



STUDENT EDUCATION NUMBER									

---

# Samoa National Junior Secondary Certificate

---

# CHEMISTRY

# 2022

## 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 at the appropriate places in this booklet.

**Note: Periodic Table is on page 20 of the Question Paper.**

STRANDS		Pages	Time (min)	Weighting
<b>STRAND 1</b>	THE WAYS MATERIALS ARE STRUCTURED	2-6	62	34
<b>STRAND 2</b>	THE PROPERTIES AND USES OF SUBSTANCES	7-12	56	32
<b>STRAND 3</b>	THE WAYS MATERIALS CHANGE	13-19	62	34
<b>TOTAL</b>			<b>180</b>	<b>100</b>

Check that this booklet contains pages 2-21 in the correct order and that none of these pages are blank.

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

Study Figure 1 below to answer Question 1.

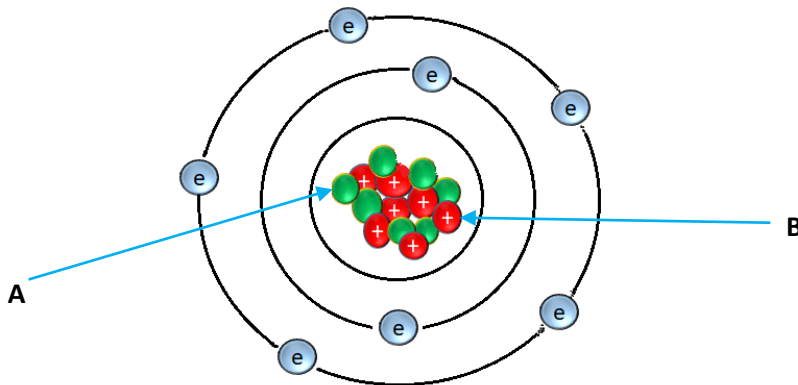


Figure 1: Structure of an atom

1. Label the sub-atomic particles labelled **A** & **B** in Figure 1 above.

**A** : \_\_\_\_\_

**B** : \_\_\_\_\_

SL 2

2. Write the name of the element in Period 3 and Group 16 of the Periodic Table. Refer to **Periodic Table** on page 20.

\_\_\_\_\_

\_\_\_\_\_

SL 1

3. Explain why sodium chloride (NaCl) can only conduct electricity when in a solution or molten state but not in the solid state.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SL 3

---

---

---

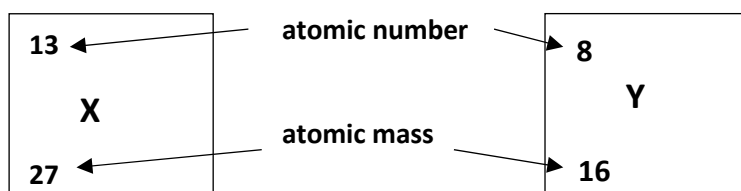
---

---

---

---

Two Year 10 Science students analysed an unknown ionic solid (XY). They discovered the atomic numbers and the atomic masses of Element X and Element Y as shown below.



**Figure 2: Elements X and Y in a compound**

4. Identify the number of neutrons for Element X (Figure 2 above).

---

---

SL 1

5.  $\text{Al}_2\text{O}_3$  is one of the common ingredients of sunscreen. Referring to the Figure 2 above, describe how  $\text{Al}_2\text{O}_3$  is ionically bonded.

---

---

---

---

SL 2

6. Define anion.

---

---

SL 1

7. Discuss using diagrams how Potassium ion and Chloride ion are formed. Make sure to clearly show how their arrangements change from atomic form to ionic form.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

SL 4

8. Methane is one of the greenhouse gases. Draw the Lewis structure of Methane.

---

---

---

---

---

---

---

---

---

---

SL 2

9.  $\text{Al}(\text{NO}_3)_3$  is a salt used as an antiperspirant. What is the total number of atoms in this salt?

