

## Atomic Mass

①

	Mass	%
$^{10}\text{B}$	10.01	x
$^{11}\text{B}$	11.01	y

$$x + y = 1$$

$$y = 1 - x$$

$$y = 1 - 0.2$$

$$y = 0.8$$

$$10.01x + 11.01y = 10.81$$

$$10.01x + 11.01(1-x) = 10.81$$

$$10.01x + 11.01 - 11.01x = 10.81$$

$$-x + 11.01 = 10.81$$

$$x = 11.01 - 10.81$$

$$x = 0.2$$

$^{10}\text{B}$  20%       $^{11}\text{B}$  80%

②

	Mass	%
$^{63}\text{C}$	62.930	x
$^{65}\text{C}$	64.928	y

$$x + y = 1$$

$$y = 1 - x$$

$$y = 1 - 0.695$$

$$y = 0.305$$

$$62.93x + 64.928y = 63.54$$

$$62.93x + 64.928(1-x) = 63.54$$

$$62.93x + 64.928 - 64.928x = 63.54$$

$$64.928 - 1.998x = 63.54$$

$$1.998x = 1.388$$

$$x = 0.695$$

$^{63}\text{C}$  69.5%       $^{65}\text{C}$  30.5%

③

<sup>85</sup> Rb	84.91	x
<sup>87</sup> Rb	86.92	y

$$\begin{aligned}
 x + y &= 1 \\
 y &= 1 - x \\
 &= 1 - 0.721 \\
 y &= 0.279
 \end{aligned}$$

$$\begin{aligned}
 84.91x + 86.92y &= 85.47 \\
 84.91x + 86.92(1-x) &= 85.47 \\
 84.91x + 86.92 - 86.92x &= 85.47 \\
 86.92 - 2.01x &= 85.47 \\
 2.01x &= 1.45
 \end{aligned}$$

$$x = 0.721$$

<sup>85</sup> Rb	72.1%	<sup>87</sup> Rb	27.9%
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④

<sup>79</sup> Br	78.91	x
<sup>81</sup> Br	80.916	y

$$\begin{aligned}
 x + y &= 1 \\
 y &= 1 - x \\
 &= 1 - 0.504 \\
 y &= 0.496
 \end{aligned}$$

$$\begin{aligned}
 78.91x + 80.916y &= 79.904 \\
 78.91x + 80.916(1-x) &= 79.904 \\
 78.91x + 80.916 - 80.916x &= 79.904 \\
 80.916 - 2.006x &= 79.904 \\
 2.006x &= 1.012
 \end{aligned}$$

$$x = 0.504$$

<sup>79</sup> Br	50.4%	<sup>81</sup> Br	49.6%
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$$\textcircled{5} \quad (0.787)(24) + (0.101)(25) + (0.112)(26)$$

$$= 24.325 \text{ amu}$$

$$\textcircled{6} \quad (0.5725)(120.9) + (0.4275)(122.9)$$

$$= 121.755 \text{ amu}$$

$$\textcircled{7} \quad (0.604)(68.9) + (0.396)(70.9)$$

$$= 69.692 \text{ amu}$$

$$\textcircled{8} \quad (0.92)(28) + (0.05)(29) + (0.03)(30)$$

$$= 28.11 \text{ amu}$$

$\textcircled{9}$	$^{35}\text{Cl}$	$34.96885$	$x$
	$^{37}\text{Cl}$	$36.96590$	$y$

$$x + y = 1$$

$$y = 1 - x$$

$$= 1 - 0.767$$

$$y = 0.233$$

$$34.96885x + 36.96590y = 35.435$$

$$34.96885x + 36.96590(1-x) = 35.435$$

$$34.96885x + 36.96590 - 36.96590x = 35.435$$

$$36.96590 - 1.99705x = 35.435$$

$$1.99705x = 1.5309$$

$$x = 0.767$$

$^{35}\text{Cl}$	$76.7\%$	$^{37}\text{Cl}$	$23.3\%$
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$$\textcircled{10} \quad (0.99759)(15.99491) + (0.00037)(16.99914) + (0.00204)(17.99916)$$

$$= 15.9994 \text{ amu}$$

## Naming Worksheet

(From [http://www.palomar.edu/chemistry/docs/Name\\_of\\_Chemical\\_Compounds.html](http://www.palomar.edu/chemistry/docs/Name_of_Chemical_Compounds.html))

