The effect of pH on the structure and activity of yeast RNA polymerase I

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Abstract

The analysis of the effect of pH upon the rate of polymerization indicates that the activity of yeast RNA polymerase I is optimal between pH 7.5 and 9 and depends on the ionization state of two groups with apparent pK_a values of 6.5 and 10. Yeast RNA polymerase I is extremely labile at acid pH. Below pH 5 the enzyme is irreversibly inactivated by [H^+], with a second-order rate constant of $1.6 \times 10^{-4} M^{-1}$ min^{-1}. Sucrose gradient sedimentation and gel electrophoresis analysis of the enzyme inactivated at acid pH indicates the sequential dissociation of several enzyme subunits. The polypeptides of 44,000 and 24,000 daltons dissociate first from the enzyme core followed by the dissociation of the polypeptides of 48,000 and 36,000 daltons.