THE

MOLE CONCEPT

BANK

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1. Which one of the following is the percentage of the sodium carbonate in 2.8 g of hydrated sodium carbonate, $Na_2CO_3.10H_2O$,
$(Na = 23, O = 16, C = 12, H = 1)$

A. 9.86% B. 26.20% C. 29.02% D. 37.06%

2. The number of moles of sulphate ions in 3.0g of aluminium sulphate, $Al_2(SO_4)_3$ is $(Al = 27, S = 32, O = 16)$

A. $\frac{3.0}{342}$ B. $\frac{3.0 \times 3}{342}$ C. $\frac{3.0 \times 4}{342}$ D. $\frac{3.0 \times 12}{342}$

3. 20cm^3 of an acid HX was neutralized by 25cm^3 of 0.05M sodium carbonate. Which one of the following is the molarity of the acid

A. $\left(\frac{25\times0.05}{20}\right)M$ B. $\left(\frac{2\times25\times0.05}{20}\right)M$ C. $\left(\frac{2\times20\times0.05}{25}\right)M$ D. $\left(\frac{25\times0.05}{2\times25}\right)M$

4. Lead(II) ions react with iodide ions according to the following equation:

$$Pb^{2+}(aq) + 2I^{-}(aq) \longrightarrow PbI_2(aq)$$

Which one of the following is the volume of 1M potassium iodide solution that would react completely with 20cm^3 of 0.5M lead(II) nitrate.

A. $5cm^3$ B. $10cm^3$ C. $20cm^3$ D. $40cm^3$

5. Which one of the following is the empirical formula of a hydrocarbon containing 88.88% carbon (C = 12, H = 1)

A. C_4H_6 B. C_2H_3 C. CH_2 D. CH

6. Sodium hydrogen carbonate decomposes according to the following equation when heated

$$2NaHCO_3(s) \longrightarrow Na_2CO_3(s) + CO_2(g) + H_2O(l)$$

The mass of sodium hydrogen carbonate which must be heated to give off 200cm^3 of carbon dioxide at room temperature is $(Na = 23, H = 1, C = 12, O = 16, 1\ mole\ of\ gas\ at\ room\ temperature\ occupies\ 24000cm^3)$

A. $\left(\frac{84\times200}{24000}\right)g$ B. $\left(\frac{84\times24000}{2\times200}\right)g$ C. $\left(\frac{2\times84\times200}{24000}\right)g$ D. $\left(\frac{84\times200}{2\times24000}\right)g$

7. Hydrogen peroxide decomposes according to the equation

$$2H_2O_2(l) \longrightarrow 2H_2O(l) + O_2(g)$$

Which one of the following is the volume, of oxygen formed when 24.8g of hydrogen peroxide is completely decomposed at s.t.p. (H = 1, O = 16, 1 mole of a gas occupies 22.4dm^3 at s.t.p.)

A. $\left(\frac{68\times22.4}{24.8}\right)$ B. $\left(\frac{34\times22.4}{24.8}\right)$ C. $\left(\frac{22.4\times24.8}{68}\right)$ D. $\left(\frac{22.4\times24.8}{34}\right)$

8. When heated, 0.25 mole of a hydrated salt lost 27g of water. Which one of the following is the number of moles of water of crystallization in one mole of the salt ($H = 1, O = 16$)

A. 2 B. 5 C. 6 D. 10

9. 560cm^3 of an oxide of nitrogen N_yO_x weigh 1.10g at s.t.p. which one of the following is the oxide of nitrogen

($N = 14, O = 16, 1\ mole\ a\ gas\ occupies\ 22.4\ dm3\ at\ s.t.p$)

A. NO B. NO_2 C. N_2O D. N_2O_4

10. The number of moles of hydroxide ion contained ion 10g of calcium hydroxide, $Ca(OH)_2$, is

A. 0.135 B. 0.175 C. 0.270 D. 0.350

11. Propane burns in air according to the following equation

$$C_3H_8(g) + 5O_2(g) \longrightarrow 3CO_2(g) + 4H_2O(l)$$

Which one of the following is the volume of air; in cm^3 required for complete combustion of 60cm^3 of propane (percentage of oxygen in air is 21%)

A. $\left(\frac{5\times100}{60\times21}\right)$ B. $\left(\frac{21\times5\times60}{100}\right)$ C. $\left(\frac{5\times60\times100}{21}\right)$ D. $\left(\frac{100\times60}{5\times21}\right)$

12. Hydrochloric acid reacts with calcium hydrogen carbonate according to the following equation. ($Ca = 40, O = 16, C = 12$)

$$Ca(HCO_3)_2(s) + 2HCl(aq) \longrightarrow CaCl_2(aq) + 2H_2O(l) + 2CO_2(g)$$

25cm^3 of a solution of calcium hydrogen carbonate required 8.0 cm^3 of a 0.05M hydrochloric acid for complete neutralization. The concentration of the calcium hydrogen carbonate solution in gl^{-1} is

A. $\left(\frac{8.0\times0.05\times162}{25}\right)$ B. $\left(\frac{8.0\times0.05\times162}{2\times25}\right)$ C. $\left(\frac{25\times0.05\times162}{2\times8.0}\right)$ D. $\left(\frac{25\times0.05\times162}{8.0}\right)$

13. Silicon hydride, SiH_4, reacts with sodium hydroxide solution according to the equation

$$SiH_4(g) + 2NaOH(aq) + H_2O(l) \longrightarrow Na_2SiO_3(aq) + 4H_2(g)$$

Which one of the following is the volume of hydrogen produced at room temperature when 5.3g of silicon hydride is reacted with dilute sodium hydroxide? ($Si = 28, Na = 23, H = 1,\ 1\ mole\ of\ a\ gas\ occupies\ 24\ dm^3$)

A. 96.00 dm^3 B. 28.26 dm^3 C. 15.90 dm^3 D. 3.98 dm^3

14. Lead (II) nitrate reacts with potassium iodide according to equation

$$Pb(NO_3)_2(aq) + 2KI(aq) \longrightarrow PbI_2(s) + 2KNO_3(aq)$$

Which one of the following is the mass of lead (II) iodide formed when 33.2g of potassium iodide is reacted with excess lead (II) nitrate?

$(Pb = 207, I = 127, K = 39)$

A. 4.61 g B. 9.22 g C. 46.10 g D. 92.20 g

15. 6.48g of calcium hydrogen carbonate, $Ca(HCO_3)_2$, was dissolved in water to make 500cm^3 of solution. Which one of the following is the molarity of the solution $(Ca = 40, H = 1, C = 12, O = 16)$

A. 0.04 M B. 0.06 M C. 0.08 M D. 0.12 M

16. 12.7g of a metal R reacts with 11.3g of oxygen to form an oxide. Which one of the following is the formula of the oxide of R, (O = 16, R = 27)

A. RO_2 B. R_2O C. R_2O_3 D. R_3O_2

17. The percentage by mass of oxygen in one mole of carbon dioxide is

$(C = 12, O = 16)$

A. 72.7% B. 57.1% C. 36.4% D. 32.0%

18. Which one of the following solutions contains the same number of moles of sodium ions as 200cm^3 of a 0.5M $NaHSO_4$ solution

A. $100cm^3\ of\ 2M\ Na_2CO_3$ B. $100cm^3\ of\ 0.5M\ NaNO_3$

C. $250cm^3\ of\ 0.8M\ NaHCO_3$ D. $250cm^3\ of\ 0.4M\ NaCl$

19. Chlorine displaces bromine for sodium bromide according to the equation

$$2NaBr(aq) + Cl_2(g) \longrightarrow 2NaCl(aq) + Br_2(aq)$$

The volume of bromine produced at room temperature when chlorine is bubbled through 20cm^3 of 0.5M sodium bromide solution is (1 mole of a gas occupies 24dm^3 at room temp)

A. 0.12 dm^3 B. 0.24 dm^3 C. 6.00 dm^3 D. 12.00 dm^3

20. When 150cm^3 of oxygen was mixed with 500cm^3 of hydrogen and the mixture exploded, water was formed according to the following equation.

$$2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$$

The volume of hydrogen that was left unreacted is

A. 75 cm^3 B. 200 cm^3 C. 350 cm^3 D. 425 cm^3

21. 10cm^3 of a monobasic acid reacted completely with 20cm^3 of a 0.05M sodium carbonate solution. The number of moles of the acid that reacted is?

A. $\left(\frac{20\times0.05\times2}{1000}\right)$ B. $\left(\frac{20\times0.05\times2}{1000\times10}\right)$ C. $\left(\frac{20\times0.05}{2\times1000}\right)$ D. $\left(\frac{10\times0.05\times2}{20\times1000}\right)$

22. Iron reacts with oxygen according to the equation. ($Fe = 56$; $O = 16$)

$$4Fe(s) + 3O_2(g) \longrightarrow 2Fe_2O_3(s)$$

The mass of iron that reacts with oxygen to form 0.8g of iron(III) oxide is

A. $\left(\frac{0.8\times56\times2}{160}\right)g$ B. $\left(\frac{0.8\times56\times2}{320}\right)g$ C. $\left(\frac{0.8\times2}{160\times56}\right)g$ D. $\left(\frac{0.8\times56\times2}{160}\right)g$

23. Nitric acid reacts with copper(II) oxide according to the equation.

$$CuO(s) + 2HNO_3(aq) \longrightarrow Cu(NO_3)_2(aq) + H_2O(l)$$

0.5g of an impure copper(II) oxide reacted completely with 50cm^3 of 0.1M nitric acid. The mass of copper(II) oxide in the sample is.

$(Cu = 64, O = 16)$

A. 0.20 g B. 0.24 g C. 0.30 g D. 0.40g

24. Which one of the following compounds contains the highest percentage of sulphur. ($H = 1, S = 32, O = 16$)

A. $H_2S_2O_7$ B. H_2SO_4 C. SO_2 D. H_2S

25. When 5.74 g of a hydrates salt X was heated, 3.22g of the anhydrous salt Y was formed. The number of moles of water of crystallization is

$(Y = 161, O = 16, H = 1)$

A. 2 B. 5 C. 7 D. 10

26. 2.07g of a metal Z, combined with oxygen to form 3.02g of an oxide. Which one of the following is the formula of the oxide of Z.