---

---

---

---

---

---

---

---

---

---

SL 2

10. Define the term molar mass.

---

---

---

SL 1

11. Describe how Sodium metal becomes a cation during the ionization process.

---

---

---

---

---

---

---

SL 2

12. 0.56g of CaCl<sub>2</sub> was used in a Year 10 experiment. Determine the number of moles of CaCl<sub>2</sub> used in this experiment. [Ca= 40g/mol, Cl= 35.5g/mol]

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

SL 3

13. Define isotope.

---

---

SL 1

14. List any **TWO** physical properties of a metal.

---

---

---

---

---

---

---

SL 2

15. Oxygen gas ( $O_2$ ) can be referred to as an element and Water ( $H_2O$ ) is an example of a compound. Explain the key differences between  $O_2$  and  $H_2O$ .

---

---

---

---

---

---

---

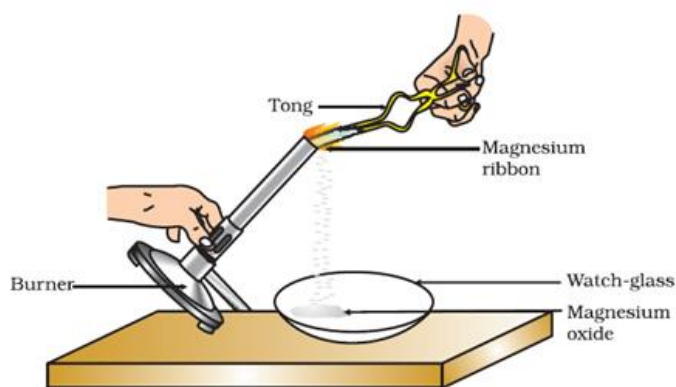
---

---

---

SL 3

16. Write observations and equation of the change in physical nature of Magnesium metal when burning in air (oxygen gas) as illustrated below.



Observation \_\_\_\_\_

---

---

---

---

---

SL 4

Equation \_\_\_\_\_

---

---

---

17. Washing soda is chemically structured as  $\text{Na}_2\text{CO}_3$ . **TRUE** or **FALSE**?

\_\_\_\_\_

SL 1

18. Explain the use of  $\text{NaHCO}_3$  (baking soda) in baking which results in the formation of holes as shown in the image below of a cooked bread.



cooked bread

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SL 3

19. The soap is made up of fat or oil and  $\text{NaOH}$ . The soap structure is  $\text{CH}_3(\text{CH}_2)_{16}\text{COONa}$ . Explain using the soap structure the cleaning action of soap.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SL 3

---

---

---

---

---

20. Ozone forms a layer that protect us from sun's radiation. Draw the structural formula of Ozone.

---

---

---

---

---

---

---

---

---

SL 2

21. Discuss the effects of CFC on the Ozone layer and environment.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

SL 4



22. Identify one Allotrope of Sulphur.

\_\_\_\_\_

SL 1

23. Graphite is considered a good conductor of electricity compared to diamond. Explain why graphite is a better conductor of electricity than diamond.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SL 3

24. State a first aid applied when a dangerous chemical is accidentally in contact with the skin.

\_\_\_\_\_

\_\_\_\_\_

SL 1

# Sodium Hypochlorite 12.5%



## **DANGER**

Causes severe skin burns. Causes serious eye damage. Very toxic to aquatic life with long lasting effects. May intensify fire; oxidizer. May be corrosive to metals.



## **PREVENTION**

Keep away from heat. Keep only in original container. Do not breathe mist, gas, spray or vapor. Wash thoroughly after handling. Avoid release to the environment. Wear protective gloves, protective clothing, eye protection, and face protection.



## **RESPONSE**

**If swallowed:** Rinse mouth. Do NOT induce vomiting.

**If on skin (or hair):** Take off immediately all contaminated clothing. Rinse skin with water/shower.

**If inhaled:** Remove person to fresh air and keep comfortable for breathing.

**If in eyes:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do, continue rinsing. Wash contaminated clothes before reuse. Absorb spillage to prevent material damage. Specific treatment (see SDS).

Immediately call a poison center or doctor.

