CANTY

PROCESS TECHNOLOGY

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VECTOR TEST REPORT

SAMPLE FROM: Chemical Processing Company

CONSISTING OF:

Log Number	Product
102-01-1	ZINC product slurry, #1
102-01-2	ZINC product slurry, #2
102-01-3	ZINC product slurry, #3
102-01-4	ZINC product slurry, #4

REPORT BY: Dick Owen

SUMMARY -- The Canty Vector measurements of the customers product was measured for concentrations up to two percent. This data can be used to produce a calibration curve to output the product concentration percent directly from the Vector. The material tested consisted of a series of dilutions made in the Canty Lab from sample 102-01-1, the 'PACK OUT' product assumed to be 25 percent concentration.   A small portion of each sample remains so the actual concentration may be determined if desired.

SAMPLE PREPARATION PROCEDURE -- A group of 8 samples was made from the pack-out product which has a concentration of 25 percent. Prior to removing material from the 1 gallon container, the pack-out container was mixed using a hand-held blender inserted into the fluid operated for about 5 minutes to thoroughly mix the source product. One liter of a 2% concentration was prepared by weighing both the 25% pack out product and the dilution water. The remaining samples were prepared by further diluting portions of the 2% sample. The Instrument used for the weighing operation was an Ascom Hasler Model MP-2, S/N 000175, which has a 1000 gram capacity and 1 gram resolution. Typical sample volumes were near 270 ml.

MEASUREMENT PROCEDURE -- Each of the 7 samples tested was pumped through a lab flow cell and viewed by a high magnification camera / lens assembly. The flow cell volume was adjusted to have a moderately wide gap between the light source on one side of the cell and the camera view glass on the other side of the cell. The light source was adjusted to a maximum value. The samples were sequenced from the most concentrated first, followed by the next most concentrated in sequence, with the lowest concentration last. The flow cell initially contained water which was displaced by the 2% sample; readings were noted as the concentration increased, and the 2% reading made after the value stabilized. This procedure was repeated for each sample in turn. The cell discharge was collected and not returned to the sample containers. Each sample was vigorously mixed before pumping into the flow cell. The remaining material, approximately 50 ml for most samples is retained for possible lab analysis for actual concentration.

CONCLUSIONS --   The data obtained will allow a very accurate calibration in the form of a Look-Up-Table (LUT) to be constructed. A flow cell with the same geometry, light source and camera can be used to directly measure (report) concentration of the centrate pumped through the flow cell. The calibration curve (see graph plot in measurement results section) shows good resolution in the region of 0.5% with a typical minimum resolution of 0.005% per Intensity step. It should be noted that the curve ends (Intensity reading saturated) at a concentration of 0.2% on the low side, but extends out to 2% and could be extended farther. Thus, if readings are desired at concentrations lower than 0.2%, the curve could be shifted to better place the measurement span (and give up some of the measurement ability at 2% and above). The LUT can be constructed by entering the measurement data (from the reported data table) directly and doing a straight line interpolate for intermediate points. The plot shown is by Excel spread sheet with some line smoothing rather than straight line interpolation. If that smoothing is desired, additional points can be picked from the plot to represent each curved section with 2 or 3 points. An additional caution is that this data may need to be repeated with the final flow cell geometry so that the calibration represents actual process conditions. The major cost in time to do this calibration is involved in the preparation of the necessary test samples in known concentration.

MEASUREMENT RESULTS --   Test results are reported for the measurements made on the constructed samples.

Reading from Vector:

Concentration, percent	Intensity value
2.00	51
1.00	81
0.80	130
0.60	156
0.50	175
0.40	195
0.20	254
0.10	---

Calibration Curve