

STUDENT EDUCATION NUMBER

GOVERNMENT OF SAMOA
MINISTRY OF EDUCATION, SPORTS AND CULTURE

Samoa School Certificate

CHEMISTRY

2019

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 right 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	4	22	12
STRAND 3: ORGANIC CHEMISTRY	6	43	24
STRAND 4: OXIDATION AND REDUCTION	10	18	10
STRAND 5: INORGANIC CHEMISTRY	11	50	28
STRAND 6: PRINCIPLES OF PHYSICAL CHEMISTRY	15	29	16
TOTAL		180	100

Check that this booklet contains pages 2-19 in the correct order and that none of these pages is blank.

HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION

1. Consider the atom with the symbol ${}_{19}^{39}\text{Y}$.

(i) What is the mass number for the atom?

(ii) How many neutrons does this atom have?

SL 2

2. Draw the Lewis dot diagram for the NH_3 molecule.

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SL 3

3. Define *metallic bond*.

SL 1

**Particle A has 10 protons, 10 neutrons and 10 electrons.
Particle B has 10 protons, 12 neutrons and 10 electrons.**

4. From this information, A and B can be described as:
Circle the correct answer.

- A. Ions
- B. Allotropes
- C. Isomers
- D. Isotopes

SL 1

5. Explain why ionic compounds generally have high melting and boiling points.

SL 3

11.25 g of hydrated copper sulphate, $\text{CuSO}_4 \cdot x\text{H}_2\text{O}$, is heated until it loses all of its water. Its new mass is found to be 7.19 g.

6. Calculate the value of x .

$$M(\text{Cu}) = 63.5 \text{ g/mol}$$

$$M(\text{S}) = 32 \text{ g/mol}$$

$$M(\text{O}) = 16 \text{ g/mol}$$

$$M(\text{H}) = 1 \text{ g/mol}$$

SL 3

7. Calculate the molar mass of nitric acid, HNO_3 .

$$M(\text{H}) = 1 \text{ g/mol}$$

$$M(\text{N}) = 14 \text{ g/mol}$$

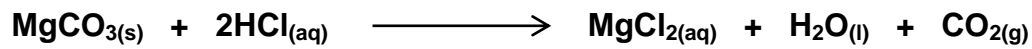
$$M(\text{O}) = 16 \text{ g/mol}$$

SL 1

8. State the *Avogadro's constant*.

SL 1

The reaction between magnesium carbonate and dilute hydrochloric acid is represented by the equation:



9. Calculate the mass of magnesium carbonate that will be needed to produce 8.8 g of CO_2 .

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SL 4

10. The amount (mole) of carbon in 88g of propane, C_3H_8 is:
Circle the correct answer.

- A. 3 mol
- B. 6 mol
- C. 11 mol
- D. 16 mol

SL 1

11. 4g of helium atoms will contain the same number of atoms as:
Circle the correct answer.

- A. 16g of hydrogen gas.
- B. 8g of oxygen gas.
- C. 14g of nitrogen gas.
- D. 4g of any gas.

SL 2

12. List any TWO uses of ethanol.

SL 2

13. Define the term *functional groups*.

SL 1

14. Discuss an important observation that would be made when propanol is warmed with methanoic acid in the presence of sulphuric acid.

SL 4

15. List any TWO physical properties of alkanes.

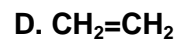
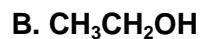
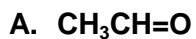
SL 2

16. Define the term *homologous series*.

SL 1

Use the Key List below to answer Number 17 to 19.
You may use any member of this list more than once.

KEY LIST



17. Which compound is an alkene?

SL 1

18. Which ONE of the compounds is a carboxylic acid?

SL 1

19. Other than the carboxylic acid, which ONE compound will yield hydrogen gas when placed in contact with metallic sodium?

SL 1

Ethene, C_2H_4 can be made in the laboratory from ethanol $\text{C}_2\text{H}_5\text{OH}$.

20. Write the balanced equation for the preparation of ethene.

SL 3

A straight chain alkane has the percentage composition (by mass), carbon 83% and hydrogen 17%. The molar mass of the alkane is 58 g/mol.

21. Find its empirical, molecular formula and name the alkane.

$$M(\text{C}) = 12 \text{ g/mol}$$

$$M(\text{H}) = 1 \text{ g/mol}$$

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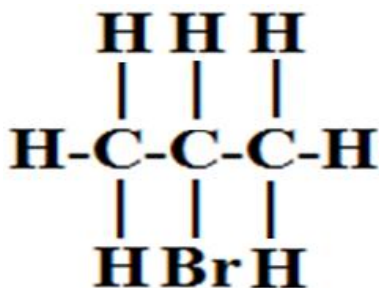
SL 3

22. Draw an isomer of C_4H_8 .

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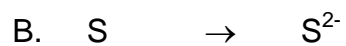
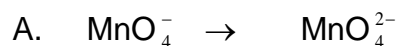
SL 1

23. Name the following compound.



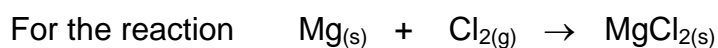
SL 1

25. Which of the following is an oxidation reaction? (The equation are not balanced).
Circle the correct answer.



SL 1

Use the reaction below to answer Number 26 to 28.



