Improving Mill Lab Performance

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- Topics for Discussion

Scheduling
Filtrate Testing
    Residual
    pH
Bleach Pulp Testing
    Brightness
    K Number/ Kappa
Lab Conditions
Data Handling

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Lab Scheduling

- Mill Lab testers typically have busy schedules, and careful thought needs to be paid to sample scheduling.
- 1st hour samples are often not scheduled to allow for shift meetings and ISO calibrations.
- Residual samples need to be collected and tested quickly.
- Brightness/Kappa
  - Typically pulp samples collected from washer mat.
  - Collect Extraction pulp from vat.
- Avoid samples less than 1/shift.
- More frequent with results entered as soon as completed is better.

Filtrate Testing

Sampling

- Filtrate samples may be from extraction devices or washer vats.
- Special care should be taken to assure extraction filtrate measurements are continuous.
  - Small piping with large vent bypass for blowback is recommended
  - Lab sample valve should be tight to the sample line.
  - Testers should observe the sample discharge flow and report low flow to operator.

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Filtrate Testing

Sampling

- Vat samples are convenient.
- Pulp can easily be removed using a screen or press devise
- Testers can learn what type of vat consistency is normal and report any issues to the operator.

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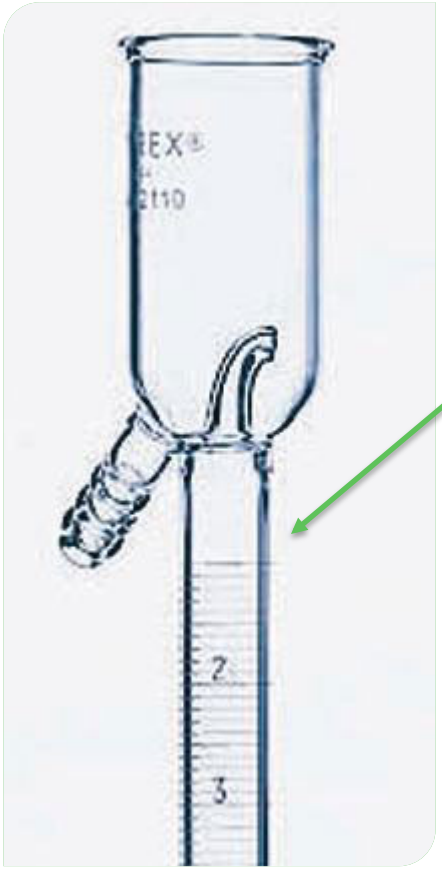
Residual Testing

- Since residual is depleted as a sample ages, it is important to specify a time interval where residual tests should be completed.
- This time interval should be consistent, each round.
- Residual samples should be tested first.
- Residual samples require 100 mls of filtrate.
- Residual testing varies widely from location to location. Check units if you are not familiar (gpl or lb/ton)
- To titrate total ClO2 residual, the sample must be acidified.
- Vat residuals typically run 0 or require a few drops of titrant. A procedure must be developed if wanting to measure low residual amounts.

Residual Testing



- A typical thiosulfate pipette does not indicate until more than 1 ml is titrated.
- Digital pipettes are more accurate at low levels, are relatively cheap and work well with thiosulfate.

pH Testing

- A Low and a high pH meter is typically used to help calibration.
- More than 100 mls of filtrate is required, so pH testing is typically done at the same time as residual testing.

