Name: KEY Period: _____

Molar Mass Worksheet

Directions: Find the molar mass. Have fun ☺

1. $KBr = 39.1 + 79.9 = 119.0$ — 119.0 g/mol
2. $CaCl_2 = 40.1 + 2(35.5) = 111.1$ — 111.1 g/mol
3. $AlF_3 = 27.0 + 3(19.0) = 84.0$ — 84.0 g/mol
4. $Na_2O = 2(23.0) + 16.0 = 62.0$ — 62.0 g/mol
5. $KOH = 39.1 + 16.0 + 1.0 = 56.1$ — 56.1 g/mol
6. $CaSO_4 = 40.1 + 32.1 + 4(16.0) = 136.2$ — 136.2 g/mol
7. $FeSO_4 = 55.8 + 32.1 + 4(16.0) = 151.9$ — 151.9 g/mol
8. $Fe_2(SO_4)_3 = 2(55.8) + 3(32.1) + 12(16.0) =$ — 399.9 g/mol
9. $Na_3PO_4 = 3(23.0) + 31.0 + 4(16.0)$ — 164.0 g/mol
10. $Mn(NO_3)_2 = 54.9 + 2(14.0) + 6(16.0)$ — 178.9 g/mol
11. $Cr_2O_3 = 2(52.0) + 3(16.0)$ — 152.0 g/mol
12. $Cr_2S_3 = 2(52.0) + 3(32.1)$ — 200.3 g/mol
13. $Al_2(SO_4)_3 = 2(27.0) + 3(32.1) + 12(16.0)$ — 342.3 g/mol
14. $AlCl_3 = 27.0 + 3(35.5)$ — 133.5 g/mol
15. $Ca(NO_3)_2 = 40.1 + 2(14.0) + 6(16.0)$ — 164.1 g/mol
16. $Ag_3PO_4 = 3(107.9) + 31.0 + 4(16.0)$ — 370.7 g/mol
17. $Ag_3P = 3(107.9) + 31.0$ — 354.7 g/mol
18. $V_2O_5 = 2(50.9) + 5(16.0)$ — 181.8 g/mol
19. $Ba_3N_2 = 3(137.3) + 2(14.0)$ — 439.9 g/mol
20. $CaSe = 40.1 + 79.0$ — 119.1 g/mol
21. $CaI_2 = 40.1 + 2(126.9)$ — 293.9 g/mol
22. $WCl_6 = 183.8 + 6(35.5)$ — 396.8 g/mol
23. $ScBr_3 = 45.0 + 3(79.9)$ — 284.7 g/mol
24. $Co(NO_3)_2 = 58.9 + 2(14.0) + 6(16.0)$ — 182.9 g/mol
25. $Pb_3(PO_4)_4 = 3(207.2) + 4(31.0) + 16(16.0)$ — 1001.6 g/mol

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Name: KEY Period: _____

26. CO_2 = 12.0 + 2(16.0)	44.0 g/mol
27. CO = 12.0 + 16.0	28.0 g/mol
28. SO_2 = 32.1 + 2(16.0)	64.1 g/mol
29. SO_3 = 32.1 + 3(16.0)	80.1 g/mol
30. N_2O = 2(14.0) + 16.0	44.0 g/mol
31. NO = 14.0 + 16.0	30.0 g/mol
32. N_2O_3 = 2(14.0) + 3(16.0)	76.0 g/mol
33. NO_2 = 14.0 + 2(16.0)	46.0 g/mol
34. N_2O_4 = 2(14.0) + 4(16.0)	92.0 g/mol
35. N_2O_5 = 2(14.0) + 5(16.0)	108.0 g/mol
36. PCl_3 = 31.0 + 3(35.5)	137.5 g/mol
37. PCl_5 = 31.0 + 5(35.5)	208.5 g/mol
38. NH_3 = 14.0 + 3(1.0)	17.0 g/mol
39. SCl_6 = 32.1 + 6(35.5)	245.1 g/mol
40. P_2O_5 = 2(31.0) + 5(16.0)	142.0 g/mol
41. CCl_4 = 12.0 + 4(35.5)	154.0 g/mol
42. SiO_2 = 28.1 + 2(16.0)	60.1 g/mol
43. CS_2 = 12.0 + 2(32.1)	76.2 g/mol
44. OF_2 = 16.0 + 2(19.0)	54.0 g/mol
45. PBr_3 = 31.0 + 3(79.9)	270.7 g/mol

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Name: KEY Period: _____

Moles and Mass Worksheet

Determine the number of ***moles*** in each of the quantities below.

1. 25.0 g of NaCl ($23.0 + 35.5 = 58.5\ g/mol$)

$25.0\ g\ NaCl \times \frac{1\ mol}{58.5\ g} = 0.427\ mol\ NaCl$

(1) 0.427 mol NaCl

2. 125.5 g of H_2SO_4 ($2(1.0) + 32.1 + 4(16.0) = 98.1\ g/mol$)

$125.5\ g\ H_2SO_4 \times \frac{1\ mol}{98.1\ g} = 1.28\ mol\ H_2SO_4$

(2) 1.28 mol H_2SO_4

3. 100.5 g of $KMnO_4$ ($39.1 + 54.9 + 4(16.0) = 158.0\ g/mol$)

$100.5\ g\ KMnO_4 \times \frac{1\ mol}{158.0\ g} = 0.636\ mol\ KMnO_4$

(3) 0.636 mol $KMnO_4$

4. 74.0 g of KCl ($39.1 + 35.5 = 74.6\ g/mol$)

$74.0\ g \times \frac{1\ mol}{74.6\ g} = 0.992\ mol\ KCl$

(4) 0.992 mol KCl

5. 35.9 g of $CuSO_4 \cdot 5H_2O$ ($63.5 + 32.1 + 4(16.0) + 5(18.0) = 249.6\ g/mol$)

$35.9\ g \times \frac{1\ mol}{249.6\ g} = 0.144\ mol\ CuSO_4 \cdot 5H_2O$

(5) 0.144 mol $CuSO_4 \cdot 5H_2O$

6. 109.5 g of LiBr ($6.9 + 79.9 = 86.8\ g/mol$)

$109.5\ g \times \frac{1\ mol}{86.8\ g} = 1.26\ mol\ LiBr$

(6) 1.26 mol LiBr

7. 33.45 g of KNO_3 ($39.1 + 14.0 + 3(16.0) = 101.1\ g/mol$)

$33.45\ g \times \frac{1\ mol}{101.1\ g} = 0.331\ mol\ KNO_3$

(7) 0.331 mol KNO_3

8. 15.95 g of $Ca(NO_3)_2$ ($40.1 + 2(14.0) + 6(16.0) = 164.1\ g/mol$)

$15.95\ g\ Ca(NO_3)_2 \times \frac{1\ mol}{164.1\ g} = 0.09720\ mol\ Ca(NO_3)_2$

(8) 0.09720 mol $Ca(NO_3)_2$

9. 12.65 g of Potassium Sulphate $K_2SO_4 = 2(39.1) + 32.1 + 4(16.0) = 174.3\ g/mol$