$(O = 16, Z = 52.)$

A. Z_2O_3 B. Z_3O_2 C. Z_2O D. ZO_2

27. When 80cm^3 of air was passed over heated copper, 64cm^3 of the gas remained. The percentage of air that reacted is

A. $\left(\frac{80\times100}{64}\right)$ B. $\left(\frac{(80-64)\times100}{80}\right)$ C. $\left(\frac{(80-64)\times100}{64}\right)$ D. $\left(\frac{64\times100}{80}\right)$

28. Sulphur dioxide reacts with oxygen according to the equation

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

The volume of sulphur trioxide forms when 20cm^3 of sulphur dioxide is reacted with 100cm^3 of oxygen at s.t.p is

$(1\ mole\ of\ gas\ occupies\ 22400cm3\ at\ s.t.p)$

A. $120\ cm^3$ B. $30\ cm^3$ C. $20\ cm^3$ D. $10\ cm^3$

29. 25.0cm^3 of a 0.2M sodium hydroxide solution reacted with 16.6cm^3 of a 0.1M solution of an acid. The ratio in which the acid reacted with sodium hydroxide is

A. 1:2 B. 1:3 C. 2:1 D. 3:1

30. Magnesium burns in air according to the following equation

$$2Mg(s) + CO_2(g) \longrightarrow 2MgO(s)$$

The mass of oxygen required to burn 5g of magnesium completely is

$(O = 16, Mg = 24)$

A. $\left(\frac{5\times16}{24}\right)$ B. $\left(\frac{5\times16}{48}\right)$ C. $\left(\frac{5\times32}{24}\right)$ D. $\left(\frac{5\times32}{48}\right)$

31. Both calcium carbonate and copper (II) carbonate decomposes according to the following equation when heated. $(Where\ M = Ca\ or\ Cu)$

$$MCO_3(s) \longrightarrow MO(s) + CO_2(g)$$

The mass of copper (II) carbonate which when heated will give off the same volume of carbon dioxide as 10.0g of calcium carbonate is

$(CaCO_3 = 100, \quad CuCO_3 = 124)$

A. $1.24\ g$ B. $6.40\ g$ C. $12.40\ g$ D. $24.80\ g$

32. Ammonia reacts with copper(II) oxide according to the following equation

$$2NH_3(g) + 3CuO(s) \longrightarrow 3H_2O(l) + N_2(g) + 3Cu(s)$$

The volume of ammonia at s.t.p that will react with 6.0g of copper(II) oxide is (H = 1, N = 14, O = 16, Cu = 64, 1 mole of a gas occupies 22.4dm^3 at s.t.p)

A. $3.36dm^3$ B. $2.52dm^3$ C. $1.68dm^3$ D. $1.12dm^3$

33. 40g of zinc sulphide combined with 30g of water of crystallization to form hydrated zinc sulphide, $ZnS.xH_2O$. Find the value of x.

$(Zn = 65, S = 32, O = 16)$

A. 2 B. 3 C. 4 D. 5

34. 5.72g of hydrated sodium carbonate, $Na_2CO_3.10H_2O$, was dissolved in water to make 500cm^3 of a solution. The molarity of the solution is, $(Na = 23, O = 16, C = 12, H = 1)$.

A. $0.05M$ B. $0.02M$ C. $0.04M$ D. $0.11M$

35. 25cm^3 of 0.12M sodium hydroxide was neutralized by 30cm^3 of a solution of a dibasic acid. The molarity of the acid is

A. $0.05M$ B. $0.06M$ C. $0.01M$ D. $0.12M$

36. Which one of the following samples of compounds contains the highest mass of the compound?

$(Na2SO4 = 142, Na2CO3 = 106, NaCl = 58.5, NaOH = 40)$

A. 0.2 $moles\ of\ Na_2SO_4$ B. 0.3 $moles\ of\ Na_2CO_3$

C. 0.5 $moles\ of\ NaCl$ D. 0.6 $moles\ of\ NaOH$

37. Methane burns in oxygen according to the equation

$$CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l)$$

The volume of carbon dioxide formed when 20cm^3 of methane is burnt in 40cm^3 of oxygen is

A. 10 cm^3 B. 20 cm^3 C. 40 cm^3 D. 60 cm^3

38. Calcium carbonate decomposes on heating according to the following equation

$$CaCO_3(s) \longrightarrow CaO(s) + CO_2(g)$$

The maximum volume of carbon dioxide produced at s.t.p when 10.0g of calcium carbonate is heated is ($CaCO_3$ = 100; 1 mole of a gas occupies 22.4dm^3 at s.t.p)

A. $\left(\frac{10\times22.4}{100}\right) dm^3$ B. $\left(\frac{10\times100}{22.4}\right) dm^3$ C. $\left(\frac{22.4}{100\times10}\right) dm^3$ D. $\left(\frac{10\times22.4}{100}\right) dm^3$

39. Zinc carbonate decomposes according to the following equation when heated.

$$ZnCO_3(s) \longrightarrow ZnO(s) + CO_2(g)$$

The mass of zinc oxide formed when 2.5g of zinc carbonate is heated is (Zn = 65, O = 16, C = 12)

A. 0.41 g B. 0.81 g C. 1.62 g D. 3.24 g

40. Propane burns in oxygen according to the following equation

$$C_3H_8(g) + 2O_2(g) \longrightarrow 4H_2O(l) + 3CO_2(g)$$

At a certain temperature and pressure, 10 liters of propane was completely burnt in oxygen. The volume of oxygen gas used was

A. 5 $liters$ B. 10 $liters$ C. 15 $liters$ D. 20 $liters$

41. The molarity of a solution containing 49g of sulphuric acid in 250cm^3 of solution (H = 1, O = 16, S = 32)

A. $0.125M$ B. $0.50M$ C. $1.00M$ D. $2.00M$

42. The mass of sodium hydroxide present in 200cm^3 of a 0.05M sodium hydroxide is (H = 1, O = 16, Na = 23)

A. $0.25g$ B. $0.40g$ C. $2.00g$ D. $10.00g$

43. Glucose burns in oxygen according to the equation

$$C_6H_{12}O_6(s) + 6O_2(g) \longrightarrow 6CO_2(g) + 6H_2O(l)$$

The volume of oxygen at s.t.p that is required to produce 150g of carbon dioxide is (H = 1, C = 12, O = 16, 1 mole of gas at s.t.p occupies 22.4dm^3)

A. $\left(\frac{150\times22.4}{44}\right)$ B. $\left(\frac{150\times22.4}{44\times6}\right)$ C. $\left(\frac{44}{150\times22.4}\right)$ D. $\left(\frac{44\times6}{150\times22.4}\right)$

44. On heating sodium nitrate produces sodium nitrite and oxygen according to the equation

$$2NaNO_3(s) \longrightarrow 2NaNO_2(s) + O_2(g)$$

The mass of sodium nitrite formed when 480cm^3 of oxygen was evolved at room temperature is (N = 14, O = 16, Na = 23, 1 mole of a gas at room temperature occupies 24 litres)

A. $1.38g$ B. $2.76g$ C. $5.52g$ D. $11.04g$

45. When 3.0g of X was heated, 210cm^3 of a gas were evolved at s.t.p and 2.4g of a solid remained. The relative molecular mass of the gas is.

(1 $mole\ of\ a\ gas\ occupies$ 22.4 $dm3\ at\ s.t.p$)

A. $\left(\frac{0.6\times22400}{210}\right)$ B. $\left(\frac{3\times22400}{210}\right)$ C. $\left(\frac{2.4\times22400}{210}\right)$ D. $\left(\frac{5.4\times22400}{210}\right)$

46. Copper(II) sulphate reacts with zinc according to the following ionic equation

$$Cu^{2+}(aq) + Zn(s) \longrightarrow Cu(s) + Zn^{2+}(aq)$$

The mass of copper that would be deposited when 100cm^3 of 0.2M copper(II) sulphate solution is reacted with excess zinc is (Cu = 64)

A. 0.64 g B. 1.28 g C. 2.56 g D. 12.80 g

47. Which one of the following contains the same number of moles of hydrogen ions as the number of moles of sodium ions in 50.0cm^3 of a 0.2M Na_2SO_4? ($H = 1, Cl = 35.5$)

A. $1.83g\ of\ HCl$ C. $0.73g\ of\ HCl$

B. $100cm^3\ of\ 4M\ HCl$ D. $100cm^3\ 2M\ of\ HCl$

48. The gas that can diffuse at the same rate as oxygen at room temperature is (H = 1, O = 16, S = 32, C = 12, N = 14)

A. SO_2 B. NH_3 C. CO_2 D. NO

49. 20cm^3 of 0.1M sodium carbonate solution reacted completely with 10cm^3 of dilute hydrochloric acid. The molarity of the acid is

A. $0.1M$ B. $0.2M$ C. $0.4M$ D. $0.8M$

50. A hydrocarbon contains 4.8g of carbon and 0.8g of hydrogen. The empirical formula of the hydrocarbon is (C = 12, H = 1)

A. C_2H B. CH_4 C. CH_2 D. C_2H_6

51. Copper (II) sulphate reacts with sodium carbonate according to the equation.

$$CuSO_4(aq) + Na_2CO_3(aq) \longrightarrow CuCO_3(s)\ Na_2SO_4(aq)$$

The mass of copper (II) carbonate that is formed when 200cm^3 of a solution containing 5.3g of sodium carbonate per liter of solution was reacted completely with copper (II) sulphate is given by. (C=12; O=16; Na=23; Cu=64; S=32)

A. $\left(\frac{5.3\times200\times124}{106\times1000}\right)g$ B. $\left(\frac{5.3\times124\times1000}{106\times200}\right)g$ C. $\left(\frac{106\times200\times124}{5.3\times1000}\right)g$ D. $\left(\frac{106\times1000\times124}{5.3\times200}\right)g$

52. Hydrogen chloride reacts with ammonia according to the equation;

$$NH_3\ (g) + HCl(g) \longrightarrow NH_4Cl(s)$$

The mass of ammonium chloride formed when excess ammonia is reacted with 0.56dm^3 of hydrogen chloride at s.t.p is

($N = 14, H = 1, Cl = 35.5, 1\ mole\ of\ a\ gas\ occupies\ 22.4dm^3$)

A. $\left(\frac{0.56\times22.4}{53.5}\right)g$ B. $\left(\frac{53.5\times0.56}{22.4}\right)g$ C. $\left(\frac{53.5\times22.4}{50.5}\right)g$ D. $\left(\frac{50.5\times0.56}{22.4}\right)g$

53. Copper (II) oxide reacts with hydrogen according to the equation;

$$CuO(s) + H_2(g) \longrightarrow Cu(s) + H_2O(l)$$

The volume of hydrogen in liters, required to react completely with 16.0g of copper (II) oxide is (Cu=64; O=16, 1 mole of a gas occupies 22.4 liters)

A. 1.12 B. 2.24 C. 4.48 D. 11.20

54. Hydrogen burns in oxygen to form steam according to the equation;

$$2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$$

The mass of steam formed when 100cm^3 of hydrogen is burnt in excess oxygen at s.t.p is (H=1; O=16, 1 mole of a gas occupies 22400cm^3)

A. $0.04g$ B. $0.08g$ C. $0.12g$ D. $0.16g$

55. 10 cm^3 of sulphuric acid reacted completely with 25cm^3 of 0.1M sodium hydroxide solution. The molarity of sulphuric acid is?

