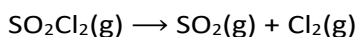


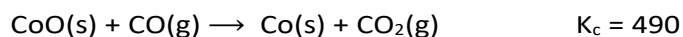
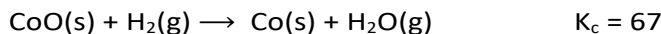
CHEM 1212K Reading Day Study Session – Spring 2019

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: $\text{H}_2(\text{g}) + \text{CO}_2(\text{g}) \longrightarrow \text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g})$ at 823K.

3. A 0.084 M solution of phenylacetic acid, $\text{C}_6\text{H}_5\text{CH}_2\text{COOH}$, has a pH of 2.68. What is K_a for this acid?
4. Which of the following will act as the strongest base in water?

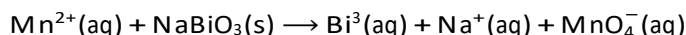


5. Hypoiodous acid, HIO , has a $\text{p}K_a = 10.64$ at 25°C . What is the $[\text{OH}^-]$ in a 0.250 M solution of HIO ?
6. What is the pH of 0.045 M solution of $\text{Sr}(\text{OH})_2$?
7. $K_{sp} = 1.4 \times 10^{-7}$ for copper(II) iodate, $\text{Cu}(\text{IO}_3)_2$ in water at 25°C . Estimate the molar solubility of the compound at the same temperature.
8. 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
9. What is the pH of a 0.265 M solution of ammonium nitrate, NH_4NO_3 ? The K_b for $\text{NH}_3 = 1.76 \times 10^{-5}$.
10. 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?
11. 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 with addition of NaOH . The K_a of acetic acid = 1.8×10^{-5} .

12. Calculate ΔG° for the following reaction that occurs in a galvanic cell at 25°C .



13. 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?

14. Gold can be plated out of a solution containing Au^{3+} . What mass of gold (in grams) can be plated by 5.5 Amp current applied for 10 minutes?

15. 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?
16. 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 $\text{H}_2 = 1.0$ atm, what is the pH of the cathode solution?
17. 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? Assume a first order rate constant $k = .416 \text{ min}^{-1}$
18. Which of the following extrinsic semiconductors would form a p-type semiconductor?
- Ge : S Ge : P Si : Al Si : N

19. Which statement is *true*?

- A) Co has a greater atomic radius than Rh.
- B) Fe has fewer possible oxidation states than Ti.
- C) Mn has a greater atomic radius than Sc.
- D) Ru and Os have similar atomic radii.
- E) The maximum possible oxidation state for V (vanadium) is +3.

20. How many *d* electrons does Co^{3+} possess?

21. What characteristic do isomers of all types share?

- A) The number and type of atoms
- B) The connectivity of atoms
- C) The spatial arrangement of atoms
- D) The type of ligands involved
- E) The angle at which the ligands are oriented to one another

22. Which compound is an ionization isomer of $[\text{Pt}(\text{NH}_3)_4\text{SO}_4](\text{NO}_2)_2$?

- A) $[\text{PtCl}_4(\text{NH}_3)_2](\text{NO}_2)_2$
- B) $[\text{Pt}(\text{NH}_3)_4(\text{NO}_2)_2]\text{SO}_4$
- C) $[\text{Pt}(\text{NH}_3)_4\text{Cl}_3](\text{NO}_2)_3$
- D) $[\text{Pt}(\text{NH}_3)_4\text{SO}_4](\text{NO}_2)_4$
- E) The chemical formulas for coordination isomers are the same.

CHEM 1212K Reading Day Study Session – Spring 2019 (Solutions)

- 1) 0.71
- 2) $K_c = 0.14$
- 3) 5.4×10^{-5}
- 4) ClO^-
- 5) 4.2×10^{-9}
- 6) $\text{pH} = 12.95$
- 7) 0.0033 mol/L
- 8) 10.94
- 9) $\text{pH} = 4.911$
- 10) $\text{pH} = 12.376$
- 11) 0.114 mol NaOH
- 12) -120 kJ
- 13) 14, left side of the equation
- 14) 2.2 g
- 15) $+1.04 \text{ V}$
- 16) $\text{pH} = 3.51$
- 17) 2.2 min.
- 18) Si : Al
- 19) D
- 20) 6
- 21) A
- 22) B