Quantitative measures in chemical equations

23 January 2024 17:29

44

10 mL of gaseous hydrocarbon on combustion gives 40 mL of CO_2(g) and 50 mL of water vapour. Total number of carbon and hydrogen atoms in the hydrocarbon is _____.

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Enter your answer 14

Sol

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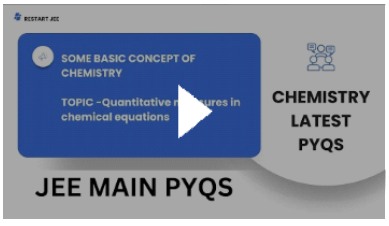

45

Consider the following reaction:

$3PbCl_2 + 2(NH_4)_3PO_4 \rightarrow Pb_3(PO_4)_2 + 6NH_4Cl$

If 72mmol of $PbCl_2$ is mixed with 50mmol of $(NH_4)_3PO_4$, then amount of $Pb_3(PO_4)_2$ formed is _____ mmol. (nearest integer)

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Enter your answer 24

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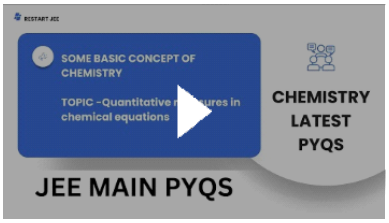

46

A sample of $CaCO_3$ and $MgCO_3$ weighed 2.21 g is ignited to constant weight of 1.152 g. The composition of mixture is :
(Given molar mass in $gmol^{-1}$ $CaCO_3$: 100, $MgCO_3$: 84)

JEE Main 2024 (31 Jan Shift 2)

A $1.187\ gCaCO_3 + 1.023\ gMgCO_3$

B $1.023\ gCaCO_3 + 1.023\ gMgCO_3$

A sample of $CaCO_3$ and $MgCO_3$ weighed 2.21 g is ignited to constant weight of 1.152 g. The composition of mixture is : (Given molar mass in $gmol^{-1}$ $CaCO_3$: 100, $MgCO_3$: 84)

JEE Main 2024 (31 Jan Shift 2)

A $1.187\ gCaCO_3 + 1.023\ gMgCO_3$

B $1.023\ gCaCO_3 + 1.023\ gMgCO_3$

C $1.187\ gCaCO_3 + 1.187\ gMgCO_3$

D $1.023\ gCaCO_3 + 1.187\ gMgCO_3$

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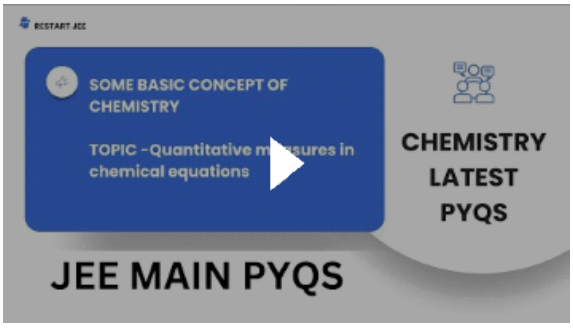

97

The molarity of 1 L orthophosphoric acid (H_3PO_4) having 70% purity by weight (specific gravity 1.54 g cm^{-3}) is _____ M. (Molar mass of H_3PO_4 = 98 g mol^{-1})

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Enter your answer

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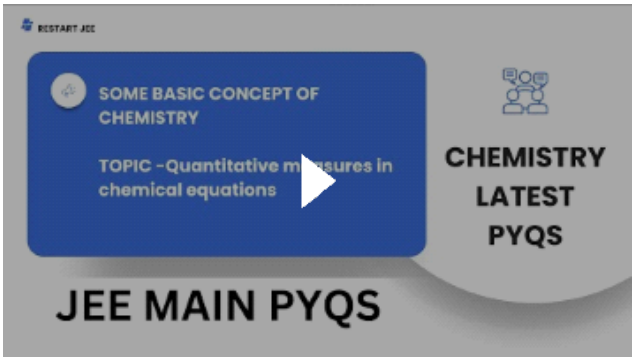

48

1 mole of PbS is oxidised by " X " moles of O_3 to get " Y " moles of O_2. X + Y = _____

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Enter your answer

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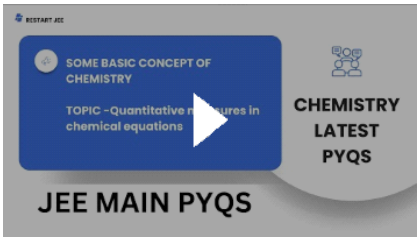

Answer:
8

Solution:

$PbS + 4O_3 \rightarrow PbSO_4 + 4O_2$

$x = 4, y = 4$

49

1 g of a carbonate (M_2CO_3) on treatment with excess HCl produces 0.01 mol of CO_2. The molar mass of M_2CO_3 is $gmol^{-1}$. (Nearest integer)

JEE Main 2023 (13 Apr Shift 2)

Enter your answer

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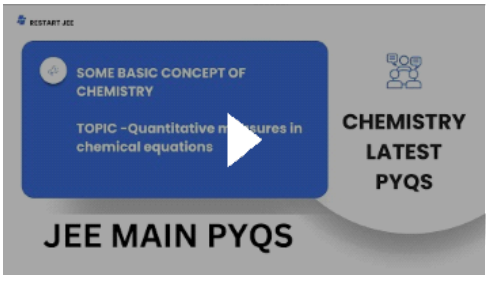

50

An organic compound gives 0.220 g of CO_2 and 0.126 g of H_2O on complete combustion. If the % of carbon is 24 then the % of hydrogen is _____ $\times 10^{-1}$. (Nearest integer)

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Enter your answer

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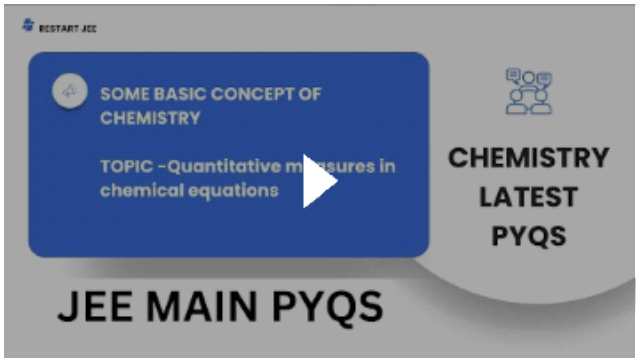

S1

The volume of hydrogen liberated at STP by treating 2.4 g of magnesium with excess of hydrochloric acid is .....$\times 10^{-2}$ L. Given Molar volume of gas is 22.4 L at STP. Molar mass of magnesium is 24 g mol^{-1}

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Enter your answer

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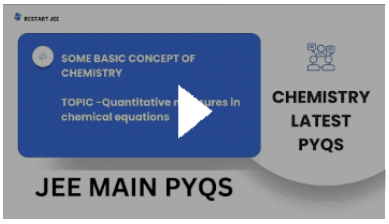

Answer:
224

Solution:

The stoichiometric equation of the reaction between magnesium and hydrogen chloride can be written as follows,
One mole magnesium can liberate one mole of hydrogen gas according to the following equation.

$$\underset{\substack{2.4\ g\\ =0.1\ mole}}{Mg} + 2HCl \rightarrow MgCl_2 + \underset{0.1\ mole}{H_2}$$

Volume of 1 mole H_2 at = 22.4 L

$\therefore$ 0.1 mole H_2 at STP will occupy = 2.24 L

S2

25 mL of silver nitrate solution (1M) is added dropwise to 25 mL of potassium iodide (1.05 M) solution. The ion(s) present in very small quantity in the solution is/are

JEE Main 2023 (11 Apr Shift 1)

A I^- only

25 mL of silver nitrate solution (1M) is added dropwise to 25 mL of potassium iodide (1.05 M) solution. The ion(s) present in very small quantity in the solution is/are

JEE Main 2023 (11 Apr Shift 1)

A I^- only

B K^+ only

C NO_3^- only

D Ag^+ and I^- both

52

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You Marked | Correct Answer

D Ag^+ and I^- both

Solution:

To determine the ion(s) present in very small quantity in the solution, we need to consider the chemical reaction that occurs when silver nitrate reacts with potassium iodide. The reaction between $AgNO_3$ and KI is a double replacement reaction and can be represented as follows:

$AgNO_3 + KI \rightarrow AgI + KNO_3$

Millimoles of $AgNO_3 = 25$

Millimoles of $KI = 25 \times 1.05 = 26.25$

$\therefore$ KI is in excess & AgI forms negatively charged colloid. (Some Ag^+ remains in solution) Ions Ag^+ & F^- are therefore, present in very small quantity.

