WORK SHEET ON CHEMICAL FAMILIES, FORM 4 REVISION, 2019
BISHOP MUGENDI SECONDARY SCHOOL

1. What name is given to elements of group I

2. Give the names of elements that are in group 1 of the periodic table

3. Give the chemical symbols of:
    a) Lithium

    b) Sodium

    c) Potassium

4. Write the electron arrangement of:
    a) Lithium

    b) Sodium

    c) Potassium

5. Define the term atomic radius

6. Explain why the atomic radius of group I increase as you go down the group.

7. Explain the trend in ionic radius down group I.

8. Compare the ionic and atomic radius of group I elements.

9. State and explain the physical properties of alkali metals.

10. By use of balanced chemical equation explain what happens when sodium is exposed to the atmospheric air.

11. How does sodium burn in air? Show by aid of a balanced chemical equation.

12. How does sodium burn in air enriched with oxygen? Explain by use of a balanced chemical equation

13. How does potassium burn in air? Show by aid of a balanced chemical equation.

14. What product is formed when alkali metals react with chlorine gas?

15. State and explain the observations made when water reacts with the following metals write equations for each metals:
    a) Potassium

    b) Sodium

c) Lithium

16. State and explain the observations when the following metals are lowered into a gas jar of chlorine:
    a) Hot sodium

    b) Burning lithium

    c) Hot potassium

17. From the above reactions comment and explain on the general chemical reactivity of alkali metals as you go down the group..

18. Alkali metals are not found as free elements explain.

19. Give any two uses of alkali metals

20. What name is given to elements of group II

21. Give the names of elements that are in group 1 of the periodic table

22. Give the chemical symbols of:
    a) Beryllium

    b) Magnesium

    c) Calcium

23. Write the electron arrangement of:
    d) Beryllium

    e) Magnesium

    f) Calcium

24. Define the term atomic radius

25. Explain why the atomic radius of group II increase as you goes down the group.

26. Explain the trend in ionic radius down group II.

27. Compare the ionic and atomic radius of group II elements.

28. State and explain the physical properties of alkaline earth metals.

29. Explain by aid of balanced chemical equations how the following metals burn in air.
    a) Magnesium

    b) Calcium

    c) State and explain the effect of adding water to the products formed when magnesium is reacted with water.

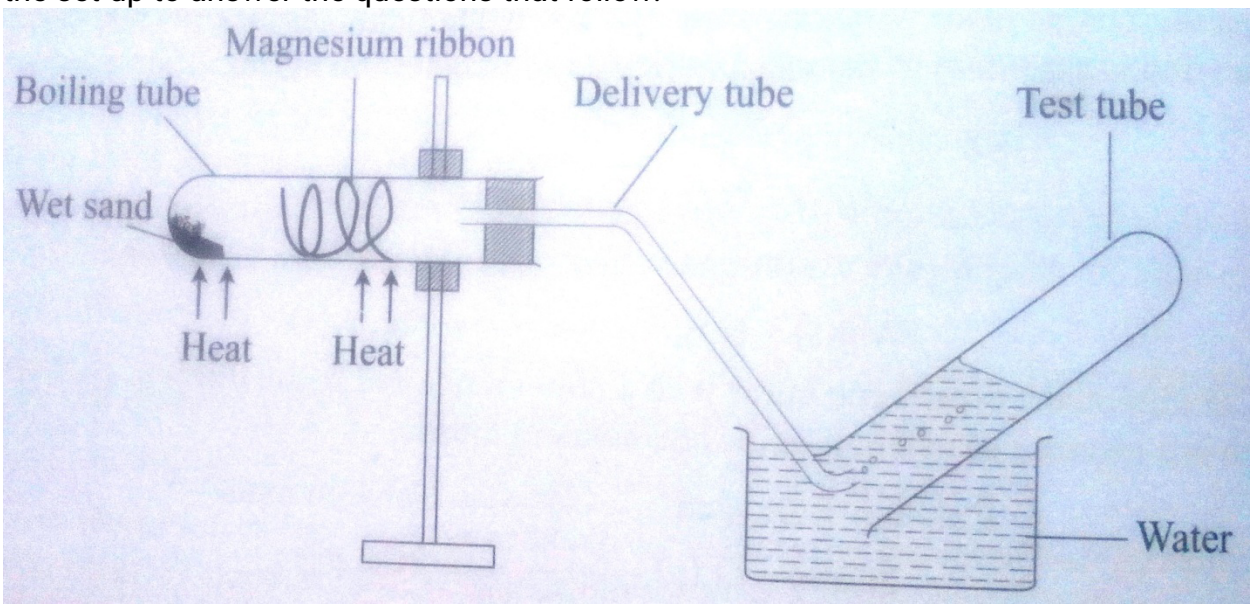
    d) State and explain the effect of adding water to the products formed when magnesium is reacted with water.