$12.65\ g\ K_2SO_4 \times \frac{1\ mol}{174.3\ g} = 0.07258\ mol\ K_2SO_4$

(9) 0.07258 mol K_2SO_4

10. 156.98 g of Lead (IV) Chromate $Pb(CrO_4)_2 = 207.2 + 2(52.0) + 8(16.0) = 439.2\ g/mol$

$156.98\ g\ Pb(CrO_4)_2 \times \frac{1\ mol}{439.2\ g} = 0.3574\ mol\ Pb(CrO_4)_2$

(10) 0.3574 mol $Pb(CrO_4)_2$

11. 0.9568 g of Tin (II) Iodide $SnI_2 = 118.7 + 2(126.9) = 372.5\ g/mol$

$0.9568\ g\ SnI_2 \times \frac{1\ mol}{372.5\ g} = 0.002569\ SnI_2$

(11) 0.002569 SnI_2

12. 12.65 g of Titanium (III) Cyanide $Ti(CN)_3 = 47.9 + 3(12.0) + 3(14.0) = 125.9\ g/mol$

$12.65\ g\ Ti(CN)_3 \times \frac{1\ mol}{125.9\ g} = 0.1005\ mol\ Ti(CN)_3$

(12) 0.1005 mol $Ti(CN)_3$

13. 15.65 g of Ammonium Chlorate $NH_4ClO_3 = 14.0 + 4(1.0) + 35.0 + 3(16.0) = 101.0\ g/mol$

$15.65\ g\ NH_4ClO_3 \times \frac{1\ mol}{101.0\ g} = 0.1550\ mol\ NH_4ClO_3$

(13) 0.1550 mol NH_4ClO_3

Name: KEY Period: _____

Determine the number of ***grams*** in each of the quantities below.

14. 2.5 moles of NaBr $(23.0 + 79.9 = 102.9\ g/mol)$

$2.5\ mol\ NaBr \times \frac{102.9\ g}{1\ mol} = 257\ g\ NaBr$

15. 0.50 moles of H_2CO_3 $(2(1.0) + 12.0 + 3(16.0) = 62.0\ g/mol)$

$0.50\ mol\ H_2CO_3 \times \frac{62.0\ g}{1\ mol} = 31.0\ g\ H_2CO_3$

16. 1.70 moles of $CaMoO_4$ $(40.1 + 95.9 + 4(16.0) = 200.0\ g/mol)$

$1.70\ mol\ CaMoO_4 \times \frac{200.0\ g}{1\ mol} = 340\ g\ CaMoO_4$

17. 0.25 moles of CsCl $(132.9 + 35.5 = 168.4\ g/mol)$

$0.25\ mol\ CsCl \times \frac{168.4\ g}{1\ mol} = 42.1\ g\ CsCl$

18. 3.2 moles of $FeSO_4 \cdot 7H_2O$ $(55.8 + 32.1 + 4(16.0) + 7(18.0) = 277.9\ g/mol)$

$3.2\ mol\ FeSO_4 \cdot 7H_2O \times \frac{277.9\ g}{1\ mol} = 889\ g\ FeSO_4 \cdot 7H_2O$

19. 3.75 moles of CoC_2O_4 $(58.9 + 2(12.0) + 4(16.0) = 146.9\ g/mol)$

$3.75\ mol\ CoC_2O_4 \times \frac{146.9\ g}{1\ mol} = 551\ g\ CoC_2O_4$

20. 4.15 moles of CO $(12.0 + 16.0 = 28.0\ g/mol)$

$4.15\ mol\ CO \times \frac{28.0\ g}{1\ mol} = 116\ g\ CO$

21. 0.795 moles of O_2 $(2(16.0) = 32.0\ g/mol)$

$0.795\ mol\ O_2 \times \frac{32.0\ g}{1\ mol} = 25.4\ g\ O_2$

22. 6.25 moles of PbO $(207.2 + 16.0 = 223.2\ g/mol)$

$6.25\ mol\ PbO \times \frac{223.0\ g}{1\ mol} = 1394\ g\ PbO$

23. 9.15 moles of NaBrO $(23.0 + 79.9 + 16.0 = 118.9\ g/mol)$

$9.15\ mol\ NaBrO \times \frac{118.9\ g}{1\ mol} = 1088\ g\ NaBrO$

24. 2.25 moles of $SnSO_3$ $(118.7 + 32.1 + 3(16.0) = 198.8\ g/mol)$

$2.25\ mol\ SnSO_3 \times \frac{198.8\ g}{1\ mol} = 447\ g\ SnSO_3$

25. 1.86 moles of $AuBO_3$ $(197.0 + 10.8 + 3(16.0) = 255.8\ g/mol)$

$1.86\ mol\ AuBO_3 \times \frac{255.8\ g}{1\ mol} = 476\ g\ AuBO_3$

26. 2.15 moles of $CuHPO_4$ $(63.5 + 1.0 + 31.0 + 4(16.0) = 159.5\ g/mol)$

$2.15\ mol\ CuHPO_4 \times \frac{159.5\ g}{1\ mol} = 343\ g\ CuHPO_4$

27. 0.750 moles of $CrAsO_4$ $(52.0 + 74.9 + 4(16.0) = 190.9\ g/mol)$

$0.750\ mol\ CrAsO_4 \times \frac{190.9\ g}{1\ mol} = 143\ g\ CrAsO_4$

(14) 260 g NaBr

(15) 31 g H_2CO_3

(16) 340. g $CaMoO_4$

(17) 42 CsCl

(18) 890 g $FeSO_4 \cdot 7H_2O$

(19) 551 g CoC_2O_4

(20) 116 g CO

(21) 25.4 g O_2

(22) 1390 g PbO

(23) 1090 g NaBrO

(24) 447 g $SnSO_3$

(25) 476 g $AuBO_3$

(26) 343 g $CuHPO_4$

(27) 143 g $CrAsO_4$

ne: KEY Period: _____

Mole Grid Worksheet

Directions: Fill in the missing squares. Be sure to show your work using the method shown in class. Have fun ☺

Formula	Molar Mass	# of Moles	Mass (g)	# of Molecules
$CaCO_3$	$40.1+12.0+3(16.0)$ $= 100.1 \frac{g}{mol}$	**3.45 mols**	$100.1\frac{g}{mol} \times 3.45 mol =$ $345 g$	$3.45 mol \times \frac{6.02\times10^{23} molecules}{1 mol}$ $= 2.08 \times 10^{24}$ molecules
HNO_3	$1.0+14.0+3(16.0)$ $= 63.0 \frac{g}{mol}$	$4.51\times10^{26} molecules \times \frac{1 mol}{6.02\times10^{23} molecules}$ $= 749 mol$	$749 mol \times \frac{63.0 g}{1 mol}$ $= 4.70 \times 10^4 g$	**4.51×10^{26}**

