

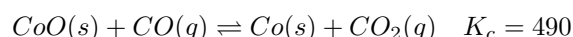
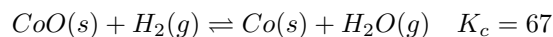
CHEM 1212K READING DAY STUDY SESSION - FALL 2017

1. When 2.00 mol of SO_2Cl_2 is placed in a 2.00 L flask at 303 K, 56% of the SO_2Cl_2 decomposes to SO_2 and Cl_2 :



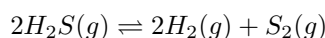
What is the equilibrium constant in terms of molar concentrations, K_c , for this reaction at 303K?

2. The following K_c values were attained at 823 K:



Calculate the equilibrium constant for: $H_2(g) + CO_2(g) \rightleftharpoons CO(g) + H_2O(g)$ at 823K.

3. Calculate the Gibbs free energy of reaction, $\Delta G_{r \times n}$, that occurs in a closed vessel with constant volume, temperature and total pressure for the reaction:



when the partial pressures of the substances are as follows: $P_{H_2S} = 0.445$ bar; $P_{H_2} = 0.112$ bar; $P_{S_2} = 0.055$ bar. The value of $K = 2.4 \times 10^{-4}$ at 1073K.

4. A 0.084 M solution of phenylacetic acid, $C_6H_5CH_2COOH$, has a pH of 2.68. What is the acid dissociation constant for this acid?
5. Which of the following will act as the strongest base in water?



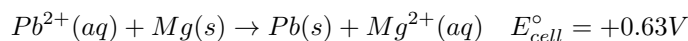
6. Hypoiodous acid, HIO , has a $pK_a = 10.64$ at $25^\circ C$. A solution is 0.250 M of hypoiodous acid. What is the $[OH^-]$ in the solution?
7. What is the pH of 0.045 M solution of $Sr(OH)_2$?
8. $K_{sp} = 1.4 \times 10^{-7}$ for copper(II) iodate, $Cu(IO_3)_2$ in water at $25^\circ C$. Estimate the molar solubility of the compound at $25^\circ C$.

9. A buffer contains equal amounts of a weak base and its conjugate acid. It has a $pH = 10.84$. Out of the following, what is a reasonable value for the pH after the addition of a small amount of base?

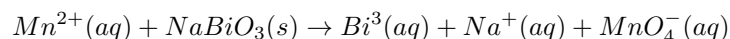
3.16 7.00 10.74 10.94 13.84

10. What is the pH of a 0.265 M solution of ammonium nitrate, NH_4NO_3 ? The K_b value of $NH_3 = 1.76 \times 10^{-5}$.
11. Consider the titration of 30.0 mL of 0.115 M KOH with 0.250 M $HClO_4$. What is the pH after 10.0 mL of $HClO_4$ has been added?
12. Approximately how many moles of $NaOH$ must be added to 1.00 liter of 0.150 M acetic acid to make the pH of the solution 5.240? Assume no change in volume. The K_a of acetic acid = 1.8×10^{-5} .

13. Calculate $\Delta G_{r \times n}^\circ$ in kJ for the following reaction occurring in a galvanic cell at $25^\circ C$.



14. Balance the following reaction in acidic solution.



What is the coefficient in front of $\text{H}^+(\text{aq})$ and which side of the equation is it on in the overall, balanced reaction?

15. Gold can be plated out of a solution containing Au^{3+} . What mass of gold (in grams) can be plated by a 10.0-min. flow of a 5.5 Amp current?
16. A galvanic electrochemical cell was made at 25°C using the redox couples Mn^{2+}/Mn and Sn^{2+}/Sn . What is the cell potential of the electrochemical cell?
17. If the cell potential of a galvanic cell made using the redox couples H^+/H_2 and Zn^{2+}/Zn is 0.55 V at 25°C when the concentration of zinc ions is 1.2 M and the partial pressure of $\text{H}_2 = 1.0\text{ atm}$, what is the pH of the cathode solution?
18. If you start with 0.0250 mol of $\text{N}_2\text{O}_5(\text{g})$ in a volume of 2.0 L , how many minutes will it take for the quantity of $\text{N}_2\text{O}_5(\text{g})$ to drop to 0.010 mol ?
19. Which of the following extrinsic semiconductors would form a p -type semiconductor?

$\text{Ge} : \text{S}$ $\text{Ge} : \text{P}$ $\text{Si} : \text{Al}$ $\text{Si} : \text{N}$

CHEM 1212K READING DAY STUDY SESSION - FALL 2017 (SOLUTIONS)

- | | |
|--------------------------|------------------------------------|
| 1. 0.71 | 11. $\text{pH} = 12.376$ |
| 2. $K_c = 0.14$ | 12. 0.114 mol NaOH |
| 3. 24 kJ/mol | 13. -120 kJ |
| 4. 5.4×10^{-5} | 14. 14, left side of the equation. |
| 5. ClO^- | 15. 2.2 g |
| 6. 4.2×10^{-9} | 16. $+1.04\text{ V}$ |
| 7. $\text{pH} = 12.95$ | 17. $\text{pH} = 3.51$ |
| 8. 0.0033 mol/L | 18. 2.2 min. |
| 9. 10.94 | 19. $\text{Si} : \text{Al}$ |
| 10. $\text{pH} = 4.911$ | |