CHEMISTRY

BOOKS - G.R. BATHLA & SONS CHEMISTRY (HINGLISH)

STOICHIOMETRY (CHEMICAL FORMULAE AND EQUATIONS)

Example

1. Oxygen is prepared by catalytic decomposition of potassium chlorine $(KClO_3)$. Decomposition of potassium, chloride gives potassium chloride (KCl) and oxygen (O_2). How many moles and how many grams of $KClO_3$ are required to produce 2.4 mole O_2?

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2. Calculate the mass of lime (CaO) obtained by heating $200kg$ of $95\,\%$ pure lime stone $(CaCo_3)$:

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3. Chloringe is prepared in the laboratory by treating magnesse dixoide (MnO_2) with aqueous hydrochlorine acid according to the reaction.

$$MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$$

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4. How many grams of oxygen are required to burn completely 570g of octane?

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5. Calculate the number of grams of magnesium chloride that could be obtained from 17.0g of HCl when HCl is reacted with an excess of magnesium oxide.

6. How many kilogram of pure H_2SO_4 could be obtained from 1kg of iron $(FeSS_2)$ according to the following reactions?

$4FeS_2 + 11O_2 \rightarrow 2Fe_2O_3 + 8SO_2$

$2SO_2 + O_2 \rightarrow 2SO_3$

$SO_3 + H_2 \rightarrow H_2SO_4$
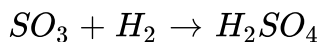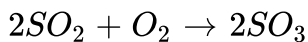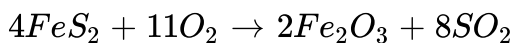
7. If 20g of $CaCO_3$ is treated with 20g of HCl. How many grams of CO_2 can be generated according to the following equations?

$CaCO_3 + 2HCl(aq) \rightarrow CaCl_2(aq.\,) + H_2O(l) + CO_2g$

8. 100 g sample of calcicum carbonate is reaction with 70g of orthophosphoric acid. Calculate

(a) the number of grams of calcium phosphate that could be produced.

(b) the number of grams of excess reagent that will remain unreacted.

9. 1g of Mg is burnt in a closed vessel which contains $0.5 g\, of\, O_2$

(i) Which reactants is left in excess

(ii) Find the mass of the excess reactant.

10. The reaction, $2C + O_2 \rightarrow 2CO$ is carried out by taking $24g$ of carbon and $96g O_2$, find out:
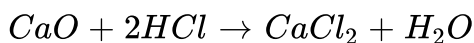
(a) which reactant is left in excess?

(b) How much of it is left?

(c) How many mole of CO are formed?

(d) How many g of other reactant should be taken so that nothing is left at the end of reaction?

11. For the reaction

$$CaO + 2HCl \rightarrow CaCl_2 + H_2O$$

1.23g of CaO is reacted with excess of nydrochloric acid and 1.85g of $CaCl_2$ is formed. What is the per cent yeild.

12. Chlorine evolved by the reaction of 45.31g of pyrolusite (impure) and excess of HCl is found to combine completely with the hydrogen produced by the reaction of 10g of magnesium and excess of dilute

hydrochloric acid. Find the percentrage of purity of MnO_2 in the given pyrolusite.

13. A solid mixture $5g$ consists of lead nitrate and sodium nitrate was heated below $600°C$ until weight of residue was constant. If the loss in weight is 28% find the amount of lead nitrate and sodium nitrate in mixture.

14. 3.68g of a mixture of calcium carbonate and magnesium carbonate when heated strongly leaves 1.92g of a white residue. Find the percentage composition of the mixture.

15. $0.50g$ of a mixture of K_2CO_3 and Li_2CO_3 required $30mL$ of $0.25NHCl$ solution for neutralization. What is % composition of mixure?

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16. What volume of $NH_3(g)at27°C$ and 1atm pressure will be obtained by therma, decomposition of 26.25g NH_3Cl?

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17. What quantity of copper(II) oxide will react 2.80litre of hydrogen at NTP

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18. Calculate the volume of carbon dioxide at NTP evolved by strong heating of 20g calcium carbonate.

19. Calculate the volume of hydrogen liberated at $27°C$ and $760mm$ pressure by treating 1.2g of magnesium with excess of hydrochloric acid.

20. A solid mixture $5g$ consists of lead nitrate and sodium nitrate was heated below $600°C$ until weight of residue was constant. If the loss in weight is 28% find the amount of lead nitrate and sodium nitrate in mixture.

21. One litre of a mixture of CO and CO_2 is passed through red-hot charcoal. The volume now becomes 1.6 litre. Find the composition of the mixture by volume.

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22. What volume of air containing 21% oxygen by volume is required to completely burn 1kg of carbon containing 100% combustible substances?

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23. What volume of oxygen gas at NTP is necessary for complete combustion of 20 litre of proportional measured at $27°C$ and 760mm preesure?

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24. One litre of oxygen at NTP is allowed to reasonanace with three times of carbon monoxide at NTP. Calculate the volume of each gas found after the reaction.
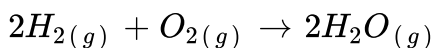
25. Calculate the weight of CaO required to remove hardness of $10^6 L$ of water containing $1.62g$ of $Ca(HCO_3)_2$ in $1.0L$.

$\left(MwofCa(HCO_3)_2 = 162, mwofCaO = 56\right)$

26. A mixture in which the mole ratio of H_2 and O_2 is $2:1$ is used to prepare water by the reaction.

$2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(g)}$

The total pressure in the container is $0.8atm$ at $20°C$ before the

reaction. Determine the final pressure at $120°C$ after reaction assuming 80% yield of water.

27. An impure sample of calcium carbon contains 80% pure of impure sample reacted with excess of hydrochloric acid. Calculate the volume of carbon dioxide at NTP obtained from the sample.

28. The mass of one litre sample of ozonised oxygen at NTP was found to be $1.5g$. When $100mL$ of this mixture at NTP were treated with terpentine oil, the volume was reduced to $90mL$. Hence calculate the molecular mass of ozone.

(Terpentine oil absorbs ozone)

29. A mixture of $NaHCO_3$ and Na_2CO_3, weighed 1.0235. The dissolved mixture was reached with excess of $Ba(OH)_2$ to form 2.1028g $BaCO_3$, by the following reactions:

$$Na_2CO_3 + Ba(OH)_2 \rightarrow BaCO_3 + 2NaOH$$

$$NaHCO_3 + Ba(OH)_2 \rightarrow BaCO_3 + NaOH + H_2O$$
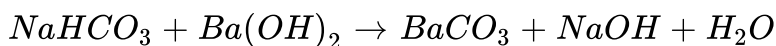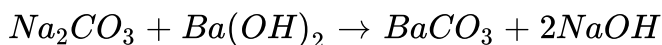
What was the percentage of $NaHCO_3$ in the orginal mixture?

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30. A mixture of ethane (C_2H_6) and ethene (C_2H_4) occupies $40L$ at $1.00atm$ and at $400K$. The mixture reacts completely with $130g$ of O_2 to produce CO_2 and H_2O. Assuming ideal gas behaviour, calculate the mole fractions of C_2H_4 and C_2H_6 in the mixture.

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31. A mixture of $HCOOH$ and $H_2C_2O_4$ is heated with conc. H_2SO_4. The gas produced is collected and on treating with KOH solution the volume of the gas decreases by $1/6th$. Calculate molar ratio of two acids in original mixure.

32. 3.6g mixture of sodium chloride and potassium chloride is dissolved in water. The solution is treated with excess of silver nitrate solution, 7.74g of silver chloride is obatined. Find the percentage of sodium chloride and potassium chloride in the mixture.

33. 5g of K_2SO_4 are dissolved in 250mL of solution. How many mL of this solution should be used so that 1.2 of $BaSO_4$ may be precipated from $BaCl_2$ solution?

34. A $2.0g$ of mixture of Na_2CO_3 and $NaHCO_3$ loses $0.248g$ when heated to $300°C$, the temperature at which $NaHCO_3$ decomposes to Na_2CO_3, CO_2 and H_2O. What is the percentage of Na_2CO_3 in mixture?

