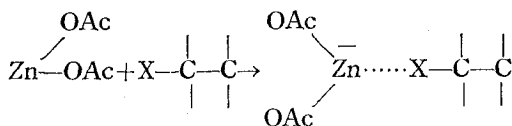


the complex compound with zinc acetate to increase the activity of zinc acetate for acetylene.

The negative part of active carbon which is shown by the symbol X, will probably be united with zinc acetate as follows.



### 32. X-ray Studies on the Reaction between Polyvinyl Alcohol and Boric Acid

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It was found recently in this laboratory, that a small amount of boric acid reduces enormously the effect of heat treatment of polyvinyl alcohol fibers. X-ray studies were therefore carried out to elucidate the mechanism of this disturbing effect of boric acid.

Reaction between aqueous solutions of polyvinyl alcohol and boric acid of various concentrations was at first studied. Above 3% (conce. of boric acid) polyvinyl alcohol was no more soluble and precipitation occurred. The precipitate showed, even after complete drying or heat treatment, no characteristic crystalline diagram of polyvinyl alcohol. With increasing concentration of boric acid, all interference rings became broader,  $A_1(d=7.98\text{\AA})$  of polyvinyl alcohol disappeared, and intensity of  $A_3$  decreased while that of  $A_1$  increased. Spacing of  $A_3$  decreased from  $4.52\text{\AA}$  to  $4.26\text{\AA}$ , while that of  $A_1$  increased from  $3.79\text{\AA}$  to  $4.11\text{\AA}$ . The typical X-ray diagram of the precipitate, obtained from 10% boric acid solution was an amorphous one.

Films or fibers of polyvinyl alcohol which had been subjected to heat treatment were immersed in boric acid solutions of various concentrations; above 7.5% crystalline interferences disappeared and only amorphous ones remained.

It may be concluded from these observations that polyvinyl alcohol reacts as a polyalcohol with boric acid to form a complex and random cross linkages are formed between fiber molecules, which disturbs crystallization of polyvinyl alcohol and reduces the effect of the heat treatment.