### **Warning signs of Clorox, a household item**

25. Use the warning signs stated above to explain with evidence the three main dangers that Sodium Hypochlorite (Clorox) may impact on us and the environment.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

<b>SL 3</b>

26. Identify the colour of carbon-monoxide gas.

---

<b>SL 1</b>

27. Describe any **TWO** uses of Carbon Dioxide gas.

---



---



---



---



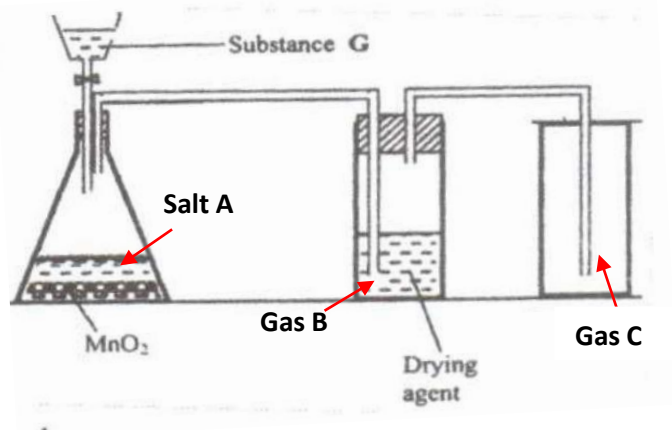
---



---

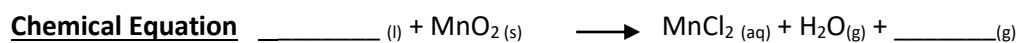
SL 2

28. The diagram below represents a simple preparation of Chlorine gas. Substance G (Liquid) is added to solid (powder)  $MnO_2$  forming salt A, Gas B and Gas C. A drying agent is used to absorb Gas B and dry Gas C. Complete the table and chemical equation of the reaction.



Chemicals	Chemical names/formula
Substance G	_____
Drying agent	$H_2SO_4$
Gas B	$H_2O$
Gas C	_____
Salt A	$MnCl_2$

SL 4



29. List any **TWO** properties of Ammonia that have negative impacts on environment.

---

---

---

---

---

SL 2

30. List any **TWO** properties of SO<sub>2</sub> that makes it dangerous to the environment and ruining Carbonated statue like the one shown below.



Carbonated statue

---

---

---

---

---

---

---

---

SL 2

31. From the list of changes provided below, **CIRCLE** a good example of a chemical change.

**List:** *dissolving salt, freezing water, burning paper, boiling water, melting wax*

SL 1

32. In an acid-metal reaction, a piece of magnesium metal is placed in a test tube of 2M Hydrochloric acid. Describe any **TWO** observations that indicated a chemical reaction had taken place.

---

---

---

---

---

---

---

---

---

---

SL 2

33. From the list below, **CIRCLE** one of the products that will be formed in an Acid-carbonate reaction:

**List:**  $H_2$ ,  $O_2$ ,  $H_2O$ ,  $CO_2$ ,  $Cl_2$ ,  $CO$

SL 1

34. Predict the products formed in the Acid-base reaction, when magnesium hydroxide solution is added to a test tube of sulphuric acid. Include a balanced equation in your response.

---

---

---

---

---

---

---

---

---

---

SL 4

---

---

---

---

---

---

---

---

---

---

---

---

---

---

35. In a precipitation reaction, a Year 10 student adds calcium chloride solution to a solution of sodium sulphate in a test tube. Predict the precipitate and a solution formed from this reaction.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