35. 1.0g sample of KCl_3 was heated under such condition that a part of it decomposed according to the equation.

$2KClO_3 \rightarrow 2KCl + 3O_2$ and the remaining underwent change according to the equation.

$4KClO_3 \rightarrow 3KClO_4 + KCl.$

If the amount of O_2 evolved was 145.8 mL at STP. Calculate the percentage by weight of $KClO_4$ in the residue.

36. A mixture of FeO and Fe_3O_4 when heated in air to a constant weight, gains 5% of its weight. Find the composition of the intial mixutre.

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37. A mixture in which the mole ratio of H_2 and O_2 is $2:1$ is used to prepare water by the reaction.
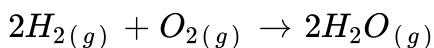
$$2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(g)}$$

The total pressure in the container is $0.8atm$ at $20°C$ before the reaction. Determine the final pressure at $120°C$ after reaction assuming 80% yield of water.

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38. Galena (an ore) is partially oxidised by passing air through it at high temperature. After some time the passage of air stopped, but the

heating is continued in a closed furnace such that the contents undergo self-reduction. The weight (in kg) of Pb produced per kg of O_2 consumed is__ ,

Atomic weights in g mol^{-1}: $O = 16, S = 32, Pb = 207$

39. The ammonia prepared by treating ammonium sulphate with calcium hydroxide is completely used by $NiCl_2, 6H_2O$ to form a stable coodinate compound. Assume that both the reaction are 100% complete. If 1584g of ammonium sulphate and 952g of $NiCl_2. 6H_2O$ are used in the preaparation the combined weight (in grams) of gypsum and the nickel-ammonia coordination compound thus produced is

Atomic weight is $gmol^{-1}: H - 1, N = 14, O = 16, S = 32, Cl = 35.5, Ca = 40, Ni = 59)$

Iillustration

1. One mole of calcium phosphide on reaction with excess of water give:

    A. three moles of phosphine

    B. one mole of phosphrinc acid

    C. two moles of phosphine

    D. one mole of P_2O_5

Answer: C

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2. $Mg(OH)_2$ in the form of Milk of Magnesia is used to neutralize excess stomach acid. How many moles of stomach acid can be neutralized by 1.00g of $Mg(OH)_2$?

$Molar\ Mass\quad g/mol$
$(mg(OH)_2)\quad 58.33$

    A. 0.0171

B. 0.0343

C. 0.686

D. 1.25

Answer: B

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3. When a mixture of 10 moles of SO_2 and 16 moles of O_2 were passed over a catalyst, 8 moles of SO_3 were formed at equilibrium. The number of SO_2 and O_2 remaining unreacted were:

A. 2,12

B. 12,2

C. 3,10

D. 10,3

Answer: A

4. Calcium carbonate decomposes on heating according to the following equations:

$$CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g)$$
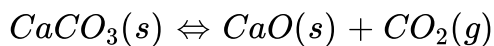
How many moles of CO_2 will be obtained by decomposition of 50g of $CaCO_3$?

A. $\dfrac{3}{2}$

B. $\dfrac{5}{2}$

C. $\dfrac{1}{2}$

D. 1

Answer: C

5. Sulphur trioxide is preapared by the following two reactions:

$$S_8(s) + 8O_2(g) \rightarrow 8SO_2(g)$$

$$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$$
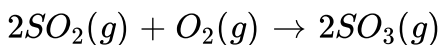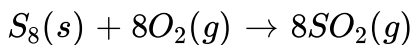
How many grams of SO_3 are produced from 1 mole fo S_8?

A. 1280

B. 640

C. 960

D. 320

Answer: B

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6. If 0.5 mole of $BaCl_2$ are mixed with 0.2 mole of Na_3PO_4,the maximum number of moles. Of $Ba_3(PO_4 - (2))$ that can be formed, is

A. 0.7

B. 0.5

C. 0.2

D. 0.1

Answer: D

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7. In the following reactions:

$4NH_3(g) + 5O_2(g) \rightarrow 4NO_g + 6H_2O(l)$
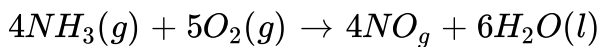
When 1 mole ammonia and 1 mole of O_2 are mixed, then the number of moles of NO formed will be:

A. 0.8

B. 0.7

C. 0.6

D. 0.5

Answer: A

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8. 30g Mg and 30g O_2 are reacted and the residual mixture contains:

A. 60g of MgO only

B. 40g of MgO and 20g of O_2

C. 45g of MgO and 15g of O_2

D. 50g of MgO and 10g of O_2

Answer: D

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9. 245 g of iodine and 142 g of chlorine are made to react completely to given a mixture of ICl and ICl_3 .How many moles of each are formed ?

A. 0.1 mole of IC l and 0.1 mole of ICI_3

B. 1 mole of I Cl and 1 mole of ICL_3

C. 0.5 mole of IC l and 0.1 mole of ICl_3

D. 0.5 mole of IC l and 0.1 mole of IC l mole of ICl_3

Answer: B

10. Magnesium hydroxide, $Mg(OH)_2$ is the white milky substance in milk of magnesia. What mass of $Mg(OH)_2$ is formed when 15mL of 0.18M of NaOH combined with 12mL of 0.14M $MgCl_2$? The molar mass of $Mg(OH)_2$ is $58.3 gmol^{-1}$

A. 0.079g

B. 0.097

C. 0.16g

D. 0.31g

11. $C_7H_6O_3 + C_4H_6O_3 \rightarrow C_9H_8O_4O_2$
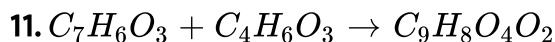
What is the percent yield if 0.85g of aspirin is formed in the reaction of

1.00g of salicylic acid with excess acetic anydride ?

Substance	Molar Mass
$C_7H_6O_3$	$138.12g.\,mol^{-1}$
$C_4H_6O_3$	$102.09g.\,mol^{-1}$
$C_9H_8O_4$	$180.15g.\,mol^{-1}$
$C_2H_4O_2$	$60.05g.\,mol^{-1}$

A. 0.65

B. 0.77

C. 0.85

D. 0.91

Answer: A

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12. A 1.50g sample of an ore containing silver was dissolved, and all of the Ag^+ was converted to 0.124 g of Ag_2S. What was the percentage of silver in the ore?

    A. 0.0641

    B. 0.072

    C. 0.0827

    D. 0.108

Answer: B

13. Magnetite, Fe_3O_4, can be converted into metallic iron by heating with carbon monoxide as represented by this equation:

$$Fe_3O_4(s) + CO(g) \rightarrow Fe(s) + CO_2(g)$$
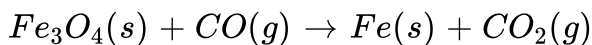
The kilograms of Fe_3O_4 which must be processed in this way to obtain $5.00kg$ of iron, if the process is 85% efficient is closest to?

$$[M: = Fe = 56]$$

A. 6.92kg

B. 8.12kg

C. 20.8kg

D. 24.4kg

Answer: B

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14. Iodobenzene is prepared from aniline $(C_6H_5NH_2)$ in a two step process as shown here:

$$C_6H_5NH_2 + HNO_2 + HCl \rightarrow C_6H_5N_2^+Cl + 2H_2O$$

$$C_6H_5N_2^+Cl^- + KI \rightarrow C_6H_5I + N_2 + KCl$$
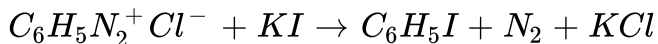
In an actual preparation, 9.30g of aniline was converted to 12.32g of iodobenzene. The percentage yield of iodobenzene is:

A. 0.08

B. 0.5

C. 0.75

D. 0.8

Answer: D

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15. Benzamide can be preapred by the action of concentrated ammonia upon benzoyl chloride.

