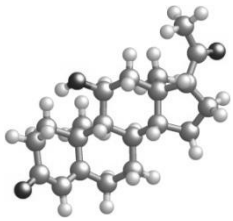


Chem!stry

Name: …… **( )**

Class: ……

Date: …… **/** …… **/** ……

Multiple-Choice Questions on Mole Concept – Assignment Thirteen

1. A sample of hydrogen is a mixture of the two isotopes $^{1}_{1}H$ and $^{2}_{1}H$.

The relative atomic mass of oxygen is 16.

What are possible values of the relative molecular mass of different molecules of water formed by the combination of oxygen and hydrogen?

1 18

2 19

3 20

A 1 only **B** 1 and 2 only

C 1 and 3 only **D** 1, 2 and 3

2. Calcium reacts with water as shown.

$$Ca(s) + 2H_2O(l) \rightarrow Ca(OH)_2(aq) + H_2(g)$$

What is the total mass of the solution that remains when 40 g of calcium reacts with 100 g of water?

A 58g **B** 74g **C** 138g **D** 140g

3. Hydrogen reacts with oxygen as shown in the equation below.

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

How much gas will remain if 2 dm^3 of hydrogen are reacted with 1 dm^3 of oxygen at room temperature?

A 0 dm^3 **B** 1 dm^3 **C** 2 dm^3 **D** 3 dm^3

4. A compound **Y** is the only substance formed when two volumes of dry ammonia gas react with one volume of dry carbon dioxide (both volumes measured at room temperature and pressure). What is the most likely formula of **Y**?

A $(NH_4)_2CO_3$ **B** NH_2COONH_4

C $(NH_2)_2CO$ **D** NH_4COONH_4

5. The M_r of oxygen, O_2, is 32 and the M_r of sulfur is 256.

What is the formula of a molecule of sulfur?

A S_2 **B** S_4 **C** S_8 **D** S_{16}

6. Which contains the greatest mass of nitrogen?

A 0.5 moles $(NH_4)_2SO_4$

B 1.0 mole NH_4NO_3

C 1.5 moles $(NH_4)_3PO_4$

D 2 moles $CO(NH_2)_2$

7. Sodium hydrogencarbonate decomposes on heating.

$$2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$$

In an experiment, a 5.0 mol sample of sodium hydrogencarbonate is heated.

Which volume of carbon dioxide, measured at room temperature and pressure, is evolved?

A 24 dm^3 **B** 36 dm^3 **C** 48 dm^3 **D** 60 dm^3

8. Nitrogen and oxygen react according to the equation.

$$N_2(g) + 2O_2(g) \rightarrow 2NO_2(g)$$

The enthalpy change for the reaction shown is +66 kJ.

If two moles of nitrogen and two moles of oxygen are used, what will be the enthalpy change?

A +16.5 kJ **B** +33 kJ **C** +66 kJ **D** +132 kJ

9. A volume of ethane, C_2H_6, at room temperature and pressure, has a mass of 20 g.

What is the mass of an equal volume of propene, C_3H_6, at room temperature and pressure?

A 20 g **B** 21 g **C** 28 g **D** 42 g

10. Analysis of a sample of an oxide of nitrogen gave the following data.

- percentage by mass of nitrogen 47%
- percentage by mass of oxygen 53%

What is the empirical formula of this oxide?

A_r [N] = 14 A_r [O] = 16

A NO **B** NO_2 **C** N_2O **D** N_2O_3

11. What is the mass of oxygen contained in 72 g of pure water?

A_r [H] = 1 and A_r [O] = 16

A 16 g **B** 32 g **C** 64 g **D** 70 g

12. The equation shown represents the neutralisation of aqueous sodium hydroxide with dilute sulfuric acid.

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

How much sulfuric acid is required to neutralise 100 cm^3 of 1.0 mol/dm^3 NaOH?

A 50 cm^3 of 2.0 mol/dm^3 sulfuric acid

B 100 cm^3 of 1.0 mol/dm^3 sulfuric acid

C 25 cm^3 of 0.5 mol/dm^3 sulfuric acid

D 50 cm^3 of 1.0 mol/dm^3 sulfuric acid

13. A compound containing only the elements carbon and hydrogen has 80.0 % by mass of carbon. What is its empirical formula?

