

STUDENT EDUCATION NUMBER



GOVERNMENT OF SAMOA
MINISTRY OF EDUCATION, SPORTS AND CULTURE

Samoa School Certificate

CHEMISTRY

2017

QUESTION and ANSWER BOOKLET

Time allowed: 3 hours and 10 minutes

INSTRUCTIONS:

1. You have 10 minutes to read **before** you start writing.
2. Write your **Student Education Number (SEN)** in the space provided on the top left hand corner of this page.
3. Answer **ALL QUESTIONS**. Write your answers in the spaces provided in this booklet.
4. If you need more space for answers, ask the Supervisor for extra paper. Write your SEN on all extra sheets used and clearly number the questions. Attach the extra sheets at the appropriate places in this booklet.

NB: Periodic Table is inserted as a separate sheet.

STRANDS	Page	Time (min)	Weighting
STRAND 1: ATOMIC STRUCTURE AND BONDING	2	18	10
STRAND 2: QUANTITATIVE CHEMISTRY	3	22	12
STRAND 3: ORGANIC CHEMISTRY	5	43	24
STRAND 4: OXIDATION AND REDUCTION	9	18	10
STRAND 5: INORGANIC CHEMISTRY	10	50	28
STRAND 6: PRINCIPLES OF PHYSICAL CHEMISTRY	15	29	16
TOTAL		180	100

Check that this booklet contains pages 2-18 in the correct order and that none of these pages is blank.
HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

STRAND 1: ATOMIC STRUCTURE AND BONDING Weighting 10

The electron arrangement of Carbon, C, is 2, 4.

1.1 Write the electron arrangement for Aluminium.

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SL 1

1.2 Define *isotopes*.

SL 1

1.3 Sketch a diagram of the carbon atom with six protons and eight neutrons. Label the nucleus and the subatomic particles.

SL 2

1.4 Draw the Lewis Structure of Methane.

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SL 3

1.5 Explain the physical properties of ionic substances in relation to its structure and bonding.

SL 3

STRAND 2:

QUANTITATIVE CHEMISTRY

Weighting 12

2.1 Define *mole*.

SL 1

2.2 State the Avogadro's Constant.

SL 1

2.3 Explain the relationship between mass and number of moles.

SL 3

2.4 Calculate the percentage composition of iron oxide, Fe_2O_3

$$M(\text{Fe}) = 55.9 \text{ g mol}^{-1} \quad M(\text{O}) = 16.0 \text{ g mol}^{-1}$$

Show all working out.

SL 3

2.5 Vitamin C has a mass composition of 40.92% carbon, 4.58% hydrogen and 54.50% oxygen.

(i) Calculate the empirical formula of vitamin C.

(ii) If the molar mass of Vitamin C is 176 g mol^{-1} , use your answer in (i) to determine the molecular formula of Vitamin C.

$$\text{C} = 12 \text{ g/mol}$$

$$\text{H} = 1 \text{ g/mol}$$

$$\text{O} = 16 \text{ g/mol}$$

SL 4

3.1 Define *homologous series*.

SL 1

3.2 Name an unsaturated hydrocarbon.

SL 1

3.3 Identify a hydrocarbon given its physical characteristics.

SL 1

3.4 Define *isomerism*.

SL 1

3.5 List TWO physical properties of alkynes.

(i) _____

(ii) _____

SL 2

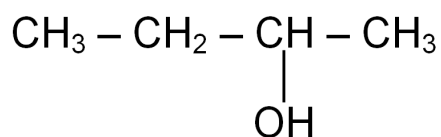
3.6 Explain why there are numerous carbon compounds (catenation).

SL 3

3.7 Define *functional groups*.

SL 1

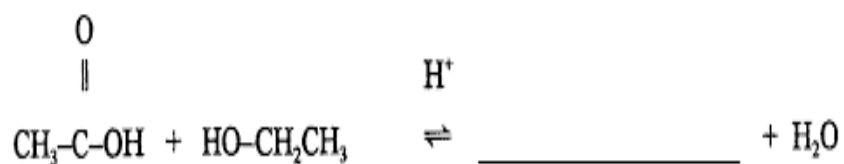
3.8 Name the structural formula below:



Name: _____

SL 1

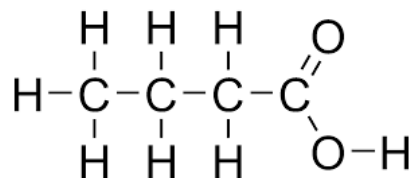
3.9 Name the product formed from the reaction below.