$$\underset{\text{Benzoyl chloride}}{C_6H_5COl} + 2NH_3 \rightarrow \underset{\text{Benzamide}}{C_6H_5 - CONH_2} + NH_4Cl$$
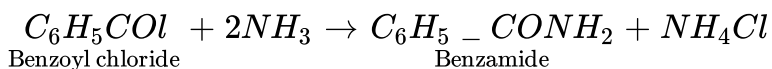
In such experiment 65cc of concentrated ammonia (in excess) was

treated with 15g of benzoyl chloride to give 11.1g of pure benzamide. Molar masses: benzoyl chloride (141), (benzamide)(121). The percentage yield of benzamide is:

A. $\dfrac{11.1}{15} \times 100$

B. $\dfrac{(15 - 11.1)}{15 \times 100}$

C. $\dfrac{11.1}{65} \times 100$

D. $\dfrac{121}{141} \times 100$

Answer:

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16. 10 litres of O_2 gas is reacted with 30 litres of CO at S.T.P. The volumes of each gas present at the end of the reaction are

A. $CO(10\,\text{litre}),\ CO_2(20\,\text{litre})$

B. $O_2(10\,\text{litre}),\ CO(30\,\text{litre})$

C. $CO(20 \text{ litre}), CO_2(10 \text{ litre})$

D. $O_2(10 \text{ litre}), CO_2(20 \text{ litre})$

Answer: A

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17. When 10g of 90% pure limestone is heated, the volume of CO_2 (in litre) liberated at STP is:

A. 22.4litre

B. 2.24litre

C. 20.16litre

D. 2.016litre

Answer: D

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18. $100 mL$ of phosphine (PH_3) on hearing forms phosphorous (P) and hydrogen (H_2). The volume change in the reaction is

A. an increase of 50mL

B. an increase of 100mL

C. an increase of 150mL

D. an decrease of 50mL

Answer: A

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19. Which of the following gases are absorbed in ammonical curpours chloride solution?

A. C_2H_5

B. CO
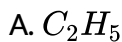
C. NO

D. O_2

Answer: A::B

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20. 30mL of a gaseous hydrocarbon requires 90mL of O_2 for complete oxidation, 60mL of CO_2 gas is formed in the process. The molecular formula of the hydrocarbon will be:

A. C_2H_4

B. $C_4H(10)$

C. C_3H_6

D. C_2H_2

Answer:

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21. If V mL of a gaseous hydrocarbon after explosion with excess of oxygen showed a contraction of 2.5V mL and further contraction of 2V mL with potash. What will be the molecular formula of hydrocarbon?

A. C_2H_4

B. C_2H_6

C. C_2H_2

D. C_3H_8
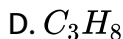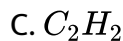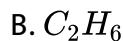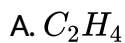
Answer: B

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22. 15mL of a gaseous hydrocarbon required for complete combustion, 357mL air contianing 21% oxygen by volume. The gaseous product occupied 327mL. If all the volumes are measured at STP. The molecular formula of hydrocarbon will be:

A. C_2H_6

B. C_4H_{10}

C. C_3H_8

D. C_2H_4
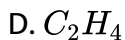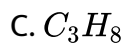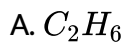
Answer: C

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23. A mixtures of methane and ethylene in the volume ration x:y has total volume of 30mL. On complete combustion it gave 40mL of CO_2. IF the ratio of original mixture is y:x instead of x:y. What volume of CO_2 would have been produced a combustion?
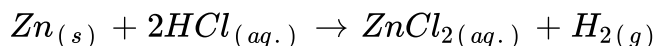
A. 50mL

B. 75mL

C. 100mL

D. 125mL

Answer: A

Practical Problems

1. 500mL of 0.25M Na_2SO_4 solution is added to an aquesous solution is 15g of $BaCl_2$ resulting in the formation of a white precipatate of insoluble $BaSO_4$. How many moles and how many grams of $BaSO_4$ are formed.

2. Zinc and hydrochloric acid react according to the reaction:

$$Zn_{(s)} + 2HCl_{(aq.)} \rightarrow ZnCl_{2(aq.)} + H_{2(g)}$$

If 0.30 mole of Zn are added to hydrochloric acid containing 0.52 mole HCl, how many moles of H_2 are produced?

3. Calcium carbonate reacts with aqueous HCl to give $CaCl_2$ and CO_2 according to the reaction:

$$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$$
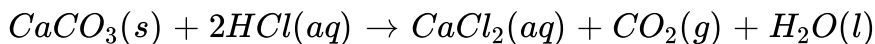
What mass of $CaCO_3$ is required to react completely with $25mL$ of $0.75 M HCl$?

4. Calculate the mass of iron will be converted into its oxide at NTP?

5. Calculate the volume chlorate is needed to obtain 2.4litre oxgyen at NTP?

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6. Calculate the volume of carbon dioxide at NTP evolved by strong heating of 20g calcium carbonate.

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7. Calculate the volume of O_2 and volume of air needed for combustion of $1kg$ carbon at STP.

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8. How many grams of oxygen will be formed by the action of 12g of sodium peroxide on water? Calculate also the volume of the gas at NTP.

9. A gaseous compound of carbon and nitrogen containing 53.8% by weight of nitrogen was found to have a vapour density of 25.8. What is the molecular formula of the compound.

10. Calculate the weight of CaO that can be obtained by heating 200kg of limestone which is 93% pure.

11. How many moles of impure potassium chlorate of 75% purity are required to produce 48g of oxygen.

12. What weight of zinc will react dil. Sulphuric acid to liberate 1000mL of hydrogen $27°C$ and 750mm pressure?

13. A mixture containing only Na_2CO_3 and K_2CO_3 and weighing $1.22g$ was dissolved in water to form $100mL$ of solution: $20mL$ of this solution required $40mL$ of $0.1NHCl$ for neutralisation.

a. Calculate the weight of K_2CO_3 in the mixture.

b. If another $20mL$ of the same solution is treated with excess of $BaCl_2$, what will be the weight of precipitate thus obtained? (Molarcular of $Na_2CO_3 = 106, K_2CO_3 = 138, BaCO_3 = 197.4$)

14. Calculate the volume of air containing 21% by volume of oxygen at NTP required to convert 294mL of SO_2 into SO_3 under the same

conditions.

15. $4g$ of an impure sample of $CaCO_3$ on treatment with excess HCl produces $0.88 g CO_2$. What is per cent purity of $CaCO_3$ sample?

16. What weight of AgCl will be precipated when a solution containing 4.77g of NaCl is added to a solution of 5.77g of $AgNO_3$

17. One gram of an alloy of aluminium and magnesium when heated with excess of dil. HCI forms magnesium chloride, aluminium chloride and hydrogen. The evolved hydrogen collected over mercury at $0^0 C$ has

a volume of 1.2 litre at $0.92atm$ pressure. Calculate the composition of the alloy.

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18. How much iron can be theoretically obatined by the reduction of 1.0kg of Fe_2O_3?(At.wt.of Fe=56)`

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19. 34g of pure H_2O_2 is decomposed. Calculate the mass and volume of NTP of oxygen that will be evolved.

> ▶ **Watch Video Solution**

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20. Find the percentage composition of iron and magnesium 5.0g which can dissolved in acid, gave 2.81 litre of H_2 at NTP.

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21. Equal weights of Hg and iodine are allowed to react completely to form a mixture of mercurous iodide and mercuric iodide. Calculate the ration of the masses of mercurous and mercuric iodides formed (Hg=201.I=117)

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22. A mixture of NaI and NcCl gave with sulphuric acid, Na_2SO_4 equal in mass to the original mixture taken. Find the percentage composition of the mixture.

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23. 92 gm mixture of $CaCO_3 and MgCO_3$ was heated strongly in an open vessel. After complete decomposition of the carbonates it was

found that the weight of residue left behind is 48g. Find the mass of $MgCO_3$ in grams in the mixture.