53

If 5 moles of $BaCl_2$ is mixed with 2 moles of Na_3PO_4, the maximum number of moles of $Ba_3(PO_4)_2$ formed is (Nearest integer)

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Enter your answer

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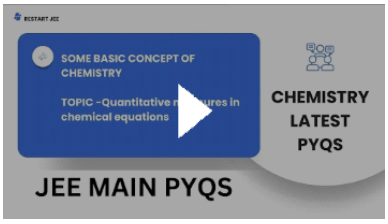

Answer:

1

Solution:

The balanced chemical equation for the reaction between $BaCl_2$ and Na_3PO_4 is:

$3BaCl_2 + 2Na_3PO_4 \rightarrow Ba_3(PO_4)_2 + 6NaCl$

5 moles of barium chloride will require $\frac{5\times2}{3} = 3.3$ moles of sodium phosphate.

Here, sodium phosphate is the limiting reagent.

2 moles of sodium phosphate produce 1 mole of barium phosphate.

Thus,2 moles of sodium phosphate will produce 1 mole of barium phosphate.

Hence, the maximum no. of moles of $Ba_3(PO_4)_2$ that can be formed is one mole.

54

When a hydrocarbon A undergoes complete combustion it requires 11 equivalents of oxygen and produces 4 equivalents of water. What is the molecular formula of A?

JEE Main 2023 (31 Jan Shift 2)

A $C_{11}H_8$

B $C_{11}H_4$

C C_5H_8

D C_9H_8

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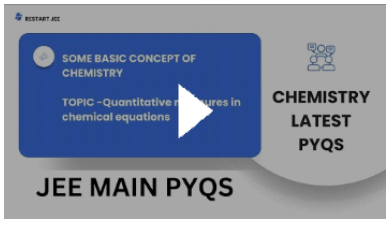

55 Easy, Do it yourself

Assume carbon burns according to following equation :

$2C(s) + O_2(g) \rightarrow 2CO(s)$

when 12 g carbon is burnt in 48 g of oxygen, the volume of carbon monoxide produced is $\times 10^{-1}$ L at STP [nearest integer]

[Given : Assume CO as ideal gas, Mass of C is 12 g mol^{-1}, mass of O is 16 g mol^{-1} and molar volume of an idal gas at STP is 22.7 L mol^{-1}]

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Enter your answer

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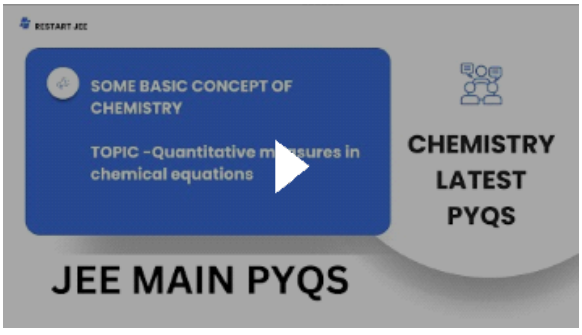

56

Number of hydrogen atoms per molecule of a hydrocarbon A having 85.8% carbon is (Given : Molar mass of A = 84 g mol^{-1})

JEE Main 2023 (25 Jan Shift 2)

Number of hydrogen atoms per molecule of a hydrocarbon A having 85. 8% carbon is (Given : Molar mass of A = 84 g mol^{-1})

JEE Main 2023 (25 Jan Shift 2)

Enter your answer

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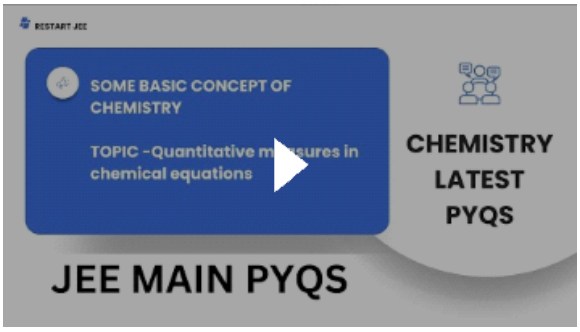

57

$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$

20 g 5 g

Consider the above reaction. If 20g of dinitrogen reacts with 5g of dihydrogen, then the limiting reagent of the reaction and number of moles of NH_3 formed respectively are

JEE Main 2022 (29 Jul Shift 1)

A $H_2, 1.42$ moles

B $H_2, 0.71$ moles

C $N_2, 1.42$ moles

D $N_2, 0.71$ moles

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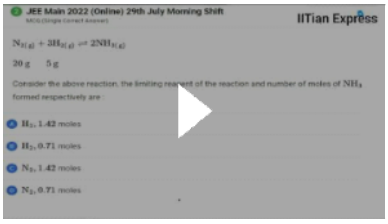

501

501

Solution:

$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$

20 g 5 g Given mass

$\frac{20}{28}$ $\frac{5}{2}$ Number of moles

To find the limiting reagent we can divide given number of moles with Stoichiometric coefficients, whichever will be the lower will be limiting reagent.

$N_2 \rightarrow \frac{\frac{20}{28}}{1} = \frac{20}{28}$ $H_2 \rightarrow \frac{\frac{5}{2}}{3} = \frac{5}{6}$

$\therefore$ N_2 is the Limiting Reagent.

According to the reaction one mole of nitrogen gas gives two moles of ammonia.

$\therefore$ $n(NH_3) = 2 \times n(N_2) = 2 \times \frac{20}{28}$

Number of moles of ammonia formed will be = 1.42

58 Do it yourself

In the given reaction,

$X + Y + 3Z \rightleftarrows XYZ_3$

if one mole of each of X and Y with 0.05 mol of Z gives compound XYZ_3. (Given : Atomic masses of X, Y and Z are 10,20 and 30 amu, respectively). The yield of XYZ_3 is____g.

JEE Main 2022 (28 Jul Shift 1)

↳ g.ω = ?

Enter your answer 2

Sol

Solution:

Z is present in least amount so, it will be limiting reagent and amount of product will depend on the amount of Z.

	X	+ Y	+ 3Z	→	XYZ_3
initially	1	1	0.05		
finally	$1-\frac{0.05}{3}$	$1-\frac{0.05}{3}$			$\frac{0.05}{3}$

Molar mass of $XYZ_3 = 10 + 20 + 30 \times 3 = 120$

Mass = number of moles $\times$ molar mass $= 120 \times \frac{0.05}{3}$

= 2 gm

59 Do it yourself

Production of iron in blast furnace follows the following equation

$Fe_3O_4(s) + 4CO(g) \rightarrow 3Fe(l) + 4CO_2(g)$

when 4.640 kg of Fe_3O_4 and 2.520 kg of CO are allowed to react then the amount of iror (in g) produced is :

[Given: Molar Atomic mass ($gmol^{-1}$): Fe = 56

Molar Atomic mass ($gmolm^{-1}$): O = 16

Molar Atomic mass ($gmolm^{-1}$): C = 12]

JEE Main 2022 (29 Jun Shift 1)

A 1400

B 2200

✓ C 3360

D 4200

Sol

Sol

Solution:

Moles of $Fe_3O_4 = \frac{4.640 \times 10^3}{232} = 20$

Moles of $CO = \frac{2.52 \times 10^3}{28} = 90$

So limiting Reagent = Fe_3O_4

Solution:

Moles of $Fe_3O_4 = \frac{4.640\times10^3}{232} = 20$

Moles of $CO = \frac{2.52\times10^3}{28} = 90$

So limiting Reagent = Fe_3O_4

So moles of Fe formed = 60

Weight of Fe = $60 \times 56 = 3360$ gms

59

Compound A contains 8.7% Hydrogen, 74% Carbon and 17.3% Nitrogen. The molecular formula of the compound is, Given : Atomic masses of C, H and N are 12, 1 and 14 amu respectively.
The molar mass of the compound A is 162 g mol^{-1}.

