tial of various salt solutions (KCl, KI, $K_4Fe(CN)_6$, etc.) at various concentrations (from 10^{-2} to 10^{-7} norm.). Seeing the change of the potential generated by various salt solutions of different concentration at constant amplitude of vibration, it was proved that the more dilute the solution is, the larger the potential is. The potential-concentration curve gave a considerable parallelism with the results given by Lachs and Biczyk [Z. physik. Chem., **148**, 441 (1930)] measured by orginary electrostatic method. We measured secondly the change of electromotive force with the amplitude of vibration at 10^{-5} norm. KCl aq. solution and 10^{-5} norm. KCl 10% alcoholic aq. solution, and compared it with Ettisch and Zwanzig's results [Z. physik. Chem., **160**, 385 (1932)]. Contrary to their results, we got a linear relation between them in both cases. This means that the electrokinetic potential is independent of the pressure.

We are performing more detailed experiments. Its theoretical treatise shall be reported next time.

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7. Study on Powder Explosion. (IV)

The Relation between Inflammability and Volatile Matter of Coal, and the Influence of Additionals.

Rempei Goto, Eiji Suito and *Koiji Taki.*

For the purpose of preventing dust explosion which takes place frequently in a coal mine, we examined the relation between inflammability and volatile matter of coal and the influence of additionals by the dispersion method (This report, **15**, 41 (1946); **18**, 120 (1949); Science of powder, **2**, 88 (1948)). 23 kinds of coal which were different from each other in volatile matter (4.75%-43.5%) were examined. The lower the volatile matter, the lower was the inflammability, and below 27.27% it was uninflammable. When 6% or 9.9% of the volatile matter was removed from "Iwaki" coal, the inflammability decreased accurately.

5%-60% of SiO_2, Al_2O_3 and $CaCO_3$ (crushed marble and precipitated calcium carbonate) were added to "Iwaki" coal. Precipitated calcium carbonate indicated the remarkable control of inflammability, while marble showed the repressive action compared with others, and with an increase of the amount of additionals, the inflammation became difficult and stopped with 40% of precipitated calcium carbonate, 45% of marble and 50% of silika and alumina. The smaller the size of the additionals, the larger was the repression action.

In regard to the remarkable repressive action of the precipitated calcium carbonate, the mixed state wes observed by the microscope and found that the coal dust particles were covered with precipitated calcium carbonate particles of the smaller

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.