Announcements

- Turn on the Clicker (the red LED comes on).

- Push "Join" button followed by "20" followed by the "Send" button (switches to flashing green LED if successful).

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Attention Chemistry Majors
Pizza With Chemistry Professors

> Meet the Faculty
> Meet Fellow Majors

Thursday Oct. 18th, 11 am - 1 pm, Room 436-HS

> Talk About Research
> Eat a Free Pizza Lunch

Review (S, G & macronutrients)

- Catabolism

  - Carbohydrates, Proteins, Lipids converted to pyruvate then to Acetyl CoA which passes into Krebs Cycle where CO_2 and H_2O are produced along with ADP --> ATP

  - Example of glycolysis (glucose -->pyruvate): steps with ΔG >0 driven by coupling to ATP + H_2O --> ADP + HPO_4^{2-}, where $\Delta G < 0$

  - Can tell whether process stores energy for organism by counting number of ATP --> ADP vs ADP --> ATP.

- DNA (deoxyribonucleic acid)

  - Sugar backbone

  - Bases on each sugar forms a double helix with bases pairing by H-bonding (A—T and C—G)

  - DNA transcribed to mRNA (decoded by ribosomes to make proteins)

Review (Kinetics)

- Kinetics is the study of the time variation of concentrations in systems of chemical reactions.