JEE Main 2022 (28 Jun Shift 2)

A $C_4H_6N_2$

B C_2H_3N

C C_5H_7N

D $C_{10}H_{14}N_2$

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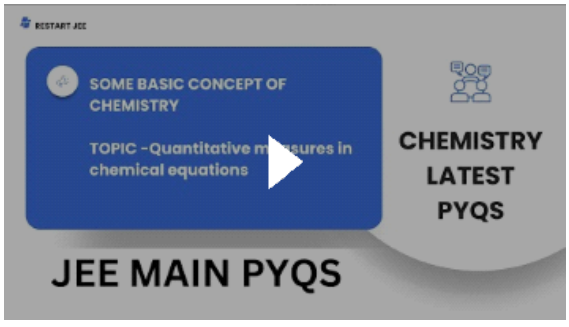

60

The complete combustion of 0.492 g of an organic compound containing 'C', 'H' and 'O' gives 0.793 g of CO_2 and 0.442 g of H_2O. The percentage of oxygen composition in the organic compound is____.(nearest integer)

JEE Main 2022 (28 Jun Shift 2)

Enter your answer

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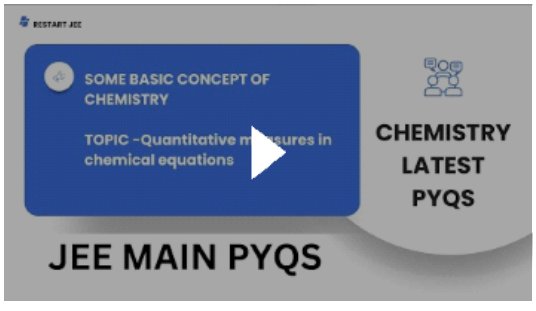

62

116 g of a substance upon dissociation reaction, yields 7.5 g of hydrogen, 60 g of oxygen and 48.5 g of carbon. Given that the atomic masses of H, O and C are 1, 16 and 12, respectively. The data agrees with how many formulae of the following?

A. CH_3COOH

B. HCHO

C. CH_3OOCH_3

D. CH_3CHO

JEE Main 2022 (27 Jun Shift 2)

Enter your answer

Sol

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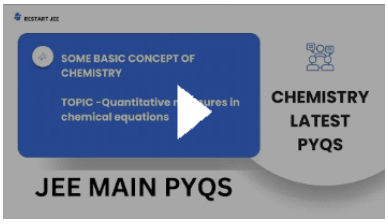

Answer:

2

Solution:

$$(\text{Organic Compound containg } C, H, O) \xrightarrow{\text{dissociation}} \underset{7.5\text{ gram}}{H} + \underset{60\text{ gram}}{O} + \underset{48.5\text{ gram}}{C}$$

% of H in the given organic compound

$$= \frac{7.5}{116} \times 100 = 6.465\%$$

(A) % of H $= \frac{4}{60} \times 100 = 6.6\%$

(B) % of H $= \frac{2}{30} \times 100 = 6.6\%$

(c) % of H $= \frac{6}{62} \times 100 = 7.677\%$

(D) % of H $= \frac{4}{44} \times 100 = 9.09\%$

The percentage of Hydrogen in the given organic compound is equal to 6.465% which is approximately equal to the percentage of hydrogen in CH_3COOH and HCHO.

63

CNG is an important transportation fuel. When 100 gCNG is mixed with 208 g oxygen in vehicles, it leads to the formation of CO_2 and H_2O and produces large quantity of heat during this combustion, then the amount of carbon dioxide, produced in grams is [nearest integer] [Assume CNG to be methane]

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Enter your answer

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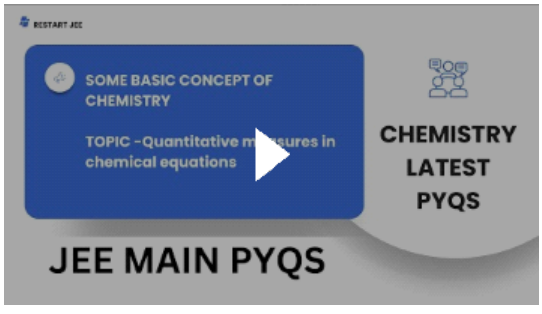

64

On complete combustion 0.30 g of an organic compound gave 0.20 g of carbon dioxide and 0.10 g of water. The percentage of carbon in the given organic compound is____(Nearest Integer)

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Enter your answer

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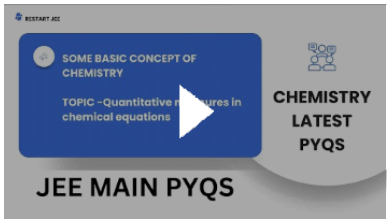

Answer:
18

Solution:

$$C_xH_yO_z + (x + \frac{y}{4} - \frac{z}{2})O_2 \rightarrow xCO_2 + \frac{y}{2}H_2O$$

$0.3\ g \qquad 0.2\ g \qquad 0.1\ g$

$$\frac{n_{CO_2}}{n_{H_2O}} = \frac{x}{\frac{y}{2}} = \frac{\frac{0.2}{44}}{\frac{0.1}{18}} = \frac{9}{11}$$

$$x = \frac{9y}{22}$$

$$\text{Now, } \frac{n_{C_xH_yO_2}}{n_{CO_2}} = \frac{1}{x}$$

$$\Rightarrow \frac{0.3}{12x+y+16z} \times \frac{44}{0.2} = \frac{1}{x}$$

$$66x = 12x + y + 16z$$

$$54x = y + 16z$$

$$\frac{54 \times 9y}{22} - y = 16z$$

$$z = \frac{29y}{22}$$

$$CxHyOz =$$

$$C_{\frac{9y}{22}}H_yO_{\frac{29y}{22}}$$

$$= C_9H_{22}O_{29}$$

$$\% \text{ of } C = \frac{12 \times 9}{(12 \times 9 + 22 + 29 \times 16)} \times 100 = 18.18\%$$

65

The number of N atoms in 681 g of $C_7H_5N_3O_6$ is $x \times 10^{21}$. The value of x is ($N_A = 6.02 \times 10^{23}\ mol^{-1}$) (Nearest Integer)

JEE Main 2022 (25 Jun Shift 1)

Enter your answer

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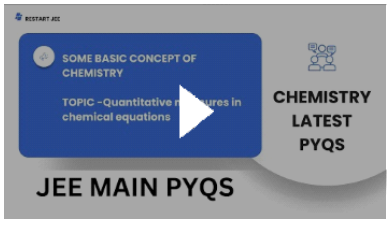

66

1 L aqueous solution of H_2SO_4 contains 0.02 m mol H_2SO_4. 50% of this solution is diluted with deionized water to give 1 L solution (A). In solution (A), 0.01 m mol of H_2SO_4 are added. Total m mols of H_2SO_4 in the final solution is____$\times 10^{-3}$ m moles.

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Enter your answer

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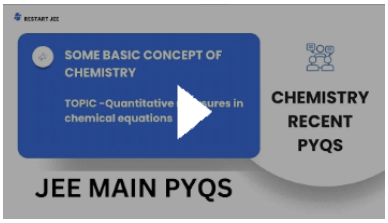

67

120 g of an organic compound which contains only carbon and hydrogen on complete combustion gives 330 g of CO_2 and 270 g of water. The percentage of carbon and hydrogen in the organic compound are respectively

JEE Main 2022 (24 Jun Shift 2)

A 25 and 75

B 40 and 60

C 60 and 40

D 75 and 25

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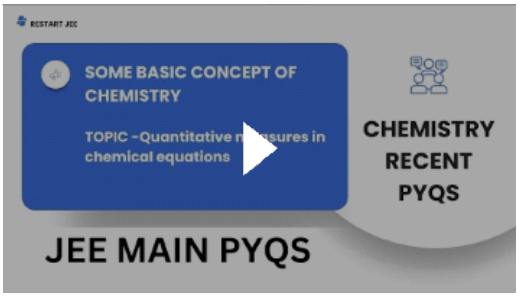

68

If a rocket runs on a fuel ($C_{15}H_{30}$) and liquid oxygen, the weight of oxygen required and CO_2 released for every litre of fuel respectively are : (Given : density of the fuel is 0.756 g/mL)

JEE Main 2022 (24 Jun Shift 1)

A 1188 g and 1296 g

B 2376 g and 2592 g

If a rocket runs on a fuel ($C_{15}H_{30}$) and liquid oxygen, the weight of oxygen required and CO_2 released for every litre of fuel respectively are : (Given : density of the fuel is 0.756 g/mL)

JEE Main 2022 (24 Jun Shift 1)

A 1188 g and 1296 g

B 2376 g and 2592 g

C 2592 g and 2376 g

D 3429 g and 3142 g

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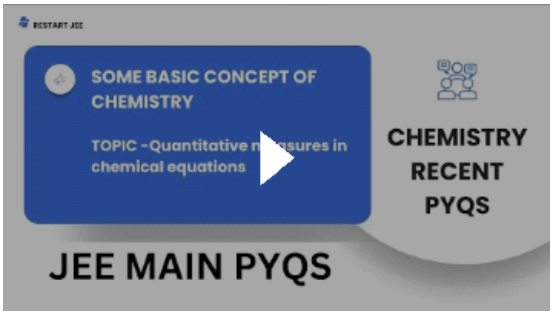


69

$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$

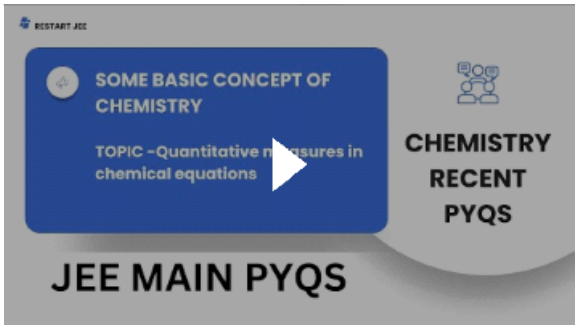
The above reaction is carried out in a vessel starting with partial pressure $P_{SO_2} = 250$ m bar, $P_{O_2} = 750$ m bar and $P_{SO_3} = 0$ bar. When the reaction is complete, the total pressure in the reaction vessel is _____ m bar.

