

HEALTH PROTECTION BRANCH  
OTTAWA

DETERMINATION OF CARBON DIOXIDE IN BAKING POWDER

**I. APPLICATION**

This method shall be used for the determination of the per cent carbon dioxide by weight in baking powder under Section B.03.002 of the Food and Drug Regulations.

**II. PRINCIPLE**

The carbon dioxide ( $\text{CO}_2$ ) is released from the baking powder by acid hydrolysis and the volume, read in a gas-measuring tube, is corrected for temperature and barometric pressure.

**III. APPARATUS**

- (1) Sieve, No. 20.
- (2) Chittick apparatus. May be purchased from Sargent-Welch Scientific Co.
  - (a) assemble apparatus as shown in figure 1;
  - (b) connect decomposition flask A, by glass T-tube B, provided with stopcock C, to graduated gas-measuring tube D, connected in turn with levelling bulb E;
  - (c) for A always use 250 mL wide-mouth pyrex extraction flask fitted with two hole rubber stopper;

- (d) pass glass tube of same diameter as connecting T-tube through one hole;
- (e) take a 25 mL buret graduated in mL at 20°C, numbered at five mL intervals, and fitted with an extra long tip and insert tip in second hole;
- (f) connect glass tube leading from decomposition flask to T-tube with rubber tubing to permit rotation of flask;
- (g) use gas measuring tube graduated in mL at 20°C with zero mark at a point 25 mL below top marking to allow for graduating upward from 0 to 25 mL and downward from 0 to 200 mL;
- (h) connect gas-measuring tube to approximately 300 mL levelling bulb with long rubber tube.

#### IV. REAGENTS

- (1) Hydrochloric acid (HCl), concentrated, reagent grade.
- (2) Sulphuric acid (H<sub>2</sub>SO<sub>4</sub>) concentrated, reagent grade.
- (3) HCl (1 + 2) or H<sub>2</sub>SO<sub>4</sub> (1 + 5).
- (4) Methyl orange indicator, 0.5% (w/v) aqueous solution.
- (5) Sodium chloride (NaCl).
- (6) Sodium hydrogen carbonate (NaHCO<sub>3</sub>).
- (7) Displacement solution.
  - (a) dissolve 100 g of NaCl in 350 mL of distilled water (H<sub>2</sub>O);
  - (b) add approximately 1 g of NaHCO<sub>3</sub>, 2 mL of methyl orange indicator followed by enough HCl (1 + 2) or H<sub>2</sub>SO<sub>4</sub> (1 + 5) to make just acid (decided pink);
  - (c) stir until all CO<sub>2</sub> is removed;
  - (d) this solution is used in the gas-measuring tube and levelling bulb and seldom needs replacement.

## V. PROCEDURE

The test shall be carried out in accordance with the following instructions:

- (1) remove entire sample from package, pass through a No. 20 sieve and mix thoroughly;
- (2) accurately weigh 1.7 g of prepared sample into flask A and connect flask with apparatus as shown in figure 1;
- (3) open stopcock C, and use levelling bulb E to bring displacement solution to 10 mL graduation above zero mark on the gas-measuring tube;
- (4) this 10 mL is practically equal in volume to that of the acid to be used in decomposition;
- (5) let apparatus stand 1 - 2 min for temperature and pressure within apparatus to come to room conditions;
- (6) close stopcock C and lower levelling bulb somewhat to reduce pressure within apparatus;
- (7) with stopcock closed add 25 mL of HCl (1 + 2) or H<sub>2</sub>SO<sub>4</sub> (1 + 5) to buret;
- (8) open stopcock and slowly add 10 mL of HCl (1 + 2) or H<sub>2</sub>SO<sub>4</sub> (1 + 5) to decomposition flask;
- (9) to prevent escape of liberated CO<sub>2</sub> through acid buret into the air, keep displacement solution at lower level in levelling bulb than that in gas-measuring tube at all times during decomposition;
- (10) rotate and then vigorously agitate decomposition flask to mix contents thoroughly;
- (11) let stand five minutes to secure equilibrium;
- (12) use levelling bulb to equalize pressure in measuring tube and read volume of gas in tube;

- (13) observe temperature of air surrounding apparatus and also barometric pressure;
- (14) multiply mL of gas evolved by factor given in Table 52.007, Reference (1) for observed temperature and pressure.

