GOVERNMENT OF SAMOA

STUDENT EDUCATION NUMBER									

Samoa National Junior Secondary Certificate

CHEMISTRY

2024

QUESTION and ANSWER BOOKLET

Time allowed: 3 Hours & 10 minutes

INSTRUCTIONS

1. You have 10 minutes to read **before** you start the exam.
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, ask the Supervisor for extra paper. Write your SEN on all extra sheets used and clearly number the questions. Attach the extra sheets to the appropriate places in this booklet.

Note: Periodic Table on page 24 of the Question Paper.

STRANDS		Pages	Time (min)	Weighting
STRAND 1	THE WAYS MATERIALS ARE STRUCTURED	2-7	62	34
STRAND 2	THE PROPERTIES AND USES OF SUBSTANCES	8-15	56	32
STRAND 3	THE WAYS MATERIALS ARE CHANGE	16-23	62	34
TOTAL			**180**	**100**

Check that this booklet contains pages 2-25 in the correct order and that none of these pages are blank.

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

STRAND 1: **THE WAYS MATERIALS ARE STRUCTURED** **WEIGHTING 34**

TRUE and FALSE. Choose the BEST answer for Questions 1 to 3 by ticking the appropriate box.

1. Atom is the smallest particle unique to an element.

☐ TRUE ☐ FALSE

SL 1

2. A proton is a negatively charged particle.

☐ TRUE ☐ FALSE

SL 1

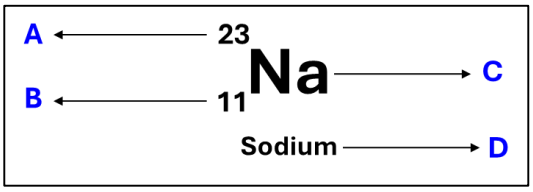
3. A neutron is a subatomic particle found in the nucleus of an atom.

☐ TRUE ☐ FALSE

SL 1

For Questions 4 and 5, choose and write the LETTER of the correct answer in the box provided.

4. The mass number for the element below is labelled:



A. A
B. B
C. C
D. D

☐

SL 1

5. A covalent bonding is the type of bonding that:

A. transfer electrons.
B. used up electrons.
C. shares electrons.
D. move electrons.

☐

SL 1

6. Draw the Lewis structure of water.

SL 2

7. Describe the formation of ionic bonds using sodium chloride, NaCl.

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SL 2

8. List any **TWO** examples of a compound. Write the correct name and formula.

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SL 2

9. Write the **TWO** isotopes of hydrogen.

_____

SL 2

10. Calculate the molar mass of **calcium sulphate**, **$CaSO_4$**.

M(Ca) = 40 g/mol **M(S) = 32 g/mol** **M(O) =16 g/mol**

SL 2

11. Write the chemical formula of the **nitrate ion**.

SL 2

_____

12. Calculate the **number of moles** of CH_4 with a mass of 64g.

M(C) = 12 g/mol **M(H) = 1 g/mol**

SL 3

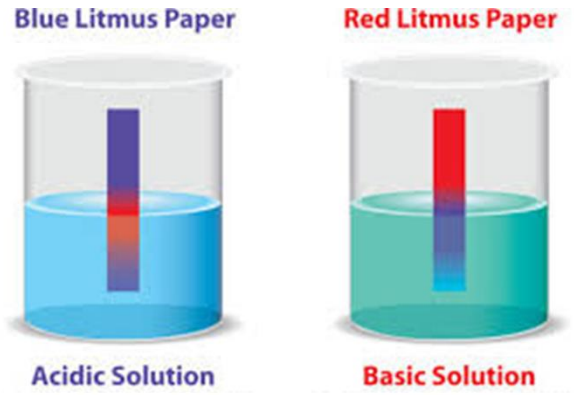
13. Calculate the percentage of hydrogen in water.

Given: **M(H) = 1 g/mol** **M(O) = 16 g/mol**

SL 3

14. Explain why sodium metal (Na) conducts electricity in the solid state whereas sodium chloride (NaCl) does not conduct electricity in the solid state.

SL 3



15. A chemistry teacher sets up an experiment, as shown in the diagram above.

Discuss the purpose of the experiment, including any observations and the results obtained.

SL 4

16. Describe and compare the main differences between cations ((Mg^{2+}) and anions (Cl^{-}), including their charges, formations, electron and proton numbers.

SL 4

STRAND 2: THE PROPERTIES AND USES OF SUBSTANCES WEIGHTING 32

For Questions 17 to 20, choose and write the LETTER of the correct answer in the box provided.