30. State and explain the observations when the following metals are reacted with cold water
    a) Magnesium

    b) Calcium

31. The diagram below shows a set-up of an experiment that was used to investigate the reaction between magnesium and steam. In this experiment some wet sand

was put at the bottom of a test tube. Magnesium ribbon was scrubbed with an emery paper and placed at the middle of the tes-tube. The wet sand was heated gently first then the magnesium ribbon was heated strongly until it glowed. Use the set-up to answer the questions that follow.



a) Why was the magnesium ribbon cleaned with an emery paper?

b) Why was the wet sand heated first before heating the magnesium ribbon?

c) Before heating is stopped the delivery tube inserted in water must be disconnected. Give a reason.

d) State and explain the observations made during the experiment.

e) Write a balanced chemical equation between magnesium and steam

f) A similar experiment must never be conducted with potassium. Explain.

32. a) State and explain the observations made when a burning magnesium ribbon is lowered
into a gas jar of chlorine.

b) Write a balanced chemical equation between magnesium and chlorine

c) A similar experiment may not be successful with calcium explain why.

d) Write a balanced chemical equation between calcium and chlorine.

33. By aid of balanced chemical equations state and explain the observations made when dilute hydrochloric acid and dilute sulphuric (VI) acid are reacted with the following metals.
    a) Dilute hydrochloric acid and magnesium

    b) Dilute hydrochloric acid and calcium

    c) Dilute sulphuric (VI) acid and magnesium.

    d) Dilute sulphuric (VI) acid and calcium

34. Give the uses of alkaline earth metals.

35. Comment on the reactivity of alkaline earth metals as you go down the group.

36. What name is given to the members of group 7 of the periodic table?

37. Give the name, chemical symbol, electron arrangement, valency, charge and state at room temperature of the halogens.

Element	Symbol	Atomic number	Electronicc configuration	Charge of ion	Valency	State at Room Temperature
Fluorine	F	9	2:7	F^-	1	Pale yellow gas
Chlorine	Cl	17	2:8:7	Cl^-	1	Pale green gas
Bromine	Br	35	2:8:18:7	Br^-	1	Red liquid
Iodine	I	53	2:8:18:18:7	I^-	1	Grey Solid
Astatine	At	85	2:8:18:32:18:7	At^-	1	Radioactive

38. Define the term atomic radius

39. Explain why the atomic radius of group VII elements increases as you go down the group.

40. Explain the trend in ionic radius down group VII.

41. Compare the ionic and atomic radius of group VII elements.

42. State and explain the physical properties of halogens.

43. Explain the following observations. When a boiling tube containing chlorine gas

or bromine vapour is inverted in water or tetrachloromethane the level of the solution rises in the boiling tube. The level of the solution rises more in tetrachloromethane than in water. The rise in water level is more with chlorine than with bromine

44. What is the trend in solubility of the halogens down the group in water and in organic solvents?

45. Iodine sublimes when heated to form purple vapour. Explain this observation

46. Halogens are non-conductors of electricity. Explain this observation.

47. The melting and boiling points of halogen increases as you go down the group. Explain.

48. Define the term electron affinity.

49. What is the relationship between the atomic radius and electron affinity?

50. What is the relationship between electron affinity and chemical reactivity of an element?

51. Why does fluorine show exceptionally low electron affinity even though it is higher on the periodic table than other halogens?

52. What product is formed when iron is reacted with halogens?

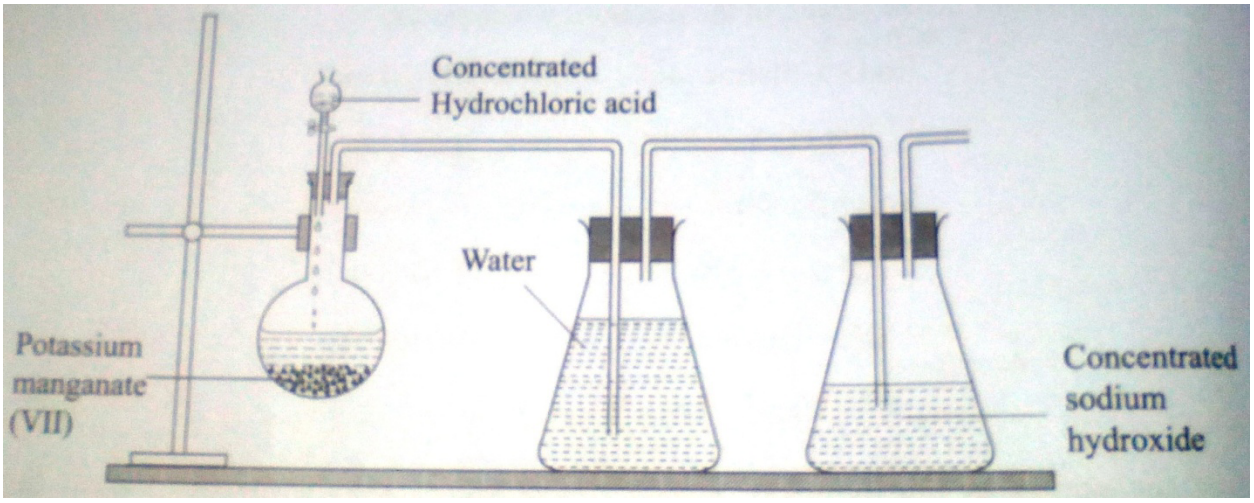
53. Write balanced chemical equation between the following substances and state the colours of the products:
    a) Iron and chlorine

