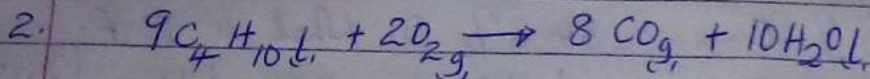


Mols of $\text{CO}_2 = ??$

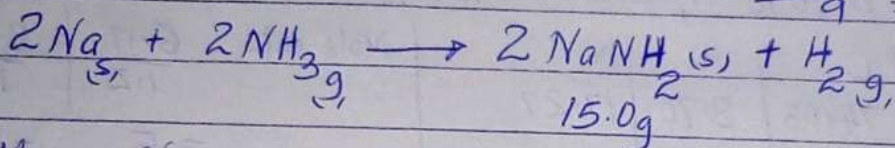
Mole ratio = 5 : 2 : 4 : 2	5 : 4
Mole ratio of ethyne : CO_2	25 mol ?
5 : 4	$\frac{25 \times 4}{5} = \underline{20 \text{ Mols}}$



Mass of CO produced from 5.0g of Butane

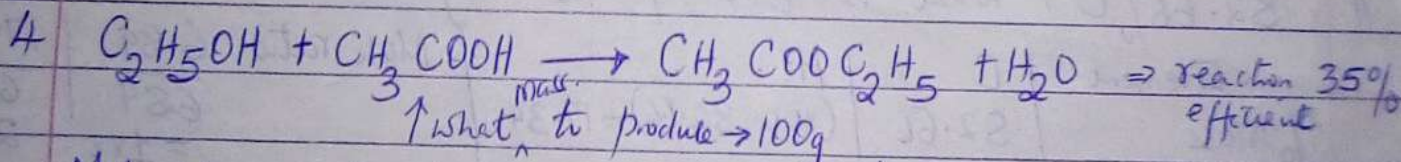
Mols C_4H_{10}	Mol ratio $\text{C}_4\text{H}_{10} : \text{CO}$	Mass CO
$= \frac{5}{58} = 0.086 \text{ mols}$	9 : 4	$= 0.038 \times 28$
	0.086 ?	$= \underline{1.064 \text{ g}}$
	$= \frac{0.086 \times 4}{9} = 0.038 \text{ mol}$	

3

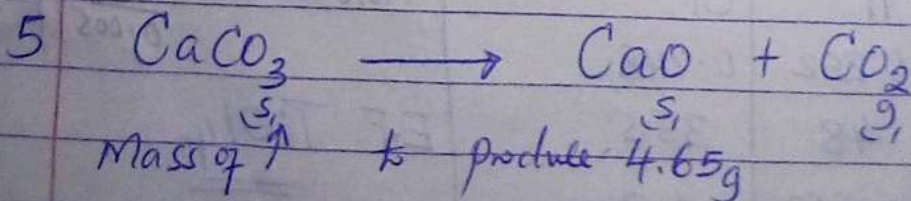


Mass of Na required ??

Mols NaNH_2	Mol ratio	Mass Na
$= \frac{15}{39} = 0.38 \text{ Mols}$	$\text{NaNH}_2 : \text{Na}$	$= 0.38 \times 23$
	1 : 1	$= \underline{8.74 \text{ g}}$
	0.38 mols ; 0.38 mols	



Mols $\text{CH}_3\text{COOC}_2\text{H}_5$	Mole ratio = 1 : 1	Mass
$= \frac{100}{90} = 1 \text{ mol}$	Mass = 1×60	$\frac{35 \times 60}{100}$
	$= 60 \text{ g}$	$= \underline{21 \text{ g}}$



Mols of CaO	Mol ratio $\text{CaCO}_3 : \text{CaO}$	Mass CaCO_3
$= \frac{4.65}{56} = 0.083 \text{ mols}$	1 : 1	$= 0.083 \times 100$
	0.083 : 0.083	$= \underline{8.3 \text{ g}}$

8 82.3% N and 17.6% H. Empirical formula

Element	N	H	Mole ratio	$\frac{5.9}{5.9}$	$\frac{17.6}{5.9}$
% Mass	82.3	17.6			
R.M.M	14	1		1	= 3
Moles	$\frac{82.3}{14}$	$\frac{17.6}{1}$			
	= 5.9	= 17.6			

E.F = NH₃

9 52.2% C, 13.0% H and 34.8% O. What is E.F.