A C_3H **B** CH_3 **C** CH_4 **D** C_2H_6

14. In an experiment, 1 cm^3 of a gaseous hydrocarbon, **Z**, requires 4 cm^3 of oxygen for complete combustion to give 3 cm^3 of carbon dioxide. All gas volumes are measured at room temperature and pressure. Which formula represents **Z**?

A C_2H_2 **B** C_2H_4 **C** C_3H_4 **D** C_3H_8

15. The relative atomic mass of chlorine is 35.5.

What is the mass of 2 moles of chlorine gas?

A 17.75 g **B** 35.5 g **C** 71 g **D** 142 g

16. The empirical formula of a liquid compound is C_2H_4O.

To find the molecular formula, it is necessary to know…

A The density of the compound.

B The percentage composition by mass of the compound.

C The relative molecular mass of the compound.

D The volume occupied by 1 mole of the compound.

17. 25.0 g of hydrated copper(II) sulfate crystals are heated to produce anhydrous copper(II) sulfate and water vapour.

$$CuSO_4{\cdot}5H_2O(s) \rightarrow CuSO_4(s) + 5H_2O(g)$$

What is the mass of anhydrous copper(II) sulfate formed?

A_r [Cu] = 64 A_r [H] = 1 A_r [O] = 16 A_r [S] = 32

A 9.0 g **B** 16.0 g **C** 22.5 g **D** 25.0 g

18. One mole of an organic compound, **Q**, is completely burnt in oxygen and produces exactly three moles of water. Which compound is **Q**?

A Butane, C_4H_{10}

B Ethanol, C_2H_5OH

C Propane, C_3H_8

D Propanol, C_3H_7OH

19. Complete combustion of a hydrocarbon produces only carbon dioxide, CO_2, and water, H_2O.

$$C_5H_{12}(l) + 8O_2(g) \rightarrow 5CO_2(g) + 6H_2O(g)$$

When 0.1 mol of the hydrocarbon C_5H_{12} is completely combusted, which volume of carbon dioxide, measured at room temperature and pressure, is produced?

A 0.5 dm^3 **B** 2.4 dm^3 **C** 5.0 dm^3 **D** 12 dm^3

20. Hydrogen sulfide burns in an excess of oxygen according to the equation shown.

$$2H_2S(g) + 3O_2(g) \rightarrow 2H_2O(g) + 2SO_2(g)$$

48 dm^3 of hydrogen sulfide is burned.

Which volume of sulfur dioxide will be formed at room temperature and pressure?

[All volumes are measured at the same temperature and pressure.]

A 24 dm^3 **B** 36 dm^3 **C** 48 dm^3 **D** 96 dm^3

21. Ammonia is manufactured from nitrogen and hydrogen by the Haber process.

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

What is the percentage yield when 60 kg of ammonia is produced from 60 kg of hydrogen?

A 5.9 % **B** 17.6 % **C** 35.3 % **D** 50.0 %

22. What is the ratio of the number of molecules in 71 g of gaseous chlorine to the number of molecules in 1 g of gaseous hydrogen?

A 1:1 **B** 1:2 **C** 2:1 **D** 71:2

23. Which contains the greatest mass of oxygen?

A 0.2 mol of aluminium nitrate, $Al(NO_3)_3$

B 0.3 mol of potassium sulfate, K_2SO_4

C 0.4 mol of sodium nitrate, $NaNO_3$

D 0.5 mol of magnesium carbonate, $MgCO_3$

24. Compound **X** has a composition by mass of 63.6 % nitrogen and 36.4 % oxygen.

What is the empirical formula of **X**?

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

25. The table gives the relative formula mass of four compounds and the mass of each compound present in 1 dm^3 of solution.

Which solution has the highest concentration in mol/dm^3?

	solution	relative formula mass	mass of compound in 1 dm^3 of solution / g
A	HC*l*	36.5	3.65
B	H_2SO_4	98	9.80
C	KOH	56	2.80
D	NaOH	40	6.00

26. Which sample contains the most atoms?

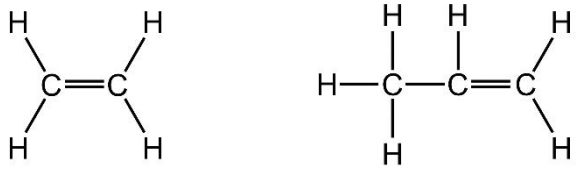
A 0.5 mol of water

B 1.0 mol of carbon dioxide

C 1.0 mol of methane

D 2.0 mol of hydrogen chloride

27. The diagrams show the structures of ethene and propene.



ethene propene

Which statement about equal volumes of ethene gas and propene gas, at room temperature and pressure, is correct?