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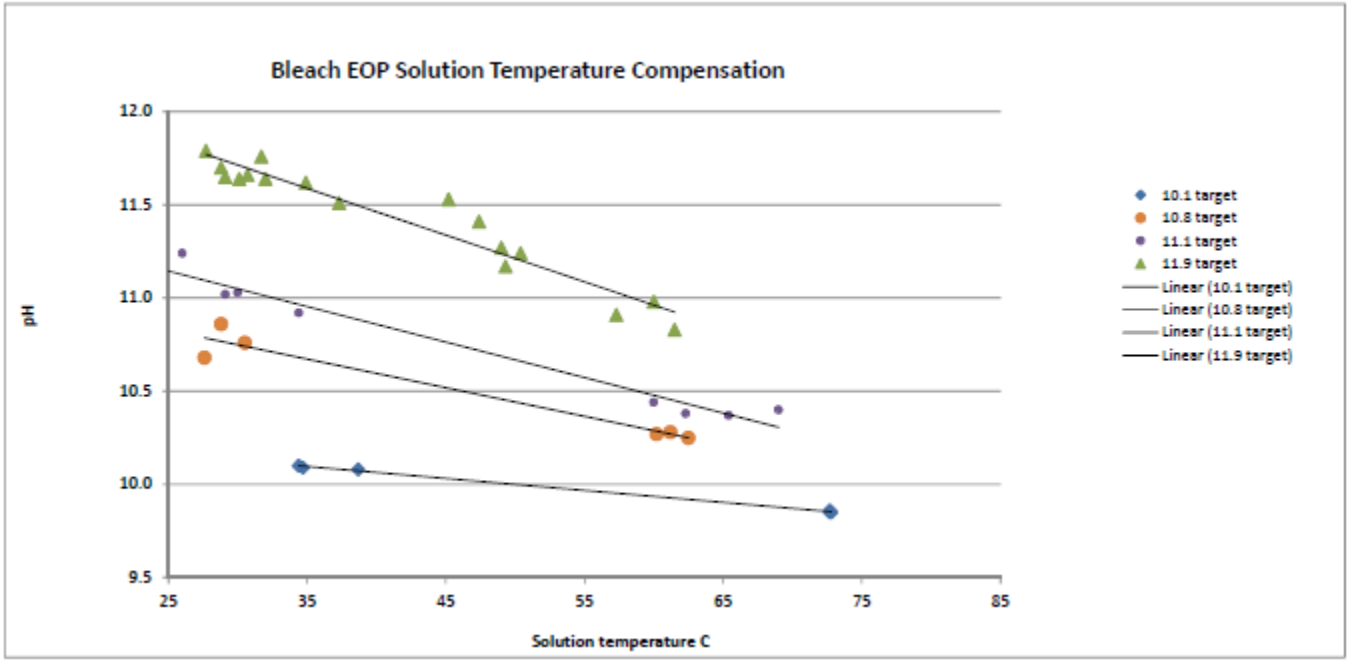
pH Testing

- Probe temperature calibration is on when ATC is indicted on the display.
- ATC does NOT adequately correct for temperature variation in extraction stage samples (E1 and E2)

pH Testing

E stage temperature correction maybe up to 1.5 pH units, and varies with caustic content. A correction factor is recommended for lab measurements and also online extraction pH probes that are exposed to the weather.



* A good discussion of this can be found in an article by Doug Reid, Eka Chemicals.

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Brightness

- Typical pulp pad former used in labs if sheet mold is not available.
- Pulp samples are washed prior to forming by diluting with a large amount of clean water.
- After the pads are formed, it is recommended to press the sheet using blotter paper and a sheet roller.

Brightness

- Microwave oven speeds up drying of the pads, and can reduce the standard deviation of brightness measured on a pad.
- Timer helps to control the pad dryness.
- Testers learn the feel of a properly dried sheet.
- Not recommended for drying pads to bone dry – consistency and kappa testing.