17. The chemical formula for washing soda or powder is:

A. $NaHCO_3$.
B. NaCl.
C. NaOH.
D. Na_2CO_3 .

	SL 1

18. The allotropes of sulfur are:

A. diamond and graphite.
B. monoclinic and rhombic.
C. diamond and rhombic.
D. graphite and monoclinic.

	SL 1

19. Which of the following is an example of a flammable substance?

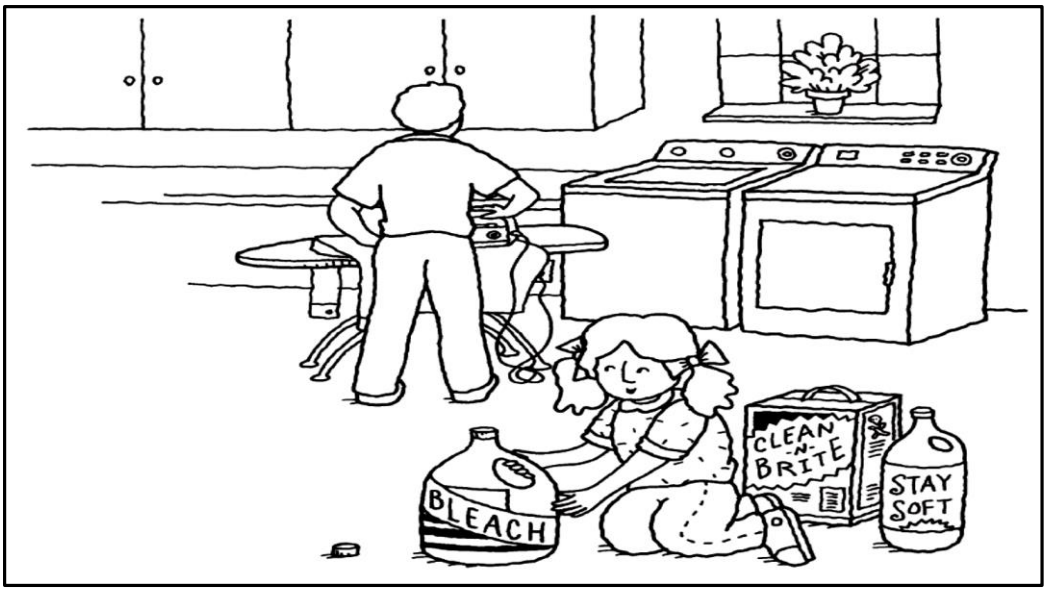
A. Water
B. Seawater
C. Diesel
D. River

	SL 1

20. Hazardous substances are:

A. Substances that are poisonous to living organisms when they are exposed to them.
B. Substances that can chemically erode or degrade materials upon contact.
C. Substances that can ignite and burn easily.
D. Substances that pose a risk or danger to health, safety, property, or the environment.

	SL 1



21. If you were the adult in the picture above, describe the appropriate actions you would take regarding safety in the home.

SL 2

22. Describe how washing powder is used in your household.

SL 2

23. Describe the impacts of household substances shown in the diagram above on the environment and human health.

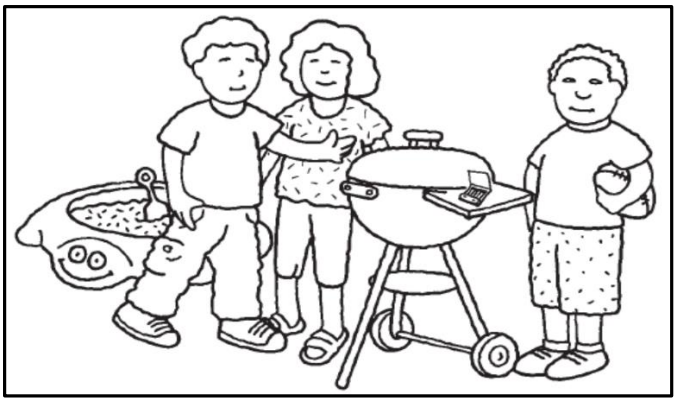
SL 2

24. Describe any **TWO** uses of carbon dioxide (CO_2)

SL 2

25. There are at least ten hazards in the picture above. Explain any **THREE** safety precautions applied to these hazards.

SL 3



26. Study the picture above, and describe the potential effects if children were to play with matches. List any **THREE** appropriate actions the children should take in this situation.

SL 3

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27. Explain why graphite leaves a black mark when rubbed on paper but diamond cuts paper.