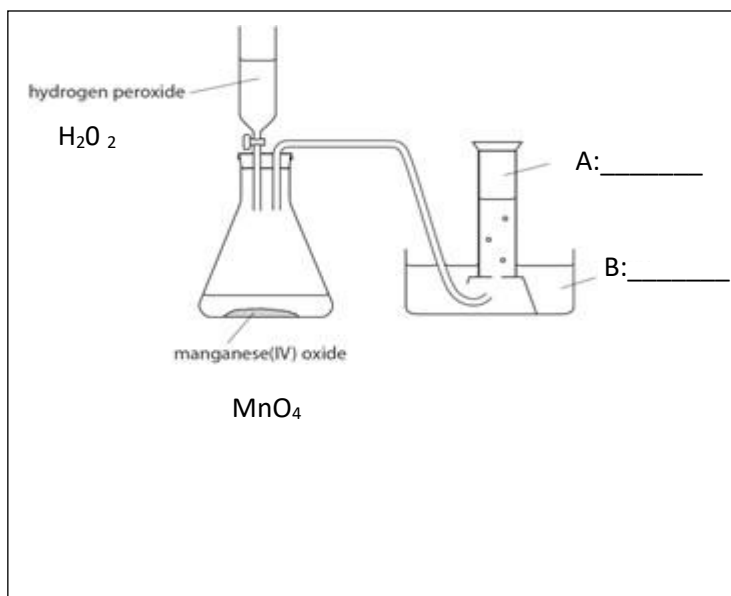
---

---

SL 4

36. The diagram below illustrates a simple decomposition of Hydrogen Peroxide. A black manganese (IV) oxide is added into the flask to speed up the reaction.

**Predict the TWO products formed and represented by letters, A and B and write a balanced equation of the reaction and the chemical tests for products A and B produced.**



SL 4

---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---

37. Describe how temperature affects the rate of a chemical reaction.

---

---

---

---

---

---

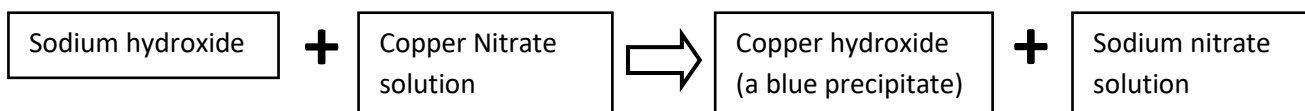
---

---

SL 2

**Study the chemical equation below.**

Two colorless solutions were mixed and resulted in the formation of a blue precipitate as described below:



38. From the equation above, draw a precipitation reaction from the precipitate form.

SL 2

---

---

---

39. State the formula for iron (III) oxide.

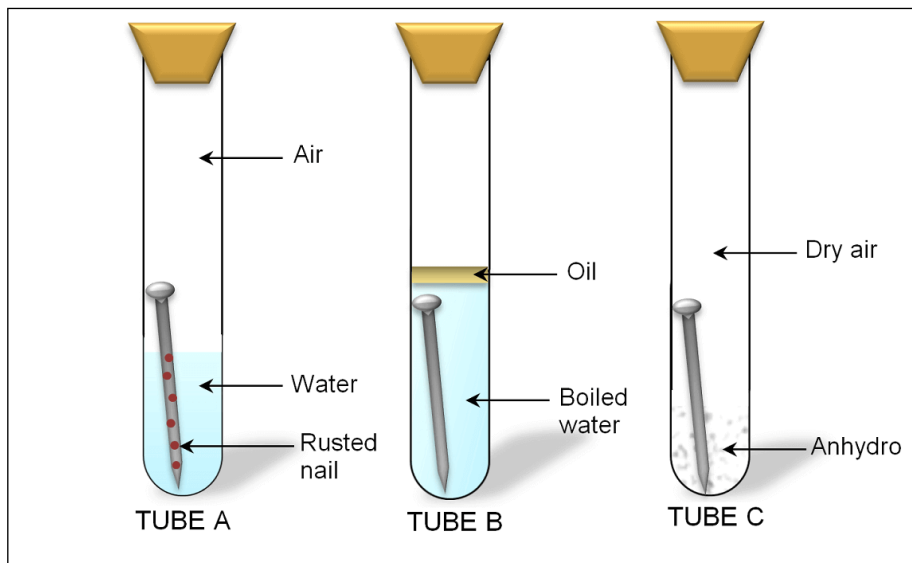
---

---

SL 1



40. The diagram below illustrates the results of a practical on rust. Discuss with valid reasons what happens to nails in test tubes A, B, C after 3 days.



