CHEMISTRY FORM THREE
MARKING SCHEME.

1.

i	ii	iii	iv	v	vi	vii	viii	ix	x
D	A	C	A	D	B	A	C	C	A

(@ 01= 05 marks)

2.

LIST A.	i	ii	iii	iv	v	vi
LIST B.	D	C	E	B	G	H

(@01=05 marks)

3. (a) The statement signify that the types of mixture are **suspension** mixture which is heterogeneous mixture of liquid and fine particles of a solid. The solid does not dissolve but remain suspended in the liquid, the suspended particles are slightly visible and settles over time if left undisturbed, therefore shaking make the syrup to mix well. **(02 Marks)**

The suitable method for separation is **Filtration (01 Marks)**

(b) i) $2AgNO_{3(aq)} + CaCl_{2(aq)} \rightarrow 2AgCl_{(s)} + Ca(NO_3)_{2(aq)}$

ii)Total ionic equation; $2Ag^{+} + 2NO_3^{+}{}_{(aq)} + Ca^{2+} + 2Cl^{-}{}_{(aq)} \rightarrow 2AgCl_{(s)} + Ca^{2+} + 2(NO_3)^{-}{}_{(aq)}$

Net ionic equation; $2Ag^{+} + 2Cl^{-} \rightarrow 2AgCl_{(s)}$

@01 Mark=03 Mrks

(c) i) Used in water purification

ii) Used to make insoluble salts.

iii) Used in diagnostic analysis (Blood analysis) **(@01= 03 marks)**

4. (a) i) Solution R is **Base** and Solution S is **Acid. (@0.5=01 mark)**

ii)

SOLUTION R(BASE)	SOLUTION S (ACID)
i.Have a bitter state	Have sour state
ii. Most of base are insoluble in water	Most of acid are soluble in water
iii.Turn red litmus paper to blue	Turn blue litmus to red

(@01=03 marks)

(b) Solution A- Nitric acid
Solution B- Acetic acid
Solution C- Ammonium solution
Solution D- Sodium hydroxide **(@01= 04 marks)**

(c) Because lemon juice is acidity in nature, it increasing the acid by lowering the PH of the solution and quickly change the pigments in the tea to be paler. **(01 mark)**

5.(a) i) $CaCO_{3(S)} + 2Hcl_{(aq)} \rightarrow Cacl_{2(aq)} + CO_{2(g)} + H_2O_{(l)}$ **(01 mark)**

ii) Due to production of carbon dioxide gas that escape to the atmosphere. **(01 mark)**

iii) From the chemical reaction;

$CaCO_{3(S)} + 2Hcl_{(aq)} \rightarrow Cacl_{2(aq)} + CO_{2(g)} + H_2O_{(l)}$

1mole of $CaCO_{3(S)} \rightarrow$ 1mole of $CO2_{(g)}$

1mole x 100 g/ mol $CaCO_{3(s)} \rightarrow$…….. x $CO_{2(g)}$?

X= 44g÷ 100g/mol **(02 mark)**

= 4.4g

Therefore, the mass loss of calcium carbonate = 4.4g

iv) Stoichiometry. **(01 mark)**

(b) i) The change state of matter. **(01 mark)**

ii) - Used in drying materials
- Used in steam engine
- Used in water cycle. **(03 mark)**

6.(a) i)

ATOM		ION
i.	Are small particle that take part in chemical reaction	Are the species formed when atom gain or lose electrons
ii.	Atom are not stable	It is stable.

(@0.5= 01 mark)

(ii) Helium is lighter than air and non-combustible or not burn with other element. **(01 mark)**

(b) i) Because pure water can be tested by freezing or boiling point, freez at 0◦C and boil at 100◦C. **(01 mark)**

ii) $CuSO_4 + 5H_2O \rightarrow CuSO_4 .5H_2O$ **(01 mark)**

iii) Blue cobalt (ii) chloride which turn to pink. **(01 mark)**

(c) Percentage composition of oxygen = 52.2 % + 13%=100

100 %- 65.2% = 34.8%

(01 Marks)

Element	C	H	O
% Composition by mass	52.2	13	34.8
Divide by R.A.M	52.2/12= 4.35	13/1=13	34.8/16=2.175
Divide by small value	4.35/ 2.175=2	13/2.175=5.9	2.175/2.175=1
Ratio	2	6	1

(02 Marks)

: Empirical formula= C_2H_6O

Therefore; (Empirical formula) x n = Molecular formula.