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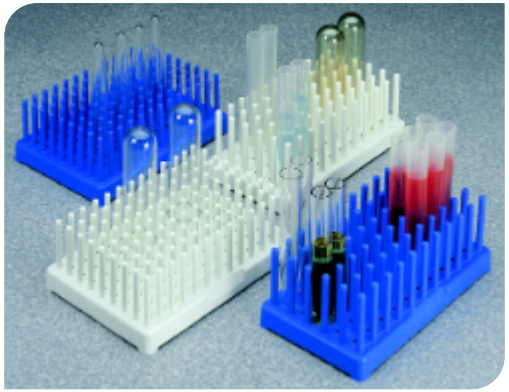
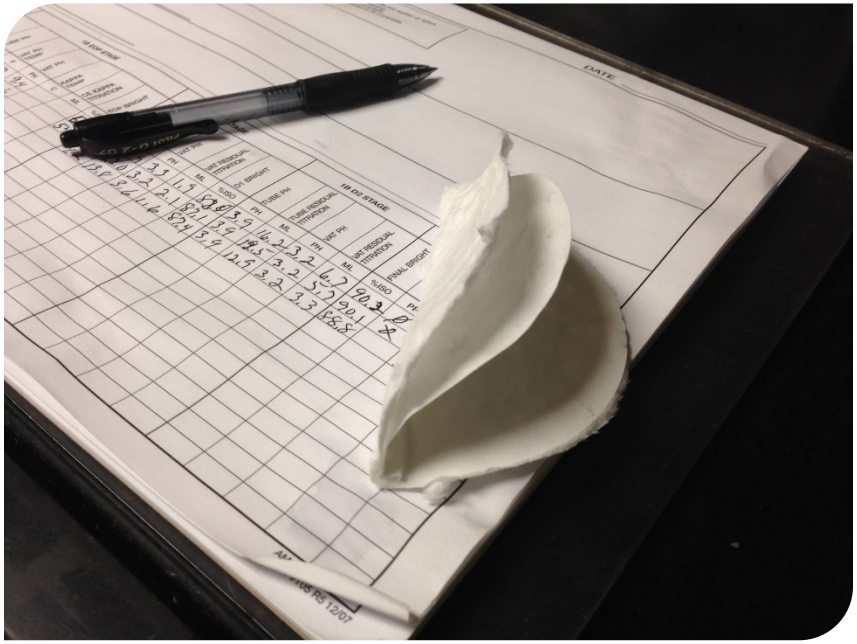
Brightness



- Peg rack is a useful rack that can be used for brightness testing.

