

Chemistry I Final Review Sheet

- 1) Matter is defined as anything that _____ .
- 2) A vapor is which state of matter?
- 3) Which state of matter has a definite volume and takes the shape of its container?
- 4) Which state of matter is characterized by having an indefinite shape, but a definite volume?
- 5) Which state of matter is characterized by low density and high compressibility?
- 6) Separating a solid from a liquid by evaporating the liquid is called _____ .
- 7) A copper-colored wire changes to a darker color after it is heated and then cooled. What type of change has likely taken place to cause this color change?
- 8) Consider the chemical reaction in which carbon reacts with oxygen to produce carbon dioxide. What mass of carbon dioxide would be produced if 24 grams of carbon reacted completely with 64 grams of oxygen?
- 9) What happens to the individual atoms in a chemical reaction?
- 10) How will the mass of a rusted iron nail compare with the mass of the same nail before it rusted?
- 11) The diameter of a carbon atom is 0.000 000 000 154 m. What is this number expressed in scientific notation?
- 12) What is the result of multiplying $(2.5 \times 10^{10}) \times (3.5 \times 10^{-7})$?
- 13) When a test instrument is calibrated, does its accuracy, precision, or reliability improve?
- 14) In the measurement 0.503 L, which digit is the estimated digit?
- 15) How many significant figures are there in the measurement 40 500 mg?

- 16) What is the measurement 111.009 mm rounded off to four significant digits?
- 17) Express the sum of 1111 km and 222 km using the correct number of significant digits.
- 18) Express the product of 2.2 mm and 5.00 mm using the correct number of significant digits.
- 19) What quantity is represented by the metric system prefix deci-?
- 20) What is the quantity 0.0075 meters expressed in centimeters?
- 21) If a liter of water is heated from 20°C to 50°C, what happens to its volume?
- 22) What is the temperature -34°C expressed in kelvins?
- 23) What is the volume of 60.0 g of ether if the density of ether is 0.70 g/mL?
- 24) How many significant figures are there in the conversion factor 100 cm/1 m?
- 25) If the correct conversion factor is $\frac{1 \text{ L}}{1000 \text{ mL}}$ and the known measurement is 33 mL, what is the answer given by dimensional analysis?
- 26) How many centimeters are there in 3 kilometers?
- 27) On a typical day you inhale about 1×10^4 liters of air. What conversion factor would you use to express the volume in cubic centimeters?
- 28) What is the result of converting 197 μm to kilometers?
- 29) What is the result of converting 0.04 kmol to centimoles?
- 30) The density of aluminum is 2.70 g/cm³. What is the mass of a cube of aluminum 1.0 cm on each edge?
- 31) What is the smallest particle of an element that retains the properties of that element?
- 32) Who was the first person to suggest the idea of atoms, in the fourth century B. C.?

- 33) What particles form the nucleus of an atom?
- 34) The atomic number of an element is the total number of which particles in the nucleus?
- 35) The mass number of an element is equal to _____.
- 36) The sum of the protons and neutrons in an atom equals the _____.
- 37) How many protons, electrons, and neutrons does an atom with an atomic number 50 and a mass number 120 contain?
- 38) What unit is used to measure average relative atomic mass?
- 39) What are the Group A elements known as?
- 40) Of the elements Pt, Sc, V, Li, and Kr, which is a nonmetal?
- 41) What type of ions have names ending in -ide?
- 42) What is the electrical charge of a cation?
- 43) What is the lowest whole-number ratio of ions in an ionic compound called?
- 44) What is the usual charge on an ion from Group 7A?
- 45) What is the ionic charge on the zirconium ion in the ionic compound zirconium oxide, ZrO_2 ?
- 46) What is the correct formula for potassium sulfite?
- 47) What is the correct formula for calcium dihydrogen phosphate?
- 48) What do the names of all binary compounds, both ionic and molecular, end in?
- 49) What is the formula for hydrosulfuric acid?
- 50) What is the correct name for $Sn_3(PO_4)_2$?