(Round off of the nearest integer).

JEE Main 2021 (27 Jul Shift 2)

Enter your answer

69 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



70

Consider the complete combustion of butane, the amount of butane utilized to produce 72.0 g of water is _____ $\times 10^{-1}$ g. (in nearest integer)

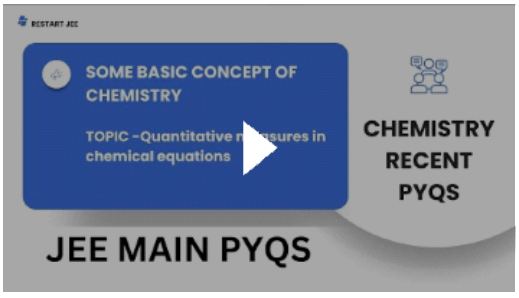
JEE Main 2021 (25 Jul Shift 1)

Consider the complete combustion of butane, the amount of butane utilized to produce 72.0 g of water is _____ $\times 10^{-1}$ g. (in nearest integer)

JEE Main 2021 (25 Jul Shift 1)

Enter your answer

70 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



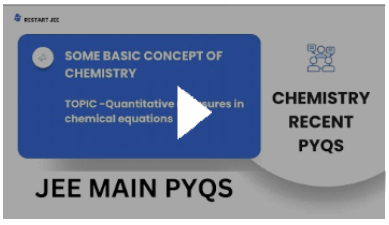
71

Methylation of 10 g of benzene gave 9.2 g of toluene. Calculate the percentage yield of toluene (Nearest integer)

JEE Main 2021 (22 Jul Shift 1)

Enter your answer

71 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



72

An inorganic Compound 'X' on treatment with concentrated H_2SO_4 produces brown fumes and gives dark brown ring with $FeSO_4$ in presence of concentrated H_2SO_4. Also Compound 'X' gives precipitate 'Y', when its solution in dilute HCl is treated with H_2S gas. The precipitate 'Y' on treatment with concentrated HNO_3 followed by excess of NH_4OH further gives deep blue coloured solution, Compound 'X' is:

JEE Main 2021 (20 Jul Shift 1)

A $Co(NO_3)_2$

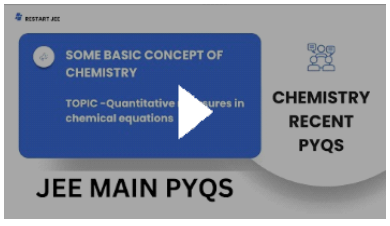
B $Pb(NO_2)_2$

C $Cu(NO_3)_2$

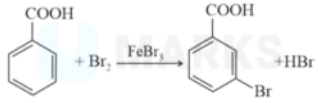
D $Pb(NO_3)_2$

Sol https://www.doubtnut.com/qna/647135401

72 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



73



Consider the above reaction where 6.1 g of benzoic acid is used to get 7.8 g of m-bromo benzoic acid. The percentage yield of the product is ___ .
(Round off to the Nearest integer)
[Given : Atomic masses : C = 12.0 u, H : 1.0 u, O : 16.0 u, Br = 80.0 u]

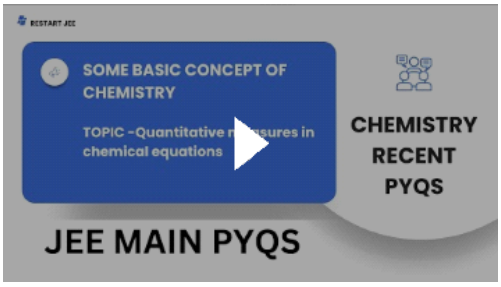
JEE Main 2021 (18 Mar Shift 2)

Enter your answer

78

80

73 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



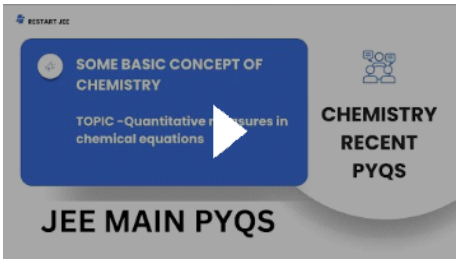
74

_____grams of 3−Hydroxy propanal (MW = 74) must be dehydrated to produce 7.8 g of acrolein (MW = 56)(C_3H_4O) if the percentage yield is 64.
(Round off to the Nearest Integer).
[Given: Atomic masses : C : 12.0u, H : 1.0u, O : 16.0u]

JEE Main 2021 (18 Mar Shift 1)

Enter your answer

74 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



75

Complete combustion of 3 g of ethane gives $x \times 10^{22}$ molecules of water. The value of x is _____ (Round off to the Nearest Integer).
[Use : $N_A = 6.023 \times 10^{23}$; Atomic masses in u : C : 12.0 ; O : 16.0 ; H : 1.0]

JEE Main 2021 (18 Mar Shift 1)

Complete combustion of 3 g of ethane gives $x \times 10^{22}$ molecules of water. The value of x is _____ (Round off to the Nearest Integer).
[Use : $N_A = 6.023 \times 10^{23}$; Atomic masses in u : C : 12.0 ; O : 16.0 ; H : 1.0]

JEE Main 2021 (18 Mar Shift 1)

Enter your answer

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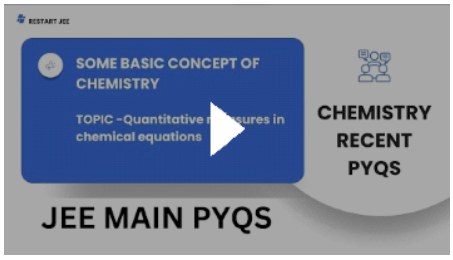
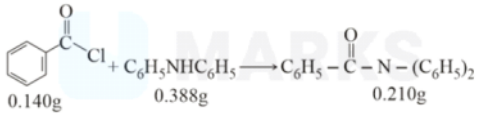


76

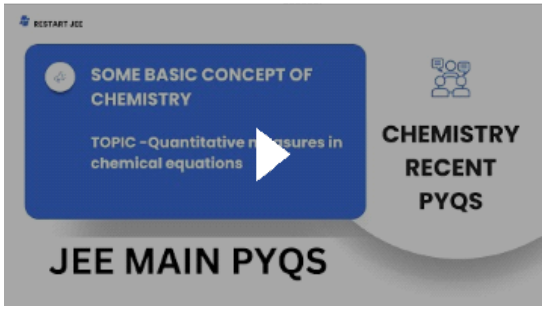


Consider the above reaction. The percentage yield of amide product is (Round off to the Nearest Integer). (Given : Atomic mass : C : 12.0u, H : 1.0u N : 14.0u, O : 16.0u, Cl : 35.5u)

JEE Main 2021 (17 Mar Shift 2)

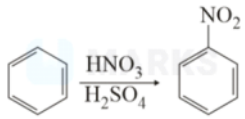
Enter your answer

76 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



77

77



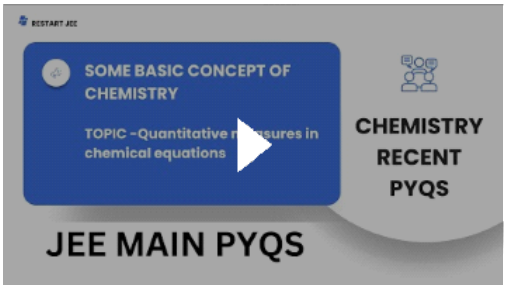
In the above reaction, 3.9 g of benzene on nitration gives 4.92 g of nitrobenzene. The percentage yield of nitrobenzene in the above reaction is _____ %. (Round off to the Nearest Integer).