Element	C	H	O	Mole ratio	$\frac{4.35}{2.175}$	$\frac{13}{2.175}$	$\frac{2.175}{2.175}$
% Mass	52.2	13.0	34.8				
R.A.M	12	1	16		2	6	= 1
Moles	$\frac{52.2}{12}$	$\frac{13.0}{1}$	$\frac{34.8}{16}$				
	4.35	13.0	2.175				

E.F = C₂H₆O

10 74.03% C, 8.70% H, and 17.27% N. What is the E.F

Element	C	H	N	Mole ratio	$\frac{6.17}{1.2}$	$\frac{8.7}{1.2}$	$\frac{1.2}{1.2}$
% Mass	74.03	8.70	17.27				
R.A.M	12	1	14		= 5	= 7	= 1
Moles	$\frac{74.03}{12}$	$\frac{8.70}{1}$	$\frac{17.27}{14}$				
	6.17	8.70	1.2				

E.F = C₅H₇N

11 82.66% C. What is E.F of the hydroCarbon

Element	C	H	Mole ratio	$\frac{6.89}{6.89}$	$\frac{17.34}{6.89}$
% Mass	82.66	(100 - 82.66) = 17.34			
R.A.M	12	1		= 1x2	= 2.5x2
Moles	$\frac{82.66}{12}$	$\frac{17.34}{1}$		= 2	= 5
	= 6.89	= 17.34			

E.F = C₂H₅

12 0.252g titanium and 0.748g Chlorine. Determine its E.F.

Element	Ti	Cl	
Mass in grams	0.252	0.748	
R.A.M	48	35.5	
Moles	$\frac{0.252}{48}$	$\frac{0.748}{35.5}$	
	= 0.005	= 0.02	
	5	20	
	1	4	

E.F TiCl₄

e $\text{Ca}_3(\text{PO}_4)_2$

$\text{RFM} = (40 \times 3) + (31 \times 2) + (16 \times 8)$ $= 310$	Percent Ca $\frac{120}{310} \times 100$ $= 38.71\%$	Percent P $\frac{62}{310} \times 100$ $= 20\%$	Percent O $\frac{128}{310} \times 100$ $= 41.29\%$
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5. 11.66g Fe and 5.01g O. Percent of each element in the Compound.

Total Mass of Fe and O $= 11.66 + 5.01$ $= 16.67\text{g}$	Percent of Fe $\frac{11.66}{16.67} \times 100$ $= 69.94\%$	Percent O $\frac{5.01}{16.67} \times 100$ $= 30.05\%$
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6. 0.590g C, 0.071g H, 0.262g O, and 0.077g N.

Percent of each element in the Compound.

Total Mass $= 0.590$ $+ 0.071$ 0.262 0.077 $\hline 1.000\text{g}$	Percent C $\frac{0.59}{1} \times 100$ $= 59\%$	Percent H $\frac{0.071}{1} \times 100$ $= 7.1\%$	Percent O $\frac{0.262}{1} \times 100$ $= 26.2\%$	Percent N $\frac{0.077}{1} \times 100$ $= 7.7\%$
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7. Copper(II) Sulphate (hydrated) =

Original Mass = 24.50g

Dried Sample = 15.66g

Percent of water in the Compound.

$$\text{Mass of water} = 24.50 - 15.66$$

$$= 8.84\text{g}$$

$$\text{Percent of water} = \frac{8.84}{24.5} \times 100$$

$$= 36.08\%$$

1. Percentage of C in C_2H_4

RFM = 24 + 4 = 28	Percent C $= \frac{24}{28} \times 100 = 85.71\%$	Percent of H $\frac{4}{28} \times 100 = 14.28\%$
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2. Percent of Carbon and Hydrogen in C_3H_6