Name: _____

SL 1

3.10 Name the functional group of the structural formula below.



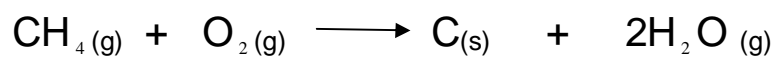
Functional group: _____

SL 1

3.11 Give ONE use of alcohol.

SL 1

3.12 For the reaction given below, state a relevant title to the process.



SL 1

3.13 Draw the structural formulae of **3,4 – dimethylpentan-2-ol**

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SL 2

3.14 Explain the production of ethanol from the hydration of ethene.

SL 3

3.15 Discuss the significance of various parts of the **esterification process** in real life.

SL 4

STRAND 4: OXIDATION AND REDUCTION REACTIONS Weighting 10

4.1 Define *oxidation*.

SL 1

4.2 Define *reducing agent*.

SL 1

4.3 When zinc metal is placed in hydrochloric acid, the zinc metal dissolves and releases a gas.

Write the half equation for the **reduction reaction**.

SL 1

4.4 From the reaction in 4.3 above, the zinc metal is oxidized.

Write the half equation for the **oxidation reaction**.

SL 1

4.5 Write an overall balanced half equation for 4.3 and 4.4 above.

SL 1

4.6 List TWO oxidizing agents.

(i) _____

SL 2

(ii) _____

4.7 Calculate the oxidation for:

(i) Oxygen in H_2SO_4

SL 3

(ii) Nitrogen in N_2

(iii) Copper ion, Cu^{+2}

STRAND 5:

INORGANIC CHEMISTRY

Weighting 28

5.1 Define *precipitation*.

SL 1

5.2 Define *efflorescence*.

SL 1

5.3 Name the ionic compounds below.

(i) CuCO_3

SL 2

(ii) NH_4OH

5.4 Define *alloy*.

SL 1

5.5 Give ONE example of an alloy.

SL 1

5.6 Describe TWO ways of preventing corrosion.

(i) _____

SL 2

(ii) _____

5.7 Define *deliquescence*.

SL 1

5.8 Discuss the importance of the ozone layer to the planet earth.

SL 4

5.9 Name ONE allotrope of carbon.

SL 1

5.10 List TWO uses of carbon dioxide.

(i) _____

SL 2

(ii) _____

5.11 Explain the effect of greenhouse gases on climate.

SL 3

5.12 Explain the CONTACT process for the manufacture of sulfuric acid.

SL 3

5.13 Discuss the properties of sulfuric acid and its uses in real life situations.

SL 4

5.14 Name a property of chlorine.

SL 1

5.15 Give ONE use of hydrochloric acid.

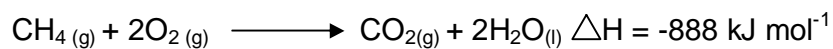
SL 1

6.1 Define *endothermic*.

SL 1

6.2 Reactions are described in different ways.

Classify whether the reaction below is **exothermic** or **endothermic**.



SL 1

6.3 Hydrogen formed by the reaction of zinc with hydrochloric acid is collected by displacement of water.

The total volume of hydrogen collected is recorded every minute for five minutes.

Time (minute)	0	1	2	3	4	5
Volume of hydrogen (ml)	0	12	20	25	28	29

Draw a graph showing the total volume of hydrogen collected (*y axis*) against the time since the start of the experiment (*x axis*).



SL 2

6.4 Explain THREE (3) factors affecting the rate of reactions.

(i) _____

SL 3

(ii) _____

(iii) _____

6.5 Describe TWO physical properties of bases.

(i) _____

SL 2

(ii) _____

6.6 Explain THREE differences between strong and weak acids.

(i) _____

SL 3

(ii) _____

(iii) _____

6.7 When conducting a simple tests for acids and bases using the litmus paper, discuss any four core objectives to implement and conduct this test.

(i) _____

SL 4

(ii) _____

(iii) _____

(iv) _____

For scorers use only

STRANDS	SCORE	Weighting
STRAND 1: Atomic Structure and Bonding		10
STRAND 2: Quantitative Chemistry		12
STRAND 3: Organic Chemistry		24
STRAND 4: Oxidation and Reduction		10
STRAND 5: Inorganic Chemistry		28
STRAND 6: Principles of Physical Chemistry		16
TOTAL		100