(C_2H_6O) n =23X2

(24+6+16) n=46

46/46n=46/46

n=1

: Molecular formula = (C_2H_6O) x 1= C_2H_6O. **(01 Marks)**

7 (a) i)- Sample A contain hydrogen carbonate of calcium and magnesium. **(01 mark)**

-Sample B contain sulphate of calcium and magnesium (**01 mark)**

ii) Sample B because use the same amount of soap solution before and after boiling, show that its hardness was not removed by boiling. **(1.5 marks)**

iii) Sample A because use small amount of soap solution after being boiled, indicated that the sample were temporary since removed by boiling. **(1.5mark)**

(b) i) Temporary hard water is formed when rain water passed in atmospheric carbon dioxide and dissolved in rock mineral or salt (marble chips) in interior of the earth crust

$H_2O_{(l)} + CO_{2(g)} + CaCO_{3(s)} \rightarrow Ca(HCO3)_{2(aq)}$ **(02 marks)**

ii) $NH_4OH_{(aq)} + Ca(HCO_3)_{2(aq)} \rightarrow CaCO_{3(s)} + (NH_4)CO_{3(aq)} + 2H_2O_{(l)}$

Through addition of ammonia solution soluble hydrogen carbonates are converted to insoluble carbonate as shown in above reaction. **(02 marks)**

8. (a) i) Element A is Magnesium

Element B is Sodium

Element C is Sulphur **(@0.5= 02 marks)**

Element D is Carbon

ii) Element A When burn in air form magnesium oxide

Element B When burn in air form sodium oxide

Element C When burn in air form sulphur dioxide gas **(@ 0.5= 02 marks)**

Element D When burn in air form carbon dioxide gas

iii) Element A and B are meatal while Element C and D is non-metal. **(02 marks)**

(b) (i) Solubility; Oxygen gas is slightly soluble in water which enable aquatic organism to get oxygen gas and sustain their life in water.

(ii) Combustion, Oxygen gas support combustion, burning of substances, welding and cutting, also used to burn food in respiration process.

(iii) React with other element. Oxygen gas react with many elements make it useful in industrial chemical process such as manufacturing of chemicals, glass and paper**. (@01= 03 marks)**

SECTION C (15 MARKS)

9.(a) Neutralization reaction **(01 mark)**

(b) Introduction **(01 mark)**

Main body.

(i) Treating insect sting.
(ii) Relieving indigestion.
(iii) Soil treatment (regulating soil PH).
(iv) Treating factory waste.
(v) Preventing acidic rainfall.
(vi) Neutralizing accidental spills
(vii) Manufacture of fertilizer.

(ANY SIX POINT ONLY WITH EXPLANATION AND RELEVANT EXAMPLES @ O2 MARKS)

Conclusion **(01 mark)**

10. Given ; moles of SO_2=3 moles
Moles of O_2=4 moles

Required;

(a) Reactant present in small amount

$$\mathbf{2SO_{2(g)} + O_{2(g)} \rightarrow 2SO_{3(g)}}$$

From the equation

For SO_2 from the equation…….

2moles of SO_2 = 2moles of SO_3

3moles of SO_2 = ? **(03 marks)**

=(3 x 2)÷ 2 = 3 moles of SO_3

Therefore, sulphur dioxide produce **3 moles** of sulphur trioxide.

For O_2 from the equation……

1mole of O_2 = 2moles of SO_3

4 moles of O_2 = ?

= 8 moles of O_{2tytrt}

Therefore, oxygen gas produces **8 moles** of Sulphur trioxide. **(02marks)**

> Hence the reactant present in small amount was Sulphur dioxide because the amount given (3moles) is smaller than the amount required to react (8 moles)

(b) Gram of reactant left in the container;
Reactant left is oxygen.

Amount of oxygen given = 4 moles and amount of oxygen gas reacted =1.5 moles

Amount remained/ left =4 moles -1.5 moles =2.5 moles

Amount of oxygen gas remained =2.5 moles.

But amount of substance (n) = mass/molar mass

Mass= 2.5 moles x 32 =80g.

Therefore, grams of reactant left in the container=80g. (04marks)

(c) Moles of Sulphur trioxide produced
From the equation

2moles of SO_2 = 2moles of SO_3

3moles of SO_2 = ?

= (3x2)÷ 2 = 3 moles of Sulphur trioxide. **(03marks)**

Therefore, moles of Sulphur trioxide produced = 3 moles.

(d) Litre of suphur trioxide produced
Amount of substance (n) = volume of a gas÷molar volume of a gas

Volume= 3molesx 22.4 dm^3/ mol 67.2 litres.

Therefore, 67.2 of Sulphur trioxide were produced at s.t.p (03marks)

11.(a) i) It is environmental friendly, since do not cause pollution.
ii) Mostly are non-toxic, for ensuring no eruption of diseases.
iii) It is cheap source of energy
iv) It create new job during construction.
v) Help to clean environment by decomposition of organic matter. For example, biogas.
vi) Is the source of fuel that never run out.

(ONLY FIVE POINT WITH EXPLANATION, @ 1.5 =7.5MARKS)

(b). i) Equal amount of biomass and water are mixed in mixing tank to for slurry, the formed slurry is fed into the digester tank through inlet chamber.

ii) When the digester is partially filled with the slurry, the introduction of slurry is stopped and the set up left un used for about two months.

iii)The slurry is left for almost two months for anaerobic respiration; the bacteria are used to decompose to form biogas.

iv) As more biogas is start to be collected, the pressure exerted by the biogas forces the slurry into the outlet pipe.

v) From the outlet chamber flow to the overflow tank and is manually removed and used as manure. **(ONLY FIVE POINTS @1.5= 7.5marks)**