SL 3

28. Explain how any household substances should be stored safely.

SL 3

29. Discuss the effect of chlorofluorocarbon (CFC) on the ozone layer as shown in the figure above.

SL 4

30. Discuss the steps and equipment required for preparing chlorine through electrolysis of sodium chloride solution (NaCl) in a school laboratory.

SL 4

STRAND 3: THE WAYS MATERIALS ARE CHANGED WEIGHTING 34

For Questions 31 to 33, choose and write the LETTER of the correct answer in the box provided.

31. Which of the following is **NOT** a factor that affects the rate of chemical reactions?

A. Temperature.
B. Surface area.
C. Concentration.
D. Air.

	SL 1

32. Which of the following is an example of chemical change?

A. Boiling water.
B. Ice cubes forming.
C. Lighting a match.
D. Mixing sand and salt.

	SL 1

33. The chemical name for the compound, Fe_2O_3 is:

A. iron chloride.
B. iron oxide.
C. iron hydroxide.
D. iron oxalate.

	SL 1

34. Balance the following chemical equation.

SL 2

_____Ca + O_2 ⟶ _____CaO

35. Write a balanced chemical equation for a ***precipitation reaction*** of calcium sulfate ($CaSO_4$).

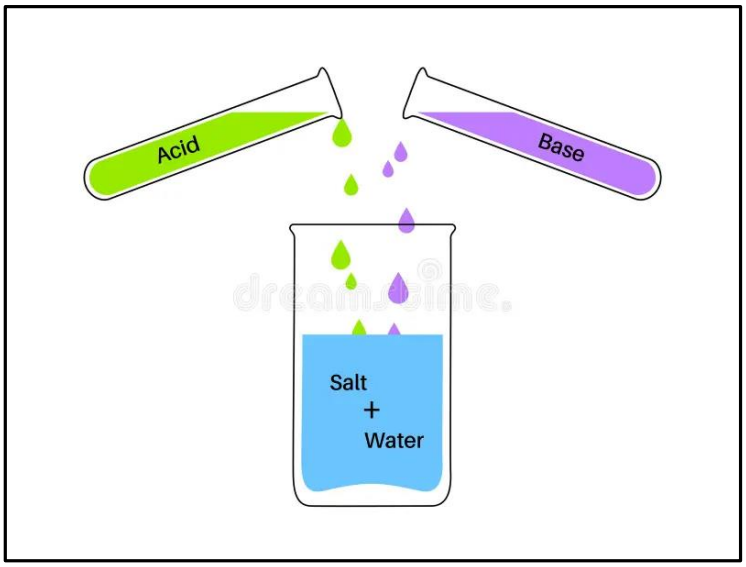
SL 2

36. Define the term **oxidation** in terms of the transfer of oxygen and electrons.

SL 2

37. Describe any observations that help you to determine when a chemical reaction has taken place.

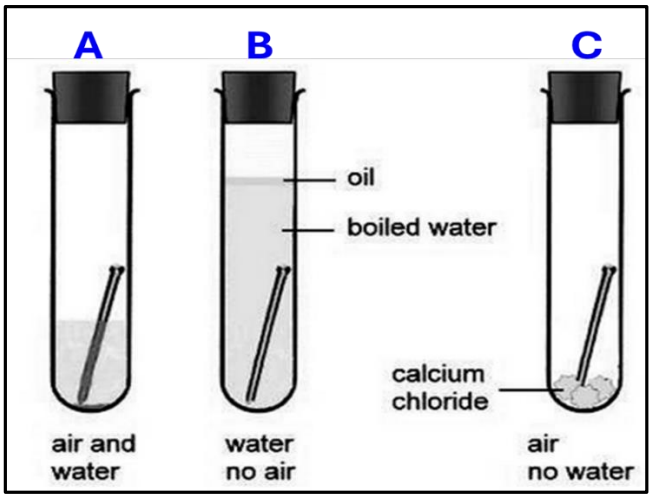
SL 2



38. A chemistry student conducted the experiment depicted in the diagram above.

Describe the type of reaction that occurred and provide an example, including a balanced chemical equation.

SL 3



39. Rusting is a serious and costly problem Rust weakens steel and iron structures. The process of rusting in iron occurs under specific conditions illustrated in the diagram above.

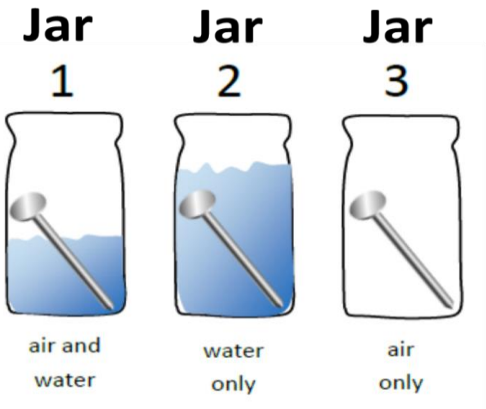
Discuss the expected result in terms of rusting, in test tubes A, B and C.