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1. The formula which represents the sample ratio of atoms in a compound is called:

A. emprirical formula

B. molecular formula

C. structural formula

D. rational formula

Answer: A

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2. The empirical formula of a compound is CH. Its molecular weight is 78. The molecular formula the compound will be:
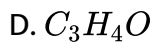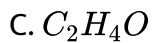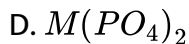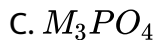
A. C_2H_2

B. C_3H_3

C. C_4H_4

D. C_6H_6
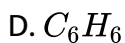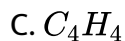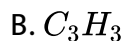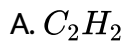
Answer: D

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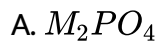**3.** An organic compound on analysis gave $C = 5.45\%$, $H = 9.1\%$ by mass. Its empirical formula is:

A. CHO_2

B. CH_2O

C. C_2H_4O

D. C_3H_4O

Answer: C

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4. The chloric of a metal has the formula MCl_3. The formula of its phosphate will be:

A. M_2PO_4

B. MPO_4

C. M_3PO_4

D. $M(PO_4)_2$

Answer: B

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5. The formula of chloric acid is $HClO_3$. The formula for calcium chlorate is:

    A. $CaClO_3$

    B. $Ca(ClO_3)_2$

    C. Ca_2ClO_3

    D. $Ca(ClO_3)_2$
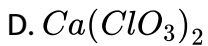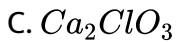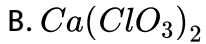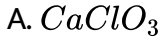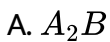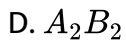
Answer: B

6. An element A is tetravalent and another element B is divalent. The formula of the compound formed from these elements will be:

    A. A_2B

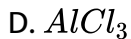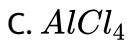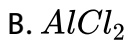   B. AB

C. AB_2

D. A_2B_2

Answer: C

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7. A compound of aluminium and chlorine is compsed of 9.0g Al for every 35.5g of chlorine. The emprical formula of the compound is:
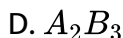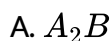
A. AlCl

B. $AlCl_2$

C. $AlCl_4$

D. $AlCl_3$

Answer: D

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8. Two element $A(at.wt.75)$ and $B(at.wt.16)$ combine to yield a compound. The $\%$ by weight of A in the compound was found to be 75.08. The formula of the compound is :

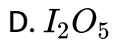A. A_2B

B. AB

C. AB_2

D. A_2B_3

Answer: B

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9. On analysis, a certain compound was found to contain iodine and oxygen in the ratio of 254:80. The formula of the compound is: (At. mass I=127,O=16)

A. IO

B. I_2O

C. I_5O_2

D. I_2O_5
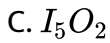
Answer: D

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10. The haemoglobin from the red blood corpuscles of most mammals contains approximately 0.33% of iron by weight. The molecular weight of haemoglobin as $67, 200.$

The number of iron atoms in each molecule of haemoglobin is (atomic weight of iron $= 56$):

A. 1

B. 2

C. 3

D. 4

Answer: D

---

11. 24.9 g of sodium thiosulphate (Mol.mass=249) is weighed by a chemist. The moles of sodium this sulphate he has weighed, are:

A. $\dfrac{1}{10}$

B. $\dfrac{1}{5}$

C. $\dfrac{1}{2}$

D. 1

Answer: A

---

12. The mass of sulphuric acid needed for dissolving 3g magnesium carbonate is:

A. 3.5g

B. 7.0g

C. 1.7g

D. 17.0g

Answer: A

13. 10mL of a solution of H_2O_2 liberated 0.5 g of iodine from KI solution. The percentage of H_2O_2 in the solution is:

A. 0.27g

B. 0.67g

C. 0.47g

D. 0.87g

Answer: B

14. The mass of CO, obtained when 60 g of calcium carbonate is treated with excess of hydrochloric acid is:

A. 30.0g

B. 15.0g

C. 13.2g

D. 26.4g

Answer: D

15. The $\%$ loss in weight heating a pure sample of potassium chlorate $(M. wt. 122.5)$ will be :

A. 12.25

B. 24.5

C. 39.17

D. 49

Answer: C

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16. The volume of oxygen required for complete oxidation of

A. 2litre

B. 4litre

C. 1litre

D. 3litre

Answer: B

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17. 3 volumes of hydrogen are required to combine with one volume of nitrogen to form 2 volumes of ammonia. When 1 mole of hydrogen is allowed to react with the mole of nitrogen, the two gases:

A. do not combine

B. combine and both the gases are used up completely

C. 2/3 mile of nitrogen remains uncombined

D. some hydrogen remains uncombined

Answer: C

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18. The percentage of nitrogen in urea is about:

A. 38.4

B. 46.6

C. 59.1

D. 61.3

Answer: B

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19. If a mixture of 3 mol of H_2 and 1mole of N_2 is completely converted into NH_3, what would be the ratio of the initial and final volume at same temperature and pressure?

A. $3:1$

B. 46.6

C. 59.1

D. 61.3

Answer: C

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20. The mass of residue left after strongly heating 1.38 g of silver carbonate will be:

    A. 1.16g

    B. 1.33g

    C. 2.66g

    D. 1.08g

Answer: D

21. The mass of oxygen with which 13.5 g of aluminium will

    A. 4g

    B. 8g

C. 12g

D. 16g

Answer: C

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22. 1.6 g of an organic compound on combustion gave 4.4 g carbon dioxide. The % of carbon in the organic compound is:

A. 30

B. 45

C. 60

D. 75

Answer: D

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23. At NTP, 10 litre of hydrogen sulphide gas reacted with 10 litre of sulphur dioxide gas. The volume of gas, after the reaction is complete, would be:

A. 5litre

B. 10litre

C. 15litre

D. 20litre

Answer: A

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24. Haemoglobin contains $0.25\,\%$ iron by weight. The molecular weight of haemoglobin is 89600. Calculate the number of iron atos per molecule of haemoglobin.

A. 5

B. 4

C. 3

D. 2

Answer: B

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25. The minimunm amount of hydrogen required to reduce 7.95g of CuO
(Mol. mass = 79.5) will be:

A. 2g

B. 4g

C. 2240mL at NTP

D. 22400mL at NTP

Answer: C

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26. 2.0 g mixture of sodium carbonate and sodium bicarbonate on heating to constant mass gave 224mL of CO_2, at NTP. The % mass of sodium bicarbonate in the mixture is:

    A. 50

    B. 54

    C. 80

    D. 84

Answer: D

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27. What volume of hydrogen at NTP will be liberated was is 3.25 g of zinc completely dissolve in dilute HCl? (At. mass of Zn=65)

    A. 1.12litre

B. 11.20litre

C. 2.24litre

D. 22.40litre

Answer: A

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28. The volume of oxygen at NTP evolved when 1.70 g of sodium nitrate

is heated to a constant mass is:

A. 0.112litre

B. 0.224litre

C. 22.4litre

D. 11.2litre

Answer: B

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29. 50 g limestone is heated. The quantity of quicklime produced is

    A. 56g

    B. 28g

    C. 14g

    D. 10g

Answer: B

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30. Assuming that petrol is octane (C_8H_{18}) and has a density of $0.8gMl^{-1}$, 1,425 litre of petrol on combustion will consume:

    A. 100 mole of phosphine

    B. 124 mole of phosphine

C. 150 mole of phosphine acid

D. 175 mole of phosphorus pentaoxide

Answer: A

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31. One mole of calcium phosphide on reaction with excess of water give:

A. 1 mole of phophine

B. 2 mole of phosphine

C. 2 mole of phosphoric acid

D. 1 mole of phoshorus pentaoxide

Answer: B

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32. Assuming full decomposition, the volume of CO_2 released at STP on heating 9.85 g of $BaCO_3$ (At mass Ba = 137) will be

A. 0.84L

B. 2.24L

C. 4.06L

D. 1.12L

Answer: D

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33. MnO_4^{2-} (1 mole) in neutral aqueous medium is disproportionate to

A. 2/3 mole is MnO_4^- and 1/3 mole MnO_2

B. 1/3 mole is MnO_4^- and 2/3 mole MnO_2

C. 1/3 mole is $Mn_2O_7^-$ and 1/3 mole MnO_2

D. 2/3 mole is $Mn_2O_7^-$ and 1/3 mole MnO_2

Answer: A

34. 56 g of nitrogen and 8 g hydrogen gas are heated in a closed vessel. At equilibrium 34 g of ammnia are present. The equilibrium number of moles of nitrogen, hdregen and ammonia are respectively

A. 1,2,2

B. 2,2,1

C. 1,1,2

D. 2,1,2

Answer: C

35. If 30mL of H_2 and $20mL$ of O_2, reacts $\rightarrow$ for mH_2O, what is left at the end of the reaction?

    A. 10mL of H_2

    B. 5mL of H_2

    C. 10mL of O_2

    D. 5mL of O_2

Answer: D

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36. For the formation of 3.65 g of hydrogen chloride gas, what volumes of hydrogen gas and chlorine gas are required at NTP conditions?