A. $0.125M$ B. $0.250M$ C. $0.500M$ D. $1.000M$

56. The volume of 0.2M hydrochloric, in cm^3 required to completely react with 20cm^3 of 0.1M sodium carbonate is?

A. $\left(\frac{2\times20\times0.1}{0.2}\right)$ B. $\left(\frac{2\times20\times0.2}{0.1}\right)$ C. $\left(\frac{20\times0.2}{0.1\times2}\right)$ D. $\left(\frac{20\times0.1}{0.2\times2}\right)$

57. Sulphur dioxide reacts with oxygen according to the equation.

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

20cm^3 of sulphur dioxide was mixed with 25cm^3 of oxygen. The volume of oxygen that reacted was?

A. $10.0cm^3$ B. $12.5cm^3$ C. $20.0cm^3$ D. $25.0cm^3$

58. When 2.5g of a solid was heated. 560cm^3 of a gas was produced and a residue of 1.4g was left. The molecular mass of the gas is given by (1 mole of a gas occupies 22.4l at s.t.p)

A. $\left(\frac{22400\times25}{560}\right)$ B. $\left(\frac{22400\times1.4}{560}\right)$ C. $\left(\frac{22400\times1.1}{560}\right)$ D. $\left(\frac{22400}{560\times2.5}\right)$

59. Lead (II) nitrate decomposes according to the following equation;

$$2Pb(NO_3)_2(s) \longrightarrow 2PbO(s) + 4NO_2(g) + O_2(g)$$

The mass of lead (II) nitrate required to produce 15dm^3 of nitrogen dioxide at s.t.p is

$(N = 14, O = 16, Pb = 207, 1\ mole\ of\ a\ gas\ occupies\ 22.4dm^3)$

A. $\left(\frac{331\times22.4}{15\times2}\right)g$ B. $\left(\frac{331\times15\times2}{22.4}\right)g$ C. $\left(\frac{2\times331\times22.4}{15}\right)g$ D. $\left(\frac{331\times15}{2\times22.4}\right)g$

60. Aluminium reacts with hydrochloric acid according to the equation

$$2Al(s) + 6HCl(aq) \longrightarrow 3H_2(g) + 2AlCl_3(aq)$$

The volume of hydrogen, in cm^3, formed when 5g of aluminium is reacted with excess acid is? (Al=27, 1 mole of gas occupies 22400cm^3 at s.t.p.)

A. $\left(\frac{5\times3\times22400}{27\times2}\right)$ B. $\left(\frac{27\times3\times22400}{5\times2}\right)$ C. $\left(\frac{5\times22400}{3\times2\times27}\right)$ D. $\left(\frac{5\times2\times22400}{3\times27}\right)$

61. The percentage of water of crystallization in iron (II) sulphate, $FeSO_4.7H_2O$ is $(FeSO_4 = 152; O = 16; H = 1)$

A. $\left(\frac{126\times100}{278}\right)$ B. $\left(\frac{278\times100}{126}\right)$ C. $\left(\frac{126\times100}{152}\right)$ D. $\left(\frac{152\times100}{126}\right)$

62. Which one of the following has the highest concentration of hydrogen ions?

A. $0.5l\ of\ 1M\ H_2SO_4$
B. $2.0l\ of\ 1M\ HCl$
C. $1.5l\ of\ 1M\ H_2SO_4$
D. $1.0l\ of\ 1M\ HCl$

63. 200.0cm^3 of 0.1M sodium hydroxide solution was diluted to make 2 liters of solution. The concentration of the diluted solution is?

A. $0.002M$ B. $0.050M$ C. $0.200M$ D. $0.010M$

64. Copper (II) sulphate reacts with iron according to the equation;

$$Cu^{2+}(aq) + Fe(s) \longrightarrow Cu(s) + Fe^{2+}(aq)$$

The mass of dry copper that can be deposited when excess iron filings is added to 250cm^3 of 0.5M copper (II) sulphate. (Cu=64, Fe=56)

A. $0.125g$ B. $7.000g$ C. $8.000g$ D. $16.000g$

65. 15 cm^3 of a dibasic acid was neutralized by 30cm^3 of a 0.4M potassium hydroxide. The molarity of the solution is?

A. $\left(\frac{2\times15}{0.4\times30}\right)M$ B. $\left(\frac{0.4\times30}{2\times15}\right)M$ C. $\left(\frac{0.4\times15}{2\times30}\right)M$ D. $\left(\frac{2\times30\times0.4}{15}\right)M$

66. An oxide of a metal M contains 86.6% M. The empirical formula of the oxide is? (O=16; M =207).

A. MO B. M_2O C. MO_2 D. M_2O_3

67. The gas that diffuses at the same rate as dinitrogen oxide, N_2O, is (O=16, H=1, C=12, S=32).

A. SO_2 B. CO_2 C. HCl D. NH_3

68. Calcium carbonate reacts with hydrochloric acid according to the following equation.

$$CaCO_3(s) + 2HCl(aq) \longrightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$$

The mass in grams, of carbon dioxide formed when 20g of calcium carbonate is completely reacted with hydrochloric acid is (Ca=40, C=12, O=16)

A. $(20 \times 44 \times 100)$ B. $\left(\frac{44\times100}{20}\right)$ C. $\left(\frac{20\times100}{44}\right)$ D. $\left(\frac{20\times44}{100}\right)$

69. Lead (II) nitrate reacts with potassium iodide according to the equation.

$$Pb(NO_3)_2(aq) + 2KI(aq) \longrightarrow PbI_2(s) + 2KNO_3(aq)$$

The mass of lead (II) iodide formed when 33.2g of potassium iodide is reacted with lead (II) nitrate is (K=39, I=127, Pb=207)

A. $16.9g$ B. $46.1g$ C. $66.4g$ D. $92.2g$

70. Calcium hydrogen carbonate decomposes when heated according to the following equation.

$$Ca(HCO_3)_2(aq) \longrightarrow CaCO_3(s) + CO_2(g) + H_2O(l)$$

The volume of carbon dioxide collected when 27g of calcium hydrogen carbonate is heated is? $(Ca = 40, C = 12, O = 16, H = 1)$

A. $27 \times 22.4l$ B. $\left(\frac{162}{27\times22.4}\right)l$ C. $\left(\frac{27\times22.4}{162}\right)l$ D. $\left(\frac{162}{2\times27\times22.4}\right)l$

71. Copper reacts with oxygen according to the equation

$$2Cu(s) + O_2(g) \longrightarrow 2CuO(s)$$

Calculate the mass of copper (II) oxide formed when 0.64g of copper powder is reacted with oxygen. (Cu=64; O=16)

A. $\left(\frac{0.6\times80}{96}\right)g$ B. $\left(\frac{0.64\times64}{80}\right)g$ C. $\left(\frac{0.64\times96}{80}\right)g$ D. $\left(\frac{0.64\times80}{64}\right)g$

72. The concentration in grams per liter of a 0.05M sodium carbonate solution is $(Na = 23;\ C = 12;\ O = 16)$

A. 0.05×83 B. $\left(\frac{106}{0.05}\right)$ C. $\left(\frac{83}{0.05}\right)$ D. 0.05×106

73. Copper (II) oxide reacts with hydrogen according to the equation.

$$CuO(s) + H_2(g) \longrightarrow Cu(s) + H_2O(g)$$

The mass, in grams, of copper formed when 8.0g of the oxide is reacted with excess hydrogen is (Cu=63.5; H=1; O=16)

A. $63.5 \times 80 \times 8.0$ B. $\left(\frac{63.5\times80}{8.0}\right)$ C. $\left(\frac{8.0\times80}{63.5}\right)$ D. $\left(\frac{63.5\times8.0}{80}\right)$

74. Methane burns in oxygen according to the equation

$$CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l)$$

The volume of methane that remains when 50cm^3 of methane is reacted with 40cm^3 of oxygen is

A. $10cm^3$ B. $20cm^3$ C. $30cm^3$ D. $45cm^3$

75. Which one of the following fertilizer has the highest amount of nitrogen per mole? (H=1; C=12; N=14; O=16; S=32; Cl=35.5)

A. $CO(NH_2)_2$ B. $(NH_4)_2SO_4$ C. NH_4Cl D. NH_4Cl

76. The mass of 4 atoms of phosphorus is (Avogadro's constant = 6.02x10^{23}; P=31)

A. $\left(\frac{6.02\times10^{23}}{4\times31}\right)$ B. $\left(\frac{31\times4}{6.02\times10^{23}}\right)$ C. $\left(\frac{31\times6.02\times10^{23}}{4}\right)$ D. $\left(\frac{31}{4\times6.02\times10^{23}}\right)$

77. Lead(II) nitrate decomposes according to the equation

$$2Pb(NO_3)_2(s) \longrightarrow 2PbO(s) + 4NO_2(g) + O_2(g)$$

The mass of lead monoxide, in grams, that is produced when 3.31g of lead (II) nitrate is completely heated is (N=14; Pb=207; O=16)