A They contain equal numbers of atoms.

B They give equal volumes of carbon dioxide when burnt completely in oxygen.

C They give equal masses of ethane and propane when reacted with hydrogen.

D They react with equal masses of bromine.

28. Methane burns in oxygen.

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

10 cm^3 of methane is reacted with 25 cm^3 of oxygen.

What is the total volume of gas that would be measured after the reaction?

(Assume all volumes of gases are measured at room temperature and pressure.)

A 10 cm^3 **B** 15 cm^3 **C** 30 cm^3 **D** 35 cm^3

29. An aqueous solution is made by dissolving 3.4 g of sodium hydroxide, NaOH, to make 500 cm^3 of solution.

What is the concentration, in mol/dm^3, of this sodium hydroxide solution?

A 0.0068 **B** 0.085 **C** 0.17 **D** 6.8

30. In order to decide which would be the better nitrogenous fertiliser, a student calculates the percentage by mass of nitrogen in both ammonium sulfate and ammonium nitrate.

Which row gives the correct results?

	percentage by mass of nitrogen in ammonium sulfate	percentage by mass of nitrogen in ammonium nitrate
A	10.6	17.5
B	10.6	35.0
C	21.2	35.0
D	21.2	17.5

31. Which gas contains the same number of molecules as 9 g of water?

A 2 g of hydrogen

B 14 g of nitrogen

C 32 g of oxygen

D 44 g of carbon dioxide

32. The mass of one mole of a chloride formed by a metal **Y** is 74.5g.

What is the formula of the chloride?

A $\mathbf{Y}_3C\mathit{l}$ **B** $\mathbf{Y}_2C\mathit{l}$ **C** $\mathbf{Y}C\mathit{l}$ **D** $\mathbf{Y}C\mathit{l}_2$

33. Which hydrocarbon will burn completely in oxygen to give equal numbers of moles of carbon dioxide and water?

A C_2H_6 **B** C_3H_6 **C** C_4H_{10} **D** C_5H_{12}

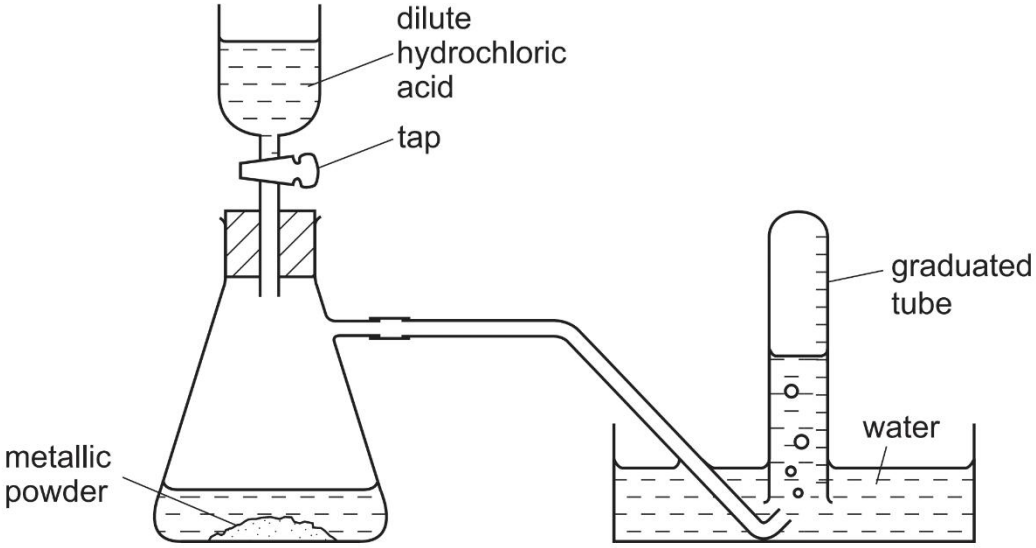
34. The equation for the reaction between calcium carbonate and hydrochloric acid is shown.

$$CaCO_3(s) + 2HC\mathit{l}(aq) \rightarrow CaC\mathit{l}_2(aq) + H_2O(\mathit{l}) + CO_2(g)$$

How many moles of calcium carbonate will give 2.4 cm^3 of carbon dioxide when reacted with An excess of the acid? (Assume one mole of carbon dioxide occupies 24 dm^3).

