
Procedures of a Batch Column Test Apparatus

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1. Introduction

The following is a schematic procedure for a Batch Column test program

2. Equipment

The equipment should consist of the following

- Column Flotation unit, 2" diam x 3 m height in collection zone
- Feed and Tail ports should be 5/8 " id nozzles to be sized down such that the feed and tail lines are sized to keep the flow in the tubes above critical velocities. It is suggested that in any event, the sizing should be not less than 1/4" ID.
- The concentrate port should be at least 2" opening...3" is preferable
- The unit to be made of transparent plastics (Plexiglas or acrylics)
- Feed and tails to be handled by peristaltic pumps capable of handling up to 5 L/min (nominal is 1.2 Lt/min)
- Washwater pump or flowrator to handle up to 200 cc/min
- Two small conditioners should be available. One to set the equipment up to achieve nominal operating conditions and a second conditioner to do the testwork. The reason is that frother can be set better having tried it with a test sample.
- Four containers are required to discharge tails and concentrate: 2 for the first conditioner and 2 for the second conditioner.
- Sample plastic bags are required to collect samples.

3. Instruments

The operation of a batch column is rather simple. The user needs to have means to measure the following:

- Feed Flow
- Tail Flow
- Concentrate Flow
- Washwater Flow
- Depth of Froth Bed
- Air Rate

The following are the suggested methods of measurement:

- Feed flow: take a reading initially, before any air is added, by maintaining a constant level. The tail flow will equal the feed flow. Record the position of the speed adjustor as this will likely be the set point for feed for the remainder of the test.
- Tail flow: is measured from the hose discharging into the collection vessel. Note that tail samples are always measured on a timed basis, so no flow measurements are necessary outside of sampling time.
- Concentrate samples are also measured during sampling time. Note that unless the concentrate flows freely, the flow cannot be measured on a timed basis
- Washwater flowrate should be measured from a calibrated rotameter.
- Froth bed depth can be visually measured. If not, the user can adapt a small plastic bottle (half filled with water) to a thin rod (wood or plastic) and measure the pulp level.
- Air rate should be measured by a rotameter calibrated for the operating pressure.

4. Operating Conditions:

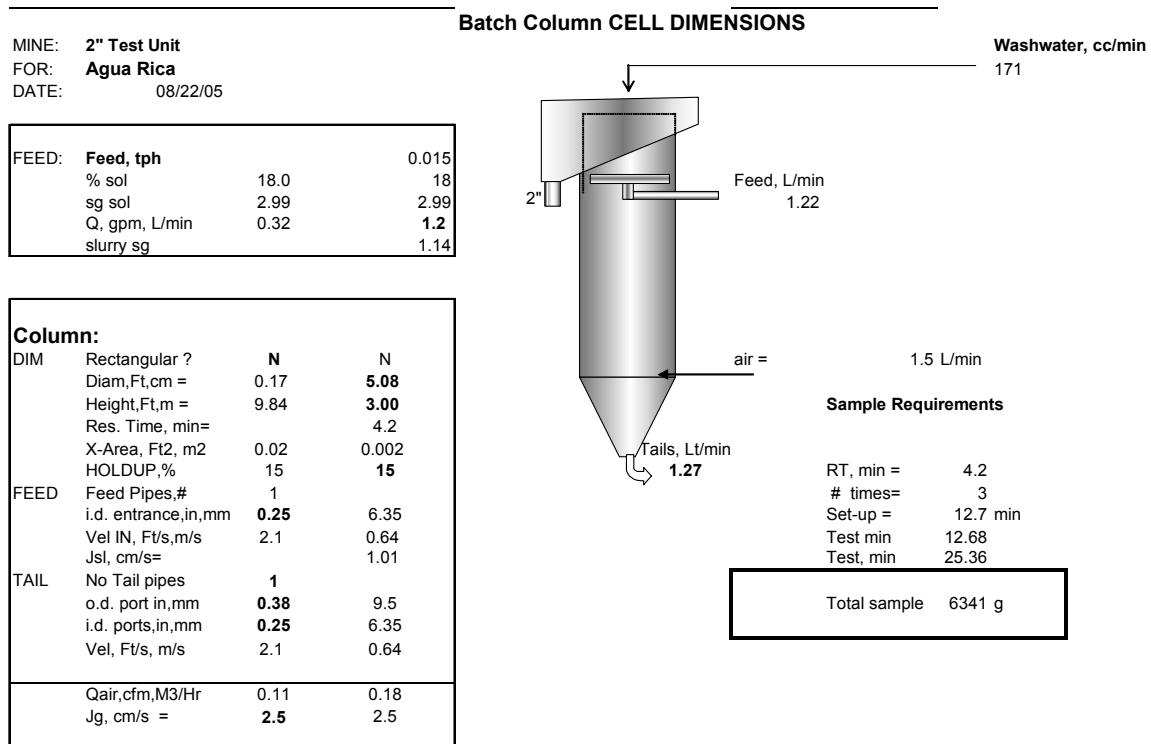
This memo has been prepared for the following conditions:

FEED: Ground Rougher Concentrate

SOURCE: A Specific Ore Type

OBJECTIVE: To generate a Column Grade-Recovery test by varying the air rate.

Flows and measurements: see below



5. Operation

The batch column test is carried out as follows:

- After all the pumps, valves and instruments are tested with water, drain column and fill with slurry (no air) at 1.2 L/min from the 1st conditioner until the level is some 30 cm from the overflow. It will likely take some 4 minutes to fill the unit. Maintain the level by adjusting the flowrate of tails. If the operator finds this a hard task, do go ahead and buy a controller, level sensor and the appropriate pump VSD to maintain the pulp level....but the fact is that with a few trials, maintaining level becomes an easy task.
- Add Washwater at a pre-planned rate (suggested is 170 cc/min)
- Add air (max air is 3 L/min) at a nominal of 0.6 Lt/min. This is the low air reading.
- Ensure the pulp level is relatively constant and near 30 cm from the overflow. Once the 1st conditioner is empty, switch the feed to the 2nd conditioner.
- If the transition time was near zero and everything is working well, you can start sampling.
- Take a 15 seconds to 1 minute sample of the tails. While doing this, sample the concentrate.
- As soon as the sample has been taken switch the air to 1.2 L/min and again, ensure the level holds constant by adjusting the tail flow. Sample within 4.6 minutes from this time. During this time you should be ensuring the Washwater flow is correct and level is held constant.
- As soon as you have sampled, do the same for an air rate of 2.0 L/min. Plan to have sufficient sample for the entire test. If you see that this might not be possible, you can always take some sample from conditioner # 1

6. Reporting

In reporting the results of the testwork, ensure you have included all the information on the operation of the column, including column size and all the pertinent readings.

Feed assays should have been taken at the start of the test. A mass balance can be calculated from the assays. The flow balance can be checked against a redundancy which is the Washwater and the tails flow. Recoveries and all the assays need to be reported. The concentrate should be assayed for all elements requested and an ICP for deleterious elements. All flows need to have % solids.