    A. 1.12L,1.12L

    B. 1.12L,2.24L

    C. 3.65L,1.83L

D. 1L,1L

Answer: A

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37. An alkaloid contains 17.28% of nitrogen and its molecular mass is 162.

The number of nitrogen atoms present in one molecule of alkaloid is:

A. five

B. four

C. three

D. two

Answer: D

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38. x gm of $CaCO_3$, was completely burnt in air. The weight of the the solid residue formed is 28g. What is the value of 'x' in grams?

A. 44

B. 200

C. 150

D. 50

Answer: D

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39. Sodium bicarbonate on heating decomposes to form sodium carbonate, CO_2, and water. If 0.2 mole of sodium bicarbonate is completely decomposed, how many mołe of sodium carbonate is formed?

A. 0.1

B. 0.2

C. 0.05

D. 0.025

Answer: A

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40. One mole of acidified $K_2Cr_2O_7$ on reaction with excess of KCl will liberate......, moles of I_2.

A. 6

B. 1

C. 7

D. 3

Answer: D

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41. The decomposition of cetian mass of $CaCO_3$ gave $11.2dm^3$ of CO_2 gas at STP. The mass of KOH required to completely neutralise the gas is:

    A. 56g

    B. 28g

    C. 42g

    D. 20g

Answer: B

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42. At T K, 100 litre of dry oxygen is present in a sealed container. It is subjected to silent electric discharge, till the volumes oxygen and ozone become equal. What is the volume (in litre) of ozone formed at T K?

A. 50L

B. 60L

C. 30L

D. 40L

Answer: D

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43. In the reaction:

$$2Al_{(s)} + 6HCl_{(aq.)} \rightarrow 2Al^{3+}_{(aq.)} + 6Cl^{-}_{(aq.)} + 3H_{2(g)}$$
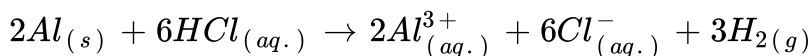
A. 11.2L $H_2(g)$ at STP is produced for every mole of HCl(aq.)consumed.

B. 6L of HCl(aq). Is consumed for every $3LH_2(g)$ produced

C. 33.6L$H_2(g)$ is produced regardless of temperature and for every mole of Al that reacts

D. 67.2L $H_2(g)$ at STP is produced for every mole of Al that reacts

Answer: C

---

44. Calculate the weight of iron which will be converted into its oxide by the reaction of $18g$ of steam.

A. 168g

B. 84g

C. 42g

D. 21g

Answer: C

45. Match the following

List-I	List-II (at STP)

(A) $10 \text{ g } CaCO_3 \xrightarrow[\text{Decomposition}]{\Delta}$ (i) $0.224 \text{ L } CO_2$

(B) $1.06 \text{ g } Na_2CO_3 \xrightarrow{\text{Excess HCl}}$ (ii) $4.48 \text{ L } CO_2$
    (iii) $0.448 \text{ L } CO_2$

(C) $2.4 \text{ g } C \xrightarrow[\text{Combustion}]{\text{Excess } O_2}$ (iv) $2.24 \text{ L } CO_2$
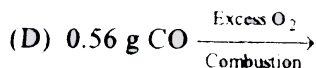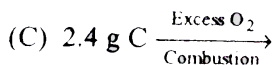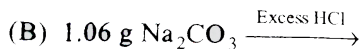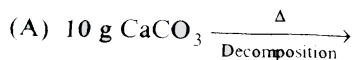
(D) $0.56 \text{ g } CO \xrightarrow[\text{Combustion}]{\text{Excess } O_2}$ (v) $22.4 \text{ L } CO_2$

	A	B	C	D
(a)	(iv)	(i)	(ii)	(iii)
(b)	(v)	(i)	(ii)	(iii)
(c)	(iv)	(i)	(iii)	(ii)
(d)	(i)	(iv)	(ii)	(iii)

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46. $Fe^{2+} \rightarrow Fe^{3+} + e^-$, $MnO_4^- + 5e^- \rightarrow Mn^{2+}$, the ratio of stoichiometric coefficient of Fe^{2+} and MnO_4 is:

A. $1:5$

B. $5:1$

C. $2:3$

D. $6:1$

Answer: B

47. What volume of oxygen gas (O_2) measured of $0°C$ and $1am$ needed to burn completely $1L$ of propane gas (C_3H_8) measured under the same conditions?

A. 5L

B. 10L

C. 7L

D. 6L

Answer: A

48. How many moles of lead (II) chloride will be formed from a reaction between 6.5g PbO and 3.2g HCl?

A. 0.011

B. 0.029

C. 0.44

D. 0.33

Answer: B

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49. 1 mole of methylamine on reaction with nitrous acid gives at NTP:

A. 1 litre of nitrogen

B. 22.4 litre of nitrogen

C. 11.2 of nitrogen

D. 5.6 litre of nitrogen

Answer: B

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50. The value of 'n' in the reaction

$$\underset{1mol}{C\,r_2O_7^{2-}} + 14H^+ + HONO \rightarrow CH_3 - OH + N_2 + \underset{\substack{22.4litre \\ at\ STP}}{7H_2O}$$
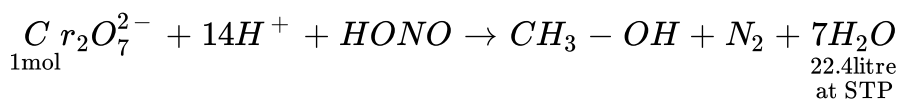
A. 2

B. 3

C. 6

D. 7

Answer: C

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51. In the complex with formula $MCl_3.4H_2O$ the co-ordination number of the metal M is six. And there is a no molecule of hydration in it. The volume of 0.1 M $AgNO_3$ solution needed to precitate the free chloride ions in 200 ml of 0.01 M solution of the complex is

   A. 40mL

   B. 20mL

   C. 60mL

   D. 80mL

Answer: B

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52. 1.5g $CdCl_2$ was formed to contain 0.9g Cd. Calculate MO, the atomic weight of Cd.

   A. 118

B. 112

C. 106.5

D. 53.25

Answer: C

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53. 10 g of hydrogen and 64 g of oxygen were filled in a steel vessel and exploded. Amount of water produced in this reaction will be

A. 1mol

B. 2mol

C. 3mol

D. 4mol

Answer: D

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54. In an experiment, 4g of M_2O_x oxide was reduced to 2.8g of the metal. If the atomic mass of the metal is $56gmol^{-1}$, the number of oxygen atoms in the oxide is:

A. 1

B. 2

C. 3

D. 4

Answer: C

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55. A vessel fitted with a weightless, frictionless piston of $0.025m^2$ area contians conc. HCl. The piston moved 1m outwards when 0.075kg of iron

fillings were added at 300K. The solution left behind was found to contain Fe(II). The approximate purity of the iron sample is:

A. 0.5

B. 0.75

C. 0.9

D. 0.4

Answer: B

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56. The reaction of calcium with water is represented by the equation

$$Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$$
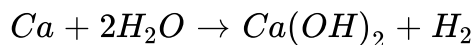
What volume of H_2, at STP would be liberated when 8g of calcium completely reacts with water

A. $0.2cm^3$

B. $0.4cm^3$

C. $224cm^3$

D. $4480cm^3$

Answer: D

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57. What volume of hydrogen will be liberated at NTP by the reaction of Zn on 50mL dilute H_2SO_4 of specific gravity 1.3 and having purity 40%?

