



1. Xg of benzoic acid on reaction with aq  $\text{NaHCO}_3$  released  $\text{CO}_2$  that occupied 11.2 L volume at STP. X is 61 g.
2. Consider the following reaction occurring in the blast furnace:  $\text{Fe}_3\text{O}_4(\text{s}) + 4\text{CO}(\text{g}) \rightarrow 3\text{Fe}(\text{l}) + 4\text{CO}_2(\text{g})$  'x' kg of iron is produced when  $2.32 \times 10^3$  kg  $\text{Fe}_3\text{O}_4$  and  $2.8 \times 10^2$  kg CO are brought together in the furnace. The value of 'x' is 420. (nearest integer) Given: molar mass of  $\text{Fe}_3\text{O}_4 = 232 \text{ g mol}^{-1}$  molar mass of  $\text{CO} = 28 \text{ g mol}^{-1}$  molar mass of  $\text{Fe} = 56 \text{ g mol}^{-1}$
3. 0.01 mole of an organic compound (X) containing 10% hydrogen, on complete combustion produced 0.9 g  $\text{H}_2\text{O}$ . Molar mass of (X) is 100  $\text{g mol}^{-1}$ .
4. When 81.0 g of aluminium is allowed to react with 128.0 g of oxygen gas, the mass of aluminium oxide produced in grams is 153 - (Nearest integer) Given : Molar mass of Al is  $27.0 \text{ g mol}^{-1}$  Molar mass of O is  $16.0 \text{ g mol}^{-1}$

### 5 - 2024 (27 Jan Shift 1)

Mass of methane required to produce 22 g of  $\text{CO}_2$  after complete combustion is 8 g.

(Given Molar mass in  $\text{g mol}^{-1}$ )

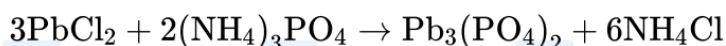
$$C = 12.0$$

$$H = 1.0$$

$$O = 16.0$$

### 6 - 2024 (01 Feb Shift 1)

Consider the following reaction:



If 72mmol of  $\text{PbCl}_2$  is mixed with 50mmol of  $(\text{NH}_4)_3\text{PO}_4$ , then amount of  $\text{Pb}_3(\text{PO}_4)_2$  formed is 24

mmol. (nearest integer)

### 7 - 2024 (01 Feb Shift 2)

10 mL of gaseous hydrocarbon on combustion gives 40 mL of  $\text{CO}_2(\text{g})$  and 50 mL of water vapour. Total

number of carbon and hydrogen atoms in the hydrocarbon is 14.

8 - 2024 (27 Jan Shift 2)

1 mole of PbS is oxidised by " X " moles of O<sub>3</sub> to get " Y " moles of O<sub>2</sub>.  $X + Y = \underline{6}$

9 - 2024 (27 Jan Shift 2)

9.3 g of aniline is subjected to reaction with excess of acetic anhydride to prepare acetanilide. The mass of acetanilide produced if the reaction is 100% completed is  $\underline{135} \times 10^{-1}$  g. (Given molar mass in gmol<sup>-1</sup> N : 14, O : 16, C : 12, H : 1)

10 - 2024 (31 Jan Shift 1)

Number of moles of methane required to produce 22 gCO<sub>2(g)</sub> after combustion is  $x \times 10^{-2}$  moles. The value of  $x$  is 50

11 - 2024 (31 Jan Shift 2)

A sample of CaCO<sub>3</sub> and MgCO<sub>3</sub> weighed 2.21 g is ignited to constant weight of 1.152 g. The composition of mixture is :

(Given molar mass in gmol<sup>-1</sup> CaCO<sub>3</sub> : 100, MgCO<sub>3</sub> : 84)

(1) 1.187 gCaCO<sub>3</sub> + 1.023 gMgCO<sub>3</sub>

(2) 1.023 gCaCO<sub>3</sub> + 1.023 gMgCO<sub>3</sub>

(3) 1.187 gCaCO<sub>3</sub> + 1.187 gMgCO<sub>3</sub>

(4) 1.023 gCaCO<sub>3</sub> + 1.187 gMgCO<sub>3</sub>

12 - 2024 (05 Apr Shift 2)

The number of moles of methane required to produce 11 gCO<sub>2(g)</sub> after complete combustion is :

(Given molar mass of methane in gmol<sup>-1</sup> : 16)

(1) 0.35

(2) 0.5

(3) 0.75

(4) 0.25

13 - 2024 (05 Apr Shift 1)

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' obtained is 26.4 g. The percentage yield is 80 %.