A 1 mol **B** 0.1 mol **C** 0.01 mol **D** 0.001 mol

35. The diagram shows apparatus for measuring the volume of hydrogen given off when an excess of dilute hydrochloric acid is added to powdered metal. The volume of gas is measured at room temperature and pressure.



The experiment is carried out three times, using the same mass of powder each time but with different powders:

- pure magnesium
- pure zinc
- a mixture of magnesium and zinc

Which powder gives the greatest volume of hydrogen and which the least volume?

	greatest volume of H_2	least volume of H_2
A	magnesium	zinc
B	magnesium	the mixture
C	zinc	magnesium
D	zinc	the mixture

36. Which compound contains the highest percentage mass of oxygen?

	compound	relative formula mass
A	Al_2O_3	102
B	Co_3O_4	241
C	CuO	80
D	$KMnO_4$	158

37. Aqueous sodium hydroxide is neutralised by dilute hydrochloric acid in a titration.

25.0 cm^3 of aqueous sodium hydroxide is measured into a conical flask using a ...1... and a few drops of methyl orange indicator are added to the solution.

The dilute hydrochloric acid is added to the conical flask using a ...2... .

The end-point is reached when the methyl orange indicator turns ...3... .

Which row completes gaps 1, 2 and 3?

	1	2	3
A	burette	pipette	red
B	burette	pipette	orange
C	pipette	burette	orange
D	pipette	burette	red

38. In which reaction does the smallest percentage change in volume occur?

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

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

C $2H_2S(g) + SO_2(g) \rightarrow 3S(s) + 2H_2O(l)$

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

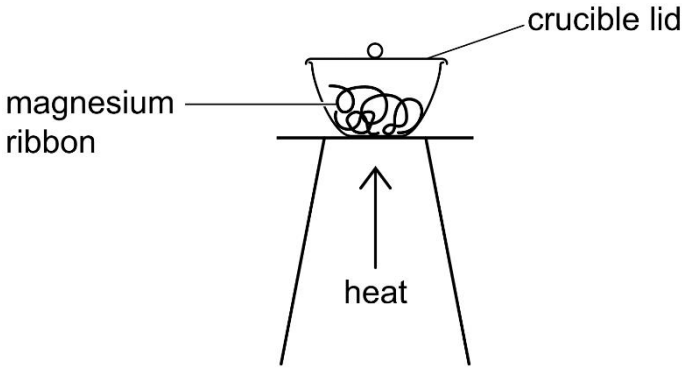
39. In a titration, 25.0 cm^3 of aqueous potassium hydroxide, KOH, is neutralised by 21.50 cm^3 of 0.100 mol/dm^3 sulfuric acid, H_2SO_4.

What is the concentration of the aqueous potassium hydroxide?

A 0.002 mol/dm^3 **B** 0.004 mol/dm^3

C 0.086 mol/dm^3 **D** 0.172 mol/dm^3

40. When 4.8 g of magnesium is heated in a crucible, 5.9 g of magnesium oxide is formed.



What is the percentage yield of the magnesium oxide?

A 53% **B** 74% **C** 80% **D** 81%

41. The equation for the reaction between copper and nitric acid is shown.

$$v\text{Cu} + w\text{HNO}_3 \rightarrow x\text{Cu(NO}_3)_2 + y\text{NO} + z\text{H}_2\text{O}$$

v, *w*, *x*, *y* and *z* are whole numbers.

Which values of *v*, *w*, *x*, *y* and *z* balance the equation?

	v	*w*	*x*	*y*	*z*
A	1	2	1	1	1
B	1	4	1	2	2
C	3	4	3	2	2
D	3	8	3	2	4

42. What is the mass of hydrogen contained in 72.0 g of pure water?

[Relative atomic masses: H = 1.0; O = 16.0]

A 2.0 g **B** 8.0 g **C** 12.0 g **D** 16.0 g

43. The equation for the reaction between calcium carbonate and hydrochloric acid is shown.

$$\text{CaCO}_3\text{(s)} + 2\text{HC}l\text{(aq)} \rightarrow \text{CaC}l_2\text{(aq)} + \text{H}_2\text{O}(l) + \text{CO}_2\text{(g)}$$

What volume of carbon dioxide gas will be produced when 250 g of calcium carbonate reacts with excess hydrochloric acid? Assume one mole of carbon dioxide occupies 24 dm^3.