Name the following compounds:

1.  $ZnS$  zinc sulfide
2.  $MgCl_2$  magnesium chloride
3.  $Ca(ClO_3)_2$  calcium chlorate
4.  $CaSO_4$  calcium sulfate
5.  $AgNO_3$  silver nitrate
6.  $H_2S$  hydrogen sulfide
7.  $CaO$  calcium oxide
8.  $H_2CO_3$  hydrogen carbonate
9.  $Mg_3(PO_4)_2$  magnesium phosphate
10.  $KCl$  potassium chloride
11.  $K_2O$  potassium oxide
12.  $Al(NO_2)_3$  aluminum nitrite
13.  $MgO$  magnesium oxide
14.  $SnI_2$  tin(II) iodide
15.  $AsCl_5$  arsenic(V) chloride
16.  $CuSO_3$  copper(II) sulfite
17.  $HF$  hydrogen fluoride
18.  $FeSO_4$  iron(II) sulfate
19.  $SnCl_4$  tin(IV) chloride
20.  $AsCl_3$  arsenic(III) chloride
21.  $KCN$  potassium cyanide
26.  $CuCl_2$  copper(II) chloride
27.  $PCl_5$  phosphorus pentachloride
28.  $LiNO_2$  lithium nitrite
29.  $KH_2PO_4$  potassium dihydrogen phosphate
30.  $CuCN$  copper(I) cyanide
31.  $KHCO_3$  potassium hydrogen carbonate
32.  $NaHSO_3$  sodium hydrogen sulfite
33.  $Li_2HPO_4$  lithium hydrogen phosphate
34.  $H_3PO_3$  phosphorous trioxide
35.  $MgSO_4$  magnesium sulfate
36.  $Ca(IO_2)_2$  calcium iodite \*\*
37.  $SiO_2$  silicon dioxide
38.  $CuCl$  copper(I) chloride
39.  $KClO_2$  potassium chlorite
40.  $CaSO_3$  calcium sulfite
41.  $NaBr$  sodium bromide
42.  $P_2O_3$  diphosphorus trioxide
43.  $HClO$  hydrogen hypochlorite
44.  $NO_2$  nitrogen dioxide
45.  $NaH$  sodium hydride
46.  $ZnS$  zinc sulfide

\*\*  $IO_2^-$  = iodite  
CH30S

22.  $\text{NH}_4\text{OH}$  ammonium hydroxide 47.  $\text{Pb}(\text{NO}_3)_2$  lead(II) nitrate  
 23.  $\text{Fe}(\text{ClO}_4)_3$  iron(III) perchlorate 48.  $\text{H}_2\text{Se}$  dihydrogen selenide  
 24.  $\text{HNO}_2$  hydrogen nitrite 49.  $\text{H}_3\text{PO}_4$  \_\_\_\_\_  
 25.  $\text{CS}_2$  carbon disulfide 50.  $\text{CaH}_2$  calcium hydride

Write the formulas for the following compounds:

