

The results were as follows :

A. The rate of formation of zinc-ferrite was sensible to the heating temperature, and greatly affected by the origin and the preparation temperature of the Fe_2O_3 used.

i. The Fe_2O_3 obtained from ferrous oxalate was most active for the formation of zinc-ferrite. In this case, the reaction velocity was fast, and it required 30 mins. at 800°C . for its completion.

ii. The Fe_2O_3 obtained from $\text{Fe}(\text{NO}_3)_3$ was more active for the formation of zinc-ferrite than the Fe_2O_3 obtained from $\text{Fe}(\text{OH})_3$, but less than the Fe_2O_3 obtained from ferrous oxalate. In this case, reaction velocity was considerably fast, but the yield was limited to about 80 % for the heating temperature at 800° and 900°C .

iii. The Fe_2O_3 obtained from $\text{Fe}(\text{OH})_3$ was least active, and it required 30 mins. at 1300°C for its completion. Under the same condition, the higher the decomposition temperature of $\text{Fe}(\text{OH})_3$, less the yield of zinc-ferrite.

B. As to the composition of zinc-ferrite, it could not be confirmed accurately. It seems necessary to consider that the zinc-ferrite is probably capable of making solid solution with the Fe_2O_3 and the ZnO . On this point we are now on the research.

C. Zinc-ferrite had not ferromagnetism unless the used Fe_2O_3 , as the raw material, had not ferromagnetism.

11. On the Density Distribution of Fluidized Bed and the Miscibility of Different Fluidized Particles

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The density distribution of fluidized bed along different heights was measured by taking out the particles through the branched tubes equipped to the fluidizing-glass-tube.

The density is given as the value dividing the weight of particles taken out by its volume in fluidizing bed (state).

The density distribution varied with the linear velocity of fluidizing fluid (gas or liquid) U , the range of particles size distribution and the total mass of particles W_s .

This result of experiments is given by the following equation

$$\rho = \rho_b - \frac{A}{W_s} \frac{\rho_b - \rho_t}{aU + 1} h$$

where ρ is the fluidized bed density at the height of h cm. from the bottom, ρ_b and ρ_t are those at the bed-bottom and bed-top respectively, A is the cross sectional area of the bed, a is a constant, and ρ_b/ρ_t is approximately equal to the ratio of the weight of the maximum particle size by that of minimum one, contained in the bed. Thus it can be concluded that the density-distribution of fluidized bed is ascribed to the non-uniformity of the particles involved in the system. Accordingly uniform particles should be used to obtain the uniform density-distribution.

In the system of the two kinds of fluidized particles, they are separated in two layers, in the same manner as the system of two liquids which have poor solubility mutually. In this system the layer is richer in one component and *vice versa*.

This phenomenon is a peculiarity of fluidized bed which is distinguished from fixed bed or transporting powder.

In the system of same kinds or particles (and of different size) *i.e.*, coarse and fine sand system, they are separated into two layers more clearly in faster linear velocity of the fluidized fluid (gas or liquid) just as in water-trimethylamine system. In the case of the different species *i.e.* sand-carbon powder system, this tendency is inverse just as in water-phenol system. This character is the third phenomenon that the fluidized particles resemble to the liquid and also in this case it can be said that the temperature (as an intensive property) of fluidized particles correspond to the linear velocity of the fluidizing fluid (gas or liquid).

12. On the Rate of Alcoholysis of Hydrosilanes

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The reaction rates of alcoholysis of six hydrosilanes, shown in Table 1, were investigated in the presence of the catalysts of HCl, KOH *etc.* in alcoholic solution at the temperature of 40-50°C, measuring the hydrogen evolved in course of the reaction.

In the case of HCl catalyst, this reaction was the first order with respect to silane and the 1.8th order as to HCl respectively, and the observed values of the first order rate constant and activation energy at the concentration of HCl 2.1 *M* are given in Table 1.