A 24 cm^3 **B** 30 dm^3 **C** 60 dm^3 **D** 90 dm^3

44. One mole of a sugar, $(CH_2O)_6$, is burned.

Which volume of oxygen, measured at room temperature and pressure, is required for complete combustion of the sugar?

A 24 dm^3 **B** 36 dm^3 **C** 144 dm^3 **D** 216 dm^3

45. 15.0 cm^3 of 1.0 mol/dm^3 potassium hydroxide just neutralise 20.0 cm^3 of a solution of nitric acid. What is the concentration of the acid?

A 0.75 mol/dm^3 **B** 1.0 mol/dm^3

C 1.5 mol/dm^3 **D** 7.5 mol/dm^3

46. The equation for the burning of hydrogen in oxygen is shown.

$$2\text{H}_2\text{(g)} + \text{O}_2\text{(g)} \rightarrow 2\text{H}_2\text{O(g)}$$

What does this equation indicate?

A 2 atoms of hydrogen combine with 2 atoms of oxygen.

B 2 g of hydrogen combine with 1g of oxygen.

C 2 moles of steam can be obtained from 0.5 mole of oxygen.

D 2 moles of steam can be obtained from 1 mole of oxygen.

47. What is the concentration of a solution containing 1.0 g of sodium hydroxide in 250 cm^3 of solution?

A 0.025 mol/dm^3 **B** 0.10 mol/dm^3

C 0.25 mol/dm^3 **D** 1.0 mol/dm^3

48. An element, **E**, forms a hydride, EH_4, which contains 90.0% by mass of **E**.
If the relative atomic mass of hydrogen is 1, what is the relative atomic mass of **E**?

A 9 **B** 36 **C** 86 **D** 90

49. A piece of chalk has a mass of 23.0 g. Chalk is impure calcium carbonate. When analysed, the chalk is found to contain 0.226 moles of pure calcium carbonate. [M_r: $CaCO_3$ = 100]
What is the percentage purity of the piece of chalk?

A 0.983% **B** 1.02% **C** 77.0% **D** 98.3%

50. What is the relative molecular mass, M_r, of $CuSO_4 \cdot 5H_2O$?

A 127 **B** 160 **C** 178 **D** 250

51. 1.00 dm^3 of ammonia gas is passed over heated copper(II) oxide.

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

What is the volume of nitrogen formed when measured at the same temperature and pressure as the ammonia?

A 0.25 dm^3 **B** 0.50 dm^3 **C** 1.00 dm^3 **D** 2.00 dm^3

52. The incomplete equation for the reaction between ethyne, C_2H_2, and oxygen is shown.

$$2C_2H_2(g) + ...O_2(g) \rightarrow ....CO_2(g) + ...H_2O(g)$$

When the equation is balanced, what is the correct value for $O_2(g)$?

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

53. A compound contains 40.0% carbon, 6.7% hydrogen and 53.3% oxygen by mass.
The relative molecular mass of the compound is between 55 and 65. What is the molecular formula of the compound?

A CH_2O **B** C_2H_4O **C** $C_2H_4O_2$ **D** $C_2H_6O_2$

54. A sample of magnesium hydroxide has a mass of 4.63 g.
How many moles of magnesium hydroxide are present?

A 0.0617 **B** 0.0798 **C** 0.113 **D** 0.154

55. The equation shows the production of iron by the reduction of iron(III) oxide.

$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$

80 tonnes of iron(III) oxide produces 50 tonnes of iron.

What is the percentage yield?

A 45% **B** 63% **C** 68% **D** 89%

56. Which statement is correct?

A The concentration of a solution is expressed in dm^3 / mol.

B The empirical formula of a compound always gives the actual numbers of each type of atom in one molecule.

C The molecular formula of a compound always contains more atoms than the empirical formula.

D The relative atomic mass of an element is the average mass of one atom of the element divided by $^1/_{12}$ the mass of one atom of carbon-12.