51. lithium chloride  $\text{LiCl}$  76. strontium carbonate  $\text{SrCO}_3$   
 52. phosphoric acid \_\_\_\_\_ 77. calcium nitrate  $\text{Ca}(\text{NO}_3)_2$   
 53. boron trichloride  $\text{BCl}_3$  78. disulfur dichloride  $\text{S}_2\text{Cl}_2$   
 54. ferric chloride \_\_\_\_\_ 79. tin (IV) oxide  $\text{SnO}_2$   
 55. carbon tetrachloride  $\text{CCl}_4$  80. sodium bicarbonate  $\text{NaHCO}_3$  \*  
 56. silver sulfide  $\text{Ag}_2\text{S}$  81. strontium chlorate  $\text{Sr}(\text{ClO}_3)_2$   
 57. antimony trichloride  $\text{SbCl}_3$  82. aluminum hydroxide  $\text{Al}(\text{OH})_3$   
 58. barium carbonate  $\text{BaCO}_3$  83. cadmium nitrate  $\text{Cd}(\text{NO}_3)_2$   
 59. iodine monochloride  $\text{ICl}$  84. diphosphorus trioxide  $\text{P}_2\text{O}_3$   
 60. aluminum nitride  $\text{AlN}$  85. sodium hydride  $\text{NaH}$   
 61. lead sulfate  $\text{PbSO}_4$  86. calcium nitride  $\text{Ca}_2\text{N}_3$   
 62. ammonium chloride  $\text{NH}_4\text{Cl}$  87. sulfur trioxide  $\text{SO}_3$   
 63. hydrogen fluoride  $\text{HF}$  88. aluminum nitrate  $\text{Al}(\text{NO}_3)_3$   
 64. hydrobromic acid \_\_\_\_\_ 89. silver oxide  $\text{Ag}_2\text{O}$   
 65. tin (II) bromide  $\text{SnBr}_2$  90. ammonium phosphate  $(\text{NH}_4)_3\text{PO}_4$   
 66. cuprous oxide \_\_\_\_\_ 91. cupric sulfate \_\_\_\_\_  
 67. calcium bicarbonate  $\text{Ca}(\text{HCO}_3)_2$  \* 92. lithium fluoride  $\text{LiF}$

\* bicarbonate is the same as hydrogen carbonate

68. copper (II) cyanide  $Cu(CN)_2$  93. sodium sulfate  $Na_2SO_4$   
69. cesium fluoride  $CsF$  94. radium carbonate  $RaCO_3$   
70. zinc phosphate  $Zn_3PO_4$  95. copper (II) oxide  $CuO$   
71. dinitrogen pentoxide  $N_2O_5$  96. iron (III) sulfate  $Fe_2(SO_4)_3$   
72. iron (II) sulfate  $FeSO_4$  97. magnesium perchlorate  $Mg(ClO_4)_2$   
73. magnesium oxide  $MgO$  98. potassium hypochlorite  $KClO$   
74. hydrogen chloride  $HCl$  99. lithium hydride  $LiH$   
75. potassium cyanide  $KCN$  100. potassium nitrate  $KNO_3$

## Formula Mass

- A.
- ① Determine the Formula
  - ② Find the mass of each element
  - ③ Sum all the masses

- B.
- ①  $22.99 + 35.45 = 58.44 \text{ amu}$
  - ②  $2(39.1) + (32.07) = 110.27 \text{ amu}$
  - ③  $2(132.91) + 32.07 + 4(16) = 361.89 \text{ amu}$
  - ④  $140.91 + 3(16) + 3(1.01) = 191.94 \text{ amu}$
  - ⑤  $4(39.1) + 55.85 + 6(12.01) + 6(14.01) = 368.37 \text{ amu}$
  - ⑥  $2(14.01) + 8(1.01) + 32.07 + 4(16) = 132.17 \text{ amu}$
  - ⑦  $\text{CuS} \quad 63.55 + 32.07 = 95.62 \text{ amu}$
  - ⑧  $\text{MgF}_2 \quad 24.31 + 2(19) = 62.31 \text{ amu}$
  - ⑨  $\text{Cu}(\text{NO}_3)_2 \quad 63.55 + 2(14.01) + 6(16) = 187.57 \text{ amu}$
  - ⑩  $\text{Fe}_3(\text{PO}_4)_2 \quad 3(55.85) + 2(30.97) + 8(16) = 357.49 \text{ amu}$
  - ⑪  $\text{Al}(\text{NO}_3)_3 \quad 26.98 + 3(14.01) + 9(16) = 213.01 \text{ amu}$
  - ⑫  $\text{Mg}_3\text{N}_2 \quad 3(24.31) + 2(14.01) = 100.95 \text{ amu}$

