Evidence of essential arginyl residues in rabbit muscle pyruvate kinase

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Rabbit muscle pyruvate kinase is inactivated by 2,3-butanedione in borate buffer. The inactivation follows pseudo-first-order kinetics with a calculated second-order rate constant of 4.6 m-1 min-1. The modification can be reversed with almost total recovery of activity by elimination of the butanedione and borate buffer, suggesting that only arginyl groups are modified; this result agrees with the loss of arginine detected by amino acid analysis of the modified enzyme. Using the kinetic data, it was estimated that the reaction of a single butanedione molecule per subunit of the enzyme is enough to completely inactivate the protein. The inactivation is partially prevented by phosphoenolpyruvate in the presence of K+ and Mg2+, but not by the competitive inhibitors lactate and bicarbonate. These findings point to an essential arginyl residue being located near the phosphate binding site of phosphoenolpyruvate. © 1979.