b) Iron and bromine

c) Iron + iodine

54. Write balanced chemical equations between zinc and halogens.

55. Chlorine gas was prepared and bubbled through water as shown on the diagram below. Use the diagram to answer the questions that follow.



a) What is the role of potassium manganate (VII) and concentrated hydrochloric acid?

b) Write a balanced chemical equation that takes place between water and chlorine.

c) What name is given to the product formed in (b) above?

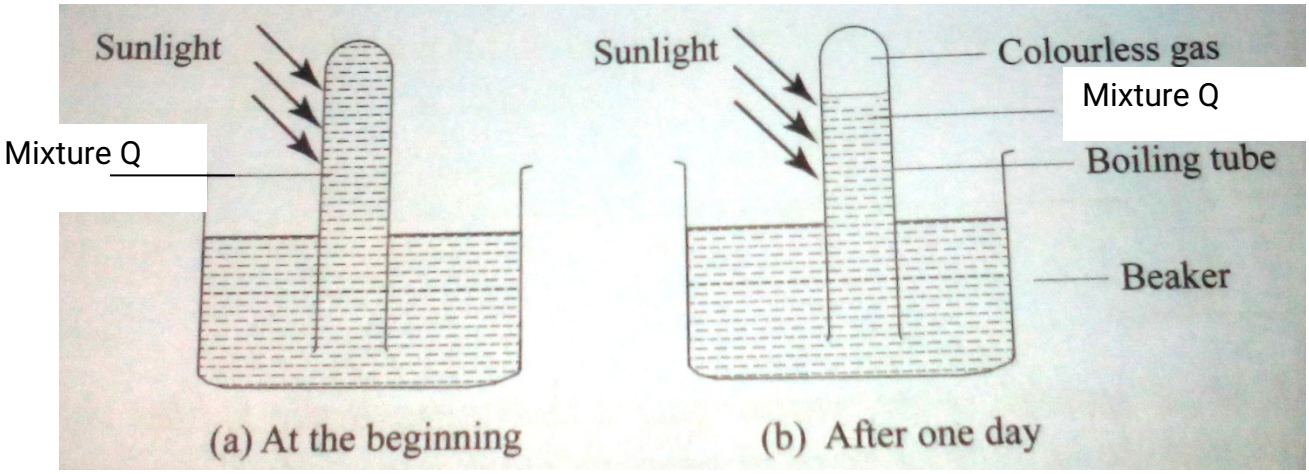
d) What colour is the product named in (c) above?

e) Which substance gives the substance named in (c) above its colour?

f) State and explain the observations made during this experiment.

g) What is the role of concentrated sodium hydroxide?
To absorb unreacted poisonous chlorine gas to prevent it to escape to the air since it is poisonous.

h) The product obtained from equation written in (b) above was filled in a boiling tube and the remaining solution was put in a beaker. The boiling tube was then inverted in the beaker with the product and the set-up was put on sunlight as shown on the diagram below. Use the diagram to answer the questions that follow.



i. State and explain the observations made after one day

ii. Write a balanced chemical equation that had taken place after one day.

i) A little of the product formed was in (B) above was put in a test tube and a blue litmus paper was put in this test tube with the product. State and explain the observations made.

j) Write a balanced chemical equationto show the change taking place in (i) above.

56. Comment on the reactivity of halogens as you go down the group.

57. Give the uses of halogens.

58. Give the elements that are found in group VIII of the periodic table.

59. Give the chemical symbols of elements in group VIII of the periodic table

60. What percentage by volume is occupied by the noble gases in atmospheric air?

61. Which noble gas is the most abundant in atmospheric air and what is its percentage by volume in air?

62. What name is given to elements in group (VIII) of the periodic table?

63. Why are group VIII elements referred to group zero elements?

64. Write the electron arrangement of the first three noble gases in the periodic table.

65. What do you understand by duplet electron arrangement?

66. What do you understand by an octet electron arrangement?

67. Explain why the ionization energies of group 0 are generally high.

68. Explain why the atomic radius of noble gases increases down the group.

69. Explain why the first ionization energy of group VIII elements decreases down the group.

70. Explain why the noble gases have low melting and low boiling points.

71. Explain why the melting and boiling points of noble gases increases down the group.

72. Noble gases were initially called inert gases. Explain.

73. Even if xenon is a stable element found in group VIII of the periodic table it found present in some compounds. Explain.