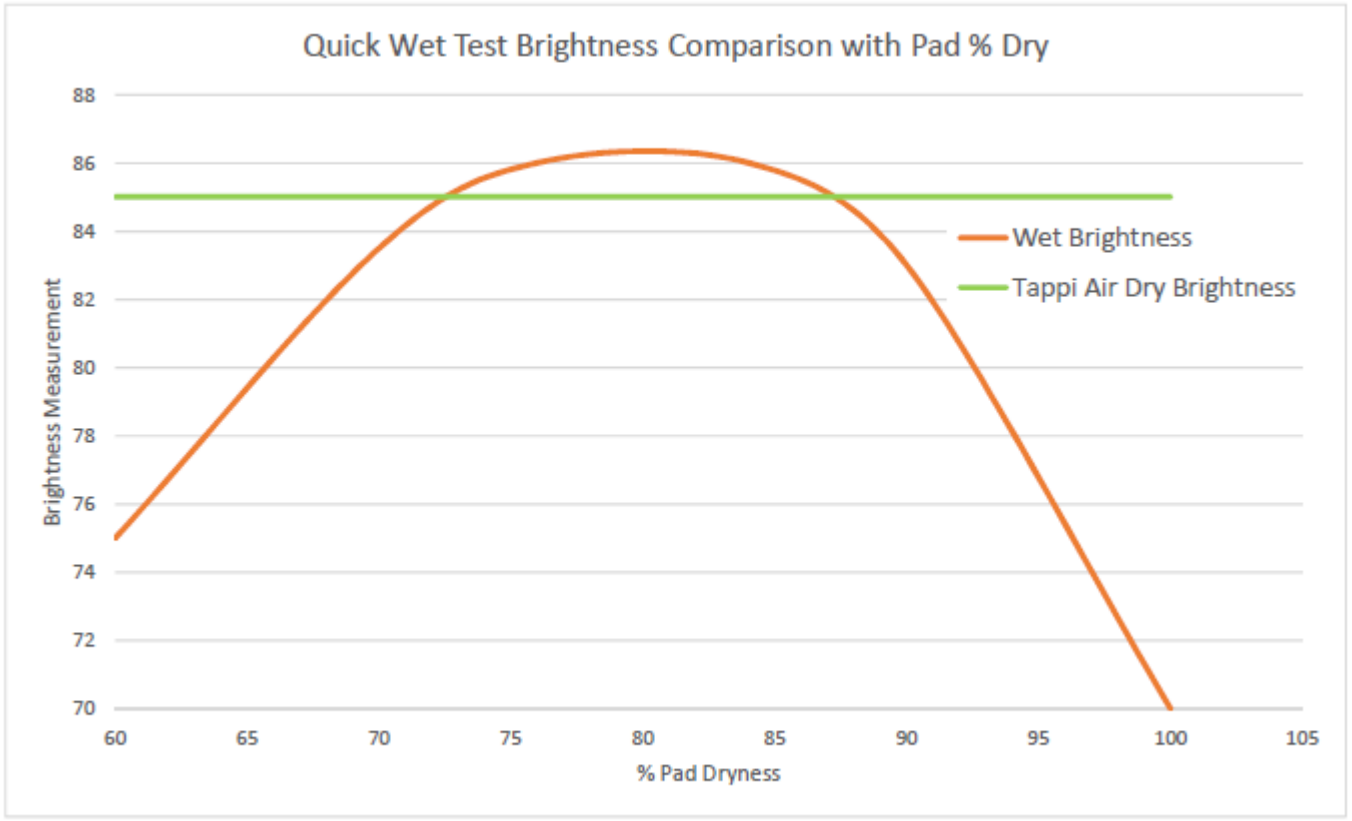
Brightness

- Quick lab brightness measurements are affected by the drying of the pulp pad.
- Pad weight should be enough so that the pad is thick enough that the filter paper used is not visible in the test.
- Pads are often folded so that a thick layer is provided for testing.
- Brightness should be measured in 4 places and most typical measurement reported.
- A single low or high test should be ignored or verified.



Brightness

A pad that has about 80% moisture or tested at the flat region of the brightness curve provides the most repeatable results, but may be 1 point higher than an air dry brightness run on the same pulp.



K Num/Kappa

- There is not a good, quick method for drying a hand sheet.
- A drying oven is recommended.
- Due to time required, kappa testing by a single technician is recommended, especially for calibration purposes.