(Given atomic mass : C : 12.0 u, H : 1.0 u O : 16.0 u, N : 14.0 u)

JEE Main 2021 (17 Mar Shift 1)

Enter your answer

77 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



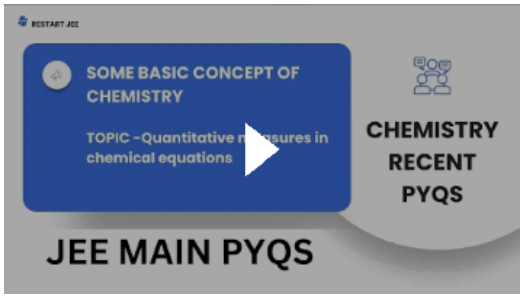
78

When 35 mL of 0.15 M lead nitrate solution is mixed with 20 mL of 0.12 M chromic sulphate solution, _____$\times 10^{-5}$ moles of lead sulphate precipitate out. (Round off to the Nearest Integer).

JEE Main 2021 (16 Mar Shift 2)

Enter your answer

78 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



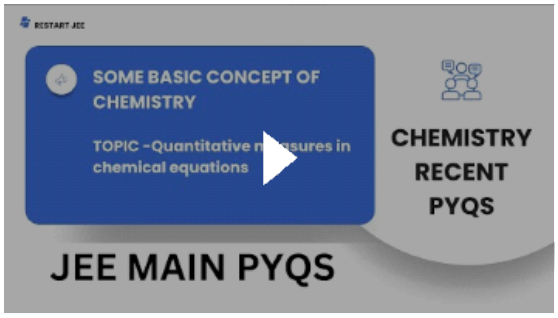
79

Complete combustion of 750 g of an organic compound provides 420 g of CO_2 and 210 g of H_2O. The percentage composition of carbon and hydrogen in organic compound is 15.3 and _____ respectively. (Round off to the Nearest Integer)

JEE Main 2021 (16 Mar Shift 1)

Enter your answer

79 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



80

Complete combustion of 1.80 g of an oxygen containing compound ($C_xH_yO_z$) gave 2.64 g of CO_2 and 1.08 g of H_2O. The percentage of oxygen in the organic compound is :

JEE Main 2021 (25 Feb Shift 1)

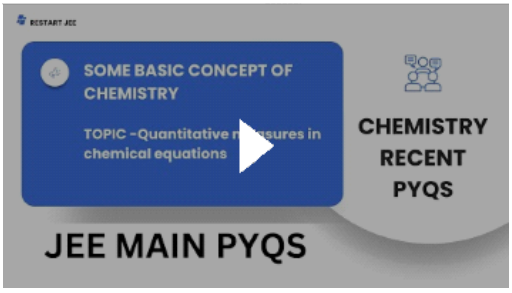
A 53.33

B 50.33

C 51.63

D 63.53

80 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



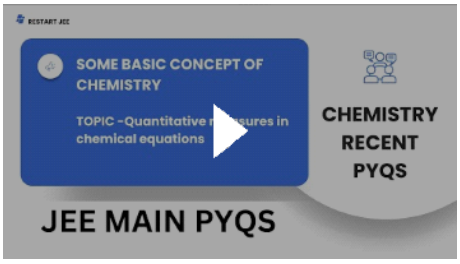
81

The formula of a gaseous hydrocarbon which requires 6 times of its own volume of O_2 for complete oxidation and produces 4 times its own volume of CO_2 is C_xH_y. The value of y is _____.

JEE Main 2021 (24 Feb Shift 2)

Enter your answer

81 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



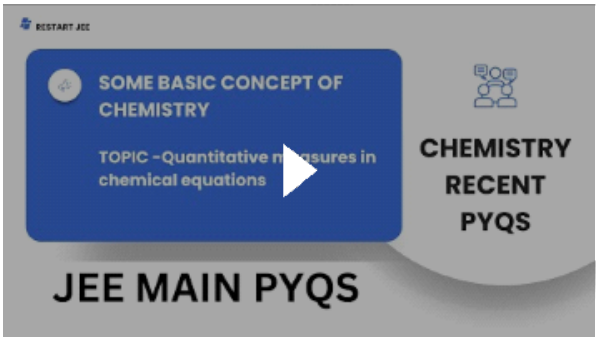
82

1. 86 g of aniline completely reacts to form acetanilide. 10% of the product is lost during purification. Amount of acetanilide obtained after purification (in g) is _____ $\times 10^{-2}$.

JEE Main 2021 (24 Feb Shift 2)

Enter your answer

82 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



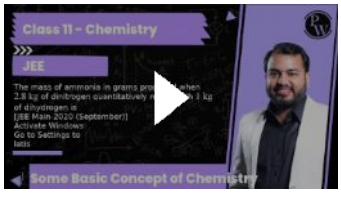
83

The mass of ammonia in grams produced when 2. 8 kg of dinitrogen quantitatively reacts with 1 kg of dihydrogen is _____

JEE Main 2020 (04 Sep Shift 1)

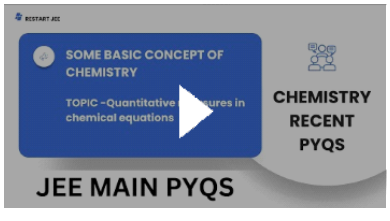
Enter your answer

The mass of ammonia in grams produced when 2.8 kg of dinitrogen quantitatively reacts with 1 kg...



Sol

83 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



Sol

Answer:

3400

Solution:

Mole of $N_2 = \frac{2800}{28} = 100$ & $H_2 = \frac{1000}{2} = 500$

	$N_2(g)$	+ $3H_2(g)$	→ $2NH_3(g)$
Initial mole	100	500	Limiting reagent is N_2
Final mole	0	$500 - 300$	200

Mass of NH_3 formed = $200 \times 17 = 3400$ gram

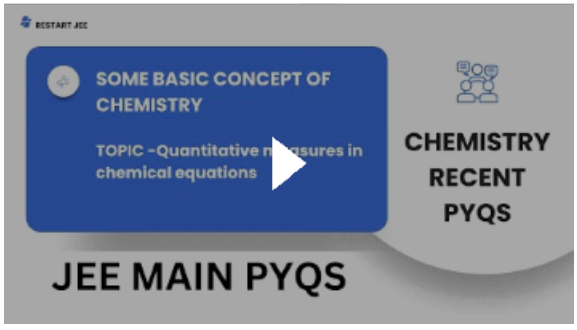
84

The ratio of the mass percentages of 'C & H' and 'C & O' of a saturated acyclic organic compound 'X' are 4 : 1 and 3 : 4 respectively. Then, the moles of oxygen gas required for complete combustion of two moles of organic compound 'X' is_____

JEE Main 2020 (02 Sep Shift 2)

Enter your answer

84 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



85

The ammonia (NH_3) released on quantitative reaction of 0.6 g urea (NH_2CONH_2) with sodium hydroxide (NaOH) can be neutralized by

JEE Main 2020 (07 Jan Shift 2)

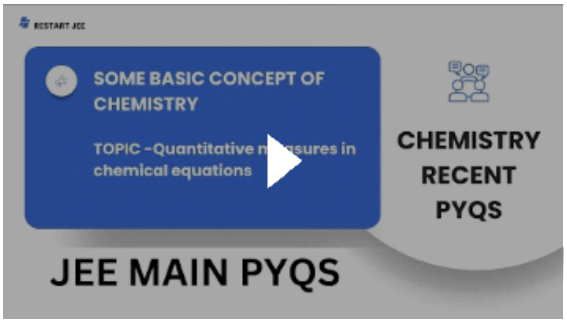
A 200 ml of 0.4 NHCl

B 200 ml of 0.2 NHCl

C 100 ml of 0.2 NHCl

D 100 ml of 0.1 NHCl

85 , Quantitative measures in chemical equations | Jee main 2024 pyqs | #iit #neet #physicswallah



86

25 g of an unknown hydrocarbon upon burnig produces 88 g of CO_2 and 9g of H_2O. This unknown hydrocarbon contains:

JEE Main 2019 (12 Apr Shift 2)

A 24 g of carbon and 1 g of hydrogen

B 18 g of carbon annd 7 g of hydrogen

C 22 g of carbon and 3 g of hydrogen

D 20 g carbon and 5 g of hydrogen

Sol https://www.doubtnut.com/qna/643654204

Sol

Solution:

$$C_xH_y + \left(X + \frac{Y}{4}\right)O_2 \longrightarrow xCO_2 + \frac{y}{2}H_2O$$

