Problems discussed in the videos:

Videos (1) – (3)

Initial Rates from Three Experiments for the Reaction

$NH_4^+ (aq) + NO_2^- (aq) \rightarrow N_2 (g) + 2H_2O (l)$

Experiment	Initial Concentration of NH_4^+	Initial Concentration of NO_2^-	Initial Rate (mol L^{-1} s^{-1})
1	0.100 M	0.0050 M	1.35×10^{-7}
2	0.100 M	0.010 M	2.70×10^{-7}
3	0.200 M	0.010 M	5.40×10^{-7}

Use this data to determine the rate law for this reaction.

Videos (4) – (5)

The reaction between bromate ions and bromide ions in acidic aqueous solution is given by the following equation:

$BrO_3^- (aq) + 5\ Br^- (aq) + 6\ H^+ (aq) \rightarrow 3\ Br_2 (l) + 3\ H_2O (l)$

The following table gives the results of four experiments involving this reaction. Using these data, determine the orders for all three reactants, the overall reaction order, and the value of the rate constant.

The Results from Four Experiments to Study the Reaction

$BrO_3^- (aq) + 5\ Br^- (aq) + 6\ H^+ (aq) \rightarrow 3\ Br_2 (l) + 3\ H_2O (l)$

Experiment	Initial Concentration of BrO_3^- (mol/L)	Initial Concentration of Br^- (mol/L)	Initial Concentration of H^+ (mol/L)	Measured Initial Rate (mol L^{-1} s^{-1})
1	0.10	0.10	0.10	8.0×10^{-4}
2	0.20	0.10	0.10	1.6×10^{-3}
3	0.20	0.20	0.10	3.2×10^{-3}
4	0.10	0.10	0.20	3.2×10^{-3}

Videos (8) – (10)

The decomposition of N_2O_5 in the gas phase was studied at constant temperature:

$$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$$

The following results were collected:

$[N_2O_5]$ (mol/L)	Time (s)
0.1000	0
0.0707	50
0.0500	100
0.0250	200
0.0125	300
0.00625	400

Using these data, determine the integrated rate law.

Videos (11) – (13)

Butadiene reacts to form its dimer according to the equation

$$2C_4H_6(g) \rightarrow C_8H_{12}(g)$$

The following data were collected for this reaction at a given temperature:

$[C_4H_6]$ (mol/L)	**Time (±1s)**
0.01000	0
0.00625	1000
0.00476	1800
0.00370	2800
0.00313	3600
0.00270	4400
0.00241	5200
0.00208	6200

Using these data, determine the integrated rate law.