57. Magnesium will react with aqueous copper(II) sulfate to form copper and aqueous magnesium sulfate.

What is the correct equation for this reaction?

A $Mg + CuSO_4 \rightarrow Cu + MgSO_4$

B $Mg + Cu_2SO_4 \rightarrow 2Cu + MgSO_4$

C $2Mg + CuSO_4 \rightarrow Cu + Mg_2SO_4$

D $2Mg + Cu_2SO_4 \rightarrow 2Cu + Mg_2SO_4$

58. The empirical formula of compound **X** is CH_2 and the relative molecular mass, M_r, of **X** is 70.

What is the molecular formula of **X**?

A CH_2 **B** C_2H_4 **C** C_5H_{10} **D** C_nH_{2n}

59. A chemist wants to make calcium nitrate. They start with 8.00 g of pure calcium oxide and an excess of dilute nitric acid. They produce 12.65 g of pure, dry anhydrous calcium nitrate crystals. What is the percentage yield of calcium nitrate?

[Relative atomic masses, A_r: Ca = 40, N = 14, H = 1, O = 16].

A 54.0 **B** 63.2 **C** 67.1 **D** 86.8

60. A compound has the formula $\mathbf{X}F_2$ and has a relative mass of 70.

What is element **X**?

A Gallium **B** Germanium **C** Sulfur **D** Ytterbium

61. What is the balanced chemical equation for the reaction between calcium and water?

A $Ca + H_2O \rightarrow CaOH + H_2$

B $Ca + H_2O \rightarrow Ca(OH)_2 + H_2$

C $Ca + 2H_2O \rightarrow CaOH + H_2$

D $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$

62. Powdered calcium carbonate reacts with dilute hydrochloric acid to produce calcium chloride, water and carbon dioxide.

What is the correct ionic equation, including state symbols, for this reaction?

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

B $Ca^{2+}(aq) + CO_3^{2-}(aq) + 2H^+(aq) \rightarrow Ca^{2+}(aq) + H_2O(l) + CO_2(g)$

C $CO_3^{2-}(aq) + 2H^+(aq) \rightarrow H_2O(l) + CO_2(g)$

D $CaCO_3(s) + 2H^+(aq) \rightarrow Ca^{2+}(aq) + H_2O(l) + CO_2(g)$

63. In a volumetric experiment, 25.0 cm^3 of 0.100 mol/dm^3 sodium hydroxide reacts exactly with 20.0 cm^3 of sulfuric acid.

$$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$$

What is the concentration of the sulfuric acid?

A 0.0625 mol/dm^3 **B** 0.0800 mol/dm^3

C 0.125 mol/dm^3 **D** 0.250 mol/dm^3

64. The reaction for the conversion of bromoethane to ethanol is shown.

$$C_2H_5Br + NaOH \rightarrow C_2H_5OH + NaBr$$

In an experiment, 10.90 g of bromoethane is converted into 3.45 g of ethanol.

What is the percentage yield of ethanol? [M_r: C_2H_5Br = 109, C_2H_5OH = 46]

A 32% **B** 42% **C** 75% **D** 100%

65. The relative molecular mass, M_r, of liquid **Z** is 60. **Z** contains 40.0% carbon, 6.70% hydrogen and 53.3% oxygen.

Which row shows the correct empirical and molecular formulae of **Z**?

	empirical formula	molecular formula
A	CH_2O	CH_2O
B	CH_2O	$C_2H_4O_2$
C	$C_2H_4O_2$	$C_2H_4O_2$
D	CH_3O	$C_2H_6O_2$

66. A mixture of 5 cm^3 of CH_4 and 100 cm^3 of air is exploded. Assume air is 80% N_2 by volume and 20% O_2 by volume. The resulting mixture is cooled. All volumes are measured at room temperature and pressure.

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

What is the composition of the resulting gas?