- Example: smog shows variation of which species are present versus time.
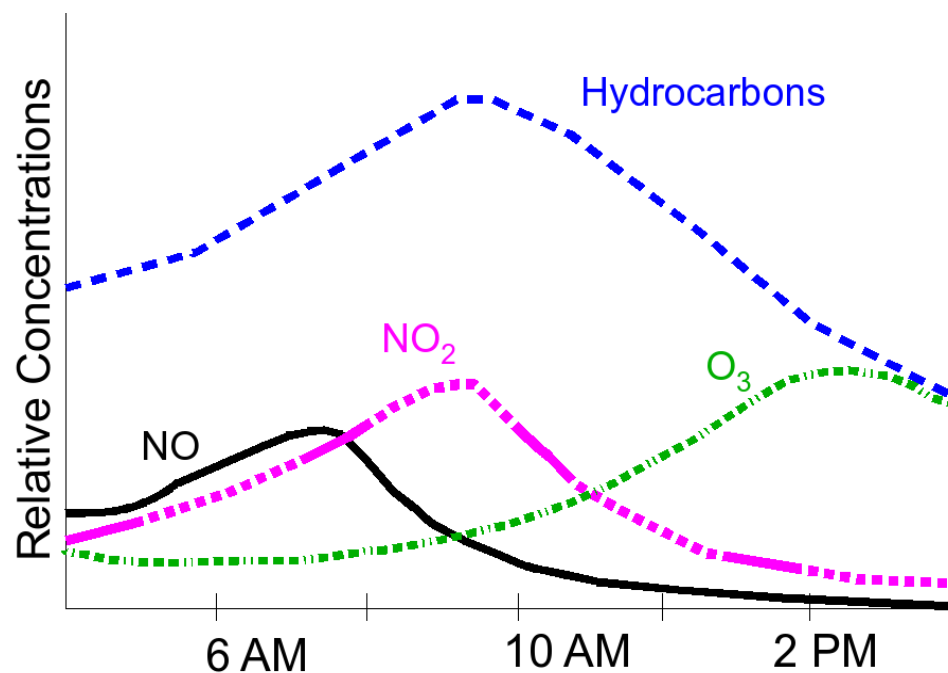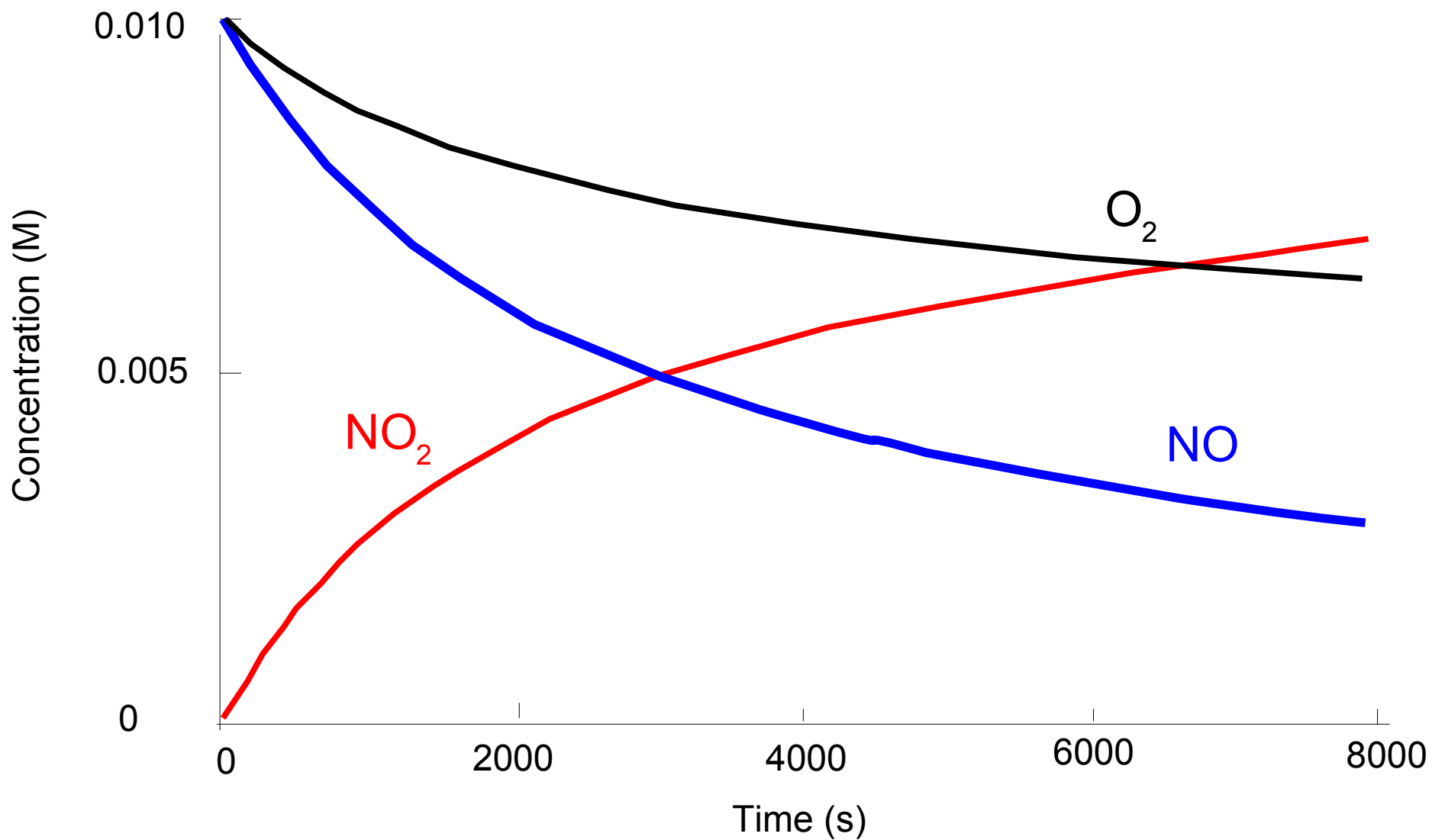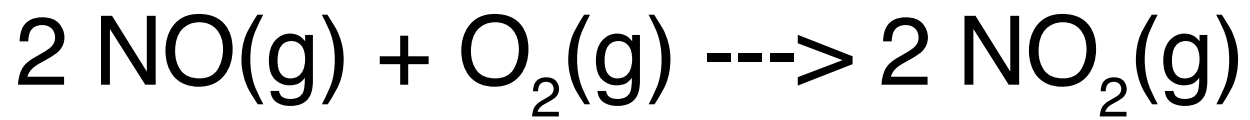
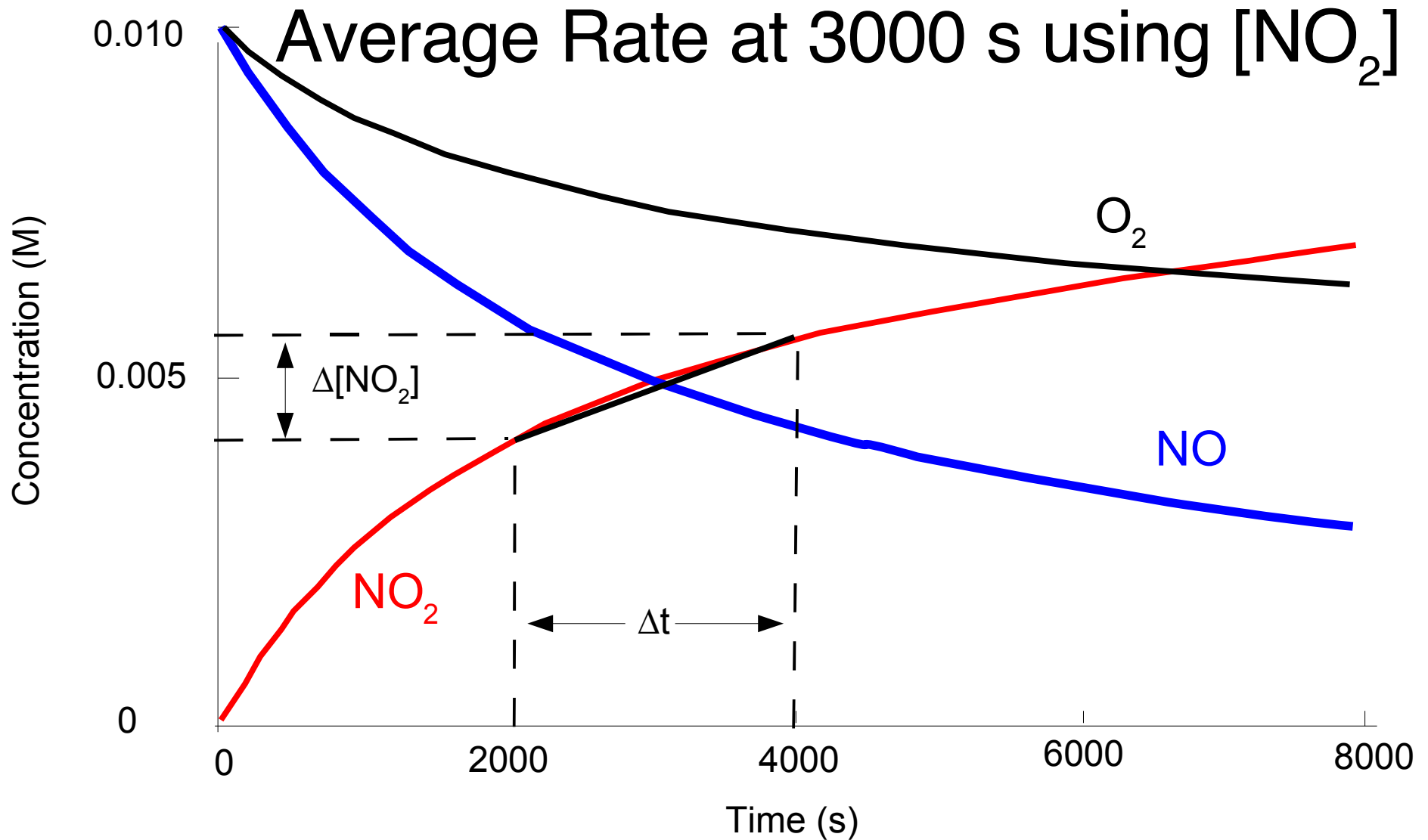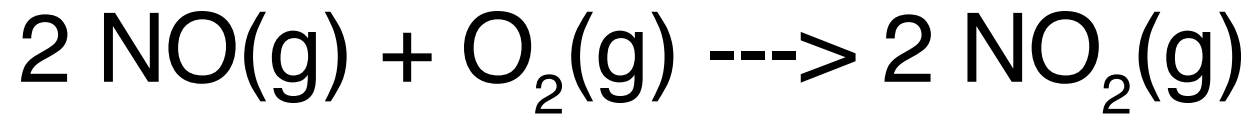 – Example: A ---> 2 B + C
  Average rate
  = R
  = $(1/2)\Delta[B]/\Delta t$
  = $\Delta[C]/\Delta t$
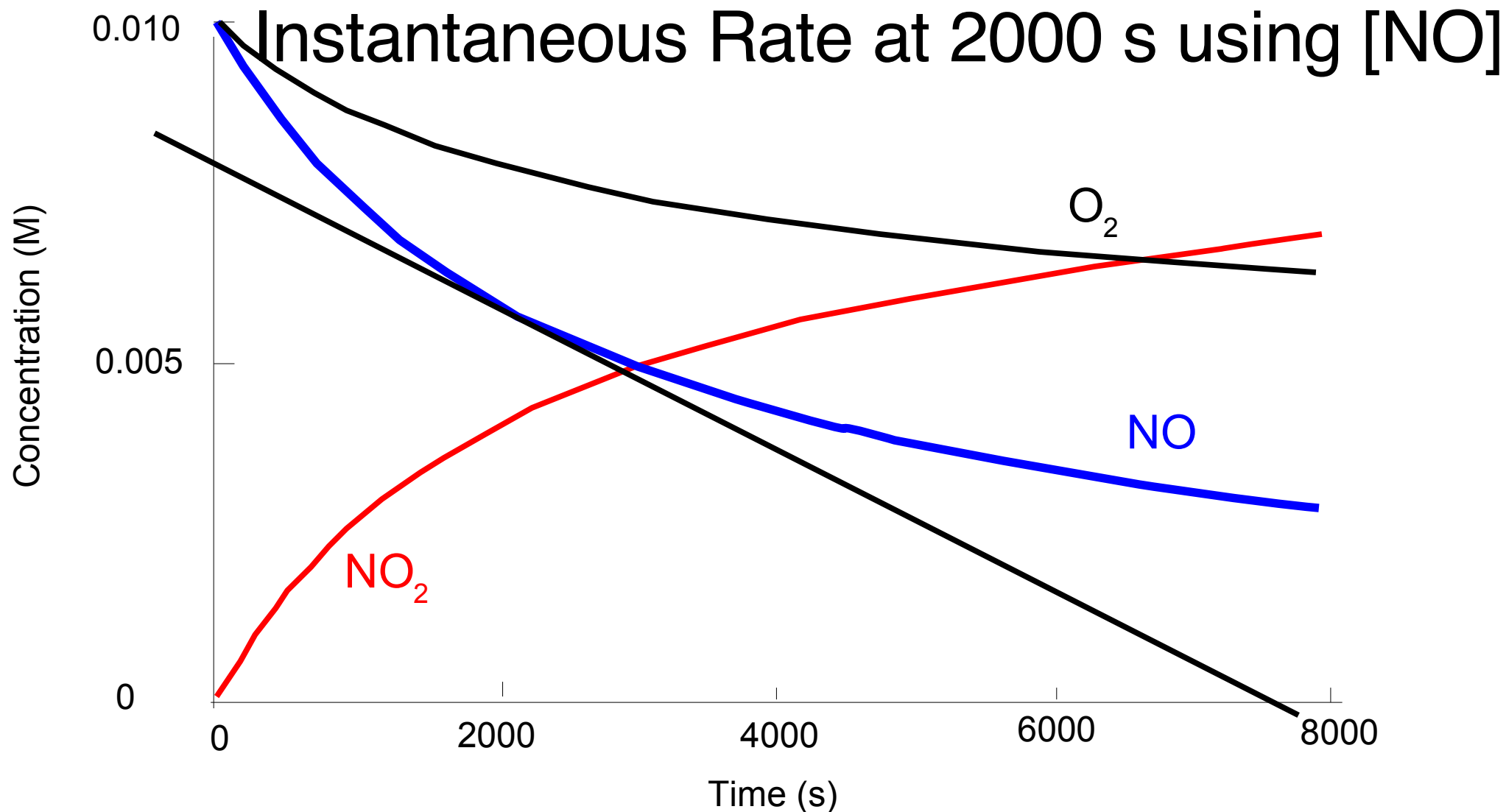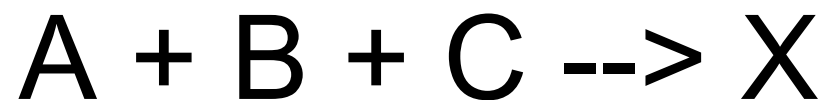 = $-\Delta[A]/\Delta t$

