

AP Chemistry Units 1-4 Review

1. How many atoms are in 66.0 grams of Cu?
2. How many grams are in 4.60×10^{24} molecules of CO_2 ?
3. What are the moles of each ion are in 2.5 moles of $\text{Al}_2(\text{SO}_4)_3$?
4. The molar mass of a compound with an empirical formula of C_3H_7 is 86.2 g/mol. What is the name and formula of:
 - a. the compound?
 - b. its alcohol?
 - c. its carboxylic acid?
 - d. its alkene?
5. If Gallium has two isotopes, Ga-69 and Ga-71 which one is more abundant and why?
6. For Ba-137 what is the
 - a. mass number
 - b. atomic number
 - c. # of protons
 - d. # of neutrons
7. What is the common monatomic ion charge for
 - a. I A metals
 - b. II A metals
 - c. Zn and Cd
 - d. Ag
 - e. Al
8. What is the percent composition of the two elements in diphosphorus pentoxide?
9. Name the following:
 - a. NH_4NO_2
 - b. ZnSiO_3
 - c. KMnO_4
 - d. $\text{Na}_2\text{Cr}_2\text{O}_7$
 - e. HClO
 - f. HF
 - g. CuSO_3
10. Write formulas for the following:
 - a. perchloric acid
 - b. cobalt (III) iodide
 - c. mercury (I) iodate
 - d. iron (III) carbonate
11. A hydrate of cobalt (II) chloride is 45.42 % water by mass. What is the formula of it?
12. 50.0 g of sodium carbonate reacts with 50.0 g of calcium nitrate. What is the mass of precipitate made in this reaction?
13. A sample of a compound of chlorine and oxygen reacts with excess hydrogen to give 0.3059 g HCl and 0.5287 g of H_2O . What is the simplest formula of the compound?
14. What are the oxidation numbers almost always for the following in compounds:
 - a. F
 - b. H
 - c. O
15. What are the oxidation numbers of each element in the following compounds:
 - a. CaCO_3
 - b. $\text{K}_2\text{Cr}_2\text{O}_7$
 - c. NaMnO_4
 - d. CO_2
 - e. N_2O
16. What are the acid base net ionic equations for the following:
 - a. HCl & NaOH
 - b. HF & NH_3
 - c. HNO_2 + LiOH
 - d. CH_3NH_2 & HBr
 - e. HI & KOH
17. What are the precipitation net ionic equations for the following:
 - a. NaCl & $\text{Pb}(\text{NO}_3)_2$
 - b. K_2SO_4 & BaI_2
 - c. $\text{CuC}_2\text{H}_3\text{O}_2$ & $\text{Ca}(\text{OH})_2$
 - d. Na_2S & ZnCl_2
18. What are the gas forming net ionic equations for the following:
 - a. HCl & Na_2CO_3
 - b. HBr & K_2CO_3
19. What mass of precipitate is made when 40.0 mL of a 1.00 M KBr reacts with 30.0 mL of a 2.00 M $\text{Pb}(\text{CH}_3\text{COO})_2$?
20. What volume of a 18.00 M H_2SO_4 is needed to make 250.0 mL of a 1.00 M H_2SO_4 ?

21. $\text{Zn (s)} + \text{Cr}_2\text{O}_7^{2-} \rightarrow \text{Zn}^{2+} + \text{Cr}^{3+}$
- Balance the redox reaction in acidic solution
 - Identify the oxidizing and reducing agents
 - What volume of a 0.400 M potassium dichromate is needed to react completely with 20.0 g of Zn?



22. For the reaction above,
- what is the rate of appearance of I_3^- if the rate of disappearance of I^- is $8.0 \times 10^{-2} \text{ M/s}$?
 - what is the rate of appearance of SO_4^{2-} if the rate of disappearance of $\text{S}_2\text{O}_8^{2-}$ is $2.0 \times 10^{-3} \text{ M/s}$?
 - Of the 4 substances in the reaction above, which two would always have the same numerical rate, depending on temperature of course, and why?
23. What is required for a collision to be good? (be specific)
24. How does increasing temperature increase the rate of a reaction? (two fold effect)
25. What must be plotted to obtain a straight line for a
- 2nd order reaction
 - 1st order reaction
 - zero order reaction
26. What kind of plot gives a straight line with the activation energy found in the slope?
27. Hydrogen peroxide in basic solution oxidizes iodide ions to iodine. The proposed mechanism for this reaction is
- $$\text{H}_2\text{O}_2 (\text{aq}) + \text{I}^- (\text{aq}) \rightarrow \text{HOI} (\text{aq}) + \text{OH}^- (\text{aq}) \quad (\text{slow})$$
- $$\text{HOI} (\text{aq}) + \text{I}^- \rightarrow \text{I}_2 (\text{aq}) + \text{OH}^- (\text{aq}) \quad (\text{fast})$$
- Write the overall reaction. Write the rate law consistent with this proposed mechanism.
28. What mass of NaCN is required to make 4.00L of HCN gas at 25°C and 758 mmHg according to the equation: $\text{NaCN (s)} + \text{H}^+ \rightarrow \text{HCN (g)} + \text{Na}^+$
29. 2.0 mol of HI gas are placed in a 1.0L container at a certain temperature. The HI dissociates according to the following equation: $2\text{HI (g)} + \text{heat} \leftrightarrow \text{H}_2 (\text{g}) + \text{I}_2 (\text{g}) \quad T = 298\text{K}$
- If 1.60 mol of HI remains when equilibrium is reached what is the K_c value? The K_p value?
- What is the total pressure in the container at equilibrium? Which way will the reaction shift if one adds some HI? Some H₂? If Temperature is decreased? If the volume is increased?
30. K_c = 5.6×10^{-12} at 500K for the following: $\text{I}_2 (\text{g}) + \text{heat} \leftrightarrow 2\text{I} (\text{g})$
- If a 2.0 L container at 500K contains 0.020mol of I₂ and 2.0×10^{-8} mol I, is the reaction at equilibrium and if not which way will it shift to reach equilibrium and if so show the ice chart set up but do not solve for the "x".
31. Tell whether each of the following is acidic, basic or neutral and give the reason why:
- NaNO₂
 - NH₄Cl
 - KSCN
 - ZnSO₄
 - LiBr
 - CaS
 - Ba(CH₃COO)₂