SORPTION OF CARBON DIOXIDE BY WHEAT

Shlomo NAVARRO

Department of Stored Products, Agricultural Research Organization, Bet Dagan 50-250, Israel.
Fax: 97239604428

Sorption of CO_2 by Soft Red Winter Wheat was tested in 1 liter jars containing 700 g of grain of 12.9% moisture content and filled to 93% of the jar capacity.

In one series of experiments, the jars of wheat were purged with CO_2 to contain an initial concentration of 99.8%. The jars were sealed and pressure changes were recorded periodically at different time intervals. All tests were carried out at temperatures of 15°, 20°, 25° and 30°C. In a second series of experiments different CO_2 partial pressures ranging from 30.6 to 98.6% were maintained in the filled jars at 25°C.

In the first series of experiments the sorption rate changed inversely with temperature of the wheat and the highest sorption was recorded at 20°C. The higher the temperature the shorter the time that was required for the sorption to reach steady state equilibrium. The times required to reach equilibrium varied inversely with temperature and were 65, 80, 95 and 120 h at temperatures of 30°, 25°, 20° and 15°C, respectively. Maximum sorption also varied inversely with temperature and was 260, 297, 331 and 393 mg CO_2 /kg of wheat at 30°, 25°, 20° and 15°C respectively.

A linear relationship was found between sorption of CO_2 and the partial pressure at a constant temperature. This was in accordance with the classic adsorbtion isotherm of Freundlich. Using this equation, the sorption of wheat at 25°C for any given CO_2 concentration in the range performed in our tests, can be calculated.