25 gram 88 gram 9 gram

$= 2$ mole $= \frac{1}{2}$ mole

2 mole of CO_2 contains 2 mole of carbon, Hence weight of carbon = $2 \times 12 = 24$ g .
mass of Hydrogen = $25 - 24 = 1$ gram

87

At 300 K and 1 atmospheric pressure, 10 mL of a hydrocarbon required 55 mL of O_2 for complete combustion, and 40 mL of CO_2 is formed. The formula of the hydrocarbon is:

JEE Main 2019 (10 Apr Shift 1)

A C_4H_8

B C_4H_{10}

C C_4H_6

At 300 K and 1 atmospheric pressure, 10 mL of a hydrocarbon required 55 mL of O_2 for complete combustion, and 40 mL of CO_2 is formed. The formula of the hydrocarbon is:

JEE Main 2019 (10 Apr Shift 1)

A C_4H_8

B C_4H_{10}

C C_4H_6

D C_4H_7Cl

https://www.youtube.com/watch?v=n_WLIx2Cpe0

Solution:

Let hydrocarbon is C_xH_y

$$C_xH_y + \left(x+\frac{y}{4}\right)O_2 \rightarrow xCO_2 + \frac{y}{2}H_2O$$

	C_xH_y	O_2	CO_2	H_2O
Initially	10	55	0	0
Finally	–	–	$10x = 40$	

$10x = 40$; $x = 4$ and $10(x + \frac{y}{4}) = 55$

$(x + \frac{y}{4}) = \frac{55}{10}$

$x + \frac{y}{4} = 5.5$

Put the value of x

$4 + \frac{y}{4} = 5.5$

$\frac{y}{4} = 5.5 - 4$

$\frac{y}{4} = 1.5$ then $y = 6$

Hence hydrocarbon is C_4H_6

For a reaction,

$N_2(g)+3H_2(g) \longrightarrow 2NH_3(g)$, identify di-hydrogen ($H_2$) as a limiting reagent in the following reaction mixtures.

JEE Main 2019 (09 Apr Shift 1)

A 28 g of N_2 + 6 g of H_2

B 35 g of N_2 + 8 g of H_2

C 56 g of N_2 + 10 g of H_2

D 14 g of N_2 + 4 g of H_2

https://www.doubtnut.com/qna/9716632

Solution:

$N_2(g)+3H_2(g) \longrightarrow 2NH_3(g)$

$$\frac{\text{moles of } N_2}{\text{stoichiometry of } N_2} \neq \frac{\text{mole of } H_2}{\text{stoichiometry of } H_2}$$

Whose ratio is less called limiting reagent.

(a) mole of $N_2 = \frac{28}{28} = 1$

$\frac{\text{moles}}{\text{stiochiometry}}$ ratio of $N_2 = \frac{1}{1} = 1$

mole of $H_2 = \frac{6}{2} = 3$

$\frac{\text{moles}}{\text{stiochiometry}}$ ratio of $H_2 = \frac{3}{3} = 1$

there is no limiting reagent.

(b) mole of $N_2 = \frac{35}{28} = 1.25$

$\frac{\text{moles}}{\text{stiochiometry}}$ ratio of $N_2 = \frac{1.25}{1}$ limiting reagent

mole of $H_2 = \frac{8}{} = 4$

Solution:

$N_2(g)+3H_2(g) \rightarrow 2NH_3(g)$

$\frac{\text{moles of } N_2}{\text{stoichiometry of } N_2} \neq \frac{\text{mole of } H_2}{\text{stoichiometry of } H_2}$

Whose ratio is less called limiting reagent.

(a) mole of $N_2 = \frac{28}{28} = 1$

$\frac{\text{moles}}{\text{stiochiometry}}$ ratio of $N_2 = \frac{1}{1} = 1$

mole of $H_2 = \frac{6}{2} = 3$

$\frac{\text{moles}}{\text{stiochiometry}}$ ratio of $H_2 = \frac{3}{3} = 1$

there is no limiting reagent.

(b) mole of $N_2 = \frac{35}{28} = 1.25$

$\frac{\text{moles}}{\text{stiochiometry}}$ ratio of $N_2 = \frac{1.25}{1}$ limiting reagent

mole of $H_2 = \frac{8}{2} = 4$

$\frac{\text{moles}}{\text{stiochiometry}}$ ratio of $H_2 = \frac{4}{3} = 1.33$

(c) mole of $N_2 = \frac{56}{28} = 2$

$\frac{\text{moles}}{\text{stiochiometry}}$ ratio of $N_2 = \frac{2}{1} = 2$

mole of $H_2 = \frac{10}{2} = 5$

$\frac{\text{moles}}{\text{stiochiometry}}$ ratio of $H_2 = \frac{5}{3} = 1.66$ limiting reagent.

(d) mole of $N_2 = \frac{14}{28} = 0.5$

$\frac{\text{moles}}{\text{stiochiometry}}$ ratio of $N_2 = \frac{0.5}{1} = 0.5$ limiting reagent

mole of $H_2 = \frac{4}{2} = 2$

$\frac{\text{moles}}{\text{stiochiometry}}$ ratio of $H_2 = \frac{2}{3} = 1.66$

$\therefore$ Answer is (3) .

89

0.27 g of a long chain fatty acid was dissolved in 100 cm^3 of hexane. 10 mL of this solution was added dropwise to the surface of water in a round watch glass. Hexane evaporates and a monolayer is formed. The distance from edge to centre of the watch glass is 10 cm . What is the height of the monolayer? [Density of fatty acid = 0.9 g cm^{-3} ; $\pi = 3$]

JEE Main 2019 (08 Apr Shift 2)

A 10^{-4} m

B 10^{-6} m

C 10^{-8} m

D 10^{-2} m

٤٥١

https://www.doubtnut.com/qna/203512713

٤٥١

Solution:

Mass of fatty acid = 0.027 g in 10 ml solution

Density of fatty acid 0.9 g/cc

Volume of fatty acid = $\frac{0.027}{0.9} = 0.03$ cc

Area of plate = $\pi r^2 = 3 \times 10^2 = 300$ cm^2

Height of fatty acid layer = $\frac{\text{volume}}{\text{area}} = \frac{0.03}{300} = 10^{-4}$ cm = 10^{-6} m

90

For the following reaction, the mass of water produced from 445 g of $C_{57}H_{110}O_6$ is: $2\,C_{57}H_{110}O_6(s)+163O_2(g) \rightarrow 114\,CO_2(g)+110H_2O(l)$

JEE Main 2019 (09 Jan Shift 2)

A 490 g

B 890 g

For the following reaction, the mass of water produced from 445 g of $C_{57}H_{110}O_6$ is: $2\,C_{57}H_{110}O_6(s)+163O_2(g)\rightarrow 114\,CO_2(g)+110H_2O(l)$

JEE Main 2019 (09 Jan Shift 2)

A 490 g

B 890 g

C 445 g

D 495 g

https://www.doubtnut.com/qna/642608929

Solution:

$C_{57}H_{110}O_6 + \frac{163}{2}O_2 \rightarrow 57CO_2 + 55H_2O$

Molecular weight of $C_{57}H_{110}O_6 = 890$

Moles of $C_{57}H_{110}O_6 = \frac{\text{weight(gm)}}{\text{Molecular weight}}$

$= \frac{445}{890} = \frac{1}{2}$

According to stoichiometry

$\because$ 1 mole of $C_{57}H_{110}O_6$ gives = 55 mole of H_2O

$\because \frac{1}{2}$ mole of $C_{57}H_{110}O_6$ gives = $55 \times \frac{1}{2}$ mole of H_2O

Wt. of H_2O = mole of $H_2O \times$ M Wt. of H_2O

$= \frac{1}{2} \times 55 \times 18 = 495$ gm

An unknown chlorohydrocarbon has 3.55 % of chlorine. If each molecule of the hydrocarbon has one chlorine atom only; chlorine atoms present in 1 g of chlorohydrocarbon are :(Atomic wt. of Cl = 35 .5 u; Avogadro constant = 6 .023 $\times 10^{23}$ mol^{-1})

JEE Main 2018 (16 Apr Online)

A 6.023×10^{9}

B 6.023×10^{23}

C 6.023×10^{21}

D 6.023×10^{20}

Solution:

C_xH_y Cl

% Cl = 3 .55

Weight of Cl = $1 \times \frac{3.55}{100}$

$n_{Cl^-} = \frac{1 \times 3.55}{100 \times 35.5}$

No. of Cl^- ion = $\frac{1 \times 3.55}{100 \times 35.5} \times 6.023 \times 10^{23} = 6.023 \times 10^{20}$

92

For per gram of reactant, the maximum quantity of N_2 gas is produced in which of the following thermal decomposition reactions? (Given: Atomic wt. : Cr = 52u, Ba = 137u).