ne: KEY Period: _____

FORMULA	MOLAR MASS	# of moles	MASS (g)	# of Molecules
$FeSO_4$	$55.8 + 32.1 + 4(16.0)$ $= 151.9\ g/mol$	$607.6\ g \times \frac{1\ mol}{151\ g}$ $= 4.02\ mol$	**607.6 g**	$4.02\ mol \times \frac{6.02 \times 10^{23}\ molecules}{1\ mol}$ =
NH_3	$14.0 + 3(1.0)$ $= 17.0\ g/mol$	$3.40 \times 10^{23}\ molecules \times \frac{1\ mol}{6.02 \times 10^{23}\ molecules}$ $= 0.565\ mol$	$0.565\ mol \times \frac{17.0\ g}{1\ mol}$ $= 9.61\ g$	**3.40×10^{23}**
$Sb(NO_3)_3$	$121.8 + 3(14.0) + 9(16.0)$ $= 307.8\ g/mol$	**$1.64 \times 10^{-2}\ mol$**	$1.64 \times 10^{-2}\ mol \times \frac{307.8\ g}{1\ mol}$ $= 5.05\ g$	$1.64 \times 10^{-2}\ mol \times \frac{6.02 \times 10^{23}\ molecules}{1\ mol}$ $= 9.87 \times 10^{21}\ molecules$
K_3PO_4	$3(39.1) + 31.0 + 4(16.0)$ $= 212.3\ g/mol$	$3.17 \times 10^{-2}\ g \times \frac{1\ mol}{212.3\ g}$ $= 1.49 \times 10^{-4}\ mol$	**$3.17 \times 10^{-2}\ g$**	$1.49 \times 10^{-4}\ mol \times \frac{6.02 \times 10^{23}\ molecules}{1\ mol}$ $= 8.97 \times 10^{19}\ molecules$.

Name: KEY Period : _____

Chemistry 11

Moles and Avogadro's Number Worksheet

Directions: Answer in the space provided. Be sure to show all your work. Have fun and enjoy the chemistry awesomeness. Use 6.02×10^{23} for Avogadro's number.

How many molecules in the following?

1. 3.25 mols

$3.25\text{mol} \times \frac{6.02\times10^{23}\text{ molecules}}{1\text{ mol}} = \boxed{1.96\times10^{24}\text{ molecules}}$

2. 5.00 mols

$5.00\text{mol} \times \frac{6.02\times10^{23}\text{ molecules}}{1\text{ mol}} = \boxed{3.01\times10^{24}\text{ molecules}}$

3. 1.275 mols

$1.275\text{mol} \times \frac{6.02\times10^{23}\text{ molecules}}{1\text{ mol}} = \boxed{7.68\times10^{23}\text{ molecules}}$

4. 0.07950 mols

$0.07950\text{ mol} \times \frac{6.02\times10^{23}\text{ molecules}}{1\text{ mol}} = \boxed{4.79\times10^{22}\text{ molecules}}$

5. 0.004580 mols

$0.004580\text{ mol} \times \frac{6.02\times10^{23}\text{ molecules}}{1\text{ mol}} = \boxed{2.76\times10^{21}\text{ molecules}}$

6. 125.25 mols

$125.25\text{mol} \times \frac{6.02\times10^{23}\text{ molecules}}{1\text{ mol}} = \boxed{7.54\times10^{25}\text{ molecules}}$

How many moles in the following molecules?

7. 1.356×10^{23}

$1.356\times10^{23}\text{ molecules} \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecules}} = \boxed{0.225\text{ mol}}$

8. 5.689×10^{24}

$5.689\times10^{24}\text{ molecules} \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecules}} = \boxed{9.45\text{ mol}}$

9. 1.005×10^{26}

$1.005\times10^{26}\text{ molecules} \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecules}} = \boxed{167\text{ mol}}$

10. 4.25×10^{21}

$4.25\times10^{21}\text{ molecules} \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecules}} = \boxed{0.00706\text{mol}}$

11. 6.985×10^{25}

$6.985\times10^{25}\text{ molecules} \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecules}} = \boxed{116\text{ mol}}$

12. 5.258×10^{22}

$5.258\times10^{22}\text{ molecules} \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecules}} = \boxed{0.0873\text{m}}$

Name: KEY Period: _____

Moles and Molecules Worksheet

Directions: Answer each question in the space provided. Please place your final answer on the line to the right. Be sure to show all your work and watch your sig figs. Have fun ☺

1. How many molecules are in 3.25 mols of water?

$$3.25 \text{ mol } H_2O \times \frac{6.02 \times 10^{23} \text{ molecules } H_2O}{1 \text{ mol } H_2O} = \boxed{1.96 \times 10^{24} \text{ molecules of } H_2O}$$

2. How many molecules are in 65.78 g of Copper (II) sulphate? $CuSO_4 = 63.5 + 32.1 + 4(16.0) = 159.6$ g

$$65.78 \text{ g } CuSO_4 \times \frac{1 \text{ mol}}{159.6 \text{ g}} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} = \boxed{2.48 \times 10^{23} \text{ molecules } CuSO_4}$$

3. How many oxygen atoms in 75.12 g of Calcium Oxalate? $Ca_2C_2O_4 = 40.1 + 2(12.0) + 4(16.0) = 128.1$ g/mol

$$75.12 \text{ g } Ca_2C_2O_4 \times \frac{1 \text{ mol}}{128.1 \text{ g}} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} \times \frac{4 \text{ atoms O}}{1 \text{ molecule}} = \boxed{1.412 \text{ atoms of O}}$$

4. How many hydrogen atoms in 5.25 g of ammonium carbonate? $(NH_4)_2CO_3 = 2(14.0) + 8.0 + 12.0 + 3(1$

$= 96.0$ g/mol

$$5.25 \text{ g } (NH_4)_2CO_3 \times \frac{1 \text{ mol}}{96.0 \text{ g}} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} \times \frac{8 \text{ atoms H}}{1 \text{ molecule}} = \boxed{2.63 \text{ atoms of H}}$$

5. Determine the mass (in grams) of 1.67×10^{23} molecules of Sodium chloride $NaCl = 23.0 + 35.5$

$= 58.5$ g/mol

$$1.67 \times 10^{23} \text{ molecules } NaCl \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ molecules}} \times \frac{58.5 \text{ g}}{1 \text{ mol}} = \boxed{16.2 \text{ g } NaCl}$$

Name: KEY Period: _____

6. Calculate how many grams of Lead (II) sulphate, if there are 9.28×10^{25} oxygen atoms. $PbSO_4 = 207.2 + 32.1 + 4(16.0) = 303.3 \frac{g}{mol}$

$$9.28\times10^{25}\ O\ atoms \times \frac{1\ molecule\ PbSO_4}{4\ atoms\ O} \times \frac{1\ mol\ PbSO_4}{6.02\times10^{23}\ molecules} \times 303.3\frac{g}{mol} = \boxed{1.17\times10^{4}\ g\ PbSO_4}$$

7. What is the mass, in grams, of Magnesium Carbonate if you have 2.568×10^{25} atoms of carbon? $MgCO_3 = 24.3 + 12.0 + 3(16.0) = 84.3 \frac{g}{mol}$

$$2.568\times10^{25}\ atoms\ of\ C \times \frac{1\ molecule\ MgCO_3}{1\ atom\ of\ C} \times \frac{1\ mol}{6.02\times10^{23}\ molecules} \times \frac{84.3\ g}{1\ mol} = \boxed{3.60\times10^{3}\ g\ MgCO_3}$$