## Balancing Equations Race - Solutions

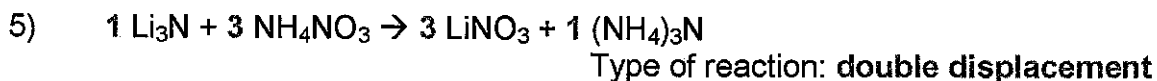
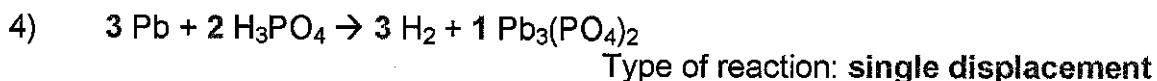
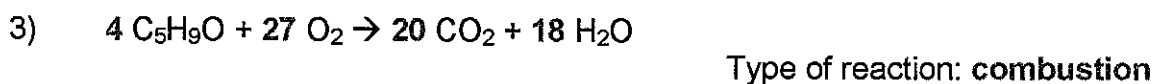
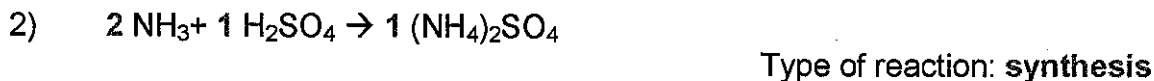
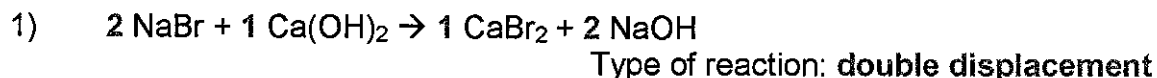
- 1)  $\underline{1} \text{ C}_3\text{H}_8 + \underline{5} \text{ O}_2 \rightarrow \underline{3} \text{ CO}_2 + \underline{4} \text{ H}_2\text{O}$
- 2)  $\underline{2} \text{ Al} + \underline{1} \text{ Fe}_3\text{N}_2 \rightarrow \underline{2} \text{ AlN} + \underline{3} \text{ Fe}$
- 3)  $\underline{2} \text{ Na} + \underline{1} \text{ Cl}_2 \rightarrow \underline{2} \text{ NaCl}$
- 4)  $\underline{2} \text{ H}_2\text{O}_2 \rightarrow \underline{2} \text{ H}_2\text{O} + \underline{1} \text{ O}_2$
- 5)  $\underline{1} \text{ C}_6\text{H}_{12}\text{O}_6 + \underline{6} \text{ O}_2 \rightarrow \underline{6} \text{ H}_2\text{O} + \underline{6} \text{ CO}_2$
- 6)  $\underline{4} \text{ H}_2\text{O} + \underline{7} \text{ CO}_2 \rightarrow \underline{1} \text{ C}_7\text{H}_8 + \underline{9} \text{ O}_2$
- 7)  $\underline{2} \text{ NaClO}_3 \rightarrow \underline{2} \text{ NaCl} + \underline{3} \text{ O}_2$
- 8)  $\underline{4} (\text{NH}_4)_3\text{PO}_4 + \underline{3} \text{ Pb}(\text{NO}_3)_4 \rightarrow \underline{1} \text{ Pb}_3(\text{PO}_4)_4 + \underline{12} \text{ NH}_4\text{NO}_3$
- 9)  $\underline{2} \text{ BF}_3 + \underline{3} \text{ Li}_2\text{SO}_3 \rightarrow \underline{1} \text{ B}_2(\text{SO}_3)_3 + \underline{6} \text{ LiF}$
- 10)  $\underline{4} \text{ C}_7\text{H}_{17} + \underline{45} \text{ O}_2 \rightarrow \underline{28} \text{ CO}_2 + \underline{34} \text{ H}_2\text{O}$
- 11)  $\underline{3} \text{ CaCO}_3 + \underline{2} \text{ H}_3\text{PO}_4 \rightarrow \underline{1} \text{ Ca}_3(\text{PO}_4)_2 + \underline{3} \text{ H}_2\text{CO}_3$
- 12)  $\underline{8} \text{ Ag}_2\text{S} \rightarrow \underline{16} \text{ Ag} + \underline{1} \text{ S}_8$
- 13)  $\underline{3} \text{ KBr} + \underline{1} \text{ Fe}(\text{OH})_3 \rightarrow \underline{3} \text{ KOH} + \underline{1} \text{ FeBr}_3$
- 14)  $\underline{2} \text{ KNO}_3 + \underline{1} \text{ H}_2\text{CO}_3 \rightarrow \underline{1} \text{ K}_2\text{CO}_3 + \underline{2} \text{ HNO}_3$
- 15)  $\underline{1} \text{ Pb}(\text{OH})_4 + \underline{2} \text{ Cu}_2\text{O} \rightarrow \underline{1} \text{ PbO}_2 + \underline{4} \text{ CuOH}$
- 16)  $\underline{1} \text{ Cr}(\text{NO}_2)_2 + \underline{1} (\text{NH}_4)_2\text{SO}_4 \rightarrow \underline{1} \text{ CrSO}_4 + \underline{2} \text{ NH}_4\text{NO}_2$
- 17)  $\underline{6} \text{ KOH} + \underline{1} \text{ Co}_3(\text{PO}_4)_2 \rightarrow \underline{2} \text{ K}_3\text{PO}_4 + \underline{3} \text{ Co}(\text{OH})_2$
- 18)  $\underline{3} \text{ Sn}(\text{NO}_2)_4 + \underline{1} \text{ Pt}_3\text{N}_4 \rightarrow \underline{1} \text{ Sn}_3\text{N}_4 + \underline{3} \text{ Pt}(\text{NO}_2)_4$
- 19)  $\underline{1} \text{ B}_2\text{Br}_6 + \underline{6} \text{ HNO}_3 \rightarrow \underline{2} \text{ B}(\text{NO}_3)_3 + \underline{6} \text{ HBr}$
- 20)  $\underline{3} \text{ ZnS} + \underline{2} \text{ AlP} \rightarrow \underline{1} \text{ Zn}_3\text{P}_2 + \underline{1} \text{ Al}_2\text{S}_3$