74. State the uses of noble gases.

75. Give the elements in period 3.

76. Give the chemical symbols of period 3 elements

77. Sodium, magnesium and alluminium are good conductors of electricity. Explain.

78. State and explain the trend of electrical conductivity of metals across period 3.

79. Compare the electrical conductivity of magnesium and alluminium.

80. Explain why chlorine sulphur, phosphorus and argon do not conduct electricity.

81. In terms of electrical conductivity explain why silicon is unique among period 3 elements.

82. Comment on the trend of atomic radius across period 3 elements of the periodic table.

83. What type of structure do magnesium, sodium and aluminium have?

84. What type of structure has silicon.

85. Silicon has a high melting and high boiling points explain.

86. Explain the trend in melting and boiling points across the metals of period 3 of the periodic table.

87. Explain why the melting and boiling points decreases from phosphorus to argon across period 3.

88. Explain why from phosphorus, sulphur, chlorine and argon have low melting and low boiling points.

89. Describe by aid of balanced chemical equations how the following elements react with oxygen and the product reacted with water.
    a) Sodium

    b) Magnesium

    c) Aluminium

    d) Silicon

    e) Phosphorus

    f) Sulphur burns in oxygen with a blue flame to form sulphur (IV) oxide

    g) Chlorine

90. Describe by aid of equations how period 3 elements react with cold water.
    a) Sodium

b) Magnesium

c) Aluminium

91. Comment on the reactivity of period 3 metals with oxygen and water.

92. Write an equation of reaction of chlorine with water.

93. Aluminium does not readily react with dilute acids explain and how can this be solved?

94. Which elements in period 3 do not react with dilute acids

95. Write balanced chemical equations between common mineral acids with aluminium and magnesium.

96. Explain sulphur does not react with dilute hydrochloric acid

97. Study the information in the table below and answer the questions that follow:

Element	Atomic radius (nm)	Ionic radius (nm)
W	0.114	0.195
X	0.072	0.136
Y	0.133	0.216
Z	0.099	0.181

a) Would these form part of a metallic or a non-metallic group? Explain

b) Suggest an element in the table above likely to be the most reactive. Explain

98. State the reason for using Argon in electric light bulbs

99. Study the information in the table below and answer the questions that follow. The letters do not represent the actual symbols of the elements.

Element	Electronic configuration	Boiling point
X	2.7	-188^{o}C
Y	2.8.7	-35^{o}C
Z	2.8.18.7	59^{o}C

a) What is the general name given to the group in which the elements **X, Y** and **Z** belong?

b) Select **two** elements which are coloured gases

c) (c) Explain why **Z** has the highest boiling point

d) Write an equation for the reaction of element **Z** with iron metal

e) Element **Y** was dissolved in water and a piece of blue litmus paper was put into the resulting solution. State and explain the observation that was made on the litmus paper

100. The table below shows elements **A, B, C, E, F**, and **G**. Elements in group **X** have a valency of 2 while elements in group **Y** have a valency of 1. Use the table to answer the questions that follow:-

	GROUP Y			GROUP X		
Element	**A**	**B**	**C**	**E**	**F**	**G**
Atomic radius (nm)	14.0	19.5	19.7	5.2	7.9	11.3
Ionic radius (nm)	7.6	10.5	12.4	12.6	16.1	19.6

i. Atomic radius increases from **A** to **C** and from **E** to **G.** Explain

ii. Explain the difference in the atomic and ionic radii of group **X** elements

iii. Elements **C** and **G** belong to the same period. Explain why the atomic radius of **C** is larger than that of **G**

iv. Give the formula of the compound formed when **B** and **F** react

v. What type of bonding is formed in the compound above? Explain

vi. Starting with the least reactive, arrange the elements in group **Y** in the order of reactivity. Explain:

101. The information in the table below relates to elements in the same group of the periodic table. Study it and answer the question that follows.

Element	Atomic size (nm)
P	0.19
Q	0.23
R	0.15

Which element has the highest ionization energy? Explain

102. Study the information in the table below and answer the questions that follow.

(The letters do not represent the actual symbols of the elements)

Element	Electronic configuration	Ionization energy Kj/mol)
P	2.2	1800
Q	2.8.2	1450
R	2.8.8.2	1150

a) What is the general name given to the group in which elements **P, Q**

and R belong?

b) Explain why P has the highest ionization energy

c) Write a balanced chemical equation for the reaction between element Q and water