14 - 2024 (08 Apr Shift 1)

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  $g\ mol^{-1} = 180$  ]

- (1) 480
- (2) 800
- (3) 960
- (4) 32

2023

15 - 29 January - Shift 2

When a hydrocarbon A undergoes combustion in the presence of air, it requires 9.5 equivalents of oxygen and produces 3 equivalents of water. What is the molecular formula of A?

- (1)  $C_8H_6$
- (2)  $C_9H_9$
- (3)  $C_6H_6$
- (4)  $C_9H_6$

17 - 29 January - Shift 2

When 0.01 mol of an organic compound containing 60% carbon was burnt completely, 4.4 g of  $CO_2$  was produced. The molar mass of compound is

200  $g\ mol^{-1}$  (Nearest integer)

16 - 31 January - Shift 1

On complete combustion, 0.492 g of an organic compound gave 0.792 g of  $CO_2$ .

The % of carbon in the organic compound is 44 (Nearest integer)

18 - 31 January - Shift 1

Zinc reacts with hydrochloric acid to give hydrogen and zinc chloride. The volume of hydrogen gas produced at STP from the reaction of 11.5 g of zinc with excess HCl is 4 L (Nearest integer)

(Given : Molar mass of Zn is  $65.4\ g\ mol^{-1}$  and Molar volume of  $H_2$  at STP = 22.7L)

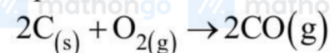
19 - 31 January - Shift 2

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 ?

- (1)  $C_9H_8$   
(2)  $C_{11}H_4$   
(3)  $C_5H_8$   
(4)  $C_{11}H_8$

20 - 31 January - Shift 2

Assume carbon burns according to following equation :



When 12 g carbon is burnt in 48 g of oxygen, the volume of carbon monoxide produced is 227

$\times 10^{-1}$  L at STP [nearest integer]

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

21 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 1 (Nearest integer)  
[2023 (06 Apr Shift 1)]

22 0.5 g of an organic compound (X) with 60% carbon will produce  $\times 10^{-1}$  g of  $CO_2$  on complete combustion. 11  
[2023 (08 Apr Shift 1)]

23 The volume of hydrogen liberated at STP by treating 2.4 g of magnesium with excess of hydrochloric acid is  $\dots \times 10^{-2}$  L. Given Molar volume of gas is 22.4 L at STP. Molar mass of magnesium is  $24 \text{ g mol}^{-1}$  224

24 [2023 (11 Apr Shift 2)]

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 56  $\times 10^{-1}$ . (Nearest integer)

25 [2023 (13 Apr Shift 1)]

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  $\text{g mol}^{-1}$ . (Nearest integer)

[2023 (13 Apr Shift 2)] 100

2022

46 - 24 June - Shift 1

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)

(A) 1188 g and 1296 g (B) 2376 g and 2592 g

(C) 2592 g and 2376 g (D) 3429 g and 3142 g

28 - 24 June - Shift 2

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

(A) 25 and 75 (B) 40 and 60

(C) 60 and 40 (D) 75 and 25

30 - 28 June - Shift 2

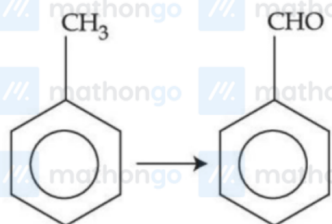
The complete combustion of 0.492 g of an organic compound containing 'C', 'H' and 'O' gives 0.793g of  $CO_2$  and 0.442 g of  $H_2O$ . The percentage of oxygen composition in the organic compound is

46. (nearest integer)

32 - 25 July - Shift 2

56.0 L of nitrogen gas is mixed with excess of hydrogen gas and it is found that 20 L of ammonia gas is produced. The volume of unused nitrogen gas is found to be 46 L.

