

Name: \_\_\_\_\_ Pd: \_\_\_\_ Date: \_\_\_\_\_  
SOL Review Packet

**\*\*\*\*\*REMEMBER REVIEW IS TO HELP YOU LEARN WHAT ITEMS YOU HAVE TROUBLE WITH – DO NOT SKIP THE PROBLEMS YOU DO NOT UNDERSTAND, ASK FOR HELP!!!!**

Provide the answers to the following questions.

1. How many meters are in 1.5 kilometers? 1500m
2. How many grams are in 20 kilograms? 20000g
3. How many milliliters are in 3.7 liters? 3700ml
4. How many milligrams are in 6.8 grams? 6800g

Write the following numbers in scientific notation.

5. 14,729  $1.4729 \times 10^4$
6. 369  $3.69 \times 10^2$
7. 0.0059  $5.9 \times 10^{-3}$

Give the number of significant figures in the following numbers.

8. 26,400 3
9. 0.0140 3

10. Round off 26,060 to three significant figures. 26100

11. Solve and express your answer in scientific notation.  $1.0 \times 10^{11}$   
 $\frac{625 \times 5200}{0.0013 \times 0.025}$

12. A group measures a quantity and the result is 25.9. The actual value is 25.6. What is the percent error in the measurement?  
 $\frac{|25.9-25.6|}{25.6} \times 100 = 1.17\% \text{ error}$

13. Find the density in  $\text{g/cm}^3$  of a rectangular piece of granite which is 2.00cm x 2.0cm x 9.00cm and has a mass of 108g.  
 $D = \frac{108\text{g}}{(2.00\text{cm} \times 2.0\text{cm} \times 9.00\text{cm})} = 3.0 \text{ g/cm}^3$

14. What amount of heat (in joules) would be produced by raising the temperature of 152 grams of water by  $9^\circ\text{C}$ ?  
 $\text{Heat} = (152\text{g})(9^\circ\text{C})(4.184\text{J/g}^\circ\text{C}) = 6000 \text{ Joules}$

15. Find the percent composition of iron and oxygen in ferric oxide.  
 $\text{Fe}_2\text{O}_3 \text{ Fe } (2 \times 55.85) + \text{O } (3 \times 16.00) = 159.70 \text{ g/mol}$

$\text{Fe} = 111.70/159.70 \times 100 = 69.94\% \quad \text{O} = 48.00/159.70 \times 100 = 30.06\%$

Complete the table below.

	Element	Atomic Number	Mass Number	Protons	Electrons	Neutrons
16.	Al	13	27	13	13	14
17.	Be	4	9	4	4	5
18.	Bi	83	209	83	83	126
19.	Ca	20	40	20	20	20
20.	C	6	13	6	6	7
21.	F	9	21	9	9	12
22.	P <sup>-3</sup>	15	31	15	18	16
23.	Mg <sup>2+</sup>	12	24	12	10	12

Fill-in the blanks on the following table.

	Energy Level	Sublevel	Number of Orbitals	Maximum Number of Electrons
24.	1	S	1	2
25.	2	s,p	4	8
26.	3	s,p,d	9	18
27.	4	s,p,d,f	16	32

28. What elements are present in SF<sub>6</sub>? sulfur and fluorine  
 29. How many atoms are in the formula above? 7

Write the formulas for the following.

30. sodium chloride NaCl      37. sodium nitrate NaNO<sub>3</sub>  
 31. sodium sulfide Na<sub>2</sub>S      38. sodium carbonate NaCO<sub>3</sub>  
 32. sodium phosphate Na<sub>3</sub>PO<sub>4</sub>

Name the following compounds.

33. KClO<sub>3</sub> potassium chlorate  
 34. Cu(NO<sub>3</sub>)<sub>2</sub> copper (II) nitrate (Cupric)  
 35. KOH potassium hydroxide  
 36. HBr (aq) hydrobromic acid

37. Calculate the empirical and molecular formula for the following compound.  
skip
38. Complete the following reaction:  
 $2\text{C}_2\text{H}_2 + 5\text{O}_2 \rightarrow \underline{4\text{CO}_2 + 2\text{H}_2\text{O}}$
39. How many atoms enter the reaction? **18** How many atoms leave the reaction? **18**
40. How many molecules of carbon dioxide produced? 4
41. How many atoms of oxygen gas are consumed? 10

For questions 42-45 complete the word problem by predicting the product, write the balanced equation and identify the type of reaction.