SL 4

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

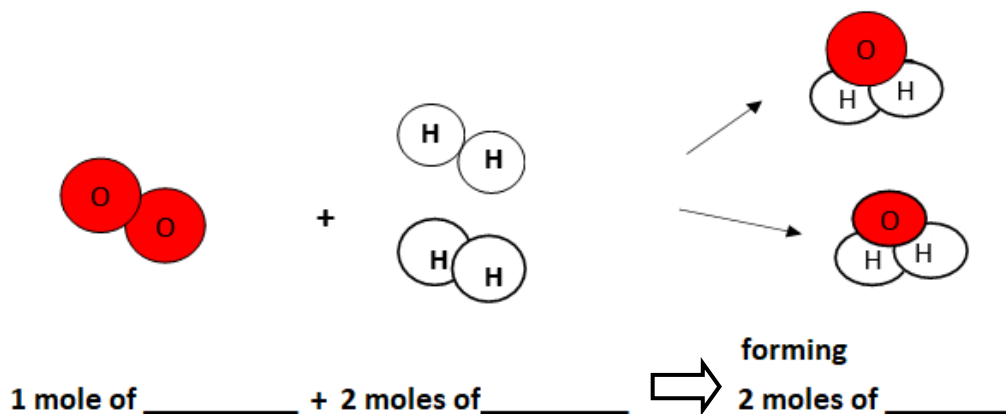
---

---

---

---

41. In the Law of conservation of mass, atoms cannot be created nor destroyed but changes form. The two gases below collide to form new substances in excess heat and pressure. Explain the application of the law by completing the mole relationship below.



SL 3

42. Collision Theory is a theory used to predict the rate of a chemical reaction, particularly for gases. But there are three important factors of a Collision Theory. One is the reacting particles must collide. State the other two of the three important factors of the theory for any reaction to occur.

---



---



---



---



---



---



---



---



---

SL 2

43. Two-Year 10 Science students carried out a practical on "How concentration of an acid affects the rate of an acid-metal reaction."  
The materials used were: Hydrochloric (HCl) acid, Magnesium (Mg) metal strip and 3 test tubes, labelled A, B, C. The table below illustrates the result observed and recorded by the students. Analyse and conclude the outcome of the students' practical.

Test tube	Concentration of HCl used	Volume of HCl used	Size/length of Mg metal strips used	Observation of rate of reaction
<b>A</b>	0.5 M	5ml	2cm	Slower
<b>B</b>	1M	5ml	2cm	Slow
<b>C</b>	2M	5ml	2cm	Fast