2 NO(g) + O$_2$(g) ---> 2 NO$_2$(g)

2 NO(g) + O_2(g) ---> 2 NO_2(g)

Average Rate at 3000 s using [NO_2]

R = (1/2)Δ[NO_2]/Δt = rise/run (2000-4000 s) ≈ (1/2)(0.0054 − 0.0042 M)/(4000-2000 s)

= 3.0 x 10^{-7} Ms^{-1}

2 NO(g) + O$_2$(g) ---> 2 NO$_2$(g)

Instantaneous Rate at 2000 s using [NO]

O$_2$

NO

NO$_2$

Concentration (M)

0.010

0.005

0

Time (s)

0   2000   4000   6000   8000
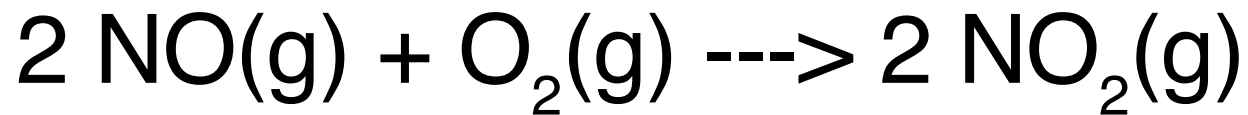
R = (-1/2)(d[NO]/dt)$_{2000s}$ = (-1/2)(slope of tangent at 2000 s)
= (-1/2)(0.0000 -0.0078 M)/(7600-0 s)= 5.1 x 10^{-7} Ms^{-1}

Initial Rate Data for RXN:
A + B + C --> X

$(d[X]/dt)_o$	$[A]_o$	$[B]_o$	$[C]_o$
1.0 M/s	10.0	10.0	0.01
4.0 M/s	10.0	10.0	0.02
16.0 M/s	10.0	10.0	0.04
2.0 M/s	20.0	10.0	0.01
4.0 M/s	40.0	10.0	0.01
1.0 M/s	10.0	100.0	0.01