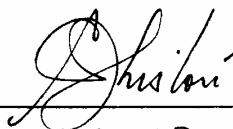
## VI. CALCULATIONS

- (1) Divide corrected reading obtained as above by 10 to give per cent CO<sub>2</sub> by weight in the sample.
- (2) Report as per cent carbon dioxide by weight in original sample.

## VII. REFERENCES

- (1) Official Methods of Analysis, Association of Official Analytical Chemists, Washington, D.C.  
Thirteenth Edition, P. 143 and 916, 1980

The method described above, being comprised of four pages, Figure 1 being comprised of one page, and identified as FO-3, DETERMINATION OF CARBON DIOXIDE IN BAKING POWDER and dated October 15, 1981, is hereby designated the "Official Method" for the purposes of Section B.03.002 of the Food and Drug Regulations.

  
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Acting Assistant Deputy Minister

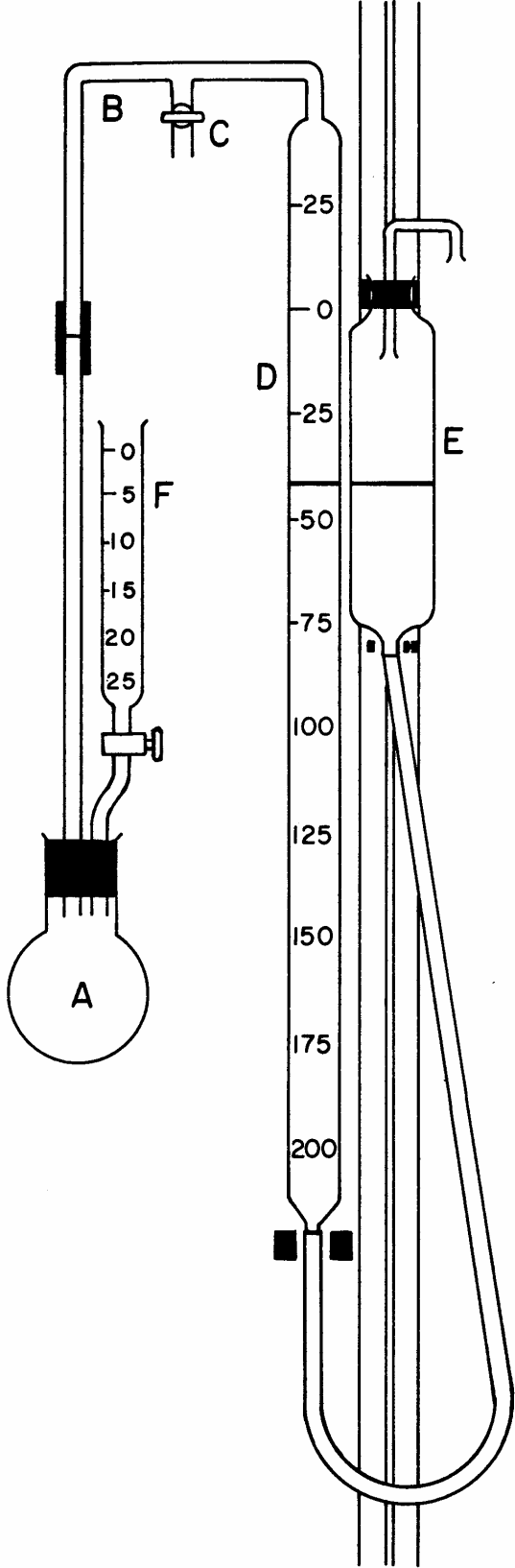


FIGURE 1