JEE Main 2018 (15 Apr Shift 2 Online)

A $Ba(N_3)_2\ (s) \longrightarrow Ba(C) + 3\ N_2(\ g)$

B $(NH_4)_2Cr_2O_7(\ s) \longrightarrow N_2(\ g) + 4H_2O(g) + Cr_2O_3(\ s)$

C $2NH_3(\ g) \longrightarrow N_2(\ g) + 3H_2(\ g)$

D $2NH_4NO_3(\ s) \longrightarrow 2\ N_2(\ g) + 4H_2O(g) + O_2(\ g)$

https://www.youtube.com/watch?v=oCR_861gQfU

Solution:

(a) Molar mass of Ba $(N_3)_2(\ s)$ = 221 g/mol 1 mole of $Ba(N_3)_2(\ s)$ will give 3 moles of N_2 hence $\frac{1\ g}{221\ g/mol}$ moles of $Ba(N_3)_2(\ s)$ will give $3 \times \frac{1}{221} = 0.014$ moles of N_2

(b) Molar mass of $(NH_4)_2Cr_2O_7$ = 252 g/mol. 1 mole of $(NH_4)_2Cr_2O_7$ will give 1 mole of N_2 hence $\frac{1\ g}{252\ g/mol}$ moles of $(NH_4)_2Cr_2O_7$ will give $1 \times \frac{1}{252} = 0.0039$ moles of N_2

(c) Molar mass of NH_3 = 17 g/mol. 2 mole of NH_3 will give 1 mole of N_2

hence $\frac{1\ g}{17\ g/mol}$ moles of NH_3 will give

$$\frac{1}{2 \times 17} = 0.0297 \text{ moles of } N_2.$$

(d) Molar mass of NH_4NO_3 = 80 g/mol. 1 mole of NH_4NO_3 will give 1 mole of N_2 hence $\frac{1\ g}{80\ g/mol}$ moles NH_4NO_3 will give

$$1 \times \frac{1}{80} = 0.0125 \text{ moles of } N_2$$

Hence Thermal decomposition of NH_3 will produce maximum amount of N_2.

93

The ratio of mass percent of C and H of an organic compound $(C_XH_YO_Z)$ is 6 : 1. If one molecule of the above compound $(C_XH_YO_Z)$ contains half as much oxygen as required to burn one molecule of compound C_XH_Y completely to CO_2 and H_2O. The empirical formula of the compound $C_XH_YO_Z$ is

JEE Main 2018 (08 Apr)

A $C_2H_4O_3$

The ratio of mass percent of C and H of an organic compound ($C_XH_YO_Z$) is 6 : 1. If one molecule of the above compound ($C_XH_YO_Z$) contains half as much oxygen as required to burn one molecule of compound C_XH_Y completely to CO_2 and H_2O. The empirical formula of the compound $C_XH_YO_Z$ is

JEE Main 2018 (08 Apr)

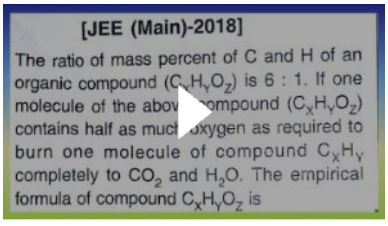
A $C_2H_4O_3$

B $C_3H_6O_3$

C C_2H_4O

D $C_3H_4O_2$

The ratio of mass percent of C and H of an organic compound (CxHyOz) is 6:1...| Krishna Ke Doubts



Solution:

Mass of C: Mass of H = 6 : 1.
Or, for every atom of C (12 u), we have 2 atoms of H (1u × 2 = 2u)
Thus, the ratio of atoms of C : H = x : y = 1 : 2
Thus, the formula is: $C_xH_{2x}O_z$
Combustion of C_xH_{2x}:
$C_xH_{2x} + (3x/2)O_2 \rightarrow xCO_2 + xH_2O$
Hence, the combustion of C_xH_{2x} requires (3x/2) oxygen molecules.
Hence, the original molecule contains (3x/4) molecules = (3x/2) atoms.
Or, z = 3x/2
Empirical Formula= $C_xH_{2x}O_{3x/2} = C_{2x}H_{4x}O_{3x} = C_2H_4O_3$

At 300 K and 1 atm, 15 mL of a gaseous hydrocarbon requires 375 mL air containing 20% O_2 by volume, for complete combustion. After combustion, the gases occupy 345 mL. Assuming that the water formed is in liquid form and the volumes were measured at the same temperature and pressure, the formula of the hydrocarbon is:
(Assume complete combustion of reactant)

JEE Main 2016 (03 Apr)

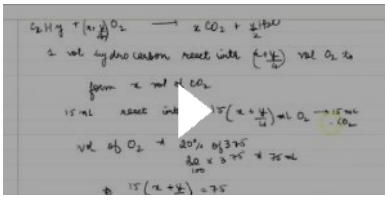
A C_4H_8

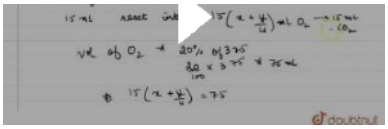
B C_4H_{10}

C C_3H_6

D C_3H_8

At `300 K` and `1 atm, 15 mL` of a gaseous hydrocarbon requires `375 mL` air containing





Solution:

Volume of N_2 in air= $375 \times 0.8 = 300$ ml

Volume of O_2 in air= $375 \times 0.2 = 75$ ml

$$C_xH_y + (x + \frac{y}{4})O_2 \longrightarrow xCO_2(g) + \frac{y}{2}H_2O(\ell)$$

15ml	$15(x + \frac{y}{4})$		
0	0	15x	–

After combustion, total volume

$345 = V_{N_2} + V_{CO_2}$

$345 = 300 + 15x$

$x = 3$

Volume of O_2 used

$15(x + \frac{y}{4}) = 75$

$x + \frac{y}{4} = 5$

$y = 8$

So, hydrocarbon is C_3H_8.

95

An element X shows +3, oxidation state in its compounds. Out of the four compounds given below, choose the incorrect formula for the element X.

JEE Main 2015 (11 Apr Online)

A X_2O_3

B $X_2(SO_4)_3$

C XPO_4

D X_2Cl_3

https://www.doubtnut.com/qna/160983775

Solution:

Oxidation state of X is +3. The formula should be XCl_3 and not X_2Cl_3.

96

A sample of a hydrate of barium chloride weighing 61 g was heated until all the water of hydration is removed. The dried sample weighed 52 g. The formula of the hydrated salt is: (atomic mass, Ba = 137 amu, Cl = 35.5 amu)

JEE Main 2015 (10 Apr Online)

A $BaCl_2 \cdot H_2O$

B $BaCl_2 \cdot 3H_2O$

C $BaCl_2 \cdot 4H_2O$

D $BaCl_2 \cdot 2H_2O$

https://www.doubtnut.com/qna/327416018

Solution:

$BaCl_2 \cdot xH_2O \rightarrow BaCl_2 + x\,H_2O$

$(137 + 2 \times 35.5 + 18x)$

Solution:

$BaCl_2 \cdot xH_2O \rightarrow BaCl_2 + x\ H_2O$

$(137 + 2 \times 35.5 + 18x)$

$=(208 + 18x)$ g/mole

$\frac{208 + 18x}{208} = \frac{61}{52}$

$10816 + 936x = 12688$

$936x = 1872$

$x = 2$

Formula is $BaCl_2 \cdot 2H_2O$

97

The amount of $BaSO_4$ formed upon mixing 100 mL of 20.8%$BaCl_2$ solution with 50 mL of 9.8% H_2SO_4 solution will be:
(Ba = 137, Cl = 35.5, S = 32, H = 1 and O = 16)

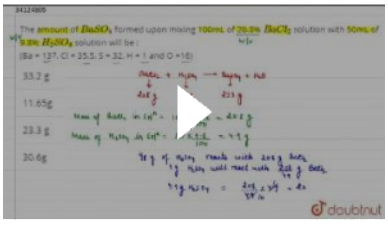
JEE Main 2014 (12 Apr Online)

A 23.3 g

B 11.65 g

C

The amount of `BaSO_(4)` formed upon mixing 100mL of 20.8% `BaCl_(2)` solution



98

A gaseous compound of nitrogen and hydrogen contains 12.5% (by mass) of hydrogen. The density of the compound relative to hydrogen is 16. The molecular formula of the compound is:

JEE Main 2014 (11 Apr Online)

A NH_2

B N_3H

C NH_3

D N_2H_4

٤٥١ https://www.doubtnut.com/qna/647167785

٤٥١

Solution:

In an unknown compounds containing N and H

given % of H = 12.5%

$$\therefore \%\ \text{of N} = 100 - 12.5 = 87.5\%$$

Element	Percentage	Atomic ratio	Simple ratio
H	12.5%	$\frac{12.5}{1} = 12.5$	$\frac{12.5}{6.25} = 2$
N	87.5	$\frac{87.5}{14} = 6.25$	$\frac{6.25}{6.25} = 1$

2× vapour density = Mol. wt = 16 × 2 = 32.