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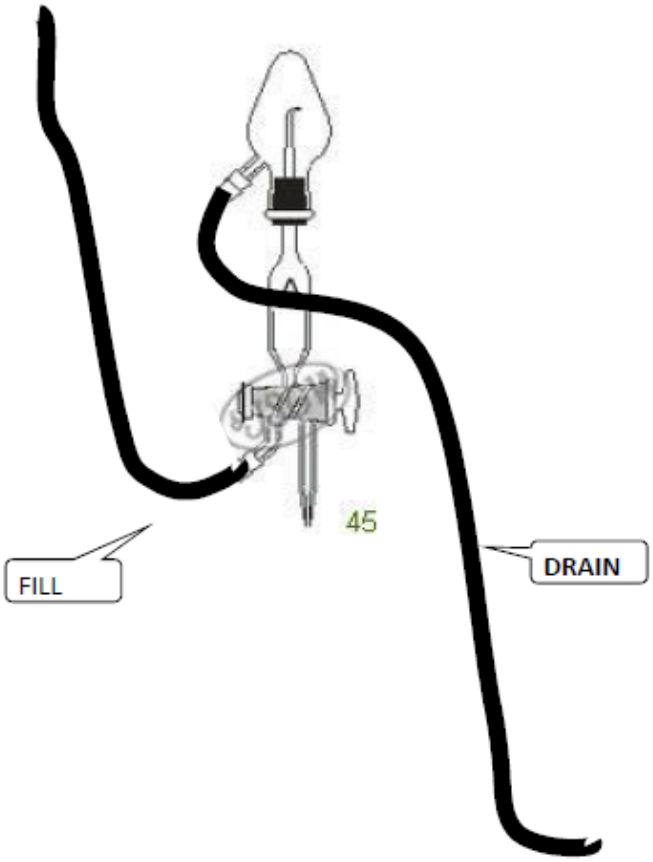
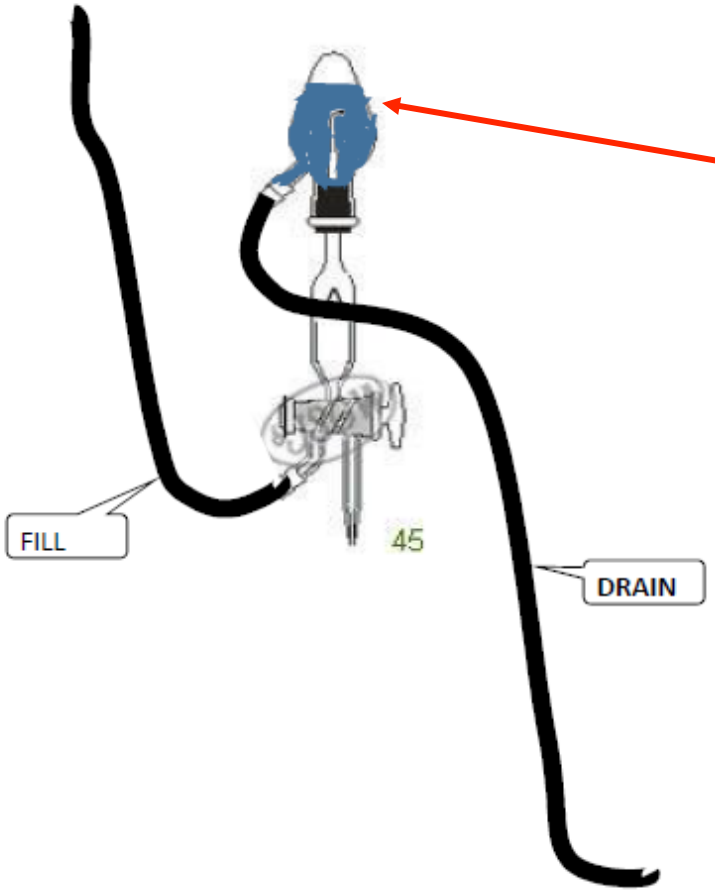
K Num/Kappa



- Permanganate is typically measured using a autofill pipette.
- Permanganate will degrade with light and on storage – shorter fill lines help to reduce permanganate in fill lines that has aged.

