Bleach Plant Best Practices

Alison Rowat

International Paper

What is Optimum CEKappa?

- Don’t ask this question
  - People might laugh at you
  - Depends on inlet kappa
  - Are you doing the right Kappa Test in the Lab?
    - Make sure you are consuming 30-70% permanganate
    - Lots of info on the right Kappa Test on our Committee Website

- You should get 70-85% Delig across D0/Eop
  - Inlet Kappa 10 → CEKappa 2
  - Inlet Kappa 30 → CEKappa 6

What is Optimum ClO2 Split between D Stages?

- Again, don’t ask this question
  - People might laugh at you
  - Depends on inlet kappa
  - Depends on Number of Bleaching Stages

- But a rule of thumb would be
  - Inlet Kappa 10 → D0 ClO2 60-80% of total
  - Inlet Kappa 30 → D0 ClO2 55-65% of total

- Never put less ClO2 on D0 stage than on D1 stage

D0 pH?

- Low D0 pH consumes more acid in D0 and more NaOH in Eop
- Low prebleach kappa pulps we see terminal pH 3.5
  - Watch for calcium based scale above terminal pH 2.9
- Higher prebleach kappa pulps we see terminal pH 2.5-3
- Does lower D0 pH bleach shives?
  - It might if you have medium consistency and 30 minutes or more retention time. Then keep terminal pH 3-3.5
  - Not much of a chance with low consistency (3-3.5%) D0

Extraction Stage NaOH and Peroxide

- Usually target Eop pre retention pH 11.2-11.3
- Ratio NaOH to D0 ClO2 works fairly well for rough dosage control
  - See 0.8-1.2 as ratio for SWD
  - See 0.5-0.9 as ratio for HWD
- Peroxide use generally seen as beneficial to replace ClO2 until saturation (saturation tends to occur “earlier” at higher inlet kappa, indicating that Peroxide usage is better toward final stages of bleaching or low kappa prebleach pulps)
  - Usually see 2 kg/tonne (4 lb H2O2/ton) to 5 kg/tonne (10 lb H2O2/ton)

Extraction Stage Temperature

- Higher T is better for Extraction
  - 70C-85C (160F – 185F)
- Note that inline probes are at process temperature but if you take a sample to the lab it will likely not be at process temperature
  - Temperature affects pH reading in Alkaline Stages
  - Work done by Reid on how to get a representative lab pH measurement in Committee Website

Stickies and Pitch

- Usually grade related (poplars etc.)
- Or high defoamer usage
  - Are any mills using defoamer in Eop? You shouldn't have to. It can be very problematic
- Only thing in bleach plant is monitoring of pitch plates, possibly higher T and higher alkalinity in Eop can help
- Defoamer control/pitch dispersant

D1 Stage

- Low prebleach kappa pulps generally use Eop brightness for D1 ClO2 dosing
- Higher prebleach kappa pulps (no O2 Delig) use CEKappa for D1 ClO2 dosing
- Temperature should be controlled to have a trace residual most of the time
  - A lot of variation in end of stage residual means poor control of ClO2 and/or tower channeling
- Can adjust D1 temperature to be lower at lower tonnage rate and higher at higher tonnage rate to help control residual post tower

D1 Stage

- Usually see a 1 unit pH drop through tower
- Target pH 4 if no shives, 3.2-3.5 if shives present
- Luckily Brightness is forgiving in this stage – big drop if pH too high and if pH too low but need to be quite out of range to see this (below pH 3, above pH 4.8)

E2/D2

- If you are lucky enough to have an E2 stage, use it
- Terminal pH 10-10.2 and wash can give 5-10 points more brightness in D2, depending on post E2 brightness level.
- If you have D1/D2 I do not suggest adding caustic before the D1 wash
  - Uses quite a bit of caustic and very little retention time
  - Then requires quite a bit of ClO2 in D2, often to get pH to terminal pH 5.5 range
- D1/D2 can hit very little brightness gain in D2 if already hitting a brightness ceiling post D1
- Work done by yours truly on why you can hit these ceilings and what you can do about them on Committee Website

Control

- If you have multiple brightness grades then set your targets accordingly (lower CEKappa/higher Eop brightness for higher brightness grades, but run trials to find optimum chemical splits between D stages)
- You can’t control what you can’t measure, so inline and online measurements and sensors are needed
  - Plenty of work by Valmet and BTG/Capstone on opportunities

Carryover and Washers

- Good washing is extremely important
  - Reduction of carryover to bleach plant is at least 0.38 lb ClO2 savings/lb Na2SO4 (Liebergott) and I believe that is conservative, even for post O2 Delig pulps
- Mills that have put in wash presses to replace bleach plant diffusion washers have had very good successes with chemical reduction
  - Evadale presentation at TAPPI was one of first to report on savings, 3 of the "new IP mills" have replaced diffusion washers in the bleach plant with good success
- Can't get a new washer? Make sure you have good vacuum and check consistency across the washer on the mat side – should be 10-12%. If lower, work with vendor, could be something relatively simple

The End

- This is a very basic presentation, with no graphs or pictures
- A lot of this information is available in more depth on the Bleaching Committee Website
- Time for Q and A’s