8. Calculate the number of molecules in 69.75 g of Sodium Oxalate. $Na_2C_2O_4$

$Na_2C_2O_4 = 2(23.0) + 2(12.0) + 4(16.0) = 134.0 \frac{g}{mol}$

$$69.75\ g\ Na_2C_2O_4 \times \frac{1\ mol}{134.0\ g} \times \frac{6.02\times10^{23}\ molecules}{1\ mol} = \boxed{3.13\times10^{23}\ molecules\ Na_2C_2O_4}$$

9. How many hydrogen atoms in 0.275 mols of Potassium acetate. KCH_3COO

KCH_3COO

$$0.275\ mol\ KCH_3COO \times \frac{6.02\times10^{23}\ molecules}{1\ mol} \times \frac{3\ atoms\ H}{1\ molecule} = \boxed{4.97\times10^{23}\ atoms\ of\ H}$$

10. How many carbon atoms in 77.895 g of Aluminum Citrate. $Al_3C_6H_5O_7$

$Al_3C_6H_5O_7 = 3(27.0) + 6(12.0) + 5.0 + 7(16.0) = 270.0 \frac{g}{mol}$

$$77.895\ g\ Al_3C_6H_5O_7 \times \frac{1\ mol}{270.0\ g} \times \frac{6.02\times10^{23}\ molecules}{1\ mol} \times \frac{6\ atoms\ C}{1\ molecule} = \boxed{1.04\times10^{24}\ atoms\ of\ C}$$

11. How many grams of Sodium Benzoate, if you have 9.890×10^{26} ~~10 26~~ carbon atoms.

$NaC_6H_5COO = 23.0 + 7(12.0) + 5.0 + 2(16.0) = 144.0 \frac{g}{mol}$

$$9.890\times10^{26}\ atoms\ of\ C \times \frac{1\ molecule\ NaC_6H_5COO}{7\ atoms\ C} \times \frac{1\ mol}{6.02\times10^{23}\ molecules} \times \frac{144.0\ g}{1\ mol} = \boxed{3.38\times10^{4}\ g\ NaC_6H_5CO}$$

Name: KEY Period: _____

Chemistry 11

Moles and Volume at STP Worksheet

Directions: For gases at STP (273 K and 1 atm pressure), one mole occupies a volume of 22.4 L. What volume will the following quantities of gases occupy at STP?

1. 4.25 mole of H_2

$$4.25\text{mol } H_2 \times \frac{22.4\text{L of } H_2}{1\text{ mol } H_2} = 95.2\text{L}$$

(1) 95.2L of H_2

2. 3.20 moles of O_2

$$3.20\text{mol } O_2 \times \frac{22.4\text{L of } O_2}{1\text{mol } O_2} = 71.7\text{L}$$

(2) 71.7L of O_2

3. 0.750 moles of CO_2

$$0.750\text{ mol } CO_2 \times \frac{22.4\text{L of } CO_2}{1\text{ mol } CO_2} = 16.8\text{L}$$

(3) 16.8L of CO_2

4. 1.75 moles of CO_2

$$1.75\text{mol } CO_2 \times \frac{22.4\text{L of } CO_2}{1\text{ mol } CO_2} = 39.2\text{L}$$

(4) 39.2L of CO_2

5. 7.50 g of NH_3

$$7.50\text{g of } NH_3 \times \frac{1\text{ mol of } NH_3}{17.0\text{g } NH_3} \times \frac{22.4\text{L of } NH_3}{1\text{ mol } NH_3} =$$

(5) 9.88L of NH_3

6. 5.05 g of H_2

$$5.05\text{g of } H_2 \times \frac{1\text{mol } H_2}{2.0\text{g } H_2} \times \frac{22.4\text{L of } H_2}{1\text{ mol } H_2} = 56.6\text{L}$$

(6) 56.6 L of H_2

7. 100.0 g of O_2

$$100.0\text{g of } O_2 \times \frac{1\text{ mol } O_2}{32.0\text{g of } O_2} \times \frac{22.4\text{L of } O_2}{1\text{mol } O_2} = 70.0\text{L}$$

(7) 70.0L of O_2

8. 28.0 g of N_2

$$28.0\text{g of } N_2 \times \frac{1\text{mol } N_2}{28.0\text{g } N_2} \times \frac{22.4\text{L of } N_2}{1\text{mol } N_2} = 22.4\text{L}$$

(8) 22.4L of N_2

9. 60.00 g of CO_2

$$60.00\text{g of } CO_2 \times \frac{1\text{mol } CO_2}{44.0\text{g } CO_2} \times \frac{22.4\text{L of } CO_2}{1\text{mol } CO_2} = 30.6\text{L}$$

(9) 30.6 L of CO_2

Name: KEY Period: _____

10. 9.65×10^{24} molecules of NH_3

$$9.65\times10^{24}\text{ molecules } NH_3 \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecules}} \times \frac{22.4\text{ L}}{1\text{ mol}}$$

(10) 3.59×10^{2} L NH_3

11. 2.458×10^{23} molecules of N_2

$$2.458\times10^{23}\text{ molecules } N_2 \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecules}} \times \frac{22.4\text{ L}}{1\text{ mol}}$$

(11) 9.15 L of N_2

12. 6.598×10^{24} atoms of O (in O_2 gas)

$$6.598\times10^{24}\text{ atoms of O} \times \frac{1\text{ molecule}}{2\text{ atoms of O}} \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecules}} \times \frac{22.4\text{ L}}{1\text{ mol}}$$

(12) 123 L of O_2 gas

13. 7.526×10^{25} molecules of SO_3

$$7.526\times10^{25}\text{ molecules of } SO_3 \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecules}} \times \frac{22.4\text{ L}}{1\text{ mol}}$$

(13) 2.80×10^{3} L SO_3

14. 9.758×10^{25} atoms in N_2O_5

$$9.758\times10^{25}\text{ atoms in } N_2O_5 \times \frac{1\text{ molecule}}{7\text{ atoms}} \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecule}} \times \frac{22.4\text{ L}}{1\text{ mol}}$$

(14) 519 L of N_2O_5

15. 6.758×10^{26} atoms in H_2SO_4

$$6.758\times10^{26}\text{ atoms in } H_2SO_4 \times \frac{1\text{ molecule}}{7\text{ atoms}} \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecules}} \times \frac{22.4\text{ L}}{1\text{ mol}}$$

(15) 3.59×10^{3} L of H_2SO_4

16. 6.789×10^{26} oxygen atoms, in Sodium acetate $NaCH_3COO$

$$6.789\times10^{26}\text{ O atoms} \times \frac{1\text{ molecule } NaCH_3COO}{2\text{ O atoms}} \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecules}} \times \frac{22.4\text{ L}}{1\text{ mol}}$$

(16) 1.26×10^{4} L of $NaCH_3CO$

17. 7.62×10^{28} hydrogen atoms in Magnesium Benzoate $Mg(C_6H_5COO)_2$

$$7.62\times10^{28}\text{ H atoms} \times \frac{1\text{ molecule } Mg(C_6H_5COO)_2}{5\text{ atoms H}} \times \frac{1\text{ mol}}{6.02\times10^{23}\text{ molecules}} \times \frac{22.4\text{ L}}{1\text{ mol}}$$