Molecular formula = n× empirical formula mass

$$n = \frac{32}{16} = 2$$

$\therefore$ Molecular formula of the compound will be = $(NH_2)_2 = N_2H_4$

99

6 litres of an alkene require 27 litres of oxygen at constant temperature and pressure for complete combustion. The alkene is :

JEE Main 2013 (25 Apr Online)

A Ethene

B Propene

C 1−Butene

Correct Answer

D 2−Butene

١٥٥

Experimentally it was found that a metal oxide has formula $M_{0.98}O$. Metal M, is present as M^{2+} and M^{3+} in its oxide. Fraction of the metal which exists as M^{3+} would be:

JEE Main 2013 (07 Apr)

A 6.05%

B 5.08%

C 7.01%

D 4.08%

الإجابة https://www.doubtnut.com/qna/12978481

الحل

Solution:

Consider one mole of the oxide, then

Moles of M = 0.98; Moles of O^{2-} = 1

Let 'x' moles of M are in +3 oxidation state, then Moles of M^{2+} = 0.98-x

On doing charge balancing we get

$(0.98 - x)2 + 3x = 2$

Or $1.96 - 2x + 3x - 2 = 0$

Or $x = 0.04$

$\therefore \%\text{ of } M^{3+} = \frac{0.04}{0.98} \times 100 = 4.08\ \%$

١٥١

A gaseous hydrocarbon on combustion gives 0.72 g of water and 3.08 g CO_2. What is the empirical formula of the hydrocarbon?

JEE Main 2013 (07 Apr)

A C_6H_5

B C_7H_8

C C_2H_4

D C_3H_4

الإجابة https://www.doubtnut.com/qna/12224778

الحل

Solution:

$C_xH_y + [x + \frac{y}{4}]O_2 \longrightarrow xCO_2 + \frac{y}{2}H_2O$

Moles of $CO_2 = \frac{3.08}{44} = 0.07$ moles = x

Moles of $H_2O = \frac{0.72}{18} = 0.04$ moles = $\frac{y}{2}$

x = 0.07 g atoms of carbon

Solution:

$C_xH_y + [x + \frac{y}{4}]O_2 \longrightarrow xCO_2 + \frac{y}{2}H_2O$

Moles of $CO_2 = \frac{3.08}{44} = 0.07$ moles $= x$

Moles of $H_2O = \frac{0.72}{18} = 0.04$ moles $= \frac{y}{2}$

$x = 0.07$ g atoms of carbon

$y = 0.08$ g atoms of hydrogen

x	:	y
0.07		0.08
7		8

Empirical formula becomes C_7H_8.

102

A transition metal M forms a volatile chloride which has a vapour density of 94.8. If it contains 74.75% of chlorine the formula of the metal chloride will be

JEE Main 2012 (26 May Online)

A MCl_3

B MCl_2

C MCl_4

D MCl_5

٤٥١ ٤٥١ https://www.doubtnut.com/qna/646654808

Solution:

74.75% of chlorine means 74.75 g chlorine is present in 100 g of metal chloride.

Weight of metal = 100 g − 74.75 g = 25.25 g

Equivalent weight

$$= \frac{\text{weight of metal}}{\text{weight of chlorine}} \times 35.5$$
$$= \frac{25.25}{74.75} \times 35.5 = 12$$

Valency of metal

$$= \frac{2 \times \text{V.D.}}{\text{Equivalent wt. of metal} + 35.5}$$
$$= \frac{2 \times 94.8}{12 + 35.5} = 4$$

∴ Formula of compound = MCl_4

103

5 g of benzene on nitration gave 6.6 g of nitrobenzene. The theoretical yield of the nitrobenzene will be

5 g of benzene on nitration gave 6.6 g of nitrobenzene. The theoretical yield of the nitrobenzene will be

JEE Main 2012 (12 May Online)

A 4.5 g

B 5.6 g

C 8.09 g

D 6.6 g

Sol

Solution:

$C_6H_6 + HNO_3 \rightarrow C_6H_5NO_2 + H_2O$ 78 g 123 g Now since 78 g of benzene on nitration give = 123 g nitrobenzene hence 5 g of benzene on nitration give = $\frac{123}{78} \times 5 = 7.88$ g

nearest answer is (c) i.e. theoritical yield = 7.88 g = 8.09 (Available closed option)

109

In a compound C, H and N atoms are present in 9 : 1 : 35 by weight. Molecular weight of compound is 108. Molecular formula of compound is

JEE Main 2002

A $C_2H_6N_2$

B C_3H_4N

C $C_6H_8N_2$

D $C_9H_{12}N_3$

Sol https://www.doubtnut.com/qna/12975008

105

105

Combustion of glucose ($C_6H_{12}O_6$) produces CO_2 and water. The amount of oxygen (in g) required for the complete combustion of 900 g of glucose is :

[Molar mass of glucose in $gmol^{-1}$ = 180]

JEE Main 2024 (08 Apr Shift 1)

A 480

B 800

C 960

D 32

Solution:

$C_6H_{12}O_{6(s)} + 6O_{2(g)} \longrightarrow 6CO_{2(g)} + 6H_2O_{(\theta)}$

$\frac{900}{180}$

= 5 mol 30 mol

Mass of O_2 required = $30 \times 32 = 960$gm

106

The number of moles of methane required to produce 11 gCO_2(g) after complete combustion is :

(Given molar mass of methane in $gmol^{-1}$: 16)

JEE Main 2024 (05 Apr Shift 2)

You Marked | Incorrect Answer

A 0.35

B 0.5

C 0.75

D 0.25

Solution:

$C_nH_{2n+2} + \frac{3n+1}{2}O_2 \longrightarrow nCO_2 + (n+1)H_2O$

$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$

4gm 11gm

0.25 mole 0.25 mole

0.25 mol CH_4 gives 0.25 mole (or 11gm) CO_2

107

An organic compound has 42.1% carbon, 6.4% hydrogen and remainder is oxygen. If its molecular weight is 342, then its molecular formula is :

JEE Main 2024 (05 Apr Shift 1)

A $C_{11}H_{18}O_{12}$

You Marked | Incorrect

B $C_{12}H_{20}O_{12}$

Correct Answer

An organic compound has 42.1% carbon, 6.4% hydrogen and remainder is oxygen. If its molecular weight is 342, then its molecular formula is :

JEE Main 2024 (05 Apr Shift 1)

A $C_{11}H_{18}O_{12}$

You Marked | Incorrect

B $C_{12}H_{20}O_{12}$

Correct Answer

C $C_{12}H_{22}O_{11}$

D $C_{14}H_{20}O_{10}$

Solution:

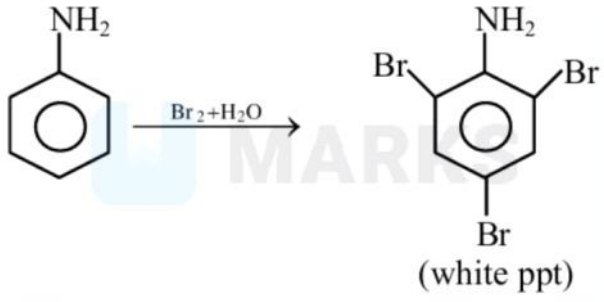
only $C_{12}H_{22}O_{11}$ has 42.1% carbon, 6.4% hydrogen &51.5 percent oxygen.

108

9.3 g of pure aniline is treated with bromine water at room temperature to give a white precipitate of the product ' P '. The mass of product ' P ' obtaind is 26.4 g. The percentage yield is _____ %.

JEE Main 2024 (05 Apr Shift 1)

Solution:



93 g of aniline produces 330 g of 2, 4, 6– tribromoaniline. Hence 9.3 g of aniline should produce 33 g of 2, 4, 6-tribromoaniline. Hence percentage yield $\frac{26.4\times100}{33} = 80\%$