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The addition reaction between ketone and bisulphite has been known since long but the kinetics and mechanism of the reaction do not appear to have been investigated. We have successfully studied the kinetics and mechanism and also the equilibrium constant of this reaction at different pH values using the polarographic technique. The principle of this technique is that at a potential of -1.0 V versus saturated calomel electrode (SCE), while bisulphite gives a diffusion current proportional to its concentration on a dropping mercury electrode (DME), neither the acetone nor the addition compound give any diffusion current. Utilizing this principle the kinetics and mechanisms of the addition reactions of bisulphite with acetone and with methyl ethyl ketone have been studied.

With a view to compare the reactivities of ionized and unionized forms of aromatic substrates in electrophilic reactions, the kinetic studies in the typical case of iodination of aniline/anilinium ion and of anthranilic acid/anthranilate ion have been carried out. Since these reactions are slow, conventional techniques have been used in these kinetic studies.

The iodination of aniline in aqueous solution is

known to be base catalysed. In the past the study of such base catalysis have involved measurement of specific rates at various base concentrations but without regard to the inevitable pH variation. Since the specific reaction rate of the iodination of aniline depends much on the pH, any evaluation of the catalytic constant of a base would lack significance unless the pH is maintained same. Taking full cognizance of this situation, the catalytic constants of five bases namely formate, acetate, propionate, phthalate and oxalate have been determined in the iodination of aniline.

The iodinations of aromatic substrates by iodine monochloride are much faster than by iodine in potassium iodide. A quantitative investigation of the extent to which iodine monochloride enhances the specific reaction rate of iodination of organic substrates has not been reported upto now. Hence the kinetics of the iodination of anthranilic acid and of aniline by iodine monochloride has been carried out and a quantitative comparison with iodination by iodine in potassium iodide has been made. These observations have been explained on the basis of the polar nature of the iodine monochloride as compared to the non-polar nature of iodine.

While kinetic data for the complexations of EDTA⁴⁻ and HEDTA³⁻ with nickel(II) have been reported in literature,

those for the complexation of H_2EDTA^{2-} and H_3EDTA^{1-} with nickel(II) have not been reported. This lacuna is presumably because of the closeness of the pKa values of their conjugate acids. Under these circumstances we have carried out the determination of specific reaction rates for complexation with these species by an analysis of the total observed specific reaction rate with respect to the relative proportions of H_2EDTA^{2-} and H_3EDTA^{1-} in a specified range of pH. In the lower pH range the polarographic technique using dropping mercury electrode is employed to follow the kinetics of the reaction and in the higher pH range the dropping mercury electrode has been incorporated in the continuous flow technique for following the course of the reaction.