

Module 2: Synthesis of Coordination Compounds and Kinetics

Pre-Lab questions.

1.- The thermal decomposition of an organic nitrile produced the following data:

$t/(10^3\text{s})$	0	2.00	4.00	6.00	8.00	10.00	12.00	∞
$[\text{nitrile}]/(\text{mol dm}^{-3})$	1.10	0.86	0.67	0.52	0.41	0.32	0.25	0

Determine the order of the reaction and the rate constant.

2.-Methane is a by-product of a number of natural processes (such as digestion of cellulose in ruminant animals, anaerobic decomposition of organic waste matter) and industrial processes (such as food production and fossil fuel use). Reaction with the hydroxyl radical OH is the main path by which CH₄ is removed from the lower atmosphere. T. Gierczak, R.K. Talukdar, S.C. Herndon, G.L. Vaghjiani, and A.R. Ravishankara (J. Phys. Chem. A 101, 3125 (1997)) measured the rate constants for the elementary bimolecular gas-phase reaction of methane with the hydroxyl radical over a range of temperatures of importance to atmospheric chemistry. Deduce the Arrhenius parameters A and E_a from the following measurements:

T/K	295	223	218	213	206	200	195
$k/ \frac{(10^6 \text{dm}^3)}{\text{molseconds}}$	3.55	0.494	0.452	0.379	0.295	0.241	0.217

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