

Advanced Chemistry Final Review

1. What are the products of complete combustion of hydrocarbons?
2. What is the total number of atoms represented in the formula $\text{Al}_2(\text{CO}_3)_3$?
3. How many significant figures are in .0040040 m?
4. Balance an equation for the production of iron (III) carbonate from iron (III) oxide and carbon dioxide.
5. What is the difference between accuracy and precision?
6. Glass is made from silicon dioxide. (sand is made of mostly silicon dioxide and glass is made from liquefied sand)
7. How does the number of molecules of Ar in a 2 liter container compare to the number of molecules of He in another 2 liter container, if the temperature and pressure are the same in both?
8. What is the name of P_2O_5 ?
9. What is the formula for Density?
10. How many moles of HCl are required to react completely with 4 moles of Zn?
11. What is the volume of one mole of gas at STP?
12. In problem 10, if you were given 30 moles of each reactant, what quantity of what reactant would remain unreacted?
13. What is the percentage of sodium in sodium oxide?
14. What is the volume of 88 grams of carbon dioxide at 25 C and 1.1 atm?
15. In an open manometer, the mercury level in the arm connected to a gas sample is lower than that of the arm open to the atmosphere by 15 mm. If the atmospheric pressure is 760, what is the pressure of the gas?
16. What effect does lowered atmospheric pressure have on the boiling point of water?
17. What is the equilibrium constant expression for the following reaction?
$$2\text{NO}_2 \rightleftharpoons \text{N}_2\text{O}_4$$
18. $2\text{A} + 2\text{B} \rightarrow \text{A}_2\text{B}_2 \quad \Delta H = -250 \text{ KJ.}$
If 4 moles of A react, what is the energy change?
19. How does a catalyst affect activation energy?
20. How are positive ions formed?
21. Is SO_2 polar?
22. What element has an electron configuration ending in $3p^2$?
23. What type(s) of bonding are in Na_2SO_4 ?
24. Which halogen has the highest ionization energy?
25. If Carbon was defined as having a mass of 20, what would be the relative mass of Mg?
26. Which is saturated? alkanes, alkenes or alkynes?
27. CO_2 has polar bonds. Why is the molecule non-polar?
28. Cs is an alkali metal. What is the likely formula for cesium nitride?
29. What volume of .2 M NaCl would contain 3 moles of NaCl?
30. What is produced when Zn reacts with sulfuric acid?
31. If silver chloride makes a saturated solution so that the concentration of silver ion in the solution is .000015, what is the chloride ion concentration?
32. How many grams of NaOH are needed to make 2 liters of 4 M solution of NaOH?
33. If 50 ml of 2 M HCl are diluted to 4 liters, what is the new concentration?
34. What is the oxidation state of sulfur in the sulfate ion?
35. What is the hydrogen ion concentration in .2 M HCl? Is this more, or less than it would be in .2 M $\text{HC}_2\text{H}_3\text{O}_2$?
36. Which metallic halides are insoluble?

37. If 40 ml of .2 M NaOH are needed to neutralize 30 ml of HCl, what was the concentration of the HCl?
38. What is the normal oxidation state of the alkaline earth metals?
39. The density of vegetable oil is .920 g/ml. How many ml do you need to have a mass of 75 grams?
40. What is the oxidation state of the hydroxide ion?
41. Which is correct? Add water to acid, or add acid to water?
42. What is the mass of 1.204×10^{24} molecules of water?
43. What is the name of FeO?
44. What gas is primarily involved in the formation of acid rain? The gas is a nonmetal oxide.
45. If a gas is collected over water and the total pressure is 750 mmHg at 25 C, what would you need to consider to find the pressure of the dry gas?
46. The empirical formula of a compound is HO. The molecular weight is 34. What is the molecular formula?
47. When pressure goes up, what happens to volume?
48. When temperature goes up, what happens to volume?
49. Draw a graph of energy vs. time for an endothermic reaction.
50. What is the definition of equilibrium?
51. A compound is 70% iron, and 30% oxygen. What is its simplest formula?
52. Which is most soluble in water: a polar compound, or a nonpolar compound?
How do you determine polarity?
53. What is the electronic structure (electron configuration) for ^{35}Cl ?
54. Which of the following particles emitted from a radioactive source is highest energy: alpha, beta, gamma or protons?
55. Why are the masses on the periodic table expressed as decimals?
56. How many electrons, protons, and neutrons are in the chlorine atom listed in number 53?
57. What elements are in the alkali metal family?
58. What elements are in the halogen family?
59. What is the functional group in a molecule of alcohol?
60. How many bonds must be on carbon atoms in organic chemistry?
61. When chlorine becomes an ion, does it lose electrons and get smaller, or gain electrons and get bigger?
62. In a solution of .01 M HCl, what is the concentration of the OH⁻ ion? (remember that the hydronium x hydroxide concentrations must equal 1×10^{-14})
63. What is the potassium ion concentration in .2 M potassium phosphate?
64. What is the relationship between Ka and acid strength?
65. Indicators like phenolphthalein are weak acids or weak bases. What particle is gained or lost when indicators change colors?
66. Polyprotic acids lose one proton at a time when they ionize. What is the anion product of the first ionization of sulfuric acid?
67. In a titration of hydrochloric acid with .1 M sodium hydroxide, the buret containing HCl dropped from 30 to 20 ml and the base buret dropped from 30 to 25. What was the molarity of the HCl?
68. If potassium nitrite is added to a solution of nitrous acid, how will the pH change?
69. Are precipitates soluble, or insoluble? Which of the following would form a precipitate if it were the product of a chemical reaction?
Lead(II) sulfide, sodium nitrate, barium sulfate, silver chloride, nitric acid, sodium chloride
70. What is the net reaction when aqueous barium nitrate is combined with potassium sulfate?