SL 4

40. Discuss any FOUR applications of the rate of reactions in real-life situations.

SL 4

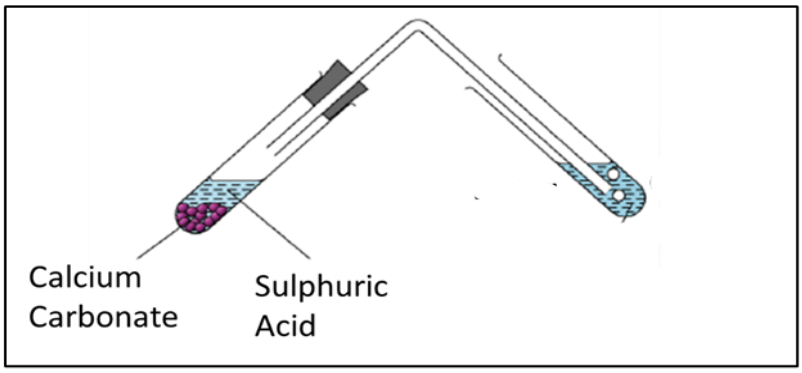
41. Iron has many properties, and one example is that it can rust.
For iron to rust it needs certain conditions.



Discuss any observation of the result based on the conditions shown in the diagram above.

SL 4

42. Most carbonates usually do not dissolve in water (insoluble) as shown in the illustration below.



Describe the result of the chemical reaction shown above. *[Hint: products of the reaction above]*

SL 4

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43. In biological reactions, catalysts are usually protein molecules called **enzymes**.

Discuss how catalysts can increase the rate of a reaction.

SL 4

Periodic Table of the Elements

1												13	14	15	16	17	18
1 H Hydrogen 1.008	2																2 He Helium 4.003
3 Li Lithium 6.941	4 Be Beryllium 9.012											5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
11 Na Sodium 22.990	12 Mg Magnesium 24.305	3	4	5	6	7	8	9	10	11	12	13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.066	17 Cl Chlorine 35.453	18 Ar Argon 39.948
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.933	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.732	32 Ge Germanium 72.61	33 As Arsenic 74.922	34 Se Selenium 78.09	35 Br Bromine 79.904	36 Kr Krypton 84.80
37 Rb Rubidium 84.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molibdenum 95.94	43 Tc Technetium 98.907	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.71	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.904	54 Xe Xenon 131.29
55 Cs Cesium 132.905	56 Ba Barium 137.327	57-71 Lanthanides	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.85	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.967	80 Hg Mercury 200.59	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [208.982]	85 At Astatine 209.987	86 Rn Radon 222.018
87 Fr Francium 223.020	88 Ra Radium 226.025	89-103 Actinides	104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [266]	107 Bh Bohrium [264]	108 Hs Hassium [269]	109 Mt Meitnerium [268]	110 Ds Darmstadtium [269]	111 Rg Roentgenium [272]	112 Cn Copernicium [277]	113 Uut Ununtrium unknown	114 Fl Flerovium [289]	115 Uup Ununpentium unknown	116 Lv Livermorium [298]	117 Uus Ununseptium unknown	118 Uuo Ununoctium unknown

57 La Lanthanum 138.906	58 Ce Cerium 140.115	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.24	61 Pm Promethium 144.913	62 Sm Samarium 150.36	63 Eu Europium 151.966	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.50	67 Ho Holmium 164.930	68 Er Erbium 167.26	69 Tm Thulium 168.934	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.967
89 Ac Actinium 227.028	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.048	94 Pu Plutonium 244.064	95 Am Americium 243.061	96 Cm Curium 247.070	97 Bk Berkelium 247.070	98 Cf Californium 251.080	99 Es Einsteinium [254]	100 Fm Fermium 257.095	101 Md Mendelevium 258.1	102 No Nobelium 259.101	103 Lr Lawrencium [262]

STUDENT EDUCATION NUMBER									

SNJSC CHEMISTRY

2024

(For Scorers only)

STRANDS		Weighting	Scores	Check Scorer	AED Check
STRAND 1	THE WAYS MATERIALS ARE STRUCTURED	34			
STRAND 2	THE PROPERTIES AND USES OF MATERIALS	32			
STRAND 3	THE WAY MATERIALS CHANGED	34			
	TOTAL	**100**			