Official Method

October 15, 1981

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 (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_2SO_4) concentrated, reagent grade.

(3) HCl (1 + 2) or H_2SO_4 (1 + 5).

(4) Methyl orange indicator, 0.5% (w/v) aqueous solution.

(5) Sodium chloride (NaCl).

(6) Sodium hydrogen carbonate ($NaHCO_3$).

(7) Displacement solution.

(a) dissolve 100 g of NaCl in 350 mL of distilled water (H_2O);

(b) add approximately 1 g of $NaHCO_3$, 2 mL of methyl orange indicator followed by enough HCl (1 + 2) or H_2SO_4 (1 + 5) to make just acid (decided pink);

(c) stir until all CO_2 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_2SO_4 (1 + 5) to buret;

(8) open stopcock and slowly add 10 mL of HCl (1 + 2) or H_2SO_4 (1 + 5) to decomposition flask;

(9) to prevent escape of liberated CO_2 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_2 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.

Acting Assistant Deputy Minister

FIGURE 1