42. Ammonia when heated produces nitrogen gas and hydrogen gas  
 Type of reaction: decomp  
 Equation:  
 $2\text{NH}_3 \rightarrow \text{N}_2(\text{g}) + 3\text{H}_2(\text{g})$
43. Carbon reacts with ferric oxide produces carbon dioxide and iron  
 Type of reaction: single replacement  
 Equation:  
 $3\text{C} + 2\text{Fe}_2\text{O}_3 \rightarrow 3\text{CO}_2 + 4\text{Fe}$
44. Chlorine gas and potassium bromide react to form potassium chloride and bromine gas  
 Type of reaction: single replacement  
 Equation:  
 $\text{Cl}_2(\text{g}) + 2\text{KBr} \rightarrow 2\text{KCl} + \text{Br}_2(\text{g})$
45. Silver nitrate and sodium chloride react to form silver chloride and sodium nitrate  
 Type of reaction: double replacement  
 Equation:  
 $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$

Find the mass in one mole of:

46.  $\text{Hg}_2(\text{SO}_3)$  **481,25 g/mol**
47.  $\text{Al}_2\text{O}_3$  **101.96 g/mol**
48.  $\text{Ca}(\text{MnO}_4)_2$  **277.96 g/mol**

How many moles are in the following:

49. 98g of  $\text{H}_2\text{SO}_4$  **1.0 mol  $\text{H}_2\text{SO}_4$**
50. 7g of  $\text{N}_2$  **0.2 mol  $\text{N}_2$**
51. 0.051g of  $\text{NH}_3$  **0.0030 mol  $\text{NH}_3$**

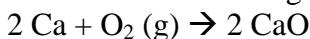
Find the volumes of the following:

52. 1 mole of oxygen gas  $22.4\text{L O}_2$

53. 3.5 moles water  $78.4\text{L H}_2\text{O}$

54. 10.0 moles of nitrogen gas  $224\text{L N}_2$

Consider the following equation:



55. How many moles of CaO would be produced by 3 moles of Ca?

$$3 \text{ mol Ca} \times \frac{2 \text{ mol CaO}}{2 \text{ mol Ca}} = 3 \text{ mol CaO}$$

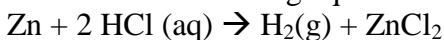
56. How many grams of CaO would be produced by 54.3 grams of oxygen gas?

$$54.3\text{g O}_2 \times \frac{1 \text{ mol O}_2}{32.00\text{g O}_2} \times \frac{2 \text{ mol CaO}}{1 \text{ mol O}_2} \times \frac{56.08\text{g CaO}}{1 \text{ mol CaO}} = 190.\text{g CaO}$$

57. How many liters of oxygen gas would be needed to produce 23.7 grams of CaO?

$$23.7\text{g CaO} \times \frac{1 \text{ mol CaO}}{56.08\text{g CaO}} \times \frac{1 \text{ mol O}_2}{2 \text{ mol CaO}} \times \frac{22.4\text{L O}_2}{1 \text{ mol O}_2} = 4.73\text{L O}_2$$

Consider the following equation:



58. How many grams of Zn are needed to produce 11.2L of hydrogen gas?

$$11.2\text{L H}_2 \times \frac{1 \text{ mol H}_2}{2.02\text{g H}_2} \times \frac{1 \text{ mol Zn}}{1 \text{ mol H}_2} \times \frac{65.39\text{g Zn}}{1 \text{ mol Zn}} = 32.7\text{g Zn}$$

Complete the following word problems.