A. 3.5litre

B. 8.25litre

C. 6.74litre

D. 5.94litre

Answer: D

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58. Calculate the mass of oxygen obtained by complete decomposition of 10kg of pure potassium chlorate (Atomic mass K=39,O=16 and Cl=35.5)

   A. 39.2kg

   B. 392kg

   C. 3.92kg

   D. 3kg

Answer: C

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59. The molecular formula of a commercial resin used for exchanging ions in water softening is $C_8H_7SO_3Na$ (Mol.wt.206). What would be the maximum uptake of Ca^{2+} ions by the resin when expressed in mole per gram resin?

A. $\dfrac{1}{412}$

B. $\dfrac{1}{103}$

C. $\dfrac{1}{206}$

D. $\dfrac{2}{309}$

Answer: A

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60. A water sample contains fMgSO What is . 68 mofCaSO4and60ppmo

4· . Mg(HC03)2 , PP 1 ? (Atomic weights of calcmm, the hardness of the

water sa~:s \ctively 40, 24 and 32). magnesium and sulphur are p (SCRA

A. 50ppm

B. 100ppm

C. 150ppm

D. 200ppm

Answer: D

---

61. At $300K$ and $1atm$, $15mL$ of a gaseous hydrocarbon requires $375mL$ air containing $20\%\ O_2$ by volume for complete combustion. After combustion, the gases occupy $330mL$. 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

A. C_3H_6

B. C_3H_8

C. C_4H_8

D. C_4H_{10}
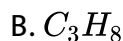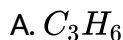
Answer: B

62. 1 gram of carbonate (M_2CO_3) on treatment with excess HCl produces 0.1186 mole of CO_2. The molar mass of M_2CO_3 in g mol^{-1}

A. 1186

B. 84.3

C. 118.6

D. 11.86

Answer: B

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63. The ration of mass per cent 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 compleltely to CO_2 and H_2O. The empirial formula of compound $C_xH_yO_z$ is:

A. C_2H_4O

B. $C_3H_4O_2$

C. $C_2H_3O_3$

D. $C_3H_6O_3$
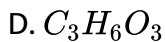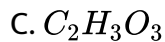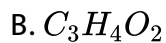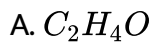
Answer: C

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Objective B

1. What mass of magnesium hydroxide is required to neutralize 125 mL

of 0.136 M hydrochloric acid solution?

Substance	Molar Mass
$MG(OH)_2$	58.33 gmol^{-1}

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2. Calculate the mass of ammonia that can be produced from the decomposition of a sample $(NH_4)_2PtCl_6$ containing 0.100g Pt.

Substance	Molar mass
$(NH_4)_2PtCl_6$	$443.9g. \, mol^{-1}$

3. Consider the following data:

Element	Atomic mass
A	12.01
B	32.5

A and B combine to form new substance X . If 4 moles of B combine with 1 mole of A to give l mole of X , then weight of one mole of X is:

4. Chlorine can be prepared by reacting HCl with MnO_2. The reaction is represented by this equation.

$$MnO_2(s) + 4HCl(aq) \Rightarrow Cl_2(g) + MnCl_2(aq) + 2H_2O(l)$$
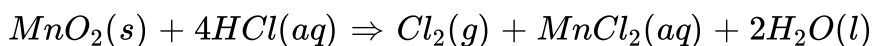
Assuming the reaction goes to completion what mass of concentrated HCL solution (36.0% HCl by weight) required to produce 45.68 g of cl2

5. What volume of $3MNa_2SO_4$ must be added to 25mL of 1M $BaCl_2$ to produce $5gBaSO_4$?

6. When FeCI is ignited in an atmosphere of pure oxygen, this reaction takes place:

$4FeCl_2(s) + 3O_2(g) \rightarrow 2Fe_2O_3(s) + 6Cl_2(g)$
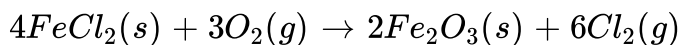
If 3 moles of are ignited in the presence of 2 moles of O_2 gas, how much of which reagent is present in excess and therefore, remains unreacted?

7. A self-contained breathing apparatus uses potassium superoxide, KO_2, to convert the carbon dioxide and water in exhaled air into oxygen, as shown by the equation:

$$4KO_2(s) + 2H_2O(g) + 4CO_2(g) \rightarrow 4HCO_3(g) + 3O_2(g)$$
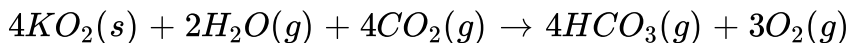
How many molecules of oxygen gas will be produced from 0.0468 g of carbon dioxide that is exhaled in a typical breath?

8. Antimony reacts with chlorine according to this equation

$$2Sb + 3Cl_2 \Leftrightarrow 2SbCl_3$$
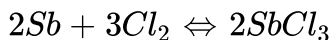
How many grams of $SbCI_3$ can be prepared if 0.012 mole of antimony are reacted with 0.02 mole .of chlorine? The molar mass of $SbCl_3$ equals $228.2 gmol^{-1}$

9. A gaseous mixture of propane and butane of volume 3L on complete combustion produces 10L of CO_2 under standard conditions of temperature and pressure. The ratio of volumes of propane to butane is:

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10. What amount of silver will be obtained on thermal decom- position of 2. 76 g of silver carbonate, Ag2CO3 (276 amu)?

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11. 100 mL of PH_3 on decomposition produced phosphorus and hydrogen. The change in volume is

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12. What amount of $BaSO_4$ can be obtained on mixing 0.5 mole $BaCI_2O$ with 1mole of H_2SO_4?

13. How many moles of O_2 will be liberated by one mole of CrO_5 is the following reaction:

$$CrO_5 + H_2SO_4 \rightarrow Cr_2(SO_4)_3 + H_2O + O_2$$
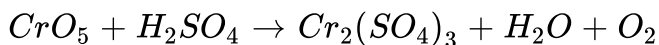
14. Calcium carbonate decomposes on heating according to the following equations:
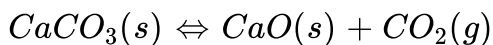
$$CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g)$$

How many moles of CO_2 will be obtained by decomposition of 50g of $CaCO_3$?

15. The volume in litres of CO_2 liberated at STP when 10 grams of 90% pure limestone is heated cmpletely is

16. A metal oxide has the formula Z_2O_3. It can be reduced by hydrogen to give free metal and water. 0.1596 g of the metal requires 6 mg of hydrogen for complete reduction. The atomic mass of the metal is:

17. 10g $CaCO_3$ is completely decomposed to X and CaO. X is passed into an aquesous solution containg one mole of sodium carbonate. What is the number of moles of moles sodium bicarbonte formed?

Molar mass: $CaCO_3(100)$, $Na_2CO_3(106)$, $NaHCO_3(84)$

18. Chlorine gas can be produced by reacting sulphuric acid with a mixutre of MnO_2 and NaCl. The reacting follows the equations:

$$2NaCl + MnO_2 + 3H_2SO_4 \rightarrow 2NaHSO_4 + MnSO_4 + Cl_2 + 2H_2O$$
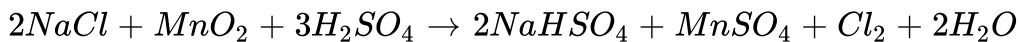
What volume of chlorine can be produced from 1g of sodium chloride under standard conditions of temperature and pressure?

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19. 1 mol of a gaseous aliphatic compound $C_nH_{3n}O_m$ is completely burnt in an excess of oxygen. The contraction in volume in (assume water gets condensed out):

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20. A mixture of CH_4 and C_2H_4 was completely burnt in excess of oxygen, yielding equal volumes of CO_2 and steam. Calculate the percentages of the compounds in the original mixture:

21. When same amount of zinc is treated separately with excess of H_2SO_4 and $NaOH$, the ratio of volumes of H_2 evolved is:

22. $HgCl_2 + 4KI \rightarrow K_2[H_gI_4] + 2KCl$
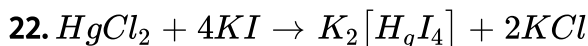
1 mole each of Hg^{2+} and I^- will form how many moles of HgI_4^{2-} ?

