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.

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

Show work to get full credit

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?

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

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3. ◈ STUDY CHECK

Given the following rate constants indicate the reaction order: (a) $k=0.03\ 1/s$ (b) $k=3 \times 10^{-4}\ L/smol$
(c) $k=3 \times 10^{-5}\ 1/sM^2$
Show work to get full credit

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.

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

Show work to get full credit

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?
Show work to get full credit

6. ◈ **STUDY CHECK**
Use the data below to calculate the rate law of the following reaction: A $\longrightarrow$ B

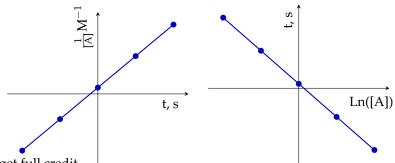| Experiment	r (M/s)	$[A]$, (M)
1	0.5	2.5
2	0.6	3.0

Show work to get full credit

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}

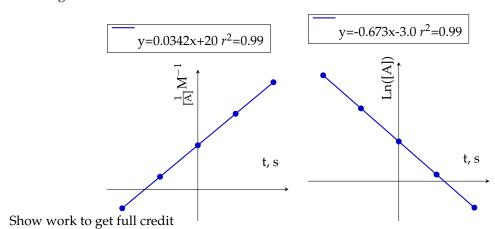Show work to get full credit

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.

Show work to get full credit

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.
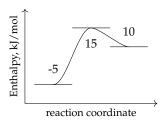
y=0.0342x+20 $r^2=0.99$

y=-0.673x-3.0 $r^2=0.99$

Show work to get full credit

10. ◈ **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

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11. ◈ **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

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12. ◈ **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}

Show work to get full credit

13. ◈ **STUDY CHECK**

Write down the forward and reverse reactions for the reaction:

$$CO(g) + O_2(g) \rightleftharpoons CO_2(g)$$

Show work to get full credit

14. ◈ **STUDY CHECK**

The value of K_c for $F_2(g) \rightleftharpoons 2\,F(g)$ at 500K is 7×10^{-13}. Indicate whether the equilibrium mixture will contain mostly reactants, mostly products or both.
Show work to get full credit

15. ◈ **STUDY CHECK**

Write down the expression of K_c for the following reaction:
$Pb^{2+}_{(Aq)} + 2\,I^-_{(Aq)} \rightleftharpoons PbI_2(s)$.   Show work to get full credit

16. ◈ **STUDY CHECK**

For the following reaction

$$SO_2Cl_{2(g)} \rightleftharpoons SO_{2(g)} + Cl_{2\,(g)}$$

The value of K_p at 300K is 0.05. Calculate the value of K_c at the same temperature.
Show work to get full credit

17. ◈ **STUDY CHECK**

The value of the equilibrium constant for the reaction

$$C_3H_{8(g)} + 5\,O_{2(g)} \rightleftharpoons 4\,H_2O_{(g)} + 3\,CO_{2(g)}$$

is 500 at a given temperature. An analysis of an equilibrium mixture gave a concentration of water, carbon dioxide and C_3H_8 of 1M. Calculate the equilibrium concentration of oxygen at that temperature.

Show work to get full credit

18. ◈ **STUDY CHECK**

We prepare mixtures of four chemicals in an experiment. These chemicals are interconnected by the following equilibrium:

$$CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)} \qquad\qquad K_c = 0.48$$

Indicate if the mixture is in equilibrium. If it is not, indicate whether the reaction will evolve towards the left or the right to reach equilibrium.

Experiment	1
$[CO_2]$	0.0015
$[H_2]$	0.0076
$[CO]$	0.0094
$[H_2O]$	0.0025

Show work to get full credit

19. ◈ **STUDY CHECK**

For next exothermic reaction indicate whether the reaction will shift right ($\longrightarrow$) or left ($\longleftarrow$) after the following changes:

$$C\,(g) + O_2\,(g) \rightleftharpoons CO_2\,(g) + \text{Heat}$$

(a) removing reactants (b) removing products (c) decreasing the temperature.
Show work to get full credit