

STIRRING AS A TIME SAVER IN GRAVIMETRIC ANALYSIS.

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While making experiments recently on the deposition of metals with a rotating anode, it occurred to me that various gravimetric analyses might be greatly facilitated by rapid stirring of the precipitate. That stirring greatly facilitates precipitation is known to every one, but I do not know that any data have been recorded to show just how efficient the stirrer may be, hence these experiments. These results are very surprising.

A stirrer was made from a small glass rod about two millimeters in diameter. It had the shape of the letter T, the arms, each about eighteen millimeters long, being flattened at the ends and turned so as to resemble an ordinary propeller. The stem was about ten centimeters long and was attached to a wheel run by a small electric motor, which in turn was connected with an ordinary 110 volt lighting circuit. There was thrown in the circuit a small lamp bank so that the speed of the motor might be varied. The following analyses were carried out with the stirrer making an average of 900 revolutions per minute.

1. *Estimation of barium in crystallized barium chloride.* The sample of the pure salt, 0.2330 gram, was weighed out in a 150 c. c. beaker, diluted to about 50 c. c., acidified with hydrochloric acid, heated to the boiling point, treated with slight excess of dilute sulphuric acid, *stirred four minutes*, immediately filtered, washed, ignited, cooled, and weighed. Found for barium 56.25%; calculated, 56.23.

2. *Estimation of calcium in pure calcium carbonate.* A small sample of the purest calcium carbonate, 0.2225 gram, was transferred to a 150 c. c. beaker, converted into the chloride, diluted to about 50 c. c., heated to boiling, treated with slight excess of ammonium oxalate, made alkaline with ammonia, *stirred four minutes*, then filtered, washed, ignited, heated over the blast lamp, cooled and weighed. Found for calcium oxide 56.04%; calculated 56.03.

3. *Estimation of copper in cupric sulphate.* A small sample of recrystallized pure sulphate, 0.2000 gram, was weighed in a 150 c. c. beaker,

diluted to about 50 c. c., heated to boiling, treated with a few drops of sodium bisulfite solution and then with slight excess of ammonium sulphocyanate, *stirred three minutes*, filtered (Gooch), washed, dried at 130°, cooled and weighed. Found for copper, 25.42%; calculated, 25.46.

4. *Estimation of chlorine in sodium chloride.* A small sample of Kahlbaum's purest sodium chloride, 0.2102 gram, was dissolved in about 50 c. c. of water in a 150 c. c. beaker, acidified with a few drops of nitric acid, treated with slight excess of silver nitrate solution, *stirred two minutes*, filtered (Gooch), washed, dried at 130°, cooled and weighed. Found for chlorine 60.64; calculated 60.63.

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