

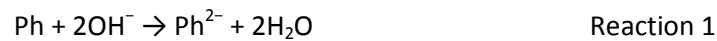
# Phenolphthalein Kinetics

**TO: Engineering Development Branch**

**FROM: Engineering Division**

**SUBJECT: Phenolphthalein Kinetics**

The reaction of phenolphthalein with a base solution follows the 2 reaction sequence given below.



Reaction 1 is very fast and can be assumed to be instantaneous.

Phenolphthalein could act as an indicator to determine the residence time of several large CSTR reactors in the pilot plant (see Fogler, Chapters 13-14). Your assignment is to determine the kinetic parameters for Reaction 2 with respect to phenolphthalein fading in sodium hydroxide in the temperature range of 60 – 120 °F. In addition to the rate constants, determine the heat of reaction and the equilibrium constant. Finally, indicate an equation that can be used to estimate the average reactor residence time based on measured inlet and outlet phenolphthalein concentrations and the kinetic parameters.

References:

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Barnes, M.O. and LaMer, V.K., J. Amer. Chem. Soc., 64, 2312, (1942).

Chen, P.T.Y. and Laidler, K.J., Canad. J. Chem., 37, 599, (1959).