RFM = 36 + 6 = 42	Percent of C $\frac{36}{42} \times 100 = 85.71$	Percent of H $\frac{6}{42} \times 100 = 14.28\%$
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3. The percentage of Carbon and Hydrogen in 1 and 2 are the same. The ratio of Carbon atom to Hydrogen in 1 and 2 is 1:2

4. Percent in each element in

(a) $MgSO_4$

RFM = 24 + 32 + 64 = 120	Percent Mg $= \frac{24}{120} \times 100 = 20\%$	Percent S $\frac{32}{120} \times 100 = 26.67\%$	Percent O $\frac{64}{120} \times 100 = 53.33\%$
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b) $MgSO_4 \cdot 7H_2O$

RFM = 24 + 32 + 64 + 126 = 246	Percent Mg $\frac{24}{246} \times 100 = 9.75\%$	Percent S $\frac{32}{246} \times 100 = 13\%$	Percent O $\frac{64}{246} \times 100 = 26.01\%$	Percent H_2O $\frac{126}{246} \times 100 = 51.21\%$
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c) $(CH_3)_2SO$

R.F.M = 24 + 6 + 32 + 16 = 78	Percent C $\frac{24}{78} \times 100 = 30.76\%$	Percent H $\frac{6}{78} \times 100 = 7.69\%$	Percent S $\frac{32}{78} \times 100 = 41.03\%$	Percent O $\frac{16}{78} \times 100 = 20.51\%$
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d) C_5H_5N

RFM = 60 + 5 + 14 = 79	Percent C $\frac{60}{79} \times 100 = 75.94\%$	Percent H $\frac{5}{79} \times 100 = 6.32\%$	Percent N $\frac{14}{79} \times 100 = 17.72\%$
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Doc 3

1. CH_3COOH (Acetic acid)

$$\begin{aligned}\text{Molar Mass} &= 12 + 3 + 12 + 16 + 16 + 1 \\ &= 60\end{aligned}$$

2. formaldehyde HCHO

$$\begin{aligned}\text{Molar Mass} &= 1 + 12 + 1 + 16 \\ &= 30\end{aligned}$$

3. 2-Dodeconal $\text{CH}_3(\text{CH}_2)_3\text{CH}(\text{OH})\text{CH}_3$

$$\begin{aligned}\text{Molar Mass} &= (12 \times 6) + (1 \times 14) + 16 \\ &= 102\end{aligned}$$

4. Glucose $\text{C}_6\text{H}_{12}\text{O}_6$

$$\begin{aligned}\text{Molar Mass} &= (12 \times 6) + (1 \times 12) + (16 \times 6) \\ &= 180\end{aligned}$$

5. Ethanol $\text{C}_2\text{H}_5\text{OH}$

$$\begin{aligned}\text{Molar Mass} &= (12 \times 2) + (1 \times 6) + 16 \\ &= 46\end{aligned}$$

6. Phosphonic Acid H_3PO_4

$$\begin{aligned}\text{Molar Mass} &= (1 \times 3) + 31 + (16 \times 4) \\ &= 98\end{aligned}$$

7. Cobalt (II) Chloride hexahydrate $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$

$$\begin{aligned}\text{Molar Mass} &= 12 + 16 + 71 + 108 \\ &= 207\end{aligned}$$

DOC 2

10 1 mol of any gas = 22.4 L, 273K and 1 atm
? = 98 L, 292K and 2.8 atm

$$\therefore \frac{98 \times 292 \times 2.8}{22.4 \times 273 \times 1}$$
$$= \underline{\underline{13.1 \text{ Mols}}}$$

$$6 \quad \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \quad P_1 = 1.0 \text{ atm} \quad P_2 = 0.60 \text{ atm}$$

$$V_1 = 4.5 \text{ DL} \quad V_2 = ??$$

$$T_1 = 20 + 273 \quad T_2 = -20 + 273$$

$$= 293 \text{ K} \quad = 253 \text{ K}$$

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

$$7. \quad \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \quad P_1 = 1.0 \text{ atm} \quad P_2 = 175 \text{ atm}$$