26. What is oxidized? _____

SL 1

27. What is reduced? _____

SL 1

28. Which reactant is the oxidant? _____

SL 1

29. Calculate the oxidation state of phosphorus in H_3PO_4 .

SL 3

30. List any TWO oxidizing agents.

SL 2

31. Define the term *reducing agents*.

SL 1

STRAND 5:

INORGANIC CHEMISTRY

Weighting 28

32. Name ONE allotrope of carbon.

SL 1

33. Name the following carbonates.

(i) CaCO_3 - _____

(ii) K_2CO_3 - _____

SL 2

34. Name the following hydroxides.

(i) Al(OH)_3 - _____

(ii) Fe(OH)_3 - _____

SL 2

35. Explain what the Greenhouse Effect is.

SL 3

36. Discuss the importance of the ozone layer to the earth.

SL 4

Identify the colours of the following precipitates for Number 37 to 39.

37. BaSO_4 - _____

SL 1

38. Cu(OH)_2 - _____

SL 1

39. Fe(OH)_2 - _____

SL 1

40. Name ONE allotrope of sulphur.

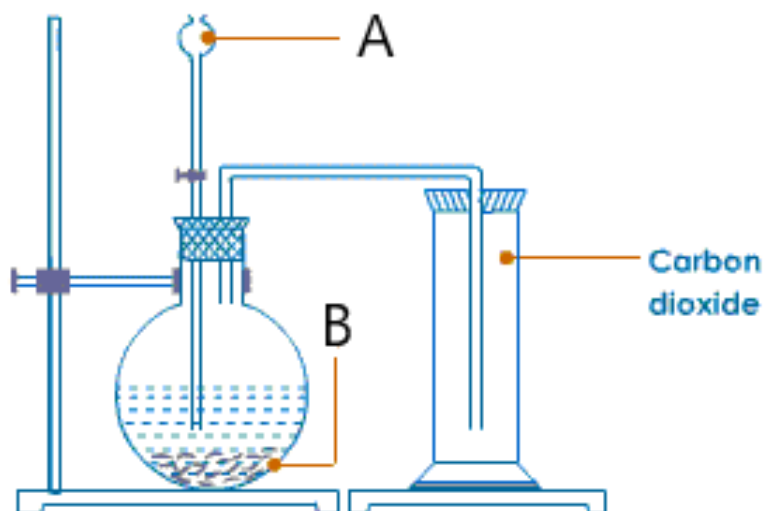
SL 1

41. Give ONE example of an alloy.

SL 1

42. The diagram below shows the apparatus for the laboratory preparation of carbon dioxide gas. Label the **chemical A** and **substance B**.

[Note: Do not label the apparatus]



A - _____

B - _____

SL 2

43. After many years, steel anchors that have been recovered from the sea bed show little corrosion. Use your knowledge of the corrosion process to explain why.

SL 3

44. Discuss the properties of sulphuric acid and its uses in real life situations.

SL 4

45. Write the chemical formula of ozone.

SL 1

46. Define the term *filtration*.

SL 1

47. Define *amphoteric*.

SL 1

48. Name TWO substances that have amphoteric properties.

SL 2

49. Which ONE of the following will form a basic solution?

Circle the correct answer.

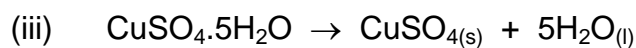
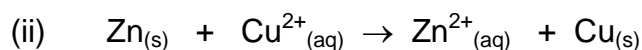
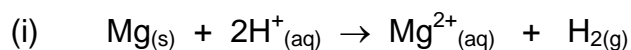
- A. NaCl
- B. CH₃COOH
- C. NaOH
- D. H₂SO₄

SL 1

50. Which of the following reactions are reversible?

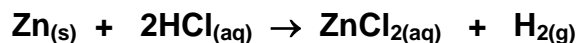
Give evidence to support your response.

Circle the correct answer.



SL 2

A student studied the rate of the chemical reaction:



Three experiments were carried out using the quantities and concentrations set out in the table below:

Experiment No.	Mass of Zn (g)	Volume of acid (mL)	Concentration of acid (mol/L)
1	1	10	1.0
2	1	20	1.0
3	1	10	2.0

51. Describe a general method that could be used to measure the rates of the reactions in these experiments. State carefully the measurements required.

SL 3

52. Dilute sulphuric acid reacts reasonably slowly with granules of zinc metal producing hydrogen gas and zinc sulphate solution.

Draw the apparatus you would use to prepare and collect the hydrogen gas and discuss the measurements needed to determine the rate of the reaction.



SL 4

53. Explain the difference between a weak acid and a dilute acid.

SL 3

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CHEMISTRY

2019

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