A. $\left(\frac{3.31\times223}{331}\right)$ B. $(331 \times 223 \times 3.31)$ C. $\left(\frac{331\times223}{3.31}\right)$ D. $\left(\frac{3.31\times331}{223}\right)g$

78. Magnesium reacts with hydrochloric acid according o the equation;

$$Mg(s) + 2HCl(aq) \longrightarrow MgCl_2(aq) + H_2(g)$$

The volume of hydrogen formed, in dm^3, at s.t.p. when 2.32g of magnesium reacts completely with hydrochloric acid is (molar gas volume is 22.4dm^3 at s.t.p. Mg=24)

A. $\left(\frac{22.4\times2.32}{24}\right)$ B. $\left(\frac{22.4\times24}{2.32}\right)$ C. $\left(\frac{24\times2.32}{22.4}\right)$ D. $(2.32 \times 24 \times 22.4)$

79. Zinc reacts with hydrochloric acid according to the equation;

$Zn(s) + 2HCl(aq) \longrightarrow ZnCl_2(aq) + H_2(g)$

The number of moles of hydrochloric acid required to react completely with 7.0g of zinc is (Zn=65)

A. $\left(\frac{65\times2}{7.0}\right)$ B. $\left(\frac{7.0\times65}{2}\right)$ C. $\left(\frac{2\times7.0}{65}\right)$ D. $7.0 \times 65 \times 2$

80. Hydrogen reacts with nitrogen according to the equation

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

The volume of nitrogen required to react with 150cm^3 of hydrogen under the same conditions is

A. $15.0cm^3$ B. $50.0cm^3$ C. $300.0cm^3$ D. $450.0cm^3$

81. The percentage by mass of phosphorus in calcium phosphate, $Ca_3(PO_4)_2$ is (O=16; P=31; Ca=40)
A. 8 B. 10 C. 17 D. 20

82. What mass, in grams, of sodium carbonate-10-water ($Na_2CO_3.10H_2O$) is contained in 50cm^3 of 0.1M solution (H=1; C=12; O=16; Na=23)
A. $\left(\frac{106\times0.1\times1000}{50}\right)$ B. $\left(\frac{106\times0.1\times50}{1000}\right)$ C. $\left(\frac{286\times0.1\times1000}{50}\right)$ D. $\left(\frac{286\times0.1\times50}{1000}\right)$

83. When 6.4g of an oxide of element X was heated and hydrogen passed over it, 3.2g of the element was produced. The empirical formula of the oxide is (O=16; X=32)
A. XO B. XO_2 C. X_2O D. X_2O_3

84. 25.0cm^3 of 0.1M hydrochloric acid reacted completely with 20.0cm^3 of sodium hydroxide. What is the molarity of sodium hydroxide?
A. $\left(\frac{25\times0.1}{20}\right)$ B. $\left(\frac{0.1\times20}{25}\right)$ C. $\left(\frac{20\times25}{0.1}\right)$ D. $(20\times0.1\times25)$

85. 100cm^3 of nitrogen were reacted with 300cm^3 of hydrogen at s.t.p. what was the volume of ammonia produced?
A. $100cm^3$ B. $200cm^3$ C. $300cm^3$ D. $400cm^3$

86. The volume of carbon dioxide evolved, in cm^3, when 6.0g of carbon are burnt completely in air at s.t.p. is (C=12; molar gas volume is 22400cm^3 s.t.p)
A. $\left(\frac{12\times22400}{6}\right)$ B. $\left(\frac{12\times6}{22400}\right)$ C. $\left(\frac{6\times22400}{12}\right)$ D. $(6\times12\times22400)$

87. 20.0cm^3 of 0.1M sodium hydroxide solution reacted with 0.1M solution of Y.
The volume of solution Y that reacted completely with the alkali is (mole ratio of NaOH:Y = 2:1)
A. $40cm^3$ B. $30cm^3$ C. $20cm^3$ D. $10cm^3$

88. When heated, copper(II) nitrate decomposes according to the equation;
$2Cu(NO_3)_2(s) \longrightarrow 2CuO(s) + 4NO_2(g) + O_2(g)$

The maximum mass of the copper(II) oxide formed when 1.88g of copper(II) nitrate is heated is (Cu=64; O=16; $Cu(NO_3)_2$ = 188)

A. $\left(\frac{1.88\times188}{80}\right)$ B. $\left(\frac{80}{1.88\times188}\right)$ C. $\left(\frac{1.88\times80}{188}\right)$ D. $\left(\frac{188}{1.88\times80}\right)$

89. $20cm^3$ of an acid HX neutralized $25cm^3$ of 0.05M sodium carbonate solution. The molarity of the acid is?

A. $\left(\frac{25\times0.05}{20}\right)$ B. $\left(\frac{25\times0.05\times2}{20}\right)$ C. $\left(\frac{20\times0.05\times2}{25}\right)$ D. $\left(\frac{20\times2}{25\times0.05}\right)$

90. A compound contains 53.3% oxygen 6.7% hydrogen and 40% carbon. The simplest formula of the compound is? (C=12; H=1; O=16)

A. CHO B. CH_2O C. C_2H_2O D. CH_2O_2

91. An oxide of P contains 50% by mass of P. its Relative molecular mass is 64. The formula of the oxide is? (P=32; O=16)

A. PO B. PO_2 C. P_2O D. PO_3

92. Which one of the following gas diffuses fastest

$(C = 12;\ O = 16;\ N = 14;\ H = 1;\ Cl = 35.5)$

A. CO_2 B. NH_3 C. HCl D. NO

93. The percentage of phosphorus in H_3PO_3 is given by (P=31)

A. $\left(\frac{82\times100}{31}\right)$ B. $\left(\frac{31\times100}{82}\right)$ C. $\left(\frac{31\times82}{100}\right)$ D. $31 \times 81 \times 100$

94. Calcium carbide reacts with water to produce a gas according to the equation.

$$CaC_2(s) + 2H_2O(l) \longrightarrow Ca(OH)_2(s) + C_2H_2(g)$$

The volume of the gas produced at s.t.p. when 6.4g of calcium carbide reacts completely is (C=12; Ca=40; 1 mole of a gas at s.t.p. occupies $22.4l$)

A. $\left(\frac{64\times6.4}{22.4}\right)$ B. $\left(\frac{22.4}{64\times6.4}\right)$ C. $\left(\frac{6.4\times22.4}{64}\right)$ D. $64 \times 6.4 \times 22.4$

95. The mass of ammonium ion, NH_4^+, in 0.5M ammonium sulphate solution is $(N = 14; H = 1; S = 32; O = 16)$

A. 0.5×132 B. $2 \times 0.5 \times 36$ C. $\left(\frac{132}{2\times0.5}\right)$ D. $\left(\frac{2\times0.5}{36}\right)$

96. The mass of silver nitrate, $AgNO_3$, in 0.2M solution of the salt is

$(Ag = 108;\ O = 16;\ N = 14)$

A. 17.0 B. 34.0 C. 85.0 D. 170.0

97. Zinc displaces copper from an aqueous solution of copper(II) sulphate according to the equation

$$Cu^{2+}(aq) + Zn(s) \longrightarrow Cu(s) + Zn^{2+}(aq)$$

The mass of copper, in grams, that is displaced by 13.1g of zinc is (Cu=63.5; Zn=65.4)

A. 6.35 B. 12.72 C. 19.07 D. 25.82

98. The mass, in grams, of hydroxide ions, OH^-, in 0.25M in sodium hydroxide solution is (H=1; O=16)

A. $\left(\frac{0.25}{17}\right)$ B. 17×0.25 C. $\left(\frac{0.25\times4}{17}\right)$ D. $\left(\frac{17\times0.25}{4}\right)$

99. The minimum volume of 1M hydrochloric acid required to produce 0.25g of hydrogen with excess magnesium is

A. $25cm^3$ B. $100cm^3$ C. $250cm^3$ D. $1000cm^3$

100. A white powder is made of 24% carbon and the rest being fluorine. Its simplest formula is. (C=12; F=19)

A. CF_2 B. C_2F_4 C. CF_3 D. CF_4

101. Ammonia is oxidised by copper(II) oxide according to the equation;

$$2NH_3(g) + 3CuO(s) \longrightarrow 3Cu(s) + N_2(g) + 3H_2O(l)$$

The volume of ammonia that will be oxidised by 6.0g of copper(II) oxide at s.t.p. is (1 mole of gas occupies $22400cm^3$)

A. $\left(\frac{80\times3\times22400}{6\times2}\right)$ B. $\left(\frac{80\times2\times22400}{6\times3}\right)$ C. $\left(\frac{6\times3\times22400}{80\times2}\right)$ D. $\left(\frac{6\times2\times22400}{80\times3}\right)$

102. What volume of ammonia at s.t.p. will be produced when $15cm^3$ of nitrogen react completely wit hydrogen according to the equation?

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

A. $7.5dm^3$ B. $15dm^3$ C. $30dm^3$ D. $45dm^3$

103. Zinc reacts with hydrochloric acid according to the equation

$$Zn(s) + 2HCl(aq) + ZnCl_2(aq) + H_2(g)$$

The volume of hydrogen liberated, in dm^3, at s.t.p. when 13.0g of zinc react completely with the acid is $(Zn = 65)$

A. $\left(\frac{65\times13}{22.4}\right)$ B. $\left(\frac{13\times22.4}{65}\right)$ C. $\left(\frac{13}{65\times22.4}\right)$ D. $\left(\frac{65\times22.4}{13}\right)$

104. 25cm^3 of 0.25M acid required 25cm^3 of 0.5M sodium hydroxide solution for complete neutralisation. What is the basicity of the acid?