23. 25mL of 0.15M Pb $(NO_3)_2$ reacts completely with 20 mL of $Al_2(SO_3)_2$. The molar concentration of $Al_2(SO_4)_3$ will be:
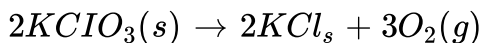
$3Pb(NO_3)_2(aq.) + Al_2(SO_4)_3(aq.) \rightarrow 3PbSO_3(s) + 2Al(NO_3)_3(aq.)$

24. In the reaction

$$2NH_3(g) + 5F_2 \rightarrow N_2F_4 + 6HF$$
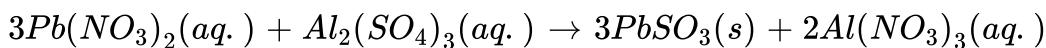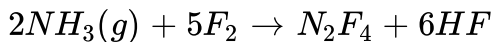
3.56g N_2F_4 is obatained by mixing 2g NH_3 and $8gF_2$. The percentage yield of the production is:

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25. 1.5 g of oxygen is produced by heating $KCIO_3$. How much KCl is produced in the reaction?

$$2KCIO_3(s) \rightarrow 2KCl_s + 3O_2(g)$$

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26. Calculate the amount of lime that can be produced by heating 100g to 90% pure limestone

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27. In an experiment, the following four gases were produced. 11.2L of which two gases at STP will weigh 14g?

28. 2 mole of CO_2 is required to preapre:

29. 8.7 g of pure MnO_2 is heated with an excess of HCl and the gas. evolved is passed into a solution of KI. Calculate the amount of .he iodine liberated (Mn=55,Cl=35.5, I=127):

30. 100 ml of gaseous mixture containing CO, CO_2 and O_2 was sparked there was contraction of 80mL volume when the nixturc was

passed through aqueous caustic potash KOH. The omposition of initial gaseous mixture will be respectively:

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31. SO_2 gas is slowly passed through an aquesous suspension containing 12g $CaSO_3$ till the milkiness just disappears, what amount of SO_2 would be required?

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Integer Answer Type Questions

1. Reaction of Br_2 with Na_2CO_3 in aquesous solution gives sodium bromide bromate with evolution of CO_2 gas. The number of sodium bromide molecules involved in the balanced chemical equation is:

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2. Two moles of sodium phosphate completely reacts with calcium chloride to form calcium phosphate $Ca_3(PO_4)$. How many moles of calcium phosphate will be formed?

3. Number of moles of O_2 formed by 136g of H_2O_2, on complete decomposition will be:

4. When oxygen is passed through silent electric discharge, it is 10% converted to ozone

$$3O_2(g) \Leftrightarrow 2O_3(g)$$
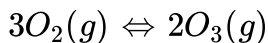
What volume of O_3 will be formed by using30 litre of O_2?

5. Three moles of B_2H_6 are completely reacted with methanol. The number of moles of boron containing product formed is:

Passage 1

1. In the reaction vessel 100g H_2 and $100gCl_2$ are mixed and suitbale conditions are provided for the following reactions:

$$H_2(g) + Cl_2(g) \xrightarrow{?} 2HCl(g)$$
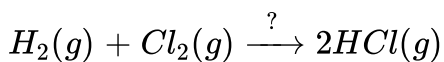
Select the correct statement(s) for the above reaction:

A. Presence of light is required for this reaction

B. It is chaing required

C. Catalyst is required

D. All of the above
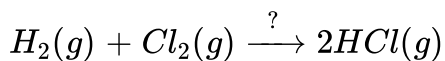
Answer: a,b

2. In the reaction vessel 100g H_2 and $100gCl_2$ are mixed and suitbale conditions are provided for the following reactions:

$$H_2(g) + Cl_2(g) \xrightarrow{?} 2HCl(g)$$
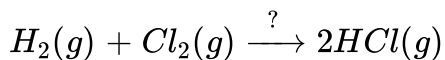
The limiting reagent in this reaction will be:

A. H_2

B. Cl_2

C. both

D. cannot be predicted

Answer: b

3. In the reaction vessel 100g H_2 and $100gCl_2$ are mixed and suitbale conditions are provided for the following reactions:

$$H_2(g) + Cl_2(g) \xrightarrow{?} 2HCl(g)$$
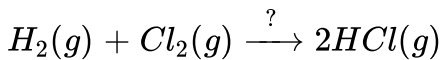
The actual amount of HCl formed in this reaction is:

A. 102.8g

B. 73g

C. 36.5g

D. 142g

Answer: a,b

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4. In the reaction vessel 100g H_2 and $100gCl_2$ are mixed and suitbale conditions are provided for the following reactions:

$$H_2(g) + Cl_2(g) \xrightarrow{?} 2HCl(g)$$
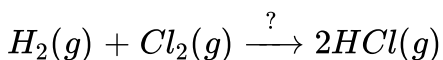
The amount of excesss reactant remaining is:

A. 50g

B. 97.2g

C. 46g

D. 64g

Answer: b

5. In the reaction vessel 100g H_2 and $100g Cl_2$ are mixed and suitbale conditions are provided for the following reactions:

$$H_2(g) + Cl_2(g) \xrightarrow{?} 2HCl(g)$$

The amount of HCl formed (at 90% yield) will be:

A. 36.8g

B. 62.5g
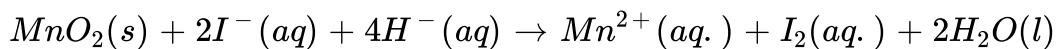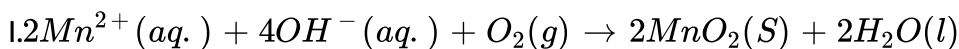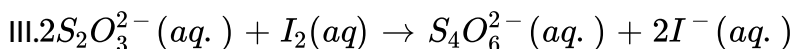
C. 80g

D. 92.53g

Answer: d

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Passage 2

1. Dissolved oxygen in water is determined by using a redox reaction.

Following equations describe the procedure.

I. $2Mn^{2+}(aq.) + 4OH^-(aq.) + O_2(g) \rightarrow 2MnO_2(S) + 2H_2O(l)$

II.

$MnO_2(s) + 2I^-(aq) + 4H^-(aq) \rightarrow Mn^{2+}(aq.) + I_2(aq.) + 2H_2O(l)$

III. $2S_2O_3^{2-}(aq.) + I_2(aq) \rightarrow S_4O_6^{2-}(aq.) + 2I^-(aq.)$
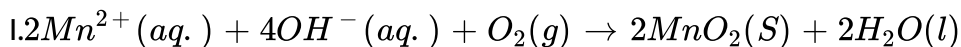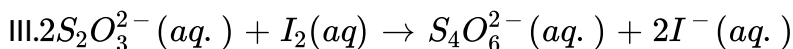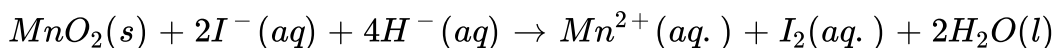
How many moles of $S_2O_3^{2-}$ are equivalent to each mole of `O_(2)?

A. 0.5

B. 1

C. 2

D. 4

Answer: d

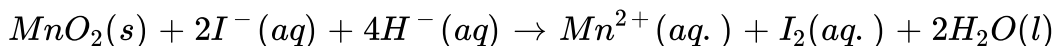2. Dissolved oxygen in water is determined by using a redox reaction.

Following equations describe the procedure.

I. $2Mn^{2+}(aq.) + 4OH^-(aq.) + O_2(g) \rightarrow 2MnO_2(S) + 2H_2O(l)$

II.

