1. **STUDY CHECK**

For the reaction below, the rate of appearance of C is 0.3M/s. Calculate: (a) The rate of disappearance of A and B. (b) The rate of appearance of D. (c) The rate of reaction.

$$5\,A + 2\,B \longrightarrow C + 2\,D$$

Answer: r_A=-1.5M/s, r_B=-0.6M/s, r_D=0.6M/s, and r=0.3M/s

2. **STUDY CHECK**

Given the following rate law. Calculate: (a) The rate constant giving the correct units. (b) The partial order of all species. (c) The total order of the reaction. (d) If [A] is doubled how would the reaction rate be affected?

$$r = 0.056[A]^4[B]^2[C]^2$$

Answer: Orders: A(4), B(2), C(2), overall(8); k=0.056 $1/M^7s$; 16 times larger

3. **STUDY CHECK**

Given the following rate constants indicate the reaction order: (a) k=0.03 1/s (b) k=3×10^{-4} L/smol (c) k=3×10^{-5} $1/sM^2$

Answer: (a) Order 1 (b) Order 2 (c) Order 3

4. **STUDY CHECK**

Identify the following rate law as differential or integral and switch into the other form for an initial concentration of 0.3M.

$$r = 5 \times 10^{-2}$$

Answer: $[A] = -5 \times 10^{-2} \cdot t + 0.3$

5. **STUDY CHECK**

Calculate the half-life for a first order reaction with initial concentration of 5.99×10^3 mol/L if the rate constant is 0.02 1/s?

Answer: 3.465s

6. **STUDY CHECK**

Use the data below to calculate the rate law of the following reaction: A $\longrightarrow$ B

Experiment	r (M/s)	$[A]$, (M)
1	0.5	2.5
2	0.6	3.0

Answer: $r = 0.2[A]^1$

7. **STUDY CHECK**

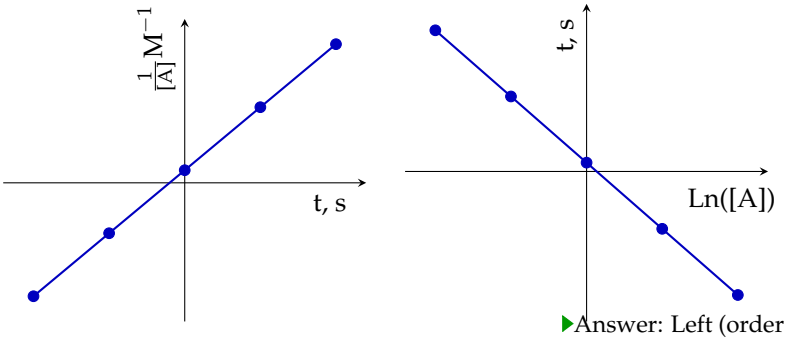
Use the data below to calculate the rate law of the following reaction: A + B $\longrightarrow$ C

Experiment	$[A]$ (M)	$[B]$ (M)	r (M/s)
1	0.5	0.2	2×10^{-4}
2	0.6	0.2	2×10^{-4}
3	0.5	0.3	4.5×10^{-4}
4	0.6	0.3	4.5×10^{-4}

Answer: $r = 5[B]^2$

8. STUDY CHECK

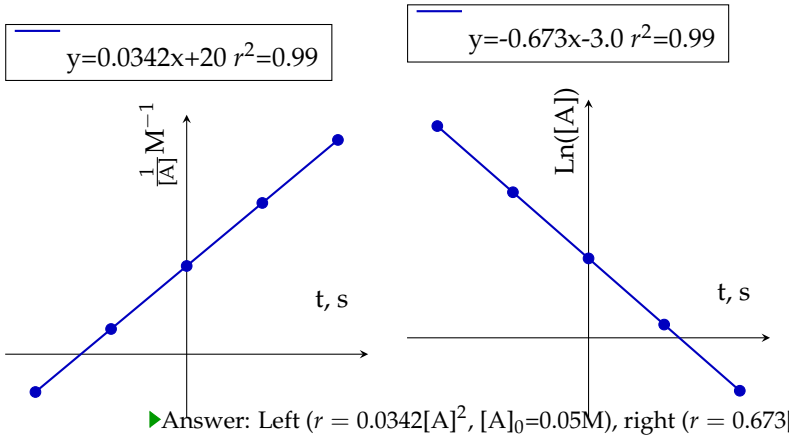
The following plots results from processing kinetic data by means of the integral method. They are all perfect lines with r^2=0.99. Indicate the order of the reaction.



Answer: Left (order 2), right (order 1)

9. STUDY CHECK

The following plots results from processing data by means of the integral method. Interpret the linear regressions and indicate the rate law and the initial concentration of reactants.



Answer: Left ($r = 0.0342[A]^2$, $[A]_0$=0.05M), right ($r = 0.673[A]$, $[A]_0$=0.05M)

10. **STUDY CHECK**

Using the following data, calculate the order and rate constant and write down the rate law.

t (s)	0	6	12	18	24
$[A]$, (M)	1.0000	0.5000	0.2500	0.1250	0.0625

Answer: $r = 0.115[A]$

11. **STUDY CHECK**

How would the following changes affect the rate of this reaction:

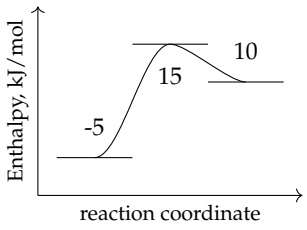
$$2\,H_2(g) + O_2(g) \longrightarrow 2\,H_2O(g)$$

(a) Removing oxygen; (b) Decreasing temperature

Answer: (a) slow down; (b) slow down.

12. **STUDY CHECK**

For the energy profile below



Calculate (a) The energy of the reactants (b) The energy of the products (c) The energy of the transition state (d) The activation energy (e) The reaction energy (f) Indicate whether the reaction is endothermic or exothermic

Answer: (a) -5kJ/mol (b) 10kJ/mol (c) 15kJ/mol (d) 20kJ/mol (e) 15kJ/mol (f) Endothermic

13. **STUDY CHECK**

The Arrhenius parameters for the gas-phase reaction below are 6×10^{-12} s^{-1} and 665J/mol.

$$H_2S + OH \longrightarrow HS + H_2O$$

Calculate: (a) the rate constant at 300K. (b) the temperature at which the rate constant is 5×10^{-12} s^{-1}

Answer: (a) 4.6×10^{-12} s^{-1} (b) 500K

14. **STUDY CHECK**

Using the following data, calculate the Arrhenius parameters (the activation energy and the frequency factor) for the following gas-phase reaction:

$$HS + Cl_2 \longrightarrow ClSH + Cl$$

T (K)	k, (s^{-1})
100	1.1×10^{-15}
200	1.4×10^{-13}
300	6.9×10^{-13}
400	1.5×10^{-12}

Answer: $E_a = 5737 J/mol$, $A = 1.7 \times 10^{-11}$ s^{-1}.

15. **STUDY CHECK**

Using the following data, calculate the Arrhenius parameters (the activation energy and the frequency factor) for the following gas-phase reaction:

$$HS + Cl_2 \longrightarrow ClSH + Cl$$

T (K)	k, (s^{-1})
100	1.1×10^{-15}
200	1.4×10^{-13}
300	6.9×10^{-13}
400	1.5×10^{-12}

Answer: $E_a = 5737 J/mol$, $A = 1.7 \times 10^{-11}$ s^{-1}.

 Name: _____