# Six Types of Chemical Reaction Worksheet

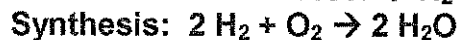
## Answers

Balance the following reactions and indicate which of the six types of chemical reaction are being represented:



7) What's the main difference between a double displacement reaction and an acid-base reaction?  
**Acid-base reactions form water.**

8) Combustion reactions always result in the formation of water. What other types of chemical reaction may result in the formation of water? Write examples of these reactions on the opposite side of this paper.



## Molar Mass

- A
- Determine Formula
  - Find molar mass of each element
  - Sum the masses

B. ①  $12.01 + 16 = 28.01 \text{ g/mol}$

②  $32.07 + 2(16) = 64.07 \text{ g/mol}$

③  $1.01 + 14.01 + 3(16) = 63.02 \text{ g/mol}$

④  $2(144.24) + 3(16) = 336.48 \text{ g/mol}$

⑤  $55.85 + 4(12.01) + 6(1.01) + 4(16) = 173.95 \text{ g/mol}$

⑥  $121.76 + 3(14.01) + 9(16) = 307.79 \text{ g/mol}$

⑦  $\text{KBr} \quad 39.1 + 79.9 = 119 \text{ g/mol}$

⑧  $\text{H}_2\text{O} \quad 2(1.01) + 16 = 18.02 \text{ g/mol}$

⑨  $\text{Na}_2\text{SO}_3 \quad 2(22.99) + 32.07 + 3(16) = 126.05 \text{ g/mol}$

⑩  $\text{NH}_4\text{Br} \quad 14.01 + 4(1.01) + 79.9 = 97.95 \text{ g/mol}$

⑪  $\text{Ca}(\text{HCO}_3)_2 \quad 40.08 + 2(1.01) + 2(12.01) + 6(16) = 162.12 \text{ g/mol}$

⑫  $\text{K}_2\text{SO}_4 \quad 2(39.1) + 32.07 + 4(16) = 174.27 \text{ g/mol}$

## Mole Conversions

$$\textcircled{1} \quad \frac{3.01 \times 10^{22}}{6.02 \times 10^{23}} = 0.05 \text{ mol}$$

$$\textcircled{2} \quad 4 (6.02 \times 10^{23}) = 2.408 \times 10^{24} \text{ molecules}$$

$$\textcircled{3} \quad \frac{1.20 \times 10^{25}}{6.02 \times 10^{23}} = 19.9 \text{ mol}$$

$$\textcircled{4} \quad 0.75 (6.02 \times 10^{23}) = 4.515 \times 10^{23} \text{ atoms}$$