(17) 5.67×10^{5} L of $Mg(C_6H_5C$

Name: KEY Period: _____

Mixed Mole Problems Worksheet

Directions: Solve the following problems. Be sure to show all your work

1. Find the number of moles if there are 7.63×10^{24} molecules of a substance.

$$7.63 \times 10^{24}\text{ molecules} \times \frac{1\text{ mol}}{6.02 \times 10^{23}\text{ molecules}} = 12.7\text{ mol}$$

2. How many moles of $CaCO_3$ are there in 2.00 kg of $CaCO_3$? $(40.1 + 12 + 3(16) = 100.1 \frac{g}{mol})$

$$2.00\text{kg} \times \frac{1000\text{g}}{1\text{kg}} \times \frac{1\text{mol } CaCO_3}{100.1\text{ g}} = 20.0\text{ mol } CaCO_3$$

3. What is the mass of 8.42 moles of $(NH_4)_2S$? $(2(14.0) + 8.0 + 32.1 = 68.1 \frac{g}{mol})$

$$8.42\text{ mol } (NH_4)_2S \times \frac{68.1\text{ g } (NH_4)_2S}{1\text{ mol } (NH_4)_2S} = 573\text{ g } (NH_4)_2S$$

4. Find the number of carbon atoms in 18.5 g of CH_3OH (methanol). $(12.0 + 4.0 + 16.0 = 32.0 \frac{g}{mol})$

$$18.5\text{g } CH_3COH \times \frac{1\text{ mol } CH_3COH}{32.0\text{g } CH_3COH} \times \frac{6.02 \times 10^{23}\text{ molecules}}{1\text{ mol}} \times \frac{1\text{ C atom}}{1\text{ molecule}} = 3.48 \times 10^{23}\text{ atoms of C}$$

5. If one litre of a gas at STP has a mass of 3.17 g, what is the molar mass of this gas? Name the diatomic element that makes up this gas?

$$\frac{3.17\text{g}}{1\text{L}} \times \frac{22.4\text{L}}{1\text{ mol}} = 71.0 \frac{g}{mol}$$ molar mass of diatomic gas

$$\frac{71.0 \frac{g}{mol}}{2} = 35.5 \frac{g}{mol}$$ of Cl

element is Cl
gas is Cl_2

6. What volume at STP would 11.50 g of oxygen gas occupy?

$$11.50\text{g } O_2 \times \frac{1\text{ mol } O_2}{32.0\text{g } O_2} \times \frac{22.4\text{ L}}{1\text{ mol}} = 8.05\text{ L of } O_2$$

7. What is the mass of 33.2 L of SO_2 gas at STP? $(32.1 + 2(16.0) = 64.1 \frac{g}{mol})$

$$33.2\text{ L} \times \frac{1\text{ mol}}{22.4\text{L}} \times \frac{64.1\text{ g } SO_2}{1\text{ mol } SO_2} = 95.0\text{g } SO_2$$

8. Calculate the molar mass of a gas at STP, if 360.0 mL of this gas has a mass of 0.680 g

$$\frac{0.680\text{g}}{0.3600\text{L}} \times \frac{22.4\text{L}}{1\text{mol}} = 42.3 \frac{g}{mol}$$ molar mass of gas

Name: KEY Period: _____

9. Methane has the formula CH_4. Calculate the mass of 2.75 L of this gas at STP.

$$2.75\,L \times \frac{1\,mol}{22.4\,L} \times \frac{16.0\,g\ CH_4}{1\,mol\ CH_4} = \boxed{1.96\,g\ CH_4}$$

10. What is the mass of 5580.0 mL of nitrogen gas at STP?

$$5580.0\,mL \times \frac{1\,L}{1000\,mL} \times \frac{1\,mol}{22.4\,L} \times \frac{28.0\,g\ N_2}{1\,mol\ N_2} = \boxed{6.98\,g\ N_2}$$

11. How many atoms of bromine are there in 175.0 mL of bromine gas at STP? (Br_2)

$$175.0\,mL\ Br_2 \times \frac{1\,L}{1000\,mL} \times \frac{1\,mol}{22.4\,L} \times \frac{6.02\times10^{23}\,molecules}{1\,mol} \times \frac{2\,atoms\ Br}{1\,molecule\ Br_2} = \boxed{9.41\times10^{21}\ atoms\ of\ Br}$$

12. How many molecules of CO_2 are there in 2.57 L of this gas at STP.

$$2.57\,L\ of\ CO_2 \times \frac{1\,mol\ CO_2}{22.4\,L\ of\ CO_2} \times \frac{6.02\times10^{23}\,molecules}{1\,mol} = \boxed{6.91\times10^{22}\ molecules}$$

13. What is the molar mass of a substance if 4.60×10^{24} molecules have a mass of 226.9 g

$$\frac{226.9\,g}{4.60\times10^{24}\,molecules} \times \frac{6.02\times10^{23}\,molecules}{1\,mol} = \boxed{29.7\,\frac{g}{mol}}$$

14. How many atoms are there in 0.125 moles of Calcium phosphate? $Ca_3(PO_4)_2$

$$0.125\,mol\ Ca_3(PO_4)_2 \times \frac{6.02\times10^{23}\,molecules}{1\,mol} \times \frac{13\,atoms}{1\,molecule\ Ca_3(PO_4)_2} = \boxed{9.78\times10^{23}\ ato}$$

15. How many atoms are there in 7.61 grams of arsenic? As

$$7.61\,g\ As \times \frac{1\,mol}{74.9\,g} \times \frac{6.02\times10^{23}\,atoms\ of\ As}{1\,mol} = \boxed{6.11\times10^{22}\ atoms\ of\ As}$$

16. How many nitrogen atoms are there in 0.310 moles of aluminum nitrate? $Al(NO_3)_3$

$$0.310\,mol\ Al(NO_3)_3 \times \frac{6.02\times10^{23}\,molecules}{1\,mol} \times \frac{3\,atoms\ of\ N}{1\,molecule} = \boxed{5.60\times10^{23}\ atoms\ of\ N}$$

Name: KEY Period: _____

17. How many atoms are there in 7.65 g of Aluminum sulphate? $Al_2(SO_4)_3$ 12

$= 2(27.0) + 3(32.1) + 7(16.0) = 262.3 \frac{g}{m}$

$$7.65g\ Al_2(SO_4)_3 \times \frac{1\ mol}{262.3g} \times \frac{6.02\times10^{23}\ molecules}{1\ mol} \times \frac{17\ atoms}{1\ molecule} = 2.98\times10^{23}\ atoms$$

342,3g

2.29 x 10 23

18. How many oxygen atoms are there in 18.00 g of Rubidium nitrate? $RbNO_3$

$= 85.5 + 14.0 + 3(16.0) = 147.5 \frac{g}{m}$

$$18.00g\ RbNO_3 \times \frac{1\ mol}{147.5g} \times \frac{6.02\times10^{23}\ molecules}{1\ mol} \times \frac{3\ atoms\ of\ O}{1\ molecule\ RbNO_3} = 2.20\ atoms\ of\ O$$