- 27 July - Shift 2



In the above reaction, 5 g of toluene is converted into benzaldehyde with 92% yield. The amount of benzaldehyde produced is 530  $\times 10^{-2}$  g. (Nearest integer)

27 - 26 June - Shift 1

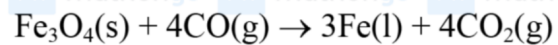
On complete combustion 0.30 g of an organic compound gave 0.20 g of carbon dioxide and 0.10 g of water. The percentage of carbon in the given organic compound is 18 (Nearest Integer)

29 - 26 June - Shift 2

The moles of methane required to produce 81 g of water after complete combustion is 225  $\times 10^{-2}$  mol. [nearest integer]

Questions 31

Production of iron in blast furnace follows the following equation



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

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

Molar Atomic mass ( $g\ mol^{-1}$ ): O = 16

Molar Atomic mass ( $g\ mol^{-1}$ ): C = 12

(A) 1400

(B) 2200

(C) 3360

(D) 4200

Questions 33

In the given reaction,



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).

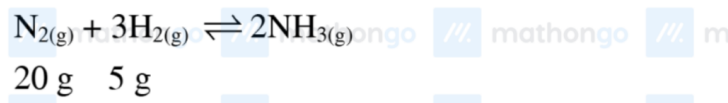
The yield of  $XYZ_3$  is 2 g.

(Nearest integer)

34 - 28 July - Shift 1

On complete combustion of 0.492 g of an organic compound containing C, H and O, 0.7938 g of CO<sub>2</sub> and 0.4428 g of H<sub>2</sub>O was produced. The % composition of oxygen in the compound is 46.

35 - 29 July - Shift 1

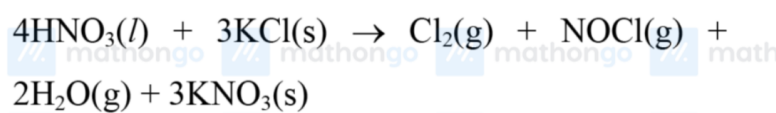


Consider the above reaction, the limiting reagent of the reaction and number of moles of NH<sub>3</sub> formed respectively are:

- (A) H<sub>2</sub>, 1.42 moles
- (B) H<sub>2</sub>, 0.71 moles
- (C) N<sub>2</sub>, 1.42 moles
- (D) N<sub>2</sub>, 0.71 moles

Questions 36

Consider the reaction

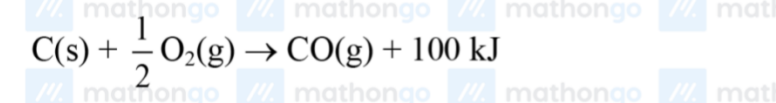
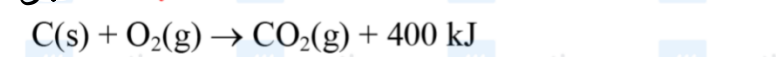


The amount of HNO<sub>3</sub> required to produce 110.0 g of KNO<sub>3</sub> is :

(Given : Atomic masses of H, O, N and K are 1, 16, 14 and 39, respectively.)

- (A) 32.2 g
- (B) 69.4 g
- (C) 91.5 g
- (D) 162.5 g

37 - 29 July - Shift 2



When coal of purity 60% is allowed to burn in presence of insufficient oxygen, 60% of carbon is converted into 'CO' and the remaining is converted into 'CO<sub>2</sub>'.

The heat generated when 0.6 kg of coal is burnt is \_\_\_\_\_.

- (A) 1600 kJ
- (B) 3200 kJ
- (C) 4400 kJ
- (D) 6600 kJ

2021

38 2021 (27 Aug Shift 2)

100 g of propane is completely reacted with 1000 g of oxygen. The mole fraction of carbon dioxide in the resulting mixture is  $x \times 10^{-2}$ . The value of  $x$  is 19. (Nearest integer)  
[Atomic weight : H = 1.008; C = 12.00; O = 16.00 ]

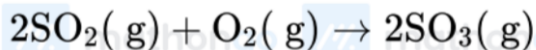
39. (22 July 2021 Shift 1)

Methylation of 10 g of benzene gave 9.2 g of toluene. Calculate the percentage yield of toluene (Nearest integer) 78

40 (25 July 2021 Shift 1)

Consider the complete combustion of butane, the amount of butane utilized to produce 72.0 g of water is  $x \times 10^{-1}$  g. (in nearest integer) 464

41. (27 July 2021 Shift 2)