$$\textcircled{5} \quad 0.4 (6.02 \times 10^{23}) = 2.408 \times 10^{23} \text{ molecules}$$

$$\textcircled{6} \quad \text{CO}_2 \quad 12.01 + 2(16) = 44.01 \text{ g/mol}$$

$$\frac{28 \text{ g}}{44.01 \text{ g/mol}} = 0.636 \text{ mol}$$

$$\textcircled{7} \quad \text{Fe}_2\text{O}_3 \quad 2(55.85) + 3(16) = 159.7 \text{ g/mol}$$

$$5(159.7) = 798.5 \text{ g}$$

$$\textcircled{8} \quad \text{Ar} \quad 39.95 \text{ g/mol}$$

$$\frac{452}{39.95} = 11.31 \text{ mol}$$

$$\textcircled{9} \quad \text{HC}_2\text{H}_3\text{O}_2 \quad 4(1.01) + 2(12.01) + 2(16) = 60.06 \text{ g/mol}$$

$$(1.26 \times 10^{-4})(60.06) = 0.0076 \text{ mol}$$

$$\textcircled{10} \quad \text{LiBr} \quad 6.94 + 79.9 = 86.84 \text{ g/mol}$$

$$2.6(86.84) = 225.78 \text{ g}$$

$$\textcircled{11} \quad 0.33(22.4) = 0.672 \text{ L}$$

$$\textcircled{12} \quad \frac{11.2 \text{ L}}{22.4} = 0.5 \text{ mol}$$

$$(13) \quad 0.05 (22.4) = 1.12 \text{ L}$$

$$(14) \quad 1.2 (22.4) = 26.88 \text{ L}$$

$$(15) \quad \frac{3.36 \text{ L}}{22.4} = 0.15 \text{ mol } \text{O}_2$$

$$0.15 (6.02 \times 10^{23}) = 9.03 \times 10^{22} \text{ molecules } \text{O}_2$$

$$(16) \quad \frac{2.00 \times 10^{23}}{6.02 \times 10^{23}} = 0.332 \text{ mol } \frac{\text{F}_2}{2}$$

$$\frac{\text{F}_2}{2} \quad 2(19) = 38 \text{ g/mol}$$

$$0.332 (38) = 12.6 \text{ g}$$

$$(17) \quad \text{N}_2 \quad 2(14.01) = 28.02 \text{ g/mol}$$

$$\frac{14 \text{ g}}{28.02} = 0.5 \text{ mol}$$

$$0.5 (22.4) = 11.2 \text{ L}$$

$$(18) \quad \text{N}_2 \quad 2(14.01) = 28.02 \text{ g/mol}$$

$$\frac{1.00 \times 10^{25}}{6.02 \times 10^{23}} = 0.166 \text{ mol}$$

$$0.166 (28.02) = 4.65 \text{ g}$$

$$(19) \quad \frac{1.43}{233} = 0.0061 \text{ mol}$$

$$0.0061 (6.02 \times 10^{23}) = 3.69 \times 10^{21} \text{ particles}$$

$$\textcircled{20} \quad a) \quad 14(12.01) + 18(1.01) + 2(14.01) + 5(16) \\ = 294.34 \text{ g/mol}$$

$$b) \quad \frac{10 \text{ g}}{294.34 \text{ g/mol}} = 0.03397 \text{ mol}$$

$$c) \quad 1.56 \text{ mol} (294.34 \text{ g/mol}) = 459.2 \text{ g}$$

$$d) \quad 5 \text{ mg} = 0.005 \text{ g}$$

$$\frac{0.005 \text{ g}}{294.34 \text{ g/mol}} = 1.699 \times 10^{-5} \text{ mol}$$

$$(1.699 \times 10^{-5}) (6.02 \times 10^{23}) = 1.02 \times 10^{19} \text{ molecules}$$

$$e) \quad \frac{1.2 \text{ g}}{294.34 \text{ g/mol}} = 0.0041 \text{ mol Aspartame}$$