19. How many atoms are there in 3.65 mols of Calcium Sulphate? $CaSO_4$

$$3.65\ mol\ CaSO_4 \times \frac{6.02\times10^{23}\ molecules}{1\ mol} \times \frac{6\ atoms}{1\ molecule} = 1.32\times10^{25}\ atoms$$

20. How many hydrogen atoms are present in 182.3 g of Ammonium oxalate? $(NH_4)_2C_2O_4$

$$182.3g\ (NH_4)_2C_2O_4 \times \frac{1\ mol}{124.0g} \times \frac{6.02\times10^{23}\ molecules}{1\ mol} \times \frac{8\ atoms\ H}{1\ molecule\ (NH_4)_2C_2O_4} = 7.08\ atoms\ of\ H$$

21. How many atoms of oxygen are in 925.0 mL of SO_3 gas at STP?

$$0.9250L \times \frac{1\ mol}{22.4L} \times \frac{6.02\times10^{23}\ molecules}{1\ mol} \times \frac{3\ atoms\ of\ O}{1\ molecule\ SO_3} = 7.46\times10^{22}\ atoms\ of\ O$$

22. How many grams of oxygen in 780.0 mL of oxygen gas at STP?

$$780.0mL \times \frac{1L}{1000mL} \times \frac{1\ mol}{22.4L} \times \frac{32.0g\ of\ O_2}{1\ mol\ O_2} = 1.11g\ of\ O$$

23. How many molecules in 125.0 mL of NO_3 gas at STP?

$$125.0mL \times \frac{1L}{1000mL} \times \frac{1\ mol}{22.4L} \times \frac{6.02\times10^{23}\ molecules}{1\ mol} = 3.36\times10^{21}\ molecules\ NO_3$$

Name: KEY Period: _____

Chemistry 11

Density and the Mole Worksheet

Directions: Answer in the space provided. Please show all your work and place the final answer in the line on the right. Watch your sig figs☺

1. What volume is occupied by 4.25 mols of chloroform, $CHCl_3$? (Density = 1.498 g/ml)

$$4.25\text{mol } CHCl_3 \times \frac{119.5\text{g}}{1\text{mol } CHCl_3} \times \frac{1\text{mL}}{1.498\text{g}} = 339.\text{mL}$$

339 mL

2. How many moles of benzene (C_6H_6) are contained in 627.9 mL of benzene? (Density = 0.879 g/ml)

$$627.9\text{mL} \times \frac{0.879\text{g } C_6H_6}{1\text{mL}} \times \frac{1\text{mol } C_6H_6}{78.0\text{g } C_6H_6} = 7.08\text{mol } C_6H_6$$

7.08 mol C_6H_6

3. A 2.25 L bulb contains 3.20 g of a diatomic gas at STP. Calculate the molar mass of the gas and use the molar mass to identify the gas.

$\text{Density} = \frac{3.20\text{g}}{2.25\text{L}} = 1.42\ \frac{\text{g}}{\text{L}}$

$\frac{32.0}{2} = 16.0\ \frac{\text{g}}{\text{mol}}$ Molar Mass of Oxygen

$\text{Molar Mass} = 1.42\ \frac{\text{g}}{\text{L}} \times \frac{22.4\text{L}}{1\text{mol}} = 32.0\ \frac{\text{g}}{\text{mol}}$ of Diatomic gas

O_2

4. How many carbon atoms in 250.0 ml of ethyl acetate ($CH_3OOCH_2CH_3$)? (Density = 0.894 g/ml)

$$\frac{0.894\text{g}}{1\text{mL}} \times 250.0\text{mL} \times \frac{1\text{mol } C_3H_8O_2}{76.0\text{g } C_3H_8O_2} \times \frac{6.02\times10^{23}\text{molecule}}{1\text{mol}} \times \frac{3\text{ atoms of C}}{1\text{molecule}}$$

$= 5.31\times10^{24}$ atoms of C

Name: KEY Period: _____

5. Acetone (CH_3COCH_3) has a density of 0.786 g/ml. How many atoms of hydrogen in 325.0 ml of acetone? C_3H_6O

$$\frac{0.786\text{g } C_3H_6O}{1\text{mL}} \times 325.0\text{mL} \times \frac{1\text{mol}}{58.0\text{g}} \times \frac{6.02\times10^{23}\text{ molecule}}{1\text{mol}} \times \frac{6\text{ atoms H}}{1\text{ molecule of } C_3H_6O}$$

$$= \boxed{1.59\times10^{25}\text{ atoms of H}}$$

6. The density of Hexane (C_6H_{14}) is 0.655 g/ml. How many molecules of hexane are there in 3.25 L of C_6H_{14}?

$$\frac{0.655\text{g}}{1\text{mL}} \times 3250\text{mL} \times \frac{1\text{mol}}{86.0\text{g}} \times \frac{6.02\times10^{23}\text{ molecules}}{1\text{ mol}} = \boxed{1.49\times10^{25}\text{ molecules } C_6H_{14}}$$

7. What volume of Ethanol (CH_3CH_2OH) contains 1.29×10^{25} hydrogen atoms? Density of CH_3CH_2OH = 0.789 g/ml)

$$1.29\times10^{25}\text{ atoms of H} \times \frac{1\text{ molecule } C_2H_6O}{6\text{ atoms of H}} \times \frac{1\text{mol}}{6.02\times10^{23}\text{ molecules}} \times \frac{46.0\text{g}}{1\text{mol}} \times \frac{1\text{mL}}{0.789\text{g}}$$

$$= \boxed{208\text{ mL}}$$

8. Isopropanol, $CH_3CHOHCH_3$, is a liquid having a density of 0.785 g/ml. What volume is occupied by 9.25×10^{26} molecules of $CH_3CHOHCH_3$?

$$9.25\times10^{26}\text{ molecules} \times \frac{1\text{mol}}{6.02\times10^{23}\text{ molecules}} \times \frac{60.0\text{g}}{1\text{mol}} \times \frac{1\text{mL}}{0.785\text{g}} = 1.17\times10^{5}\text{ mL}$$

$$\boxed{117\text{ L}}$$

Name: KEY Period: _____

Percent Composition Worksheet

Directions: Answer in the space provided and please show all your work.

