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Name: ……. Index No: …….

School: ……..… Centre No: ..…….

Subject: Chemistry

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Republic of South Sudan
South Sudan National Examinations Council
Certificate of Secondary Education
2021

For control use only

Subject: Chemistry **Time: 3 Hours**

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INSTRUCTIONS

Read the following instructions carefully before answering the questions

1. This paper consists of two sections A and B.
2. Section A consists of 20 multiple choice questions (20 marks) and section B consists of 10 structured questions (80 marks). Circle the most correct answer in section A.
3. A candidate is required to attempt all questions in both sections.
4. A candidate is required to use blue ballpoint pen or black (avoid using liquid pens).
5. All answers must be written in the spaces provided and no additional answer booklet will be provided.
6. Unnecessary crossing of work may lead to loss of marks.
7. Where necessary use: (Cu = 63.5, O = 16, H = 1, N = 14, S = 32, 1 Faraday = 96500 Coulombs, specific heat capacity of water = $4.2Jk^{-1}g^{-1}$)

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Section	**Question**		**Marks**	**Marked by**	**Checked by**
A	**1- 20**				
B	**21-30**				

Do not write inside this rectangle

SECTION A (20 MARKS)

Write the most correct alternative in the boxes provided.

1. Which one of the following is the electronic configuration of potassium atomic number 19?
   A. 2:8:8:1
   B. 2:8
   C. 2:8:2
   D. 2:8:7

2. Chlorine is used for treatment of water and sewage because?
   A. It is non-metal
   B. It can kill micro organism
   C. It is red in color
   D. It is a reducing agent

3. Which one of the following pairs of substance is a mixture?
   A. Air and alloy
   B. Petroleum and sea water
   C. Mango and copper metal
   D. Milk and urine

4. The reaction between a dilute acid and a base will form salt and water. This reaction is called?
   A. Oxidation
   B. Reduction
   C. Neutralization
   D. Synthesis

5. Basicity of an acid is:
   A. Number of electrons in the acid
   B. Number of hydrogens in one mole of a base
   C. Number of hydroxides in one mole of a base
   D. Number of neutrons in one mole of an acid

6. An unknown compound X of mass 1.38g contains 0.01 mole. The relative molecular mass of X is?
   A. 13.8
   B. 380
   C. 138
   D. 381

7. Unsaturated hydrocarbons contain _____ covalent bond.
   A. Double
   B. Double or single
   C. Double or triple
   D. Triple bond only

8. Z grams of Calcium hydroxide was dissolved in $500cm^3$ of solution. If the molarity of Calcium hydroxide is 0.28 M, the value of Z is?
   A. $\frac{0.28\ x\ 100}{500}$
   B. $\frac{0.28\ x\ 500\ x\ 78}{1000}$
   C. $\frac{500\ x\ 78}{1000\ x\ 28}$
   D. $\frac{0.28\ x\ 500}{78\ x\ 1000}$

9. The process by which the nucleus of uranium 235 absorbs neutrons and splits up into two nuclei of equal size is called?
   A. Nuclear fission.
   B. Nuclear fusion
   C. Radioactivity
   D. Nuclear reaction

10. $500cm^3$ of oxygen gas at a pressure of 620 mmHg was compressed to a volume of $380cm^3$. The resulting pressure will be?
   A. 815.8 mmHg
   B. 810 mmHg
   C. 580 mmHg
   D. 615.8 mmHg

11. A certain gas G has the following properties
    i. It is colorless
    ii. It is a reducing agent
    iii. It makes a pop sound in air

Gas G is most likely
A. Chlorine
B. Hydrogen
C. Oxygen
D. Ammonia

12. The chemical reaction $PbO + CO \rightarrow Pb + CO_2$ is an oxidation reaction. The chemical formula of the oxidizing agent is?
A. PbCO
B. CO_2
C. PbO
D. Pb

13. Metals have the following properties except
A. They are good conductors of heat and electricity
B. They are malleable and ductile
C. All of them react with cold water
D. They lose electrons to form positive ions.

14. Which of the following solution has PH of 8.8 ?
A. Sodium chloride
B. Hydrochloric acid
C. Potassium hydrogencarbonate
D. Sugar

15. The energy required to break the in one mole of a substance is called
A. Bond energy
B. Kinetic energy
C. Potential energy
D. Nuclear energy

16. The electromotive force (emf) of an electric cell formed from $Mg \mid Mg^{2+} = +2.38$ V and $Ag \mid Ag^{+} = +0.80$ V is?
A. 8.31
B. 2.18
C. 1.58
D. 3.58

17. Graphite is an allotrope of carbon. It conducts electricity because
A. It has strong covalent bonds
B. It contains free delocalized electrons
C. All the electrons of carbon are bonded
D. It is a non-metal

18. Which of the following hydrocarbons decolorizes the color of bromine molecule
A. CH_2
B. C_2H_4
C. C_3H_8
D. C_4H_{10}

19. Ionic compounds have the following properties except?
A. Their solution conducts electricity
B. Their melting points are low
C. They are formed by transfer of electrons from metal to non-metal
D. They have high melting points

20. Which of the following substances is a mixture
A. Salt
B. Water
C. Air
D. Steel

Section B (80 Marks)

21. The table below is part of the periodic table. The unknown elements QRSTUV and W are put in the table. Study this table and use the letters to answer the questions that follow.

