

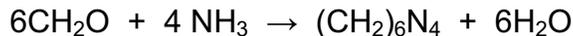
- An aqueous solution of calcium bromide has a concentration of 0.441 molal. The percent by mass of calcium bromide in the solution is:
 - 8.10%
- The melting point of ethanol $\text{CH}_3\text{CH}_2\text{OH}$ is $-117.300\text{ }^\circ\text{C}$ at 1 atmosphere ($K_f(\text{ethanol}) = -1.99\text{ }^\circ\text{C/m}$). In a laboratory experiment, students synthesized a new compound and found that when 10.60 grams of the compound were dissolved in 241.0 grams of ethanol, the solution began to melt at $-117.778\text{ }^\circ\text{C}$. The compound was also found to be nonvolatile and a non-electrolyte. What is the molecular weight they determined for this compound?
 - 183 g/mol
- For the decomposition of ammonia on a platinum surface at $856\text{ }^\circ\text{C}$

$$2\text{ NH}_3 \longrightarrow \text{N}_2 + 3\text{ H}_2$$
 the average rate of disappearance of NH_3 over the time period from $t = 0\text{ s}$ to $t = 4746\text{ s}$ is found to be $1.50\text{e-}6\text{ M s}^{-1}$. The average rate of formation of H_2 over the same time period is:
 - $2.25\cdot 10^{-6}\text{ M s}^{-1}$
- The gas phase decomposition of nitrogen dioxide at $383\text{ }^\circ\text{C}$

$$2\text{ NO}_2 \longrightarrow 2\text{ NO} + \text{O}_2$$
 is second order in NO_2 with a rate constant of $0.540\text{ M}^{-1}\text{s}^{-1}$. If the initial concentration of NO_2 is $8.76\cdot 10^{-2}\text{ M}$, the concentration of NO_2 will be $2.19\cdot 10^{-2}\text{ M}$ after how many seconds?
 - 63.4 s
- What is the mol fraction Na_2SO_4 in a solution which is 11.5% by weight Na_2SO_4 (molar mass $\text{Na}_2\text{SO}_4 = 142.06\text{ g/mol}$ and $\text{H}_2\text{O} = 18.016\text{ g/mol}$)?
 - 0.0162
- If the mol fraction NaCl in a solution is 0.0175, what is the weight percent NaCl (molar mass $\text{NaCl} = 58.44\text{ g/mol}$ and $\text{H}_2\text{O} = 18.016\text{ g/mol}$)?
 - 5.46%
- What is the mol fraction NaNO_3 in a solution which is 2.15 m?
 - 0.0373

8. A 1.34 M NiCl_2 (molar mass = 129.6 g/mol) solution has a density of 1.12 g/cm^3 . What is the weight percent NiCl_2 of the solution?
- c. 15.5%
9. A volumetric flask is necessary for the preparation of which one of the following concentration measurements?
- d. molarity
10. Which of the following solutions would have the lowest vapor pressure?
- b. 1 m MgCl_2
11. In general, as the temperature increases, the rate of a chemical reaction
- c. increases due to a greater number of effective collisions.
12. If the activation energy for the forward reaction of a given process is +110 kJ and the activation energy for the reverse reaction of the same process is +60.0 kJ, then the energy change for the overall process is
- b. +50 kJ
13. In basic solution, $(\text{CH}_3)_3\text{CCl}$ reacts according to the equation
 $(\text{CH}_3)_3\text{CCl} + \text{OH}^- \rightarrow (\text{CH}_3)_3\text{COH} + \text{Cl}^-$
The accepted mechanism for the reaction is
 $(\text{CH}_3)_3\text{CCl} \rightarrow (\text{CH}_3)_3\text{C}^+ + \text{Cl}^-$ (slow)
 $(\text{CH}_3)_3\text{C}^+ + \text{OH}^- \rightarrow (\text{CH}_3)_3\text{COH}$ (fast)
What is the rate law expression for the reaction?
- d. rate = $k[(\text{CH}_3)_3\text{CCl}]$
14. The reaction $\text{X} \rightarrow \text{Y}$ follows first-order kinetics with $k = 0.83/\text{min}$. If the initial concentration of X is 3.6 M, what is the concentration of X after 15 minutes?
- e. 1.4×10^{-5} M
15. For a reaction, the rate law is rate = $k[\text{A}]^1[\text{B}]^0[\text{C}]^1$. What are the units for k where the time unit is seconds (s)?
- b. $\text{L/mol}\cdot\text{s}$

16. For the reaction



the rate is expressed as $1/6(\Delta[\text{H}_2\text{O}]/\Delta t)$. An equivalent would be

d. $-1/4(\Delta[\text{NH}_3]/\Delta t)$

17. Given the initial rate data for the reaction $\text{A} + \text{B} \rightarrow \text{C}$, determine the rate expression for the reaction.

<u>[A], M</u>	<u>[B], M</u>	<u>$\Delta[\text{C}]/\Delta t$ initial M/s</u>
0.10	0.20	5.00
0.20	0.20	10.0
0.10	0.15	2.81

a. $\Delta[\text{C}]/\Delta t = 1250[\text{A}][\text{B}]^2$

18. After five half-life periods for a first-order reaction, what is the molarity of a reagent initially at 0.366 M?

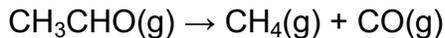
a. 1.14×10^{-2}

19. Which of the following reactions will have the greatest rate at 298 K? Assume that the frequency factor A is the same for all reactions.

c. $\Delta E = -10 \text{ kJ/mol}$ $E_a = 15 \text{ kJ/mol}$

e. $\Delta E = -10 \text{ kJ/mol}$ $E_a = 15 \text{ kJ/mol}$ (typo led to two possible correct choices)

20. The reaction



proceeds via the rate expression $\Delta[\text{CO}]/\Delta t = [\text{CH}_3\text{CHO}]^{3/2}$. What is the overall order of the reaction?

e. three-halves-order