- 51) What SI unit is used to measure the number of representative particles in a substance?
- 52) How many atoms are there in 0.075 mol of titanium?
- 53) How many moles of helium atoms are there in 2.4×10^{24} helium atoms?
- 54) How many moles of SO_3 are in 2.4×10^{24} molecules of SO_3 ?
- 55) How many grams are in 0.900 mol Pd?
- 56) What is the number of moles in 0.025 g $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$?
- 57) What is the volume, in liters, of 0.500 mol of C_3H_8 gas at STP?
- 58) What is the volume, in liters, of 2.8 moles of NO_2 gas at STP?
- 59) The gram formula mass of a certain gas is 49 g. What is the density of the gas in g/L at STP?
- 60) If 60.2 grams of Hg combines completely with 24.0 grams of Br to form a compound, what is the percent composition of Hg in the compound?
- 61) What are the missing coefficients for the skeleton equation below?
 $\text{Al}_2(\text{SO}_4)_3(\text{aq}) + \text{KOH}(\text{aq}) \rightarrow \text{Al}(\text{OH})_3(\text{aq}) + \text{K}_2\text{SO}_4(\text{aq})$
- 62) If you rewrite the following word equation as a balanced chemical equation, what will the coefficient and symbol for iodine be?
bromine + potassium iodide \rightarrow potassium bromide + iodine
- 63) What are the missing coefficients for the skeleton equation below?
 $\text{N}_2 + \text{H}_2 \rightarrow \text{NH}_3$
- 64) When the equation, $\text{Fe} + \text{Cl}_2 \rightarrow \text{FeCl}_3$, is balanced, what is the coefficient for Cl_2 ?

- 65) If a combination reaction takes place between potassium and chlorine, what is the product?
- 66) Write a balanced equation for the combination reaction that takes place when iron(III) oxide is formed from its constituent elements.
- 67) Write a balanced equation to represent the decomposition of lead(IV) oxide.
- 68) The equation $\text{Mg(s)} + 2\text{HCl(aq)} \rightarrow \text{MgCl}_2\text{(aq)} + \text{H}_2\uparrow$ is an example of which type of reaction?
- 69) The equation $\text{H}_3\text{PO}_4 + 3\text{KOH} \rightarrow \text{K}_3\text{PO}_4 + 3\text{H}_2\text{O}$ is an example of which type of reaction?
- 70) The equation $2\text{C}_3\text{H}_7\text{OH} + 9\text{O}_2 \rightarrow 6\text{CO}_2\uparrow + 8\text{H}_2\text{O}\uparrow$ is an example of which type of reaction?
- 71) How many liters of oxygen are required to react completely with 3.6 liters of hydrogen to form water?
 $2\text{H}_2\text{(g)} + \text{O}_2\text{(g)} \rightarrow 2\text{H}_2\text{O(g)}$
- 72) How many moles of glucose, $\text{C}_6\text{H}_{12}\text{O}_6$, can be "burned" biologically when 10.0 mol of oxygen is available?
 $\text{C}_6\text{H}_{12}\text{O}_6\text{(s)} + 6\text{O}_2\text{(g)} \rightarrow 6\text{CO}_2\text{(g)} + 6\text{H}_2\text{O(l)}$
- 73) Iron(III) oxide is formed when iron combines with oxygen in the air. How many grams of Fe_2O_3 are formed when 16.7 g of Fe reacts completely with oxygen?
 $4\text{Fe(s)} + 3\text{O}_2\text{(g)} \rightarrow 2\text{Fe}_2\text{O}_3\text{(s)}$
- 74) Mercury can be obtained by reacting mercury(II) sulfide with calcium oxide. How many grams of calcium oxide are needed to produce 36.0 g of Hg?
 $4\text{HgS(s)} + 4\text{CaO(s)} \rightarrow 4\text{Hg(l)} + 3\text{CaS(s)} + \text{CaSO}_4$
- 75) How many grams of chromium are needed to react with an excess of CuSO_4 to produce 27.0 g Cu?
 $2\text{Cr(s)} + 3\text{CuSO}_4\text{(aq)} \rightarrow \text{Cr}_2\text{(SO}_4\text{)}_3\text{(aq)} + 3\text{Cu(s)}$
- 76) How many liters of NH_3 , at STP, will react with 5.3 g O_2 to form NO_2 and water?
 $4\text{NH}_3\text{(g)} + 7\text{O}_2\text{(g)} \rightarrow 4\text{NO}_2 + 6\text{H}_2\text{O(g)}$
- 77) How many liters of NH_3 are needed to react completely with 30.0 L of NO (at STP)?
 $4\text{NH}_3\text{(g)} + 6\text{NO(g)} \rightarrow 5\text{N}_2\text{(g)} + 6\text{H}_2\text{O(g)}$