H							He
	Q		T		U		
	R			W		V	
	S						

a) Name the family of the element represented by Q, R S.

_____

b) Write the electronic configuration of:

i) Atom of V: _____

ii) Ion of W: _____

c) Write the chemical formula of:

i) Nitrate of R: _____

ii) Hydroxide of S: _____

d) Draw the types of bonding in the compound formed between the element:

i) T and V

_____

_____

_____

_____

ii) R and U

_____

_____

_____

_____

22. a) Define

i) Electrolysis

_____

_____

_____

ii) Electroplating

_____

_____

b) A silver spoon is electroplated with copper metal.

i) Name the electrolyte

_____

ii) Will the silver spoon be the cathode or the anode?

_____

_____

Reason

_____
_____
_____

c) A current of 2.5A were passed for 9.65 hours through the solution of copper (II) sulphate. Calculate the mass of copper deposited. (Cu = 63.5, 1F = 96500C)

_____
_____
_____
_____
_____
_____
_____
_____

23. a) What is the difference between allotropes and isotopes?

_____
_____
_____

b) Compare the physical properties of the two allotropes of sulphur in the table below.

Rhombic sulphur	Monoclinic sulphur

c) Complete and balance the following equations.
i) Na_2SO_4 (aq) + HCl(aq) →

ii) S(s) + H_2SO_4(aq) →

iii) Cu(s) + H_2SO_4(aq) →

d) Give two uses of sulphur (IV) oxide

_____
_____

24. a) What is meant by the following terms?
i) Molarity

_____
_____
_____

ii) Molar solution

iii) Titration

b) Barium hydroxide of volume 22.0 cm^3 was completely neutralized by a solution of 0.14M hydrochloric acid.
i) Complete the titration equation

$HCl(aq) + Ba(OH)_2(aq) \rightarrow$

ii) Calculate the molarity of barium hydroxide.

iii) Name the indicator used for this reaction.

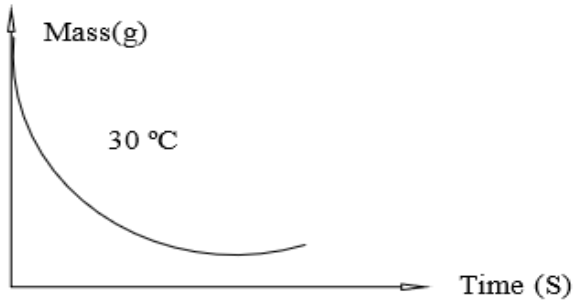
Give a reason for your answer.

25. a) Define the following terms:
i) Catalyst

ii) Rate of reaction

b) Explain why the rate of chemical reaction increases when the temperature is raised.

c) The rate of reaction of 2g of Calcium carbonate lamps of 30 ºC with 0.2M hydrochloric acid is shown in the curve below.



i) Write the equation of reaction between Calcium carbonate and 0.2M hydrochloric acid.

_____
_____
_____
_____

ii) Draw the sketch of two curves on the same graph for the same graph at:
a) 25 ºC
b) 45 ºC

d) Suggest another method that can be used to measure the rate of the reaction above.

_____
_____

26. Write one observation and chemical equation for the activities described below.
a) Chlorine gas is bubbled through a solution potassium bromide in a test tube. Write the
i) Observation

_____
_____
_____

ii) Chemical equation

_____
_____

b) Carbon dioxide is bubbled through a solution of lime water. Write the observation when it is passed for:
i) Short time

_____
_____

ii) Long time

_____
_____

c) Dry ammonia was passed over hot copper (II) oxide in a combustion tube.
i) Observation

_____
_____
_____
_____

ii) Chemical equation

_____

_____

27. a) The reaction schemes show the change of glucose ($C_6H_{12}O_6$) to polymer D. Study these schemes and answer the questions that follow.

A.	B.	C.	D.
$C_6H_{12}O_6$ 1	C_2H_5OH 2	C_2H_4 3	Polymer 4

i) Name the compounds

B _____

C _____

D _____

ii) Write the reagent for reaction (1) and (2)

_____

_____

iii) Name the type of reaction

1. _____
2. _____
3. _____

c) Use structural formula to write the equation for the reaction of:

i) B with ethanoic acid

_____

_____

_____

_____

ii) C with bromine molecules

_____

_____

_____

_____

28. An organic compound Q consists of the elements shown in the table.

Element	C	H	O
Composition by mass	40%	6.7%	53.3%

(C = 12, O = 16, H = 1)

i) Calculate the empirical formula of Q.

_____

_____

_____

_____

_____

_____

_____

ii) If the relative molecular mass of Q is 60. Determine the molecular formula of Q.

iii) Hence deduce the name and structure of Q.

29. a) i) Distinguish between normal and acidic salt.

ii) Give one example of each of the salt type above.

b) Describe how Zinc Sulphate can be prepared in the laboratory from Zinc oxide. (Diagram is not required)

30. a) Ethanol can react with sulphuric acid to form sulphuric acid.
i) State the condition for the reaction to occur.

ii) Write the equation for the reaction that occurred in i)

iii) Name the type of reaction above.

_____

_____

b) Draw and name one isomer of each of the following compounds.

i) C_4H_8

_____

_____

_____

_____

ii) C_4H_6

_____

_____

_____

_____

THE END