size ($<4\mu$), but not always in case of the particles of the same size.

In conclusion, it is verified certainly that the inflammability depends mainly upon the volatile matter and size of the coal dust. Calcium carbonate is better as additionals, and the smaller, the more effective it is.

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8. Theory of Propagation of Detonation Wave.

Rempei Goto and *Nishio Hirai.*

In the flame front of the stationary detonation wave in the gaseous explosive mixtures, the resultant molecules have an excess energy which is the sum of the activation energy ε and heat of reaction Q. It is assumed that ε can be consumed for the activation of the adjacent zone and Q will be conserved as kinetic energy of the resultant molecules which will be distributed equally for all the degrees of freedom. Taking total mass of the resultant M, and the mean velocity of those molecules V,

$$\frac{1}{2} MV^2 = JQ \frac{f_t}{F}$$

where J is the mechanical equivalent of heat, F is tolal degree of freedom and f_t is that of translation. Thus the propagation velocity V can be calculated as follows:

$$V = \sqrt{2JQf_t/FM}$$

Regarding 15 cases of detonation, calculated velocity showed good agreement with observed values.

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9. On the Dielectric Properties of Starch. (I)

The Bahavior of Water Absorbed by Starch in the Field of Ultra High Frequency.

Naokazu Koizumi and *Sozaburo Ono.*

The nature of water absorbed by starch was examined by measuring its dielectric properties. The samples used are "α" modification (J. R. Katz: Z. phys. Chem. A **150**, 60 (1930)) and "β" one (native) of potato starch with various water contents from 0 to 17% and each of these samples was suspended in liquid paraffin. The measurements were made on the above mentioned suspended systems, after Drude's second method at the frequency of 214 megacycles per second and the dielectric canstant and loss were observed at various temperatures from 10^0 to 55^0C.

ε' of the system rises with increasing temperature and the more water content, the higher ε' at a given temperature. In case of less water content ε'' rises with the increaing temperature, but with heigher water content ε'' has a mximum at a given temperature, but decreases at higher temperature. This loss perhaps is due to rotation of dipoles of water molecules in starch. We can evaluate the relaxation time, by means of respresenting the values of ε' and ε'' for each system as a circular arc locus. (K. S. Cole and R. H. Cole: J. Chem. Phys. **9**, 341 (1941)). The values of τ for samples with water content more than 10% were found to be of the order of 10^{-9} seconds at room teperature, and τ_0 for "α" modification seems somewhat larger than that for "β" one for the same water content. Also from the circular arc loci, it may be inferred that the distribution of relaxation time is fairly broad.

From the above considerations, it appears that molecules of water loosely bound with starch in the systems in which the dispersion of the dielectric constant occurs at the present frequency in the neighbourhood of room temperature.

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10. On the Solvation of Dispersed Systems. (I)

Plastic Deformation and Slip Bands.

Rempei Goto and *Nishio Hirai.*

When the block of Bentonite clay kneaded with water which is thixotropic, is pressed with two pararell planes, there appear distinct slip-bands on the surface of the clay and the lines of band are inclined at 45° in the direction of the force given. If Bentonite has been heated above 800°C beforehand, it becomes hydrophobic and shows remarkable dilatarcy. Then, the slip bands do not appear and lines of crevice are observed to incline at 60° in the direction of the force. Under heat treatment at 550°C. There appears no slip band nor line of crevice and becomes as plastic as usual clay. Thus, in accordance with the degree of dehydration by heat treatment, thixotropic (hydrophilic) Bentonite becomes plastic and hydrophobic. Dehydrating with alcohol or NaCl, Bentonite clay kneaded with water becomes very plastic.

All the lyophobic dispersion systems which are composed of fine powders and liquid (for instance; S, $CaCO_3$ and starch with H_2O; Bentonite with benzene of oil) shows dilatancy and lines of crevice are inclined at 60° to the force.

It is considered that gellation, thixotropy, plasticity, dilatancy, slip band and lines of crevice all correspond to the degree of affinity between dispersion phase and their medium.