<b>SL 4</b>

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

# Periodic Table of the Elements

1 <b>H</b> Hydrogen 1.01																	18 <b>He</b> Helium 4.00												
3 <b>Li</b> Lithium 6.94	4 <b>Be</b> Beryllium 9.01																	10 <b>Ne</b> Neon 20.18											
11 <b>Na</b> Sodium 22.99	12 <b>Mg</b> Magnesium 24.31																	18 <b>Ar</b> Argon 39.95											
19 <b>K</b> Potassium 39.10	20 <b>Ca</b> Calcium 40.08	21 <b>Sc</b> Scandium 44.96	22 <b>Ti</b> Titanium 47.88	23 <b>V</b> Vanadium 50.94	24 <b>Cr</b> Chromium 51.99	25 <b>Mn</b> Manganese 54.94	26 <b>Fe</b> Iron 55.85	27 <b>Co</b> Cobalt 58.93	28 <b>Ni</b> Nickel 58.69	29 <b>Cu</b> Copper 63.55	30 <b>Zn</b> Zinc 65.38	31 <b>Al</b> Aluminum 26.98	32 <b>Ga</b> Gallium 69.72	33 <b>Ge</b> Germanium 72.63	34 <b>As</b> Arsenic 74.92	35 <b>Se</b> Selenium 78.97	36 <b>Kr</b> Krypton 83.80												
37 <b>Rb</b> Rubidium 85.47	38 <b>Sr</b> Strontium 87.62	39 <b>Y</b> Yttrium 88.91	40 <b>Zr</b> Zirconium 91.22	41 <b>Nb</b> Niobium 92.91	42 <b>Mo</b> Molybdenum 95.95	43 <b>Tc</b> Technetium 98.91	44 <b>Ru</b> Ruthenium 101.07	45 <b>Rh</b> Rhodium 102.91	46 <b>Pd</b> Palladium 106.42	47 <b>Ag</b> Silver 107.87	48 <b>Cd</b> Cadmium 112.41	49 <b>In</b> Indium 114.82	50 <b>Sn</b> Tin 118.71	51 <b>Sb</b> Antimony 121.76	52 <b>Te</b> Tellurium 127.6	53 <b>I</b> Iodine 126.90	54 <b>Xe</b> Xenon 131.29												
55 <b>Cs</b> Cesium 132.91	56 <b>Ba</b> Barium 137.33	57-71 Lanthanides	72 <b>Hf</b> Hafnium 178.49	73 <b>Ta</b> Tantalum 180.95	74 <b>W</b> Tungsten 183.85	75 <b>Re</b> Rhenium 186.21	76 <b>Os</b> Osmium 190.23	77 <b>Ir</b> Iridium 192.22	78 <b>Pt</b> Platinum 195.08	79 <b>Au</b> Gold 196.97	80 <b>Hg</b> Mercury 200.59	81 <b>Tl</b> Thallium 204.38	82 <b>Pb</b> Lead 207.20	83 <b>Bi</b> Bismuth 208.98	84 <b>Po</b> Polonium [208.98]	85 <b>At</b> Astatine [209.98]	86 <b>Rn</b> Radon [222.02]												
87 <b>Fr</b> Francium [223.02]	88 <b>Ra</b> Radium [226.03]	89-103 Actinides	104 <b>Rf</b> Rutherfordium [261]	105 <b>Db</b> Dubnium [262]	106 <b>Sg</b> Seaborgium [266]	107 <b>Bh</b> Bohrium [264]	108 <b>Hs</b> Hassium [269]	109 <b>Mt</b> Meitnerium [278]	110 <b>Ds</b> Darmstadtium [281]	111 <b>Rg</b> Roentgenium [280]	112 <b>Cn</b> Copernicium [285]	113 <b>Nh</b> Nihonium [286]	114 <b>Fl</b> Flerovium [289]	115 <b>Mc</b> Moscovium [289]	116 <b>Lv</b> Livermorium [293]	117 <b>Ts</b> Tennessine [294]	118 <b>Og</b> Oganesson [294]												
57 <b>La</b> Lanthanum 138.91	58 <b>Ce</b> Cerium 140.12	59 <b>Pr</b> Praseodymium 140.91	60 <b>Nd</b> Neodymium 144.24	61 <b>Pm</b> Promethium [144.91]	62 <b>Sm</b> Samarium 150.36	63 <b>Eu</b> Europium 151.96	64 <b>Gd</b> Gadolinium 157.25	65 <b>Tb</b> Terbium 158.93	66 <b>Dy</b> Dysprosium 162.50	67 <b>Ho</b> Holmium 164.93	68 <b>Er</b> Erbium 167.26	69 <b>Tm</b> Thulium 168.93	70 <b>Yb</b> Ytterbium 173.06	71 <b>Lu</b> Lutetium 174.97	89 <b>Ac</b> Actinium 227.03	90 <b>Th</b> Thorium 232.04	91 <b>Pa</b> Protactinium 231.04	92 <b>U</b> Uranium 238.03	93 <b>Np</b> Neptunium 237.05	94 <b>Pu</b> Plutonium 244.06	95 <b>Am</b> Americium 243.06	96 <b>Cm</b> Curium 247.07	97 <b>Bk</b> Berkelium 247.07	98 <b>Cf</b> Californium 251.08	99 <b>Es</b> Einsteinium [254]	100 <b>Fm</b> Fermium 257.10	101 <b>Md</b> Mendelevium 258.10	102 <b>No</b> Nobelium 259.10	103 <b>Lr</b> Lawrencium [262]

- Alkali Metal
- Alkaline Earth
- Transition Metal
- Block Metal
- Metalloid
- Nonmetal
- Halogen
- Noble Gas
- Lanthanide
- Actinide

© 2017 Edmentum  
www.edmentum.com

STUDENT EDUCATION NUMBER									

## CHEMISTRY

2022

*(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			
<b>TOTAL</b>		<b>100</b>			