shear	Verify preparation and delivery before replacing the product	That a stable sensor means an unchanged treatment exposure

Use these patterns to choose a comparison, not to certify a diagnosis. In a closed loop, sources can interact and the initial disturbance can appear at several points. When both ionic loading and demand change, preserve that mixed condition in subsequent tests. Removing one component for a

convenient laboratory comparison can help explain a mechanism, but it no longer represents the receiving wet end by itself.

Do not substitute one measurement for another

Conductivity

Which ions or water source changed?

Trace water and preparation conditions

Filtrate charge demand

Is the method comparable?
Which stream contributes?

Localize before screening a fixation candidate

Fines / ash

Which solids loading or return changed?

Check stock balance and retention conditions

Combine with timing, drainage, formation and deposit observations

Diagnostic comparison, not measured data: each signal narrows a different question before a treatment change.

Test a change that can distinguish the competing explanations

For a mainly ionic change, compare the previous and current representative process water with the same furnish and existing additive sequence where feasible. Keep pH, temperature, solids and mixing documented. A deliberately salt-adjusted sample can investigate an ion effect, but it is not automatically a reconstruction of the new white water. A published OCC study using chitosan and bentonite found conductivity-dependent responses in that particular laboratory system. It supports retaining matrix context, not borrowing its product, salt level or reported improvement for a different machine.

For a reproducible demand contribution, identify the source fraction before comparing fixation candidates. The DCS and fixative guide addresses that subsequent chemistry decision. A source correction, better segregation or a different return arrangement may deserve comparison with chemistry. If a candidate is introduced, use the actual grade, preparation and addition conditions; preserve downstream interactions. A better titration result is useful only if the changed stock remains workable.

For a solids-led event, compare the furnish or recovery change and its receiving point. Check whether the apparent retention shift follows altered feed consistency, filler input or sampling. Only after that should a retention trial compare the relevant polymer or feed arrangement. Keep dispersion and shear representative. Changing the source blend, fixative, retention polymer and dilution water together may improve a shift, but it will not tell the next operator which change to retain.

Use a written decision rule for inconclusive tests. If the instrument endpoint is unstable, repeat the validated method or obtain appropriate analytical help. If the sampled source varies faster than the test can resolve, improve the sampling plan. If a necessary process comparison would jeopardize sheet quality or safety, do not create a deliberate upset to prove a hypothesis. Use ordinary operating transitions and a mill-approved bounded test instead.

1. Validate sensor and sample method → 2. Align source and machine timing → 3. Separate ions, demand and solids → 4. Test one discriminating correction → 5. Confirm sheet and loop together



Editorial illustration generated with AI: sample-screening context only, not a prescribed dose or a VCYCLETECH trial.

Confirm the correction through a normal machine transition

The laboratory can help decide what deserves machine time. It cannot reproduce the whole inventory, feed-point contact, shear and grade history of the circulating wet end. On the machine, preserve a comparable operating interval and record concurrent interventions. Follow the event through white water, drainage, retention and ash retention where measured, formation, breaks, deposits and the required sheet properties. A calmer sensor trace is not success if it merely shifts the cost to formation or downstream cleanliness.

Use the established retention-trial acceptance scorecard for the detailed multi-endpoint evaluation rather than designing a second conflicting scorecard. Include ordinary furnish variation and the next relevant transition before adopting a correction as routine. When the problem instead follows a discrete broke event, use the broke-return source and timing investigation. Conductivity can be one clue in that event without being its cause.

Connect the diagnosis to a useful product discussion

The Paper Chemicals range is the starting commercial route for this paper-process decision. The PAM and PAC pages identify related families, not an approval of a particular wet-end grade or salt tolerance. Fixation and high-molecular-weight retention have different jobs; a catalog name cannot establish that one formulation performs both. Match the exact candidate to current product information and the representative trial.

For a focused technical inquiry, send the grade and furnish/broke history, matched measurement methods and trends, water-source change, addition diagram, present products and the operating constraint you need to protect. Say whether the next decision is source correction, fixation screening or retention revalidation. That is more useful than asking for a stronger polymer from a conductivity number alone.

Frequently asked questions

Does higher wet-end conductivity mean higher anionic demand?

No. Conductivity responds to dissolved ions, while charge demand depends on the defined sample and titration procedure. They can change independently. Compare matched samples, temperature conventions, pH and source history before deciding that a conductivity increase represents more anionic material.

Should a conductivity alarm trigger more PAC or PAM?

Not by itself. First determine whether ions, a reproducible demand contribution, solids loading or chemical preparation changed. PAC and PAM are different product families with grade-dependent roles. A chemical change needs a demonstrated task and representative comparison, not a direct conversion from conductivity to dose.

What if conductivity and charge demand move in opposite directions?

Check sampling, temperature, pH, fraction preparation and endpoint reliability before interpreting the difference. Then trace the contributing water and stock streams separately. Opposing trends are a reason to investigate distinct mechanisms, not to average the signals into one control target.

Can a clear white-water filtrate rule out a fines problem?

No. A filtrate represents the fraction produced by its separation method. Whole stock includes fines or ash excluded by that separation, and their retention behavior requires a stock-relevant comparison. Keep stock consistency, ash and relevant fines measurements in the investigation.

When is a laboratory result ready for machine confirmation?

When the comparison is repeatable, distinguishes a plausible changed variable, and preserves the relevant furnish, water, preparation and contact conditions. Agree the safe operating window and sheet-quality checks first. Machine confirmation must test the receiving loop and normal transitions, not only repeat the laboratory endpoint.

Technical sources

Reviewed 21 October 2026. These sources explain measurement and mechanism limits; they do not establish a VCYCLETECH dose or mill result.

Hubbe et al.: DCS and charge-demand review (bioresources.cnr.ncsu.edu)

Taheri et al.: conductivity in a specific OCC laboratory system (bioresources.cnr.ncsu.edu)

BTG: complementary charge, surface and drainage test scopes (www.btg.com)