$MnO_2(s) + 2I^-(aq) + 4H^-(aq) \rightarrow Mn^{2+}(aq.) + I_2(aq.) + 2H_2O(l)$

III. $2S_2O_3^{2-}(aq.) + I_2(aq) \rightarrow S_4O_6^{2-}(aq.) + 2I^-(aq.)$
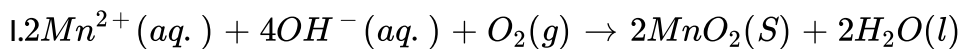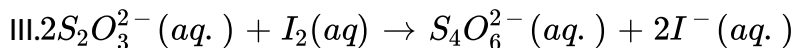
What amount of I_2 will be liberated from 8g dissolved oxygen?

A. 127g

B. 254g

C. 504g
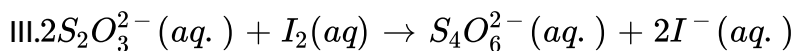
D. 1008g

Answer: a

3. Dissolved oxygen in water is determined by using a redox reaction. Following equations describe the procedure.

I.$2Mn^{2+}(aq.) + 4OH^-(aq.) + O_2(g) \rightarrow 2MnO_2(S) + 2H_2O(l)$

II.

$MnO_2(s) + 2I^-(aq) + 4H^-(aq) \rightarrow Mn^{2+}(aq.) + I_2(aq.) + 2H_2O(l)$

III.$2S_2O_3^{2-}(aq.) + I_2(aq) \rightarrow S_4O_6^{2-}(aq.) + 2I^-(aq.)$

If 3×10^{-3} moles O_2 is dissolved per litre of water, then what will be the molarity of I^- produced in the give reaction?

A. $3 \times 10^{-3}M$

B. $4 \times 3 \times 10^{-3}M$

C. $2 \times 3 \times 10^{-3}M$
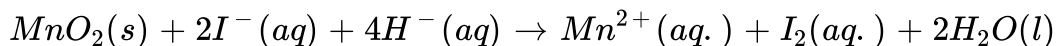
D. $\dfrac{1}{2} \times 3 \times 10^{-3} M$

Answer: b

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4. Dissolved oxygen in water is determined by using a redox reaction. Following equations describe the procedure.
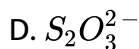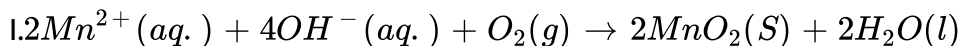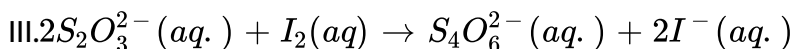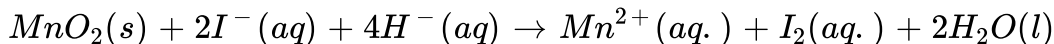
I.$2Mn^{2+}(aq.) + 4OH^-(aq.) + O_2(g) \rightarrow 2MnO_2(S) + 2H_2O(l)$

II.

$MnO_2(s) + 2I^-(aq) + 4H^-(aq) \rightarrow Mn^{2+}(aq.) + I_2(aq.) + 2H_2O(l)$

III.$2S_2O_3^{2-}(aq.) + I_2(aq) \rightarrow S_4O_6^{2-}(aq.) + 2I^-(aq.)$
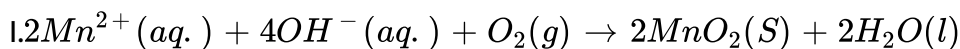
Number of which two chemical species will be same in the given procedure?

A. MnO_2

B. I_2

C. I^-

D. $S_2O_3^{2-}$

Answer: a

5. Dissolved oxygen in water is determined by using a redox reaction.

Following equations describe the procedure.

I.$2Mn^{2+}(aq.) + 4OH^-(aq.) + O_2(g) \rightarrow 2MnO_2(S) + 2H_2O(l)$

II.

$MnO_2(s) + 2I^-(aq) + 4H^-(aq) \rightarrow Mn^{2+}(aq.) + I_2(aq.) + 2H_2O(l)$

III.$2S_2O_3^{2-}(aq.) + I_2(aq) \rightarrow S_4O_6^{2-}(aq.) + 2I^-(aq.)$

8mg of dissolved oxygen will consume:

A. $5 \times 10^{-4} mol Mn^{2+}$

B. $2.5 \times 10^{-4} mol Mn^{2+}$
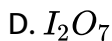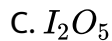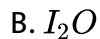
C. $10^{-3} mol Mn^{2+}$

D. $2 mol Mn^{2+}$

Answer: a

1. An oxide of iodine contains 25.4g of iodine for 8g of oxygen. Its molecular formula will be:

A. I_2O_3

B. I_2O

C. I_2O_5

D. I_2O_7
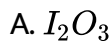
Answer: c

2. 2g of H_2 and $1gO_2$ are allowed to react according to following equation

$$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$$
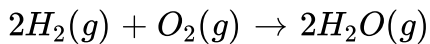
Amount of H_2O formed in the reaction will be:

   A. 3g

   B. 1.125g

   C. 4.5g

   D. 2.50g

Answer: b

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3. 20cc of CO_2 gas is passed over red hot coke. The volume of cabron monoxide evolved is:
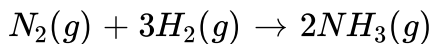
   A. 10cc

B. 20cc

C. 30cc

D. 40cc

Answer: d

4. In the Haber process:

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

30L of H_2 of N_2 were taken for reaction which yielded only 50% of expected product. What will be th composition of the geseous mixture in the end?

A. $20LNH_3$, $25LN_2$ and $20LH_2$

B. $10LNH_3$, $25LN_2$ and $15LH_2$

C. $20LNH_3$, $10LN_2$ and $30LH_2$

D. $20LNH_3$, $25LN_2$ and $15LH_2$

Answer: b

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5. $KMnO_4$ reacts with oxalic acid according to the equation:
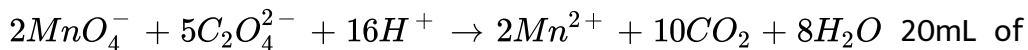
$$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$$ 20mL of
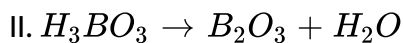
0.1M $KMnO_4$ will react with:

    A. 120mL of 0.25M oxalic acid

    B. 150mL of 0.1M oxalic acid

    C. 50mL of 0.1M oxalic acid

    D. 150mL of 0.2M oxalic acid

Answer: c

6. Orthoboric acid, on heating decomposes in two ways:

I $H_3BO_3 \rightarrow HBO_2 + H_2O$

II. $H_3BO_3 \rightarrow B_2O_3 + H_2O$

If 9 moles of H_3BO_3, decomposes by (I) pathway and remaining by (II) pathway. Of moles of Ba_2O_3 formed is:

A. 6

B. 5

C. 3

D. 2

Answer: d
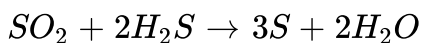
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7. 2 mol of H_2S and 11.2 L of SO_2 at N.T.P. react to form x moles of sulphur, x is

$SO_2 + 2H_2S \rightarrow 3S + 2H_2O$

A. 1.5

B. 3

C. 11.2

D. 6

Answer: a

8. A sample of argentite ore contains 1.34% of Ag_2S by mass. How many grams of this ore would give 1g of Ag on extraction?

A. 134g

B. 108g

C. 85.7g

D. 74.6g

Answer: c

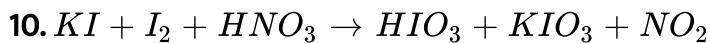**9.** What mass of HNO_3 is needed to convert 5g of the iodine into iodic acid according to the reaction

$$I_2 + HNO_3 \rightarrow HIO_3 + NO_2 + H_2O$$

A. 12.4g

B. 24.8g

C. 0.248g

D. 49.6g

Answer: a

10. $KI + I_2 + HNO_3 \rightarrow HIO_3 + KIO_3 + NO_2$

If 3 moles of KI and 2 moles of I_2 are mixed with excess HNO_3 then

volume of NO_2 gas evolved at NTP is:

A. 716.8litre

B. 1075.2litre

C. 44.8litre

D. 67.2litre

Answer: a

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11. The decomposition of cetian mass of $CaCO_3$ gave $11.2dm^3$ of CO_2 gas at STP. The mass of KOH required to completely neutralise the gas is:

A. 56g

B. 28g

C. 42g

D. 20g

Answer: a

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