$$V_1 = 4.25 \times 10^4 \text{ L} \quad V_2 = ??$$

$$T_1 = 273 + 15 \quad T_2 = 3 + 273$$

$$= 288 \text{ K} \quad = 276 \text{ K}$$

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

$$= \frac{1 \times 4.25 \times 10^4 \times 276}{288 \times 175}$$

$$8 \quad \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \quad P_1 = 900 \text{ mmHg} \quad P_2 = ??$$

$$V_1 = 1 \quad V_2 = 1$$

$$T_1 = 27 + 273 \quad T_2 = -183 + 273$$

$$= 300 \text{ K} \quad = 90 \text{ K}$$

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

$$= \frac{900 \times 1 \times 90}{1 \times 300}$$

$$= 270 \text{ mmHg}$$

$$9 \quad \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$P_1 = \text{Initial pressure}$; $P_2 = \text{Final pressure}$
 $V_1 = \text{Initial volume}$; $V_2 = \text{Final volume}$
 $T_1 = \text{Initial temperature}$; $T_2 = \text{Final temperature}$

$$4. P_1 V_1 = P_2 V_2$$

$$P_1 = 1.0 \text{ atm} \quad P_2 = 0.75 \text{ atm}$$

$$V_1 = 35 \text{ L} \quad V_2 = ??$$

$$V_2 = \frac{P_1 V_1}{P_2} \quad \frac{1 \times 35}{0.75}$$

$$= \underline{46.67 \text{ L}}$$

$$5. \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$P_1 = 6 \text{ atm} \quad ; \quad P_2 = ??$$

$$V_1 = 20 \text{ L}$$

$$V_2 = 20 \text{ L}$$

$$T_1 = 273 + 20 \\ = 293 \text{ K}$$

$$T_2 = 273 + 77 \\ = 350 \text{ K}$$

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

$$= \frac{6 \times 20 \times 350}{293 \times 20}$$

$$= \underline{7.16 \text{ atm}}$$

doc 1

$$1. \quad \frac{V_1}{T_1} = \frac{V_2}{T_2} \quad ; \quad \begin{array}{l} V_1 = 35.0 \text{ L} \\ T_1 = 273 + 20 \\ = 293 \text{ K} \end{array} \quad \begin{array}{l} V_2 = ?? \\ T_2 = 273 + 45 \\ = 318 \text{ K} \end{array}$$

$$\begin{aligned} V_2 &= \frac{V_1 T_2}{T_1} \\ &= \frac{35 \times 318}{293} \\ &= \underline{\underline{37.9863 \text{ L}}} \end{aligned}$$

$$2. \quad \frac{V_1}{T_1} = \frac{V_2}{T_2} \quad \begin{array}{l} V_1 = 135 \text{ L} \\ T_1 = 273 + 260 \\ = 532 \text{ K} \end{array} \quad \begin{array}{l} V_2 = 75 \text{ L} \\ T_2 = ?? \end{array}$$

$$\begin{aligned} T_2 &= \frac{V_2 T_1}{V_1} \quad ; \quad \begin{array}{l} \cancel{135} \times \\ 75 \times 532 \\ \hline 135 \end{array} \\ &= 295.5 \text{ K} \\ &= \underline{\underline{23.5^\circ \text{C}}} \end{aligned}$$

$$3. \quad P_1 V_1 = P_2 V_2$$

$$\begin{array}{l} P_1 = 1.0 \text{ atm} \\ V_1 = 6.0 \text{ L} \end{array} \quad \begin{array}{l} P_2 = ?? \\ V_2 = 3.5 \text{ L} \end{array}$$

$$\begin{aligned} P_2 &= \frac{P_1 V_1}{V_2} \quad ; \quad \frac{1 \times 6}{3.5} \\ &= \underline{\underline{1.714 \text{ atm}}} \end{aligned}$$