CHEM 3011: Physical Chemistry
Chemical Kinetics, Fall 2015
Assignments

Here is a list of conceptual problems ("Q") and numerical problems ("P") from end-of-chapter in Engel and Reid "*Thermodynamics, Statistical Thermodynamics & Kinetics*" (TSK), 3rd Edition. (Chapters 18 and 19 of TSK are the same as chapters 35 and 36 of Engel and Reid "*Physical Chemistry*", 3rd Edition.) I suggest that you do these problems. They are a good practice for the tests and exam.

You should also review chapter 14 (Chemical Kinetics) in *General Chemistry*, 10th Edition, by Petrucci, Herring, Madura and Bissonnette.

Assignment #1: Q18.4, Q18.9
P18.2a), P18.4 (part c) is difficult), P18.7, P18.11, P18.12, P18.14, and P18.26

Assignment #2: Q18.10, Q18.11, Q18.12
P18.27a, P18.28, P18.39

Assignment #3: Q18.16, Q18.17, Q18.19
P18.38, P18.42, P18.45, P18.48, P18.50

Assignment #4: Q18.14, Q18.15, Q18.18
P18.8, P18.13, P18.29, P18.31, P18.35, P18.37 (take $E_a = 50.0\,kJ/mol$, not $E_a = 50.0\,J/mol$)

Assignment #5: Q19.3, Q19.4, Q19.6, Q19.7
P19.2, P19.3, P19.9, P19.10

Assignment #6: Q19.8, Q19.10, Q19.11
P19.10, P19.13, P19.14, P19.15, P19.16, P19.17, P19.19

Assignment #7: Q19.12, Q19.16, Q19.17
P19.23, P19.24, P19.27, P19.28, P19.30, P19.32

Assignment #8: Q19.19, Q19.20
P19.35, P19.37, P19.38, P19.39, P19.41

Assignment #9:
P19.42 (tough), P19.45, P19.46, P19.49a), P19.50a)

Answers and hints to some of the questions.

P18.35 ans.: 1.5, 57, 18100
P18.37 take $k_2/k_1 = \exp((-E_a/R)(1/T_2 - 1/T_1))$
P19.2 a) no, b) yes, c) use the preequilibrium approximation (PEA) for step 1, and the steady-state approximation (SSA) for N_2O.
P19.10 $R = k_2[A][B]$ and use the PEA in step 1 to get $[A]$.
P19.13 a) make the SSA for A^*: $R = k_3[A^*]$; b) set $[M] = 0$ and compare to equation (19.28).
P19.14 use equation (19.35), plot or tabulate $1/k_{uni}$ vs $1/[A]$.
P19.15 it is identical to the Lindemann mechanism, see the section from equation (19.23) to (19.28).
P19.17 Tabulate $1/R_0$ vs $1/[S]_0$ (Lineweaver-Burke); the slope is K_m/R_{max}, intercept is $1/R_{max}$, and $k_2 = R_{max}/[E]_0$.