$$0.0041 \text{ mol Aspartame} \rightarrow 0.0082 \text{ mol N}$$

$$0.0082 (6.02 \times 10^{23}) = 4.91 \times 10^{21} \text{ atoms of N}$$

## Molar Volume

$$\textcircled{1} \quad @ \text{ STP} \quad 2 \text{ mol} \times 22.4 \text{ L/mol} = 44.8 \text{ L}$$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$(1) \frac{(44.8)}{(273)} = \frac{P_2 (0.5)}{(303)}$$

$$P_2 = 99.45 \text{ atm} = 10074 \text{ kPa}$$

$$\textcircled{2} \quad 12.5 \text{ mol} \times 22.4 \text{ L/mol} = 280 \text{ L}$$

$$\textcircled{3} \quad \frac{2.5 \text{ L}}{22.4 \text{ L/mol}} = 0.112 \text{ mol}$$

$$\textcircled{4} \quad \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$(1) \frac{V_1}{(273)} = \frac{(1.5)(5)}{(373)}$$

$$V_1 = 5.49 \text{ L}$$

$$\frac{5.49 \text{ L}}{22.4 \text{ L/mol}} = 0.245 \text{ mol}$$

$$M = \frac{4.94 \text{ g}}{0.245 \text{ mol}} = 20.2 \text{ g/mol}$$

The gas is Neon

$$\textcircled{5} \quad @ \text{ STP} \quad 1 \text{ mol } O_2 \rightarrow 22.4 \text{ L}$$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$\frac{95 \text{ kPa}}{101.3} = 0.94 \text{ atm}$$

$$(1) \frac{(22.4)}{(273)} = \frac{(0.94) V_2}{(303)}$$

$$V_2 = 26.5 \text{ L}$$

molar mass of  $O_2 = 32 \text{ g/mol}$

$$D = \frac{M}{V} = \frac{32 \text{ g/mol}}{26.5 \text{ L/mol}}$$

$$D = 1.21 \text{ g/L}$$

$$\textcircled{6} \quad @ \text{ STP} \quad 4 \text{ mol} \times 22.4 \text{ L} = 89.6 \text{ L}$$

$$(1) \frac{(89.6)}{(273)} = \frac{(5.4)}{T_2} (120)$$

$$T_2 = 1974 \text{ K or } 1701^\circ \text{C}$$

$$\textcircled{7} \quad a) \quad P_1 V_1 = P_2 V_2$$

$$(1.25)(2.5) = (95) V_2$$

$$V_2 = 0.0329 \text{ L}$$

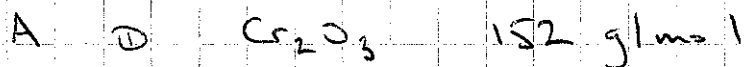
$$b) \quad \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$\frac{2.99 \text{ L}}{22.4 \text{ L/mol}} = 0.133 \text{ mol}$$

$$(1) \frac{V_1}{(273)} = \frac{(1.25)(2.5)}{(285)}$$

$$V_1 = 2.99 \text{ L}$$

## Percent Comp



$$\text{Cr: } \frac{2(52)}{152} \times 100 = 68.4\%$$

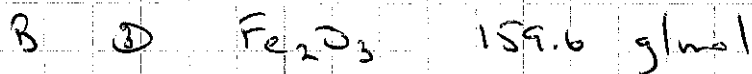
$$\text{O: } \frac{3(16)}{152} \times 100 = 31.6\%$$



$$\text{Ca: } \frac{3(40.1)}{310.3} \times 100 = 38.8\%$$

$$\text{P: } \frac{2(31.0)}{310.3} \times 100 = 20.0\%$$

$$\text{O: } \frac{8(16.0)}{310.3} \times 100 = 41.2\%$$



$$\text{Fe: } \frac{2(55.8)}{159.6} \times 100 = 69.9\%$$

$$\text{O: } \frac{3(16.0)}{159.6} \times 100 = 30.1\%$$



$$\text{Fe: } \frac{55.8}{71.8} \times 100 = 77.7\%$$

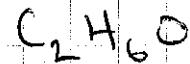
$$\text{O: } \frac{16.0}{71.8} \times 100 = 22.3\%$$