Calculate the % Composition of the following

1. C_2H_6 $2(12.0)+6(1.0)=30.0\ g/mol$

$\%C=\frac{24.0}{30.0}\times100\%=$ **80% C** $\%\ H=\frac{6.0}{30.0}\times100\%=$ **20% H**

2. $CaCO_3$ $1(40.1)+1(12.0)+3(16.0)=100.1\ g/mol$

$\%Ca=\frac{40.1}{100.1}\times100\%=$ **40% Ca** $\%C=\frac{12.0}{100.1}\times100\%=12\%$ $\%O=\frac{48.0}{100.1}\times100\%=$ **48 O**

3. $Ag(NH_3)_2Cl$ $1(107.9)+2(14.0)+6(1.0)+1(35.5)=177.4\ g/mol$

$\%\ Ag=\frac{107.9}{177.4}\times100\%=$ **61% Ag** $\%\ H=\frac{6.0}{177.4}\times100\%=$ **3 % H**

$\%\ N=\frac{2(14.0)}{177.4}\times100\%=$ **16% N** $\%Cl=\frac{35.5}{177.4}\times100\%=$ **20% Cl**

*Calculate the % composition of the **BOLD** species in the following*

4. $CaCl_2\cdot 8H_2O = 1(40.1)+2(35.5)+16(1.0)+8(16.0)=255.1\ g/mol$

$\%\ Cl=\frac{2(35.5)}{255.1}\times100\%=$ **28% Cl**

5. $FeSO_4 = 1(55.8)+1(32.1)+4(16.0)=151.9\ g/mol$

$\%O=\frac{4(16.0)}{151.9}\times100\%=$ **42% O**

6. $Fe_2(SO_4)_3\cdot 5H_2O = 2(55.8)+3(32.1)+12(16.0)+5(18.0)=489.9\ g/mol$

$\%\ H_2O=\frac{5(18.0)}{489.9}\times100\%=$ **18 % H_2O**

Name: KEY Period: _____

Empirical Formula Worksheet

Directions: Answer in the space provided and please show all your work.

1. A compound is composed of 27.3 % C and 72.2 % O. What is the empirical formula of the compound? (100 g)

mol of C = $27.3\text{g} \times \frac{1\text{mol}}{12.0\text{g}} = 2.275$

mol of O = $72.2\text{g} \times \frac{1\text{mol}}{16.0} = 4.5125$

	÷ 2.275	RATIO
C	$\frac{2.275}{2.275} =$	1
O	$\frac{4.5125}{2.275} =$	2

Emp Formula = CO_2

2. Calculate the empirical formula of a compound that is 42.9 % Carbon and 57.1 % Oxygen. (100 g)

mol of C = $42.9\text{g} \times \frac{1\text{mol}}{12.0\text{g}} = 3.575\text{ mol}$

mol of O = $57.1\text{g} \times \frac{1\text{mol}}{16.0\text{g}} = 3.57\text{ mol}$

	(42.9g) ÷ 3.575	(57.1g) RATIO
C	$\frac{3.575}{3.575}$	1
O	$\frac{3.57}{3.575}$	1

Emp Formula: CO

3. Calculate the empirical formula of a compound that is 70.0 % Fe and 30.0 % Oxygen.

mol of Fe = $70.0\text{g} \times \frac{1\text{mol}}{55.8\text{g}} = 1.25\text{ mol}$

mol of O = $30.0\text{g} \times \frac{1\text{mol}}{16.0\text{g}} = 1.88\text{mol}$

	(70.0g) ÷ 1.25	(30.0g) × 2	RATIO
Fe	$\frac{1.25}{1.25} = 1$	2	2
O	$\frac{1.88}{1.25} = 1.5$	3	3

Emp Formula: Fe_2O_3

4. Calculate the empirical formula of a compound that is 39.99 % C, 6.73% H and the rest O.

mol of C = $39.99\text{g} \times \frac{1\text{mol}}{12.0\text{g}} = 3.33\text{mol}$

mol of H = $6.73\text{g} \times \frac{1\text{mol}}{1.0\text{g}} = 6.73\text{mol}$

mol of O = $53.28 \times \frac{1\text{mol}}{16.0\text{g}} = 3.33\text{mol}$

÷ 3.33	RATIO
1	1
2	2
2	2

Emp Formula: CH_2O_2

5. Calculate the empirical formula of a compound that is 52.13% C, 13.15% H and the rest O.

mol of C = $52.13\text{g} \times \frac{1\text{mol}}{12.0\text{g}} = 4.34\text{mol}$

mol of H = $13.15\text{g} \times \frac{1\text{mol}}{1.0\text{g}} = 13.15\text{ mol}$

mol of O = $34.72\text{g} \times \frac{1\text{mol}}{16.0\text{g}} = 2.17\text{mol}$

÷ 2.17
2
6
1

Emp Formula: C_2H_6O

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Molecular Formula Worksheet

Directions: Answer in the space provided and please show all your work.

1. Dichloroacetic acid is corrosive to the skin and is sometimes used to remove skin blemishes. It has a molar mass of 129 g/mol and the empirical formula is CHOCl. What is its molecular formula?

mw = 12+1+16+35.5
mw of CHOCl = 64.5 g/mol
Emp Form Mass = 64.5 g/mol

$$\text{Ratio} = \frac{\text{MF Mass}}{\text{EF Mass}} = \frac{129\ g/mol}{64.5\ g/mol} = 2$$

Molecular Formula = $C_2H_2O_2Cl_2$

2. A compound has an empirical formula of C_5H_{11}. If 0.0275 mol of the compound has a mass of 3.91g, what is the molecular formula?

$$\text{molecular Formula Mass} = \frac{3.91\ g}{0.0275\ mol} = 142.2\ g/mol$$

Emp Formula Mass C_5H_{11} = 5(12.0)+11(1.) = 71.0 g/mol.

$$\text{Ratio} = \frac{\text{Mol. Form Mass}}{\text{Emp Form Mass}} = \frac{142.2\ g/mol}{71.0\ g/mol} = 2$$

Molecular Formula = $C_{10}H_{22}$

3. A gas has an empirical formula of CH_2. AT STP, 0.500 L of the gas has a mass of 0.938 g, find the molecular formula of the gas?

$$\text{molecular Formula Mass} = \frac{0.938\ g}{0.500\ L \times \frac{1\ mol}{22.4\ L}} = 42.0\ g/mol$$

Emp Formula Mass CH_2 = 14.0 g/m

$$\text{Ratio} = \frac{\text{Mol Form Mass}}{\text{Emp Form Mass}} = \frac{42.0\ g/mol}{14.0\ g/mol} = 3$$

Molecular Formula = C_3H_6

4. A sample of gas with a mass of 0.522 g has a volume of 4.50×10^2 mL at STP. Find the molecular formula if the empirical formula is CH.

$$\text{molecular Formula Mass} = \frac{0.522\ g}{4.50 \times 10^2\ mL \times \frac{1\ L}{1000\ mL} \times \frac{1\ mol}{22.4\ L}} = 25.98\ g/mol$$

Emp Formula Mass CH = 13.0 g/mol.

$$\text{Ratio} = \frac{\text{Mol Form Mass}}{\text{Emp Form Mass}} = \frac{25.98\ g/mol}{13.0\ g/mol} = 2$$

Molecular Formula. C_2H_2

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Chemistry 11

Molarity Worksheet

Directions: Answer in the space provided and please show all your work.