K Num/Kappa

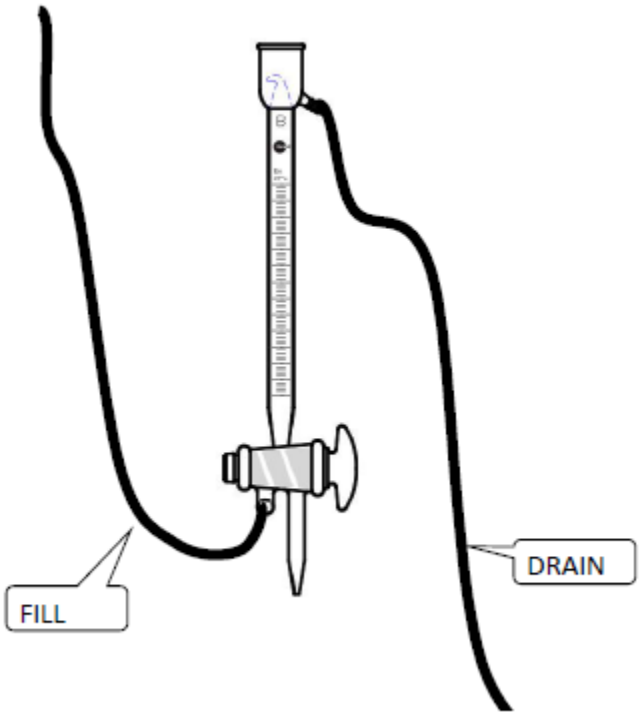


- Need to assure that permanganate does not overfill the pipette leveling devise.
- Drain tube and top vent must remain clear.
- Since permanganate stains glassware until it is very dark, this error often is unobserved.
- Causes K or Kappa number to measure low.
- Larger test volume reduces error.

K Num/Kappa

Auto burette.

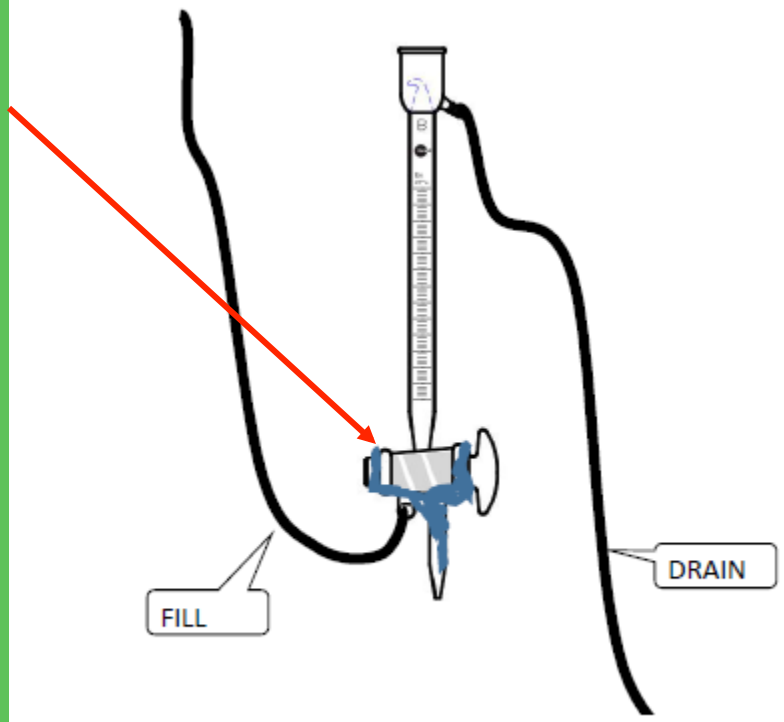
- An auto fill burette is typically used to titrate, using sodium thiosulfate.



K Num/Kappa

Auto burette.

