

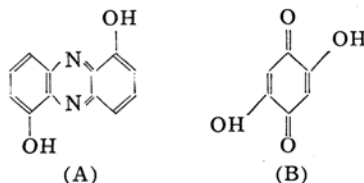
*Synthesis of Co-ordination Compounds of  
High Molecular Weight*

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An attempt has been made to synthesize polymers through co-ordination with metals. When bifunctional co-ordinating units enter into combination with a certain metal, linear polymers of the type -A-M-A-M-A- would be formed. Very little is known about the physico-chemical properties of such co-ordination polymers. The linear shape of the compounds would make them interesting subjects for various physico-chemical studies.

Along this line, two groups of compounds were synthesized: metal complexes of 1,6-dihydroxyphenazine (A) and those of 2,5-dihydroxybenzoquinone (B),



It was found that (A) gives stable co-ordination compounds with Cu (II), Ag (I), Fe (III) and Hg (II). For instance, when an alcoholic solution of (A) was

added to an aqueous solution of Cu (II) sulfate or acetate, a black precipitate formed at once, which was so fine that it was necessary to use a centrifugal machine to separate it from the solution (Found: Cu, 22; C, 52.22; N, 10.58; H, 2.35. Calcd. for  $\text{CuC}_{12}\text{H}_6\text{O}_2\text{N}_2$ : Cu, 23; C, 52.65; N, 10.28; H, 2.95%). Electron micrograph of the precipitate showed circular image of diameter ranging from  $0.1\mu$  to  $1\mu$ . Correspondingly x-ray diffraction pattern obtained by using Norelco x-ray diffractometer showed two diffuse haloes.

Cu (II), Ni (II) and Cd (II) form complex compounds with (B) by simply mixing aqueous solutions of these metal salts and an aqueous solution of sodium salt of (B) or an alcoholic solution of (B). Elementary analyses showed that all these compounds are 1:1 complexes. For example, Cu (II) compound was obtained as dark green precipitate (Found. Cu, 30; C, 35.5; H, 1.52. Calcd. for  $\text{CuC}_6\text{H}_2\text{O}_4$ : Cu, 31.6; C, 35.8; H, 1.0%). Under certain conditions, it suspends in water, forming colloidal solution, which can be kept unchanged over two months. The solution exhibited streaming double refraction. Electron micrographs of the compound revealed that it consists of small rodlike crystals of dimensions  $100\text{--}500\text{ m}\mu$  in length and  $50\text{ m}\mu$  in width. P. V. A. film containing the colloidal particles of this compound shows, on stretching, marked dichroism: by plane polarized light whose electric vector is parallel to the direction of stretching the film seems to be brown, while it is almost colorless when the electric vector is perpendicular to the direction of stretching. This anisotropy in absorption was measured by means of a Beckman Model DU spectrophotometer. A strong absorption band was found at  $25 \times 10^3\text{ cm}^{-1}$  ( $400\text{ m}\mu$ ).

The results of elementary analyses indicate that all these compounds are coordination polymers. Moreover, the observations on Cu(II)-(B) complex appear to suggest that this compound is a linear polymer. Various physico-chemical studies including structure analyses are now going on. The details of the work will be published later. The authors express their sincere thanks to Dr. M. L. Huggins\* for suggesting this problem.

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