A. 1 B. 2 C. 3 D. 4

105. Lead(II) nitrate decomposes according to the following equation

$$2Pb(NO_3)_2(s) \longrightarrow 2PbO(s) + 4NO_2(g) + O_2(g)$$

The mass of lead monoxide that is produced when 3.31g of lead(II) nitrate is heated is ($Pb = 207; O = 16; N = 14$)

A. $\left(\frac{3.31\times223}{331}\right)$ B. $\left(\frac{331\times223}{3.31}\right)$ C. $\left(\frac{3.31\times331}{223}\right)$ D. $\left(\frac{223}{331\times3.31}\right)$

106. Carbon dioxide is produced from sodium hydrogen carbonate according to the equation

$$2NaHCO_3(s) \longrightarrow Na_2CO_3(s) + CO_2(g) + H_2O$$

The volume of carbon dioxide evolved, in litres, at s.t.p. when 21.0g of sodium hydrogen carbonate is heated is ($NaHCO_3 = 84$)

A. $\left(\frac{21\times1\times22.4}{168\times2}\right)$ B. $\left(\frac{21\times1\times22.4}{84\times2}\right)$ C. $\left(\frac{84\times1\times2}{21\times22.4}\right)$ D. $\left(\frac{168\times1\times2}{21\times22.4}\right)$

107. Sulphuric acid reacts with ammonia according to the equation

$$2NH_3(g) + H_2SO_4(l) \longrightarrow (NH_4)_2SO_4(s)$$

The mass of ammonium sulphate formed when $6l$ of ammonia reacts with excess sulphuric acid is at r.t.p. ($(NH_4)_2SO_4 = 132$)

A. $8.25g$ B. $16.50g$ C. $33.00g$ D. $66.00g$

108. 25.0cm^3 of a 0.4M sodium hydroxide solution was diluted to 250cm^3 with distilled water. The molarity of the resultant solution is

A. $0.01M$ B. $0.04M$ C. $0.02M$ D. $0.4M$

109. The relative molecular mass of a gas P, if 8.4dm^3 of the gas has a mass of 0.93g is (1 mole of gas occupies 22.4dm^3)

A. $\left(\frac{0.93\times22.4}{8.4}\right)$ B. $\left(\frac{8.4\times22.4}{0.93}\right)$ C. $\left(\frac{0.93\times8.4}{22.4}\right)$ D. $\left(\frac{0.93}{22.4\times8.4}\right)$

110. Calcium carbonate reacts with hydrochloric acid according to the equation

$$CaCO_3(s) + 2HCl(aq) \longrightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$$

The mass of calcium carbonate that will react completely with 50cm^3 of 2M hydrochloric acid is ($CaCO_3 = 100$)

A. $\left(\frac{2\times50\times100}{2\times1000}\right)$ B. $\left(\frac{2\times100}{2\times50\times1000}\right)$ C. $\left(\frac{50\times100}{200\times1000}\right)$ D. $\left(\frac{2\times50\times100}{1000}\right)$

111. Hydrogen reacts with oxygen according to the equation

$$2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$$

The volume of oxygen that is required to react with hydrogen to form 40cm^3 of steam is

A. $20cm^3$ B. $40cm^3$ C. $80cm^3$ D. $120cm^3$

112. Which one of the following has the greatest number of moles

$(Cl = 35.5; O = 16; N = 14; H = 1)$

A. $1.0g\ of\ Cl_2$ B. $1.0g\ of\ O_2$ C. $1.0g\ of\ N_2$ D. $1.0g\ of\ H_2$

113. When 2.5g of a solid is heated, 560cm^3 of a gas was produced at s.t.p. and a residue of 1.4g was left. The molecular mass of the gas is? (1 mole of gas occupies 22.4dm^3)

A. $\left(\frac{22400\times2.5}{560}\right)$ B. $\left(\frac{22400\times1.1}{560}\right)$ C. $\left(\frac{22400\times1.4}{560}\right)$ D. $\left(\frac{22400}{560}\right)$

114. What is the molarity of sodium hydroxide solution if 30cm^3 of 0.2M hydrochloric acid neutralises 20cm^3 of the base

A. $\left(\frac{20}{0.2\times30}\right)$ B. $\left(\frac{20\times0.2}{30}\right)$ C. $\left(\frac{30}{0.2\times30}\right)$ D. $\left(\frac{30\times0.2}{20}\right)$

115. 20cm^3 of 0.2M hydrochloric acid reacts with 25cm^3 of sodium hydroxide solution. The molarity of the hydroxide is

A. $\left(\frac{25\times0.2}{20}\right)$ B. $\left(\frac{20\times0.2}{25}\right)$ C. $\left(\frac{25}{20\times0.2}\right)$ D. $\left(\frac{20}{25\times0.2}\right)$

116. What is the percentage composition of nitrogen in ammonium nitrate, NH_4NO_3? $(N = 14; H = 1; O = 16)$

A. $\left(\frac{14\times100}{80}\right)$ B. $\left(\frac{28\times100}{80}\right)$ C. $\left(\frac{52\times100}{80}\right)$ D. $\left(\frac{76\times100}{80}\right)$

117. Zinc reacts with sulphuric acid according to the equation

$$Zn(s) + H_2SO_4(aq) \longrightarrow ZnSO_4(aq) + H_2(g)$$

The number of moles of zinc that will react with excess sulphuric acid to produce 60cm^3 of hydrogen at room temperature is (1 mole of gas occupies 24dm^3)

A. 0.0025 B. 0.005 C. 0.025 D. 0.05

118. Potassium chlorate decomposes according to the equation;

$$2KClO_3(s) \longrightarrow 2KCl(s) + 3O_2(g)$$

The loss in mass, in grams, when two moles of potassium chlorate is decomposed is ($K = 39; Cl = 35.5; O = 16$)

A. 16 B. 32 C. 48 D. 96

119. The solubility of salt W is 35g per 100cm^3 of water at 20℃. The mass of W in 40cm^3 of water at the same temperature is

A. $7.0g$ B. $14.0g$ C. $87.5g$ D. $114.3g$

120. 80cm^3 of hydrogen and 80cm^3 of oxygen are allowed to react. What volume of the remains unreacted

A. $40cm^3$ B. $80cm^3$ C. $120cm^3$ D. $160cm^3$

121. 0.02 mole of calcium chloride ($CaCl_2$) was dissolved in water to make 200cm^3 of solution. What is the concentration of calcium chloride in moles per litre in the solution

A. $0.05M$ B. $0.1M$ C. $0.2M$ D. $0.3M$

122. The empirical formula of a compound A is C_3H_4. 25g of A occupies 14dm^3 at s.t.p. what is the molecular formula of A
($C = 12; H = 1; 1\ mole\ of\ gas\ occupies\ 22.4dm^3$)

A. C_3H_4 B. C_3H_8 C. C_6H_6 D. C_6H_8

123. The volume of 0.2M potassium hydroxide solution which neutralises 25cm^3 of 0.1M hydrochloric acid is

A. $5cm^3$ B. $12.5cm^3$ C. $25cm^3$ D. $50cm^3$

124. Nitrogen monoxide reacts with oxygen according to the equation;
$2NO(g) + O_2(g) \longrightarrow 2NO_2(g)$

What volume of oxygen would react with 200cm^3 of nitrogen monoxide?

A. $100cm^3$ B. $200cm^3$ C. $300cm^3$ D. $400cm^3$

125. Which one of the following nitrogenous compounds contains the least amount of nitrogen? ($H = 1; C = 12; N = 14; O = 16$)

A. NH_2OH B. NH_3 C. NH_2NH_2 D. NH_4NO_3

126. Which one of the following contains the same number of atoms as 8g of sulphur? ($C = 12; S = 32; Ca = 40$)

A. $20g\ of\ Ca$ B. $10g\ of\ C$ C. $12g\ of\ C$ D. $4g\ of\ C$

127. An anhydrous salt R has a relative formula mass of 158 and forms a hydrated salt with formula R.nH_2O. 79g of R combine with 45g of water. What is value of n?

A. 2 B. 3 C. 5 D. 10

128. The volume of 1M sulphuric acid required to react completely with 10cm^3 of 2M sodium hydroxide solution is?

A. $5cm^3$ B. $10cm^3$ C. $20cm^3$ D. $30cm^3$

129. The apparent increase in mass of copper observed when 0.25 mole of the metal is heated strongly in air is?

A. $4g$ B. $8g$ C. $16g$ D. $20g$

130. Ammonia is formed from hydrogen and nitrogen according to the equation; $3H_2(g) + N_2(g) \longrightarrow 2NH_3(g)$

The volume if ammonia produced when $25l$ of hydrogen reacts with excess nitrogen is

A. $12.5l$ B. $25.0l$ C. $50.0l$ D. $37.5l$

131. What mass of sodium hydroxide is in $0.5l$ of 2M sodium hydroxide solution? $(NaOH = 40)$

A. $10g$ B. $20g$ C. $40g$ D. $80g$

132. Hydrogen reacts with chlorine according to the equation.

$$H_2(g) + Cl_2(g) \longrightarrow 2HCl(g)$$

The volume of hydrogen chloride formed when 30cm^3 of hydrogen is reacted with 50cm^3 of chlorine is

A. $20cm^3$ B. $40cm^3$ C. $60cm^3$ D. $80cm^3$

133. Hydrogen and nitrogen react according to the equation.

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

The volume of nitrogen at s.t.p which will react with 6.72 litres of hydrogen is (1 mole of gas occupies $22.4l$)

A. $2.24l$ B. $6.72l$ C. $22.4l$ D. $67.2l$

134. The percentage of water of crystallisation in copper(II) sulphate-5-water $CuSO_4.5H_2O$ is $(Cu = 64; O = 16; H = 1; S = 32)$

A. $\left(\frac{90\times100}{250}\right)\%$ B. $\left(\frac{18\times100}{250}\right)\%$ C. $\left(\frac{20\times100}{160}\right)\%$ D. $\left(\frac{20\times100}{160}\right)\%$

135. 6.5g of an element X combine with oxygen to give 8.1g of the oxide. The simplest formula of the oxide is $(O = 16; X = 65)$

A. X_2O B. XO C. XO_2 D. X_2O_3

136. 2.0g of sodium hydroxide was dissolved in water to male 500cm^3 of the solution. The molarity of the solution is.