$$C: \frac{0.0130 \text{ mol}}{0.0065} = 2$$

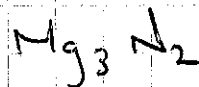
$$H: \frac{0.0390 \text{ mol}}{0.0065} = 6$$

$$O: \frac{0.0065 \text{ mol}}{0.0065} = 1$$



$$Mg: \frac{72.2 \text{ g}}{24.3 \text{ g/mol}} = 3$$

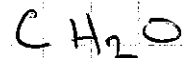
$$N: \frac{27.8 \text{ g}}{14 \text{ g/mol}} = 2$$



$$C: \frac{40 \text{ g}}{12 \text{ g/mol}} = \frac{3.33}{3.33} = 1$$

$$H: \frac{6.7 \text{ g}}{1.2 \text{ g/mol}} = \frac{6.7}{3.33} = 2$$

$$O: \frac{53.3 \text{ g}}{16.0 \text{ g/mol}} = \frac{3.33}{3.33} = 1$$



$$H: \frac{0.3086 \text{ g}}{10.0006 \text{ g}} \times 100 = 3.1\%$$

$$P: \frac{3.161 \text{ g}}{10.0006 \text{ g}} \times 100 = 31.6\%$$

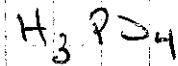
$$O: \frac{6.531 \text{ g}}{10.0006 \text{ g}} \times 100 = 65.3\%$$

continued on next page

$$\textcircled{8} \quad \text{H} \quad \frac{3.1 \text{ g}}{1 \text{ g/mol}} = 3$$

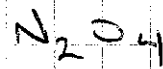
$$\text{P} \quad \frac{31.6 \text{ g}}{31 \text{ g/mol}} = 1$$

$$\text{O} \quad \frac{65.3 \text{ g}}{16 \text{ g/mol}} = 4$$



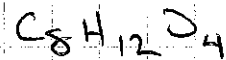
$$\textcircled{9} \quad \text{NO}_2 \quad 46 \text{ g/mol}$$

$$\frac{92.02}{46} = 2$$



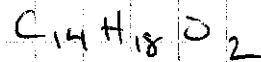
$$\textcircled{10} \quad \text{C}_2\text{H}_3\text{O} \quad 43 \text{ g/mol}$$

$$\frac{172}{43} = 4$$



$$\textcircled{11} \quad \text{C}_7\text{H}_9\text{O} \quad 109 \text{ g/mol}$$

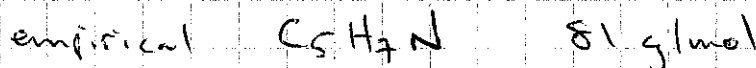
$$\frac{218}{109} = 2$$



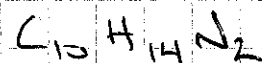
$$\textcircled{12} \quad \text{C:} \quad \frac{74.1 \text{ g}}{12 \text{ g/mol}} = 6.175 = 5$$

$$\text{H:} \quad \frac{8.6 \text{ g}}{1.0 \text{ g/mol}} = 8.6 = 7$$

$$\text{N:} \quad \frac{17.3 \text{ g}}{14 \text{ g/mol}} = 1.236 = 1$$



$$\frac{162}{81} = 2$$



$$\textcircled{13} \quad \text{C: } \frac{59 \text{ g}}{12 \text{ g/mol}} = \frac{4.92}{0.55} = 9$$

$$\text{H: } \frac{7.1 \text{ g}}{1.0 \text{ g/mol}} = \frac{7.1}{0.55} = 13$$

$$\text{O: } \frac{26.2 \text{ g}}{16.0 \text{ g/mol}} = \frac{1.64}{0.55} = 3$$

$$\text{N: } \frac{7.7 \text{ g}}{14 \text{ g/mol}} = \frac{0.55}{0.55} = 1$$

empirical  $\text{C}_9\text{H}_{13}\text{O}_3\text{N}$  183 g/mol

$$\frac{180}{183} = 1$$

molecular  $\text{C}_9\text{H}_{13}\text{O}_3\text{N}$

F  $\textcircled{14}$  Yes see # 13

$$\textcircled{15} \quad \text{H} = 3\text{C} \quad \text{C} = 2\text{O}$$

so if O is 1, then C is 2 and H is 6

