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Catalysis, Complexation, and Photolysis

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1. CATALYSIS

General and specific acid and base catalyses have been discussed in Chapter 3, and are one example of catalysis. When discussing catalysis, however, the metal induced decomposition is what comes to the pharmaceutical investigator's mind. In parenterals especially, great care is taken to exclude metals, because only slight decomposition caused by trace metals may cause sufficient discoloration to render the product unsatisfactory. Examples of this are thiamine hydrochloride injectables and ascorbic acid injectables.

Metals are most detrimental in oxidations, as shown in the previous chapter. Examples of metal catalyzed oxidation in pharmaceutical systems are cyanocobalamine (which is stabilized at very low concentrations, but destabilized at higher concentrations of ferrous ion), erythromycin (which is stabilized by such ions as mercuric, magnesium calcium, ferric, and aluminum, and destabilized by cobaltous, plumbic, zinc, and nickel) and (Kassem et al., 1969) ascorbic acid (which, in general, is destabilized by metal ions).

Figure 1 shows data by Kassem et al. (1969). Barcza and Lenner (1988) have shown that chloral hydrate forms hydrogen bonded complexes with halide ions