59. A gas at STP occupies 4L, if the pressure was lowered to 560mmHg what would the new volume be?

$$(4\text{L})(760 \text{ mmHg}) = (V_2)(560\text{mmHg}) \quad V_2 = 5\text{L}$$

60. The pressure exerted by a confined gas at 250K is 600 mmHg. What pressure would be exerted at 750K?

$$\frac{600\text{mmHg}}{250\text{K}} = \frac{P_2}{750\text{K}} \quad P_2 = 2000\text{mmHg}$$

61. A gas at 4 atm and 350K occupies a volume of  $52.3\text{cm}^3$ , what is the new volume if we bring everything to STP?

$$\frac{(52.3\text{cm}^3)(4 \text{ atm})}{350\text{K}} = \frac{V_2(1 \text{ atm})}{273\text{K}} \quad V_2 = 200\text{cm}^3$$

62. How many grams of oxygen gas are present if it occupies 2.62L at  $285^\circ\text{C}$  and 3.42 atm?

$$(3.42\text{atm})(2.62\text{L}) = n(0.0821 \text{ Latm/molK})(558\text{K}) \quad n=0.196\text{mol} \rightarrow 6.26\text{g O}_2$$

63. We need to inflate a balloon to a volume of 1.250L with 0.2494g of helium, if the pressure is 1.26atm what temperature do we need (in  $^\circ\text{C}$ )?

$$(1.26\text{atm})(1.250\text{L}) = (0.06235\text{mol})(0.0821 \text{ Latm/molK})(T) \quad T=34.7^\circ\text{C}$$

64. What is the molarity of a glucose solution if there is 0.20 mol of glucose dissolved in 750ml of water?

$$M = \frac{0.20\text{mol}}{0.750\text{L}} = 0.27\text{M}$$

65. What is the molarity of hydrochloric acid if there are 25.3g of HCl dissolved in 5.00L of water?

$$M = \frac{0.6939 \text{ mol}}{5.00 \text{ L}} = 0.139 \text{ M}$$

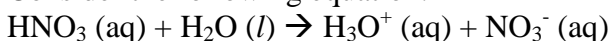
66. What is the molality of a solution that is composed of 60.4g of potassium permanganate in 1200g of water?

$$m = \frac{0.382 \text{ mol}}{1.2 \text{ kg}} = 0.32 \text{ m}$$

67. What is the molality of a solution if there is 1.68 mol of KOH dissolved in 3.00kg of water?

$$m = \frac{1.68 \text{ mol}}{3.00 \text{ kg}} = 0.560 \text{ m}$$

Consider the following equation:



68. Identify the two conjugate pairs.

Pair 1: acid- HNO<sub>3</sub> and base- NO<sub>3</sub><sup>-</sup>

Pair 2: acid- H<sub>3</sub>O<sup>+</sup> and base- H<sub>2</sub>O

69. Which of the acids above fit the Arrhenius definition of an acid? HNO<sub>3</sub>

70. Calculate the hydroxide ion concentration of a solution whose hydronium ion concentration is 0.0010M.

$$\text{H}_3\text{O}^+ = 1.0 \times 10^{-3} \text{ M} \quad \text{OH}^- = 1.0 \times 10^{-11} \text{ M}$$

71. What is the pH of a solution if the concentration of hydronium ions is  $1.0 \times 10^{-2} \text{ M}$ ? Is the solution acidic or basic?

$$\text{pH} = 2 \text{ acidic}$$

72. What is the pH of a solution if the hydroxide ion concentration is  $1.0 \times 10^{-8} \text{ M}$ ? Is the solution acidic or basic?

$$\text{H}_3\text{O}^+ = 1.0 \times 10^{-6} \text{ M} \quad \text{pH} = 6 \text{ acidic}$$

For the following questions use your knowledge of the periodic table.

73. Which of the following have the strongest metallic characteristics?

a. francium    b. fluorine    c. magnesium    d. hydrogen

74. Which of the following has the highest ionization energy?

a. calcium    b. neon    c. carbon    d. oxygen

75. Which of the following will have the strongest ionic bonds?

a. F<sub>2</sub>    b. NaCl    c. H<sub>2</sub>O    d. CH<sub>4</sub>

76. Which of the following will create a non-polar covalent bond?

a. O<sub>2</sub>    b. CaF<sub>2</sub>    c. H<sub>2</sub>O    d. NH<sub>3</sub>

77. Which of the following will have the smallest atomic radius?

a. Na    b. Cu    c. Ne    d. Cs

78. How many valence electrons does a neutral atom of Zinc have?  
a. 2                      b. 4                      c. 8                      d. 12

79. How many energy levels does an atom of beryllium have?  
a. 1                      b. 2                      c. 3                      d. 4