The above reaction is carried out in a vessel starting with partial pressure  $P_{\text{SO}_2} = 250$  m bar

$P_{\text{O}_2} = 750$  m bar and  $P_{\text{SO}_3} = 0$  bar. When the reaction is complete, the total pressure in the reaction vessel is  $m$  bar. (Round off of the nearest integer). 375

42. 16 March (Shift 1) - Numerical

Complete combustion of 750 g of an organic compound provides 420 g of  $\text{CO}_2$  and 210 g of  $\text{H}_2\text{O}$ . The percentage composition of carbon and hydrogen in organic compound is 15.3 and....respectively. (Round off to the Nearest Integer) 3

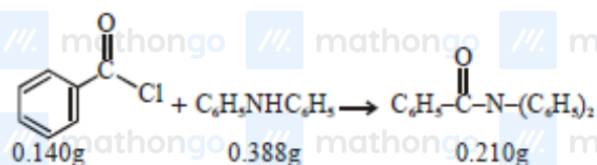
43 17 March (Shift 1) - Numerical

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 80 %. (Round off to the Nearest Integer).

Given atomic mass :

C : 12.0u, H : 1.0u, O : 16.0u, N : 14.0u

44 17 March (Shift 2) - Numerical



Consider the above reaction. The percentage yield of amide product is 77 (Round off to the Nearest Integer).  
(Given : Atomic mass: C : 12.0u, H : 1.0u

N : 14.0u, O : 16.0u, Cl : 35.5u)

45 18 March (Shift 1) - Numerical

16 grams of 3-Hydroxy propanal (MW = 74) must be dehydrated to produce 7.8 g of acrolein (MW = 56) ( $\text{C}_3\text{H}_4\text{O}$ ) if the percentage yield is 64. (Round off to the Nearest Integer).

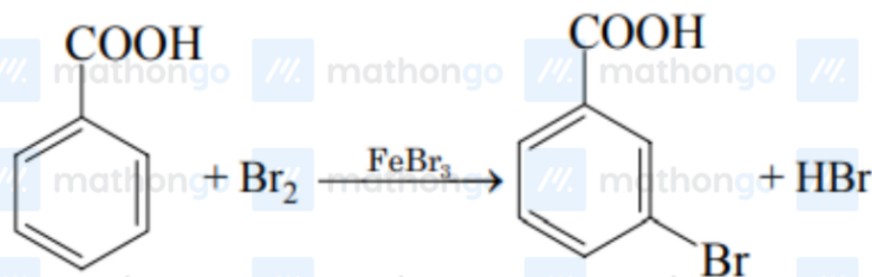
[Given : Atomic masses: C: 12.0 u, H : 1.0u, O : 16.0u]

46 18 March (Shift 1) - Numerical

Complete combustion of 3 g of ethane gives  $x \times 10^{22}$  molecules of water. The value of x is 18 (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]

47. 18 March (Shift 2) - Numerical



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 78

(Round off to the Nearest integer)

[Given : Atomic masses : C = 12.0u, H : 1.0u,

O : 16.0u, Br = 80.0u]

2020

48 JEE Main 2020 - 4 September (Morning)

The mass of ammonia in grams produced when 2.8kg of dinitrogen quantitatively reacts with 1 kg of dihydrogen is 3400

49 JEE Main 2020 - 5 September (Morning)

The minimum number of moles of  $O_2$  required for complete combustion of 1 mole of propane and 2 moles of butane is 18

50 JEE Main 2020 - 7 January (Evening)

0.6 g of urea on strong heating with  $NaOH$  evolves  $NH_3$ . Liberated  $NH_3$  will combine completely with which of the following  $HCl$  solution ?

- (A) 100 mL of 0.2 N  $HCl$
- (B) 400 mL of 0.2 N  $HCl$
- (C) 100 mL of 0.1 N  $HCl$
- (D) 200 mL of 0.2 N  $HCl$

51. JEE Main 2020 - 8 January (Evening)

$NaClO_3$  is used, even in spacecrafts, to produce  $O_2$ . The daily consumption of pure  $O_2$  by a person is 492 L at 1 atm, 300 K. How much amount of  $NaClO_3$ , in grams, is required to produce  $O_2$  for the daily consumption of a person at 1 atm, 300 K ? 2130