	5 cm^3 of CO_2	10 cm^3 of O_2	80 cm^3 of N_2	10 cm^3 of steam
A	✓	✓	✓	✓
B	✓	✓	✓	✗
C	✓	✗	✓	✓
D	✓	✗	✓	✗

67. How many tonnes of aluminium oxide, Al_2O_3, are required to produce 27 tonnes of aluminium?

A 27 **B** 51 **C** 54 **D** 102

68. A compound contains 70% by mass of iron and 30% by mass of oxygen.
What is its empirical formula? [A_r: O = 16, Fe = 56]

A FeO **B** Fe_2O_3 **C** Fe_3O_2 **D** Fe_3O_4

69. The formula for hydrated copper(II) nitrate is $Cu(NO_3)_2 \cdot xH_2O$. It contains 36.5% water of crystallisation by mass. What is the value of x? [A_r: H = 1, N = 14, O = 16, Cu = 64]

A 4 **B** 5 **C** 6 **D** 7

70. A chicken egg has a mass of 60 g. The eggshell is 10% of the total mass.
The egg shell is made of calcium carbonate.
What is the mass of calcium in the egg shell?

A 0.24 g **B** 0.40 g **C** 2.4 g **D** 4.0 g

71. 50.0 cm^3 of 0.10 mol/dm^3 silver nitrate, $AgNO_3$, is added to 150.0 cm^3 of 0.05 mol/dm^3 sodium chloride, NaCl, in a beaker.
As well as solid silver chloride, what is present in the beaker after reaction?

A Aqueous silver nitrate and aqueous sodium nitrate.
B Aqueous sodium chloride and aqueous sodium nitrate.
C Aqueous sodium chloride only.
D Aqueous sodium nitrate only.

72. Nitrogen monoxide and oxygen react to form nitrogen dioxide.

$$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$$

What is the maximum volume of nitrogen dioxide that could be obtained when 1 dm^3 of nitrogen monoxide reacts with 2 dm^3 of oxygen?

A 1 dm^3 **B** 2 dm^3 **C** 3 dm^3 **D** 4 dm^3

73. A mass of 63 g of potassium manganate(VII), $KMnO_4$, is needed for the complete oxidation of 23 g of ethanol, C_2H_5OH, under acidic conditions.

How many moles of ethanol can be completely oxidised by one mole of potassium manganate(VII) under these conditions?

A 0.37 **B** 0.80 **C** 1.00 **D** 1.25

74. Two characteristics of a gas, **G**, are given.

- **G** reduces copper(II) oxide to a pink-brown solid.
- 1.4 g of **G** has a volume of 1.2 dm^3 at room temperature and pressure.

What is **G**?

A Carbon monoxide, CO **B** Hydrogen, H_2

C Nitrogen, N_2 **D** Nitrogen monoxide, NO

75. An aqueous solution contains 0.01 mol of $Zn^{2+}(aq)$ and 0.01 mol of $Cu^{2+}(aq)$.

Aqueous sodium hydroxide is added until in excess.

After shaking, the mixture is filtered. What remains on the filter paper?

A 0.01 mol of a white hydroxide and 0.01 mol of a blue hydroxide.

B 0.01 mol of a white hydroxide.

C 0.01 mol of a blue hydroxide.

D There is no solid residue.

76. An excess of dilute sulfuric acid is added separately to the following reagents.

reaction 1	1.2 g of magnesium
reaction 2	2.0 g of magnesium oxide, then warmed
reaction 3	4.2 g of magnesium carbonate

Each reaction produces 100% yield of the products.

Which statement is correct?

A The number of moles of magnesium sulfate formed is greatest in reaction 1.

B The number of moles of magnesium sulfate formed is greatest in reaction 2.

C The number of moles of magnesium sulfate formed is greatest in reaction 3.

D The number of moles of magnesium sulfate formed is the same in all three reactions.

77. 100 cm^3 of gaseous propane, C_3H_8, are ignited in 300 cm^3 of oxygen.

What volume of each gas exists at the end of the experiment?

Assume that all measurements are made at room temperature and pressure.

	volume of gas / cm^3		
	$C_3H_8(g)$	$O_2(g)$	$CO_2(g)$
A	0	50	300
B	0	100	300
C	40	0	180
D	60	0	120

78. Which volume of carbon dioxide gas, at room temperature and pressure, is produced when 2.65 g sodium carbonate reacts with 100 cm^3 of 0.10 mol/dm^3 hydrochloric acid?

A 120 cm^3 **B** 240 cm^3 **C** 600 cm^3 **D** 1200 cm^3

- Scan the QR Code below to view the answers to this assignment.

https://www.chemist.sg/mole/assignments/mole_thirteen_ans.pdf