A. $2M$ B. $0.5M$ C. $0.1M$ D. $0.05M$

137. The percentage of sulphur in iron(III) sulphate, $Fe_2(SO_4)_3$, is $(Fe = 56; O = 16; S = 32)$

A. $\left(\frac{32\times100}{400}\right)$ B. $\left(\frac{96\times100}{400}\right)$ C. $\left(\frac{112\times100}{400}\right)$ D. $\left(\frac{128\times100}{400}\right)$

138. When 4.0g of an oxide of an element X were reduced, 3.2g of X were obtained. The simplest formula of the oxide of X is? $(O = 16; X = 64)$

A. X_2O B. XO C. XO_2 D. X_2O_3

139. Lead(II) nitrate reacts with potassium iodide according to the equation;

$$Pb(NO_3)_2(aq) + 2KI(aq) \longrightarrow PbI_2(s) + 2KNO_3(aq)$$

The mass of lead(II) iodide formed when 33.2g of potassium iodide reacts with lead(II) nitrate is $(K = 39; I = 127; Pb = 207)$

A. $16.6g$ B. $46.1g$ C. $66.4g$ D. $92.2g$

140. Magnesium reacts with chorine when heated according to the equation;

$$Mg(s) + Cl_2(g) \longrightarrow MgCl_2(s)$$

The volume of chlorine, in litres, at s.t.p. that will react completely with 0.6g of magnesium is? $(Mg = 24)$

A. $\left(\frac{0.6\times22.4}{24}\right)$ B. $\left(\frac{0.6\times22.4}{24\times2}\right)$ C. $\left(\frac{0.6\times24}{22.4}\right)$ D. $\left(\frac{0.6\times24}{22.4\times2}\right)$

141. The percentage by mass of phosphorus in calcium phosphate, $Ca_3(PO_4)_2$, is? $(Ca = 40; P = 31; O = 16)$

A. 10% B. 8% C. 20% D. 17%

142. Propene burns in air according to the equation.

$$C_3H_8(g) + 5O_2(g) \longrightarrow 3CO_2(g) + 4H_2O(l)$$

When 2.1g of propene is completely burnt in oxygen, the volume of carbon dioxide produced at room temperature is
$(C = 12; H = 1; 1\ mole\ of\ gas\ cooupies\ 24l\ at\ room\ temperature)$

A. $1.2dm^3$ B. $2.4dm^3$ C. $3.6dm^3$ D. $4.8dm^3$

143. When 6.4g of an oxide of element Y was heated with hydrogen, 3.2g of Y was formed. The empirical formula of the oxide $(Y = 32; O = 16)$

A. YO B. YO_2 C. Y_2O D. Y_2O_3

144. A 0.2M solution of X contains 18.25g of X per litre. The relative formula mass of X is

A. 18.25 B. 36.5 C. 45.63 D. 91.25

145. $10cm^3$ of a dibasic acid was neutralised by $20cm^3$ of a 0.2M sodium hydroxide. The molarity the acid is

A. $\left(\frac{2\times10}{0.2\times20}\right)$ B. $\left(\frac{0.2\times20}{2\times10}\right)$ C. $\left(\frac{0.2\times10}{20\times2}\right)$ D. $\left(\frac{2\times20\times0.2}{10}\right)$

146. The mass of nitric acid (HNO_3) required to make $200cm^3$ of a 2M solution is $(H = 1; N = 14; O = 16)$

A. $31.5g$ B. $25.2g$ C. $15.8g$ D. $12.6g$

147. The volume of $0.01M$ sodium hydroxide required to react completely with $25cm^3$of a $0.02M$ hydrochloric acid is?

A. $12.5cm^3$ B. $25.0cm^3$ C. $50.0cm^3$ D. $75.0cm^3$

148. On reduction 3.2g of an oxide of M gave 2.56g of the element. The simplest formula of the oxide is. $(M = 64; O = 16)$

A. MO B. M_2O C. MO_2 D. M_2O_3

149. The molarity of a solution containing 40g of sodium hydroxide in $500cm^3$ of solution. $(Na = 23; H = 1; O = 16)$

A. $0.2M$ B. $0.5M$ C. $1.0M$ D. $2.0M$

150. The number of moles of sodium ions, Na^+, in $1000cm^3$of a $2M$ solution of sodium carbonate, (Na_2CO_3), is

A. 0.2 B. 0.4 C. 2.0 D. 4.0

151. Steam reacts with methane according to the following equation.

$$CH_4(g) + 2H_2O(g) \longrightarrow CO_2(g) + 4H_2(g)$$

What volume of gas will remain when $30cm^3$ of methane reacts with $20cm^3$ of steam?

A. $20cm^3$ B. $50cm^3$ C. $70cm^3$ D. $80cm^3$

152. The volume of a 0.25M hydrochloric acid required to exactly react with 20.0cm^3 of a 0.1M sodium carbonate solution is?

A. $\left(\frac{0.1\times20.0}{2\times0.25}\right)$ B. $\left(\frac{20.0\times0.25}{2\times0.1}\right)$ C. $\left(\frac{2\times20.0\times0.25}{0.1}\right)$ D. $\left(\frac{2\times20.0\times0.1}{0.25}\right)$

153. An oxide of an element X is made up of 50% X. The simplest formula of the oxide of is $(X = 32; O = 16)$

A. XO B. X_2O C. XO_2 D. X_2O_3

154. Ammonium chloride reacts with calcium hydroxide according to the equation:

$$Ca(OH)_2(s) + 2NH_4Cl(s) \longrightarrow 2NH_3(s) + CaCl_2(s) + 2H_2O(l)$$

What volume of ammonia at room temperature is produced when 2.14g of ammonium chloride is reacts with calcium hydroxide? $(NH_4Cl = 53.5)$

A. $0.48dm^3$ B. $0.96dm^3$ C. $1.92dm^3$ D. $4.80dm^3$

155. Carbon monoxide burns in oxygen according to the equation

$$2CO(g) + O_2(g) \longrightarrow 2CO_2(g)$$

20cm^3 of carbon monoxide was mixed with 20cm^3 of oxygen and exploded. What was the final gaseous volume?

A. $20cm^3$ B. $30cm^3$ C. $40cm^3$ D. $50cm^3$

156. An oxide of a metal M contains 80.24% of M. The empirical formula of the oxide is $(M = 65; O = 16)$

A. MO B. M_3O C. MO_2 D. M_2O_3

157. Copper(II) carbonate decomposes when heated according to the equation; $CuCO_3(s) \longrightarrow CuO(s) + CO_2(g)$

What volume of carbon dioxide is produced at s.t.p when 0.5 moles of copper(II) oxide is formed $(Cu = 64; O = 16)$

A. $11.2l$ B. $44.0l$ C. $22.4l$ D. $11.2l$

158. Methane burns in oxygen according to the following equation

$$CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l)$$

If 10cm^3 of methane and 20cm^3 of oxygen are mixed and exploded, what is the final volume of the mixture?

A. $10cm^3$ B. $15cm^3$ C. $25cm^3$ D. $30cm^3$

159. The volume of a 0.2M sodium hydroxide that would be required to completely precipitate iron(III) hydroxide from 2cm^3 of a 0.1M solution of iron(III) chloride.

$$Fe^{3+}(aq) + 3OH^{-}(aq) \longrightarrow Fe(OH)_3(s)$$

A. 0.5 B. 1.0 C. 2.0 D. 3.0

160. When heated, calcium carbonate decomposes according to the equation; $CaCO_3(s) \longrightarrow CaO(s) + CO_2(g)$

The loss in mass of calcium carbonate when 40g of the carbonate is heated to constant mass is. ($CaCO_3 = 100$)

A. $\left(\frac{100-40}{44}\right)$ B. $\left(\frac{40\times44}{100}\right)$ C. $\left(\frac{100-44}{40}\right)$ D. $\left(\frac{100\times40}{44}\right)$

161. The maximum volume of 0.1M sulphuric acid required to react completely with 10cm^3 of 0.5M sodium hydroxide is

A. $10cm^3$ B. $20cm^3$ C. $25cm^3$ D. $50cm^3$

162. The percentage of oxygen in baking powder is $NaHCO_3 = 84$

A. $\left(\frac{48\times100}{84}\right)$ B. $\left(\frac{16\times100}{84}\right)$ C. $\left(\frac{84\times100}{48}\right)$ D. $\left(\frac{84\times100}{16}\right)$

163. Barium carbonate reacts with dilute acids according to the equation;

$$BaCO_3(s) + 2H^{+}(aq) \longrightarrow Ba^{2+}(aq) + CO_2(g) + 2H_2O(l)$$

The maximum volume of carbon dioxide that can be evolved on reacting 2.0g of barium carbonate with excess dilute hydrochloric acid at s.t.p is?

($BaCO_3(s) = 197$)

A. $112cm^3$ B. $224cm^3$ C. $227cm^3$ D. $448cm^3$

164. Which one of the following sulphates contains the highest percentage of sulphur? ($N = 14; O = 16; Na = 23; Ca = 40; Cu = 64$)

A. $(NH_4)_2SO_4$ B. Na_2SO_4 C. $CaSO_4$ D. $CuSO_4$

165. Which one of the following has the same mass as 0.05 moles of sulphur? ($C = 12; Al = 27; S = 32$)

A. $2\ mol\ of\ C$ B. $0.13\ mol\ of\ Al$ C. $1.5\ mol\ of\ Na$ D. $0.05\ mol\ of\ O_2$

166. The concentration of chloride ions in a litre of solution which contains 22.2g of calcium chloride is; ($Ca = 40; Cl = 35.5$)

A. $0.20M$ B. $0.29M$ C. $0.40M$ D. $0.60M$

167. Hydrogen reacts with nitrogen to form ammonia according to the equation;

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

The volume of the gas that would remain when $30l$ of hydrogen of reacted with $20l$ of nitrogen is

A. $15l$ B. $10l$ C. $20l$ D. $30l$

168. 0.2 mole of a metal hydroxide, $X(OH)_2$, weighed 11.6g. Which one of the following is the relative atomic mass of X.