1. What is the NaCl concentration when 0.658 moles of NaCl is dissolved in 2.50 L of water?

$NaCl_{(s)} \rightarrow Na^+_{(aq)} + Cl^-_{(aq)}$

$[NaCl] = \frac{0.658 mol}{2.50 L} = 0.263 M$ **$[NaCl] = 0.263 M$**

2. What is the resulting molarity when 78.90 g of $CaBr_2$ is dissolved in 1.5 L of water?

MW of $CaBr_2$
$1(40.1) + 2(79.9) = 199.9 \frac{g}{mol}$

$[CaBr_2] = 78.90 g \times \frac{1 mol}{199.9 g} \times \frac{1}{1.5 L} = 0.26 M$

$[CaBr_2] = 0.26 M$

3. What is the [KI] when 3.45 g of KI is mixed with 1.25 L of water?

MW of KI
$1(39.1) + 1(126.9) = 166.0 \frac{g}{mol}$

$[KI] = 3.45 g \times \frac{1 mol}{166.0 g} \times \frac{1}{1.25 L} = 0.0166 M$

$[KI] = 0.0166 M$

4. What is the $[CaCO_3]$ when 123.6 g of $CaCO_3$ is mixed with 975.0 ml of water?

MW of $CaCO_3$
$40.1 + 12.0 + 3(16.0) = 100.1 \frac{g}{mol}$

$123.6 g\ CaCO_3 \times \frac{1 mol}{100.1 g} \times \frac{1}{0.975 L} = 1.27 M$

$[CaCO_3] = 1.27 M$

5. How many moles of KCl are contained 3.50 L of a 2.34 M KCl solution?

$2.34 \frac{mol}{L}\ KCl \times 3.50 L =$ **8.19 mol KCl**

6. How many grams of CsOH in 3.00 L of a 0.250 M CsOH solution?

MW of CsOH
$132.9 + 16.0 + 1.0 = 149.9 \frac{g}{mol}$

$0.250 \frac{mol}{L}\ CsOH \times 3.00 L \times \frac{149.9 g}{1 mol} =$ **112 g CsOH**

Name: KEY Period: _____

7. How many grams of KNO_3 in 925.0 ml of a 0.925 M KNO_3 solution?

MW of KNO_3
$39.1 + 14.0 + 3(16.0) = 101.1 \frac{g}{mol}$

$0.925 \frac{mol}{L} \times 0.925 L \times \frac{101.1 g}{1 mol} = \boxed{86.5 g\ KNO_3}$

8. What volume of 0.275 M NaCl contains 1.10 mols of NaCl?

$1.10\ mol\ NaCl \times \frac{1 L}{0.275 mol} = \boxed{4.00 L\ NaCl}$

9. What volume of 1.250 M KBr contains 97.5 g of KBr?

MW of KBr
$39.1 + 79.9 = 119.0 \frac{g}{mol}$

$97.5 g\ KBr \times \frac{1 mol}{119.0 g} \times \frac{1 L}{1.250 mol} = \boxed{0.656 L\ KBr}$

10. How many molecules of NaCl are contained in 3.25 L of a 0.750 M solution of NaCl?

$0.750 \frac{mol}{L}\ NaCl \times 3.25 L \times \frac{6.02 \times 10^{23} molecules}{1 mol} = \boxed{1.47 \times 10^{24} molecules\ NaCl}$

11. How many oxygen atoms are there in 975.0 ml of a 1.75 M solution of $CaSO_4$?

$1.75 \frac{mol}{L}\ CaSO_4 \times 0.9750 L \times \frac{6.02 \times 10^{23} molecules}{1 mol} \times \frac{4 atoms\ O}{1 molecule\ CaSO_4} = \boxed{4.11 \times 10^{24} atoms\ of\ O}$

12. How many atoms are contained in 1250.0 ml of a 0.975 M solution of $Pb(SO_4)_2$?

$0.975 \frac{mol}{L} \times 1.2500 L \times \frac{6.02 \times 10^{23} molecules}{1 mol} \times \frac{11 atoms}{1 molecule\ Pb(SO_4)_2} = \boxed{8.07 \times 10^{24} atoms}$

Name: KEY Period: _____

Chemistry 11
Dilution Worksheet

Directions: Answer in the space provided and please show all your work. Watch your sig figs!

$[\ ]_{dil} = [\ ]_{int} \times \frac{Initial\ Volume}{Final/\ Total\ Volume}$ **OR** $[\ ]_{dil} \times$ final volume $= [\ ]_{int} \times$ initial volume

1. If 45.0 ml of 1.25 M NaCl is added to 155 ml of water, what is the resulting [NaCl]?

$$[NaCl]_{dil} = \frac{1.25\ mol}{L} \times \frac{45.0\ mL}{200.0\ mL} = 0.281\ m$$

$$[NaCl]_{Dil} = 0.281\ m$$

2. 350.0 ml of a 2.25 M CsOH solution is diluted to a ***total volume*** of 600.0 ml, what is the molar concentration of the resulting solution?

$$[CsOH]_{Dil} = 2.25\ \frac{mol}{L} \times \frac{350.0\ mL}{600.0\ mL} = 1.31\ m$$

$$[CsOH]_{Dil} = 1.31\ m$$

3. What is the resulting [KBr] when 125.0 ml of 0.450 M (A) KBr is mixed with 250.0 ml of 0.550 M (B) KBr?

$$[KBr]_{Dil\ (A)} = 0.450\ \frac{mol}{L} \times \frac{125.0\ mL}{375.0\ mL} = 0.150\ m \qquad [KBr]_{Dil\ (B)} = 0.550\ \frac{mol}{L} \times \frac{250.0\ mL}{375.0\ mL} = 0.367\ m$$

$$[KBr]_{TOTAL} = 0.150\ m + 0.367\ m = 0.517\ m$$

$$[KBr]_{TOTAL} = 0.517\ m$$

4. What volume of 7.00 M H_2SO_4 is used in making up 3.25 L of a 2.15 M H_2SO_4 solution?

$$\left(7.00\ \frac{mol}{L}\right) V_{initial} = \left(2.15\ \frac{mol}{L}\right)(3.25\ L)$$

$$V_{initial} = \frac{\left(2.15\ \frac{mol}{L}\right)(3.25\ L)}{\left(7.00\ \frac{mol}{L}\right)}$$

$$V_{initial} = 0.998\ L$$

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5. How would you prepare 2.50 L of 0.650 M $HCl_{(aq)}$, starting with 10.55 M HCl (find the volume)?

$$(10.55\,M)\,V_{initial} = (0.650\,M)(2.50\,L)$$

$$V_{initial} = \frac{(0.650\,M)(2.50\,L)}{(10.55\,M)}$$

$$\boxed{V_{initial} = 0.154\,L}$$

6. What volume of 11.75 M NaOH is required to prepare 750.0 ml of 0.975 M NaOH?

$$(11.75\,M)\,V_{initial} = (0.975\,M)(750.0\,mL)$$

$$V_{initial} = \frac{(0.975\,M)(750.0\,mL)}{(11.75\,M)}$$

$$\boxed{V_{initial} = 62.2\,mL}$$

7. What is the actual experimental procedure you would use to prepare 1.25 L of a 0.750 M NaOH solution, starting with solid NaOH?

mW $NaOH = 23.0 + 16.0 + 1.0 = 40.0\,g/mol$

$$0.750\,\frac{mol}{L} \times 1.25\,L \times \frac{40.0\,g}{1\,mol} = \boxed{37.5\,g\ NaOH}$$