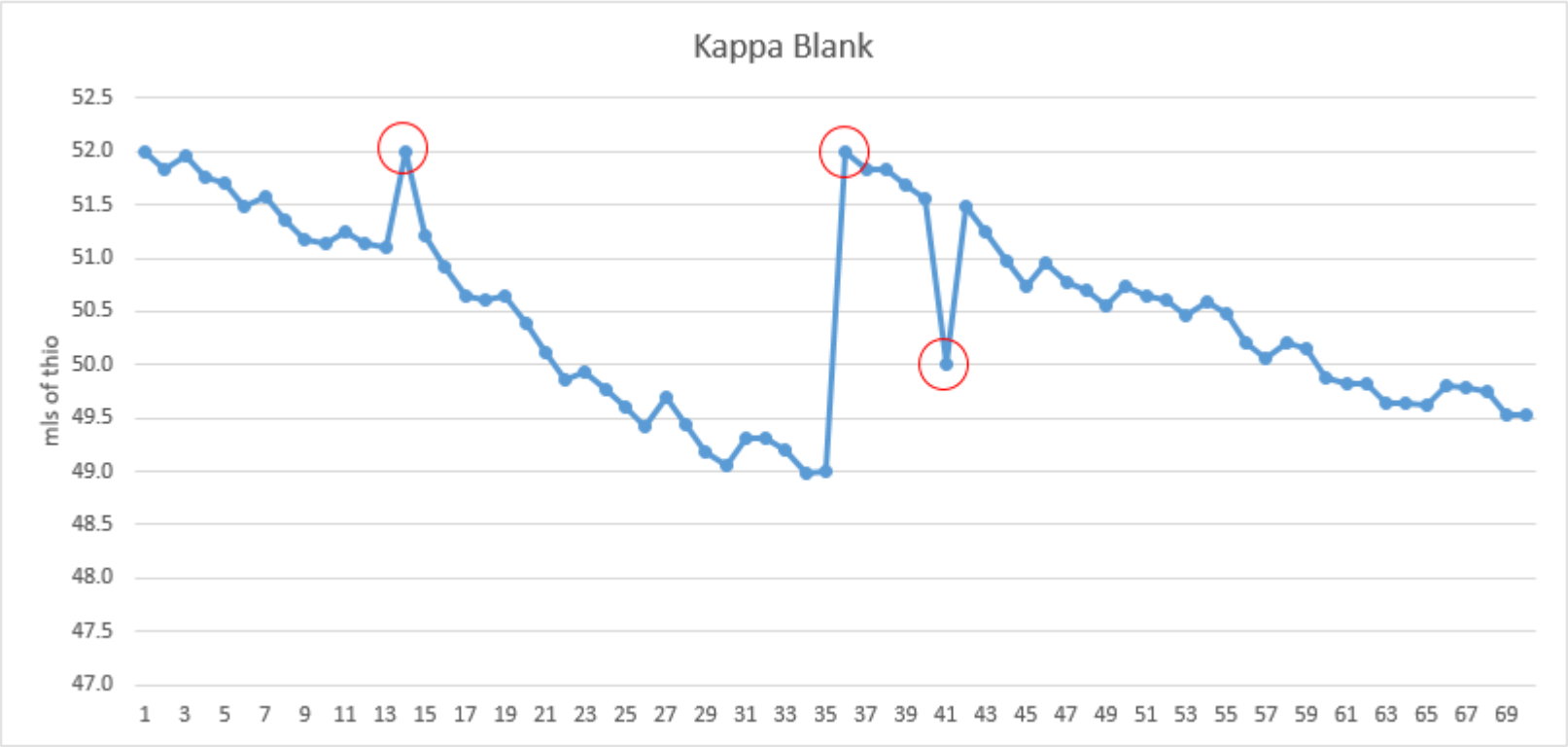
- Thiosulfate crystals need to be kept clean from the burette tip.
- Crystals can randomly drop into test solutions.
- Keep stop cocks greased.
- Rinse with water periodically.
- Will result in a periodic high K Number or Kappa.



K Num/Kappa

Permanganate blank value should be recorded, and if there is an unexplained change more than +- 0.2 mls, the blank should be retested.

- The blank will increase after chemicals are refreshed.
- It is good practice to flush the permanganate pipette testing is intermittent.



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K Num/Kappa

- Digital burettes and pipettes are more easily obtained and provide accurate results.

- These are NOT recommended for use with permanganate due to the oxidizing reactions with seals, etc.
- Over time, performance may deteriorate.
- Verify repeatability by weighing the permanganate solution.

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Other

- Improved air ventilation system.
- Comfortable work conditions are much appreciated.

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Data Handling

- Entering results often, will improve the correlation of lab data to online measurements.
- Hourly testing schedule and data entry helps assure data is entered more frequently.
- Often, the last sample round on a shift is tested earlier than needed to assist with shift change.
- Consistent procedures are the key!

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