A. 24 B. 34 C. 58 D. 41

169. Aluminium reacts with copper(II) ions according to the equation;

$$3Cu^{2+}(aq) + 2Al(s) \longrightarrow 2Al^{3+}(aq) + 3Cu(s)$$

Which one of the following is the mass of copper formed when copper(II) ions react with 2.5g of aluminium? $(Al = 27; Cu = 63.5)$

A. $\left(\frac{2.5\times2\times63.5}{27\times3}\right)$ B. $\left(\frac{2.5\times3\times27}{63.5\times2}\right)$ C. $\left(\frac{2.5\times2\times27}{63.5\times3}\right)$ D. $\left(\frac{2.5\times3\times63.5}{27\times2}\right)$

170. Which one of the following volumes of butane would produce 1500kJ of heat at s.t.p on combustion? (1 mole of gas occupies 22.4dm^3. The molar heat of combustion of butane is 2880kJ)

A. $\left(\frac{1500\times22.4}{2880}\right)$ B. $\left(\frac{22.4\times2880}{1500}\right)$ C. $\left(\frac{1500\times2880}{22.4}\right)$ D. $\left(\frac{2880}{22.4}\right)$

171. An alcohol, C_3H_7OH, burns in air according to the equation.

$$C_3H_7OH(l) + \frac{9}{2}O_2(g) \longrightarrow 3CO_2(g) + 8H_2O(l);\ \Delta H = 2017kJmol^{-1}$$

Which one of the following is the mass of the alcohol, in grams, required to produce 200kJ of heat? $(C = 12; O = 16; H = 1)$

A. $\left(\frac{60\times2\times200}{4034}\right)$ B. $\left(\frac{60\times200}{2\times4034}\right)$ C. $\left(\frac{60\times4034}{200}\right)$ D. $\left(\frac{60\times4034}{2\times200}\right)$

172. Carbon reacts with sulphur to for carbon disulphide according to the equation; $C(s) + 2S(s) \longrightarrow CS_2(l);\ \Delta H = +117kJmol^{-1}$

The heat absorbed when 17g of sulphur reacts with carbon to form carbon disulphide is? $(C = 12; S = 32)$

A. $26.2kJ$ B. $31.1kJ$ C. $52.4kJ$ D. $62.2kJ$

173. Hydrochloric acid reacts with sodium hydroxide according to the equation;

$$HCl(aq) + NaOH(aq) \longrightarrow NaCl(aq) + H_2O(l)$$

When 25cm^3 of 0.5M hydrochloric acid was added to 25cm^3 of a 0.5M sodium hydroxide solution, the temperature of the mixture rose from 25℃ to 28.4℃. The molar enthalpy of neutralisation of the acid is (assume the density of the solution = 1gcm^{-3} and specific heat capacity = 4.2kJg^{-1}℃$^{-1}$)

A. $714Jmol^{-1}$ B. $1428Jmol^{-1}$ C. $28600Jmol^{-1}$ D. $57120Jmol^{-1}$

174. Butane undergoes combustion according to the equation.

$$2C_4H_{10}(g) + 3O_2(g) \longrightarrow 8CO_2 + 10H_2O(l)$$

The mass of butane required to produce 950kJ of heat is? ($H = 1; C = 12$; 1 mole of butane produces 2877kJ of heat)

A. $\left(\frac{950\times58}{2\times2877}\right)$ B. $\left(\frac{950\times58}{2877}\right)$ C. $\left(\frac{950\times2\times58}{2877}\right)$ D. $\left(\frac{2877\times58}{950}\right)$

175. Nitric acid reacts with potassium hydroxide according to the equation;

$$KOH(aq) + HNO_3(aq) \longrightarrow KNO_3(aq) + H_2O(l)$$

When 20cm^3 of 2M nitric acid solution was added to 20cm^3 of a 2M potassium hydroxide solution, the temperature of the solution rose by 13℃. The molar heat of neutralisation of the nitric acid is (assume the specific heat capacity of solution is 4.2Jg^{-1}℃$^{-1}$ and the density of 1gcm^{-3})

A. $1092Jmol^{-1}$ B. $27300Jmol^{-1}$ C. $2184Jmol^{-1}$ D. $54600Jmol^{-1}$

176. Methane burns in air according to the equation

$$CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l);\ \Delta H = -850kJmol^{-1}$$

The heat evolved when 5.0g of methane is completely burnt in air is?

$(C = 12; H = 1)$

A. $531.2kJ$ B. $425.0kJ$ C. $256.6kJ$ D. $53.1kJ$

177. Methane burns in air according to the following equation.

$$CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l);\ \Delta H = -890kJmol^{-1}$$

The volume of methane gas at s.t.p which when burnt will raise the temperature of 160g of water by 15℃ is? (Specific heat capacity of water is 4.2Jkg^{-1}℃$^{-1}$)

A. $\left(\frac{890}{22.4\times10.08}\right)$ B. $\left(\frac{22.4\times10.08}{890}\right)$ C. $\left(\frac{22.4\times890}{10.08}\right)$ D. $\left(\frac{10.08\times890}{22.4}\right)$

178. When 2.3 g of ethanol was completely burnt in oxygen, the heat evolved raised the temperature of 100g of water by 30℃. The molar heat of combustion of ethanol in joules is?

$(C_2H_5OH = 46;\ specific\ heat\ capacity\ of\ water = 4.2Jg^{-1}K^{-1})$

A. $\left(\frac{100\times4.2\times30\times46}{2.3}\right)$ C. $\left(\frac{100\times4.2\times20\times46}{46}\right)$

B. $\left(\frac{100\times4.2\times30\times2.3}{46}\right)$ D. $\left(\frac{100\times4.2\times20\times46}{2.3}\right)$

179. Which one of the following will produce the least amount of heat energy per mole on complete combustion?

A. CH_4 B. CH_3CH_3 C. $CH_3CH_2CH_3$ D. $CH_3CH_2CH_2CH_3$

180. When 2.4g of magnesium was reacted with 200cm^3 of 2M hydrochloric acid, 13.6kJ of heat was evolved. The molar heat of reaction, in kJ, of magnesium with the acid is? ($Mg = 24$)

A. $\left(\frac{13.6\times200}{24\times2.4}\right)$ B. $\left(\frac{24\times13.6}{2.4}\right)$ C. $\left(\frac{13.6\times24}{2.4\times200}\right)$ D. $\left(\frac{2.4\times24}{13.6}\right)$

181. Ethanol burns in oxygen according to the following equation.

$$CH_3CH_2OH(l) + 3O_2(g) \longrightarrow 2CO_2(g) + 3H_2O(l)$$

Calculate the amount of heat evolved when 45g of oxygen is used for complete combustion of ethanol. ($C = 12; H = 1; O = 16$) (The molar heat of combustion of ethanol is 1370kJmol^{-1})

A. $642.2kJ$ B. $1284.4kJ$ C. $1340.2kJ$ D. $1926.6kJ$

182. When one mole of ammonium chloride was dissolved in a certain volume of water, 2.94kJ of heat was absorbed. The amount of heat, absorbed when 5.35g of ammonium chloride is dissolved in the same volume of water is ($NH_4Cl = 53.5$)

A. $\left(\frac{53.5}{2.94\times5.35}\right)kJ$ B. $\left(\frac{2.94\times53.5}{5.35}\right)kJ$ C. $\left(\frac{2.94\times5.35}{53.5}\right)kJ$ D. $\left(\frac{53.5\times5.35}{2.94}\right)kJ$

183. When 1.0g of carbon is burnt in excess oxygen, the heat produced raises the temperature of 400g of water by 10℃. The heat of combustion of carbon is ($C = 12$; The specific heat capacity of water is 4.2kJg^{-1}K^{-1})

A. $(0.4 \times 4.2 \times 19 \times 12)kJmol^{-1}$ C. $\left(\frac{0.4\times4.2}{12\times19}\right)kJmol^{-1}$

B. $(400 \times 4.2 \times 19 \times 12)kJmol^{-1}$ D. $\left(\frac{12\times19}{0.4\times4.2}\right)kJmol^{-1}$

184. Butane burns in excess air according to the equation.

$$2C_4H_{10}(g) + 3O_2(g) \longrightarrow 8CO_2 + 10H_2O(l)\ ;\ \Delta H = -5760kJ$$

The quantity of heat evolved, in kJ, when 1.6dm^3 of butane is burnt at room temperature is (1 mole of gas occupies 24dm^3 at room temperature)

A. $\left(\frac{5760\times116}{2\times24}\right)$ B. $\left(\frac{5760\times1.6}{2\times24}\right)$ C. $\left(\frac{5760\times1.6}{24}\right)$ D. $\left(\frac{5760\times116}{24}\right)$

185. Carbon burns in oxygen according to the equation;

$$C(s) + O_2(g) \longrightarrow CO_2(g); \quad \Delta H = -2.2 \times 10^{-7} kJmol^{-1}$$

The amount of heat evolved in kJ, when 480g of carbon is burnt completely in oxygen is? ($C = 12$)

A. $(480 \times 12 \times 2.2 \times 10^{-7})$ B. $\left(\frac{2.2\times10^{-7}\times12}{480}\right)$ C. $\left(\frac{480\times12}{2.2\times10^{-7}}\right)$ D. $\left(\frac{2.2\times10^{-7}\times480}{12}\right)$

186. 5.3kJ of heat energy is required to vaporise 13g of liquid Y. ($Y = 78$). The molar heat of vaporisation of Y in $kJmol^{-1}$ is?

A. $\left(\frac{5.3\times78}{13}\right)$ B. $\left(\frac{13\times78}{5.3}\right)$ C. $\left(\frac{13\times5.3}{78}\right)$ D. $(13 \times 5.3 \times 78)$

187. When 1.0g of methanol (CH_3OH) was burnt in excess air, 22.6kJ of heat were liberated. What is the quantity of heat, in kJ, liberated when 1 mole of methanol was burnt under similar conditions? ($C = 12; H = 1$)

A. 22.6 B. 32.0 C. 723.2 D. 777.8

188. When 0.4g of ethanol (C_2H_5OH) was burnt, it raised the temperature of 0.1kg of water by 20°C. The molar heat of combustion ethanol, in $kJmol^{-1}$, is? ($C_2H_5OH = 46$; specific heat capacity of water = $4.2kJkg^{-1}K^{-1}$)

A. $\left(\frac{20\times4.2\times46}{0.4\times0.1}\right)$ B. $\left(\frac{0.4\times4.2\times46}{46\times0.1}\right)$ C. $\left(\frac{0.1\times4.2\times46}{46\times0.4}\right)$ D. $\left(\frac{20\times4.2\times46\times0.1}{0.4}\right)$

189. Glucose burns in oxygen according to the equation below giving out 2802$kJmol^{-1}$ of heat.

$$C_6H_{12}O_6(s) + 6O_2(g) \longrightarrow 6CO_2(g) + 6H_2O(l)$$

What is the heat produced, in kJ, when 18g of glucose is burnt in excess air. ($C = 12; H = 1; O = 16$)

A. $\left(\frac{2802\times18.0}{180\times25}\right)$ B. $\left(\frac{18.0}{180\times25}\right)$ C. $\left(\frac{2802\times18.0}{180}\right)$ D. $\left(\frac{2802\times18.0\times25}{2802}\right)$

190. Methanol burns in air according to the following equation

$$2CH_3OH(l) + 3O_2(g) \longrightarrow 2CO_2(g) + 4H_2O(l); \quad \Delta H = -1460kJmol^{-1}$$

The amount of heat liberated when 3.2g of methanol is completely burnt is ($CH_3OH = 32$)

A. $73kJ$ B. $730kJ$ C. $1416kJ$ D. $2929kJ$

191. Carbon burns in excess oxygen according to the equation

$$C(s) + O_2(g) \longrightarrow CO_2(g); \quad \Delta H = -393kJmol^{-1}$$

What mass of carbon in grams would produce 750kJ of energy?