- 78) What is the maximum number of grams of PH_3 that can be formed when 6.2 g of phosphorus reacts with 4.0 g of hydrogen to form PH_3 ?
 $\text{P}_4(\text{g}) + 6\text{H}_2(\text{g}) \rightarrow 4\text{PH}_3(\text{g})$
- 79) Lead nitrate can be decomposed by heating. What is the percent yield of the decomposition reaction if 9.9 g $\text{Pb}(\text{NO}_3)_2$ is heated to give 5.5 g of PbO ?
 $2\text{Pb}(\text{NO}_3)_2(\text{s}) \rightarrow 2\text{PbO}(\text{s}) + 4\text{NO}_2(\text{g}) + \text{O}_2(\text{g})$
- 80) In the reaction $2\text{CO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g})$, what is the ratio of moles of oxygen used to moles of CO_2 produced?
- 81) What happens to the range of energies of the molecules in matter when the temperature is increased?
- 82) Consider an iron ball and an aluminum ball. If the two balls were at the same temperature, how would the average kinetic energy of the iron atoms compare with the average kinetic energy of the aluminum atoms?
- 83) What instrument is normally used to measure atmospheric pressure?
- 84) How does the atmospheric pressure at altitudes below sea level compare with atmospheric pressure at sea level?
- 85) What is the volume occupied by 2.20 mol of hydrogen at STP?
- 86) What is the number of molecules of nitrogen in 11.2 L at STP?
- 87) What is the volume occupied by 71 g of chlorine gas at STP?
- 88) Which states of matter can flow?
- 89) What happens to the evaporation rate of a liquid as the liquid is cooled?
- 90) When the external pressure is 505 kPa, what is the vapor pressure of water at its boiling point?
- 91) How many joules are there in 148 calories? (1 cal = 4.18 J)

- 92) What is the specific heat of a substance if 1560 cal is required to raise the temperature of a 312-g sample by 15°C?
- 93) How much heat does it take to warm 16.0 g of pure water from 90.0°C to 100.0°C? (specific heat of water = 4.18 J/g x °C)
- 94) When 45 g of an alloy at 52.1°C, is dropped into 100.0 g of water at 25.0°C, the final temperature is 37.0°C. What is the specific heat of the alloy?
- 95) What is the specific heat of olive oil if it takes approximately 420 J of heat to raise the temperature of 7 g of olive oil by 30°C?
- 96) Calculate the energy required to produce 7.00 mol Cl₂O₇ on the basis of the following balanced equation:
$$2\text{Cl}_2(\text{g}) + 7\text{O}_2(\text{g}) + 130 \text{ kcal} \rightarrow 2\text{Cl}_2\text{O}_7(\text{g})$$
- 97) What is the standard heat of reaction for this reaction:
$$\text{Zn}(\text{s}) + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{Cu}(\text{s})$$

(ΔH_f° for Cu²⁺ = +64.4 kJ/mol; ΔH_f° for Zn²⁺ = -152.4 kJ/mol)
- 98) What is the amount of heat needed to melt one mole of a solid called?
- 99) When 1.0g of solid NaOH ($\Delta H_{\text{soln}} = -445.1 \text{ kJ/mol}$) dissolves in 10 L of water, how much heat is released?
- 100) What is the amount of heat involved in the creation of 1 mole of a substance from its elements called?