CHAPTER 4

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Although a large amount of work has already been done on the kinetics of thermal decomposition of magnesite as evident from literature review, but as yet there is no unanimity of opinion as to which one of the processes (i) Rate of chemical reaction, (ii) Rate of diffusion of \( \text{CO}_2 \) from the decomposing interface and (iii) Rate of heat transfer, is the slowest and thereby controls the kinetics of the decomposition of magnesite. Most workers consider that the decomposition starts from the surface of magnesite and then proceeds inwards. Some consider that it advances towards the centre at a constant rate whereas most workers consider that the rate of advancement is not constant. Various equations have been proposed to relate decomposition with time at different temperatures. It was felt that a detailed investigation under various conditions would throw further light on the thermal decomposition of magnesite vis-a-vis kinetics of heterogeneous reactions in which a solid decomposes into a solid and a gas. Hence the investigation was undertaken.

PLAN OF THE WORK

This consisted of a study of the rate of weight loss at five different temperatures between 500°C and 700°C of

(a) small cubes prepared from six raw magnesites of different sources.
(b) crushed magnesite powder of four size fractions from each of six sources;
   (i) 853 to 422 micron (average particle diameter = 0.0638 cm)
   (ii) 422 to 211 micron (average particle diameter = 0.0316 cm)
   (iii) 211 to 124 micron (average particle diameter = 0.0167 cm)
   (iv) 89 to 64 micron (average particle diameter = 0.0076 cm)
(c) cylindrical pellets prepared from each of the six magnesite powders (<64 micron) by pressing at 1350 Kg/cm\(^2\) pressure.
(d) cylindrical pellets prepared from mixtures of each of six magnesite powders (<64 micron) and 3 wt% ferric oxide at a pressure of 1350 Kg/cm\(^2\)

The above decomposition studies were conducted in atmospheric air as well as in vacuum.