A. $\left(\frac{393\times12}{750}\right)$ B. $\left(\frac{750\times12}{393}\right)$ C. $\left(\frac{750\times12}{393}\right)$ D. $\left(\frac{750\times393}{12}\right)$

192. Carbon monoxide reacts with hydrogen according to the equation

$$CO(g) + 2H_2(g) \longrightarrow CH_3OH(l); \quad \Delta H = +91kJmol^{-1}$$

What mass of carbon monoxide would cause a heat change of +182kJ $(C = 12; O = 16)$

A. $2g$ B. $28g$ C. $56g$ D. $273g$

193. 13.70kJ of heat was evolved when 4.0g of copper was displaced from copper(II) sulphate solution by zinc. The amount of heat evolved when one mole of copper was displaced is?

A. $\left(\frac{63.5\times4}{13.7}\right)$ B. $\left(\frac{13.7\times63.5}{4}\right)$ C. $\left(\frac{13.7\times4}{63.5}\right)$ D. $\left(\frac{63.5}{13.7\times4}\right)$

194. When 8.0g of a salt was dissolved in 100g of water, the temperature decreased by 10℃. The drop in temperature when 2g of the salt is dissolved in 100g of water would be?

A. 10℃ B. 98.5℃ C. 5.0℃ D. 2.5℃

195. Methane burns in air according to the equation

$$CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l); \Delta H = -890kJmol^{-1}$$

The energy liberated when 4g of methane is burnt in air is?

A. $222.5kJ$ B. $445.0kJ$ C. $1780.0kJ$ D. $3560.0kJ$

196. When 2.0g of substance X were burnt, the heat evolved raised the temperature of 1000g of water by 15.6℃. The molar heat of combustion of X in joules is (Molecular mass of X is 60, specific heat capacity of water is $4.2Jg^{-1}℃^{-1}$)

A. $\left(\frac{1000\times4.2\times15.6\times2.0}{60}\right)$ B. $\left(\frac{1000\times15.6\times2.0}{60\times4.2}\right)$ C. $\left(\frac{1000\times15.6\times60\times4.2}{2.0}\right)$ D. $\left(\frac{4.2\times15.6\times60}{1000\times2.0}\right)$

197. The formation of methanol from hydrogen and carbon monoxide is represented by the equation

$$CO(g) + 2H_2(g) \longrightarrow CH_3OH(l); \quad \Delta H = -92kJmol^{-1}$$

What would be the energy released when 3.2g of methanol is formed? $(CH_3OH = 32)$

A. $2.9kJ$ B. $3.6kJ$ C. $9.2kJ$ D. $10.2kJ$

198. Carbon monoxide burns in air according to the equation

$$2CO(g) + O_2(g) \longrightarrow 2CO_2(g); \quad \Delta H = -572kJ$$

Which one of the following is the molar heat of combustion of carbon monoxide in, $Jmol^{-1}$?

A. 1144 B. 572 C. 286 D. 143

199. Hydrogen burns in air according to the equation

$$H_2(g) + ½O_2(g) \longrightarrow H_2O(l); \quad \Delta H_c = -298kJmol^{-1}$$

The quantity of heat liberated when $3.48dm^3$ of hydrogen was completely burnt in air at room temperature is

(1 *mole of gas occupies* 24.0l *at room temperature*)

A. 11.43kJ B. 22.88kJ C. 43.21kJ D. 91.52kJ

200. When $40cm^3$ of $1M$ hydrochloric acid was mixed with $40cm^3$ of $1M$ sodium hydroxide solution, the temperature of the solution rose by 6.8℃. Which one of the following is the enthalpy of neutralisation of hydrochloric acid in $kJmol^{-1}$

(*specific heat capacity of water* $= 4.2J$; *density of water* $= 1gcm^{-3}$)

A. 57120 B. 0.04 C. 2284.4 D. 2856.5

201. Which one if the following substances contain the same number of moles as 10cm³ of 0.5M nitric acid?

(1 *mol of gas occupies* 22.4 dm^3 *at s.t.p*; $H = 1; C = 12; N = 14$)

A. 5.6 dm³ of carbon dioxide at s.t.p.
B. 17 g of ammonia
C. 12 g of carbon
D. 112 cm³ of oxygen at s.tp.

202. Sulphuric acid reacts with sodium hydroxide according to the equation

$$H_2SO_4(aq) + 2NaOH(aq) \longrightarrow Na_2SO_4(aq) + H_2O(l)$$

Which one of the following is the volume of 2M sulphuric acid required to react completely with 10 cm³ of a 2M sodium hydroxide solution?

A. 5.0 cm³ B. 10.0 cm³ C. 20.0 cm³ D. 40.0 cm³

203. Ammonia burns in oxygen according to the following equation.

$$4NH_3(g) + 3O_2(g) \longrightarrow 2N_2(g) + 6H_2O(l)$$

The maximum volume of oxygen required to burn 60 cm³ of ammonia is

A. 45.0 cm³ B. 80.0 cm³ C. 90.0 cm³ D. 180.0 cm³

204. 0.4g of a metal hydroxide, MOH, reacted completely with 20 cm³ of a 0.5M hydrochloric acid. The relative formula mass of MOH is

A. $\left(\frac{0.5\times20}{0.4\times1000}\right)$ B. $\left(\frac{0.4\times20\times0.5}{1000}\right)$ C. $\left(\frac{1000\times0.5}{0.4\times20}\right)$ D. $\left(\frac{0.4\times1000}{0.5\times20}\right)$

205. When a solution containing 2g of sodium hydroxide was completely reacted with hydrochloric acid, 2730J of heat was evolved. Which one of the following is the heat of neutralisation of sodium hydroxide by hydrochloric acid in kJmol^{-1}? ($NaOH = 40$)

A. $-\left(\frac{2730\times2}{100\times40}\right)$ B. $-\left(\frac{1000\times40}{2\times2730}\right)$ C. $-\left(\frac{2730\times1000\times2}{40}\right)$ D. $-\left(\frac{2730\times40}{2730\times2}\right)$

206. Which one of the following is the concentration in grams per litre of a solution containing 0.05mol of sodium chloride in 50 cm^3

A. $\left(\frac{0.05\times50}{58.5\times1000}\right)$ B. $\left(\frac{0.05\times1000\times58.5}{50}\right)$ C. $\left(\frac{0.05\times58.5\times50}{1000}\right)$ D. $\left(\frac{50\times1000}{58.5\times0.05}\right)$

207. When 0.52g of methanol was burnt, the heat evolved raised the temperature of 85g of water from 20.3°C to 53.3°C. Which one of the following is the molar heat of combustion of methanol?

($the\ specific\ heat\ capacity\ of\ water = 4.2Jg^{-1}K^{-1}; C = 12; H = 1; O = 16$)

A. $\left(\frac{85\times4.2\times32\times33}{0.52\times1}\right)$ B. $\left(\frac{0.52\times1}{85\times4.2\times32\times33}\right)$ C. $\left(\frac{85\times4.2\times33}{0.52\times32\times1}\right)$ D. $\left(\frac{0.52\times32\times1}{85\times4.2\times33}\right)$

208. The mass of oxalic acid ($H_2C_2O_4$), in grams, required to prepare 250cm^3 of a 1.5M solution of oxalic acid is ($H = 1; C = 12; O = 16$)

A. $\left(\frac{1.5\times250}{1000\times90}\right)$ B. $\left(\frac{1000\times250}{90\times1.5}\right)$ C. $\left(\frac{90\times250}{1000\times1.5}\right)$ D. $\left(\frac{1.5\times250\times90}{1000}\right)$

209. Chlorine reacts with iron(III) chloride according to the equation

$$2Fe(s) + 3Cl_2(g) \longrightarrow 2FeCl_3(s)$$

Which one of the following would be the volume of chlorine that would react with 5.6g of iron to produce iron(III) chloride at s.t.p.?

($Fe = 56; 1\ mole\ of\ a\ gas\ occupies\ 22.4\ litres\ at\ s.t.p$)

A. $\left(\frac{3\times5.6\times22.4}{56}\right)$ B. $\left(\frac{3\times5.6\times22.4}{2\times56}\right)$ C. $\left(\frac{3\times56\times22.4}{2\times5.6}\right)$ D. $\left(\frac{2\times56\times22.4}{3\times5.6}\right)$

210. Ammonia reacts with copper(II) oxide to form copper according to the following equation

$$2NH_3(g) + 3CuO(s) \longrightarrow 3H_2O(g) + N_2(g) + 3Cu(s)$$

The mass of copper formed, in grams, when 12g of ammonia is reacted with copper(II) oxide is ($Cu = 64; N = 16; H = 1$)

A. $\left(\frac{12\times64}{17\times3}\right)$ B. $\left(\frac{12\times64}{2\times17}\right)$ C. $\left(\frac{2\times12\times64}{3\times17}\right)$ D. $\left(\frac{12\times3\times64}{2\times17}\right)$

Luck Favours

A Prepared Mind

Ssekyejwe A. Ronald