Student's Assessment Number.....

THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
FORM TWO NATIONAL ASSESSMENT

032

CHEMISTRY

Time: 2:30 Hours **Year: 2023**

Instructions

1. This paper consists of sections A, B and C with a total of **ten (10)** questions.
2. Answer **all** the questions.
3. Section A and C carry **fifteen (15)** marks each and section B carries **seventy (70)** marks.
4. All writing must be in black or blue ink **except** diagrams which must be in pencil.
5. Cellular phones and any unauthorized materials are **not** allowed in the assessment room.
6. Write your **Assessment Number** at the top right corner of every page.
7. The following atomic masses may be used: H = 1, C = 12, O = 16, Cl = 35.5.

FOR ASSESSOR'S USE ONLY		
QUESTION NUMBER	**SCORE**	**ASSESSOR'S INITIALS**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
TOTAL		
CHECKER'S INITIALS		

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SECTION A (15 Marks)

Answer **all** questions in this section.

1. For each of the items (i) - (x), choose the correct answer from the given alternatives and write its letter in the box provided.

(i) What are the common activities done in the chemistry laboratory?

A Exhibitions
B Demonstrations
C Exercises
D Experiments

(ii) The following substances are constituents of a First Aid Kit in the chemistry laboratory, **except**:

A petroleum jelly
B iodine tincture
C cotton wool
D plaster of paris

(iii) What is the suitable method for separating a mixture of sand and ammonium chloride?

A Magnetization
B Decantation
C Sublimation
D Simple distillation

(iv) Which one is an example of liquid solutions?

A Dental amalgam
B Fresh milk
C Alloys
D Vinegar

(v) Why do the ships often have blocks of magnesium attached to their hull?

A To improve appearance of the hull.
B To make the hull stronger.
C To give sacrificial protection to the hull.
D To weigh down the ship in the water.

(vi) Given a task of preparing hydrogen gas in the laboratory, which complete set of apparatuses will you use?

A Thistle funnel, flat-bottomed flask, pipette, water trough, beehive stand and a gas jar.
B Thistle funnel, flat-bottomed flask, delivery tube, water trough, beehive stand and burette.
C Thistle funnel, flat-bottomed flask, delivery tube, water trough, beehive stand and a gas jar.
D Thistle funnel, flat-bottomed flask, delivery tube, measuring cylinder, beehive stand and a gas jar.

(vii) What is the role of charcoal in filter elements?

A To kill germs
B To sediment impurities
C To coagulate impurities
D To trap dust particles

(viii) Why is wind considered a promising source of energy for the future?

A It does not produce harmful gases.
B It is easily stored.
C It is harnessed without chemical reaction.
D It is a renewable source of energy.

(ix) Given that, the amount of heat gained by water after a complete combustion of 46 g of ethanol (C_2H_5OH) is 8.4 kJ, what is the energy value of ethanol in J/g?

A 182.0
B 182.7
C 182.6
D 182.8

(x) The following sets of radicals have oxidation states of either -1 or -2 **except**;

A hydroxide, carbonate, nitrate, phosphate, chlorate and sulphite.
B hydroxide, sulphate, carbonate, nitrate, nitrite, chlorate and sulphite.
C hydroxide, carbonate, nitrate, chlorate and hydrogen carbonate.
D hydroxide, carbonate, nitrite, chlorate, sulphate and nitrate.

2. Match the chemical constituents in **List A** with the corresponding types of fire extinguisher in **List B** by writing the letter of a correct response below the item number in the table provided.

List A		List B	
(i)	Bromochloro-difluoro-methane.	A	Dry powder
(ii)	Sodium bicarbonate and urea complex.	B	Wet chemical
(iii)	Potassium acetate.	C	Foam
(iv)	Mono ammonium phosphate with nitrogen carrier.	D	CO_2
		E	Sand
(v)	Proteins and fluoro proteins.	F	Halon
		G	ABC

Answers

List A	(i)	(ii)	(iii)	(iv)	(v)
List B					

SECTION B (70 Marks)

Answer **all** questions in this section.

3. Compare the properties of gaseous and solid states of matter based on the following aspects:

(a) Shapes of particles

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(b) Volume

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(c) Compressibility

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(d) Ability to flow

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(e) Arrangement of particles

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4. (a) A laboratory technician instructed Form Two students to dissolve sodium chloride in distilled water. Giving two reasons, state whether a mixture or a compound was formed in the process.

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(b) Which method can be useful in separating each of the following components from their mixtures?

(i) Pure water from tea.

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(ii) Oil from a mixture of oil and water.

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(iii) Ethanol from a mixture of water and ethanol.

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(iv) Nail from a mixture of nail and flower.

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(v) Salt from sea water.

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(c) Which change of state of matter is applied in the following processes?

(i) Metallurgy

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(ii) Drying of material

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5. (a) Differentiate oxidation state from valency.

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(b) For each of the radicals given in the following table, write its chemical formula, valency and oxidation state.

Radical	Formula	Valency	Oxidation state
Nitrate			
Hydrogen sulphate			
Phosphate			
Carbonate			
Sulphite			

6. (a) (i) One gram of hydrogen atom mixes with 35.5 g of chlorine atom to give 36.5 g of hydrogen chloride. Use this experimental fact to prove the Dalton atomic theory.

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(ii) With reasons, give two statements of the Dalton atomic theory that were later corrected.

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(iii) Why is the nuclide notation $^{12}_{6}C$, ^{14}C is allowed, but $^{12}_{6}C$, $_{6}C$ is not allowed?

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(b) Complete the following table by filling in the properties of sub-atomic particles.

Sub-atomic particle	Symbol	Location	Charge	Relative mass
Proton				
Neutron				
Electrons				

7. (a) Identify the type of bond found in the following compounds:

(i) Magnesium oxide

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(ii) Table salt

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(iii) Drinking water

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(iv) Ammonia

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(v) Calcium chloride

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(b) Consider the following molecule of a certain compound then answer the questions that follow:



(i) What is the name of the molecule?

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(ii) What is the molecular formula of the compound?

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(iii) What type of bond holds the molecules?

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(iv) Give any other two compounds with the same type of bond identified in (b)(iii).

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8. Study the hypothetical elements given in the following table then answer the questions that follow:

Element	Atomic Number
A	3
C	12
D	16
E	18
F	20

(a) With reason(s), explain which of these elements:

(i) qualifies as a noble gas.

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(ii) functions as a halogen.

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(iii) serves as an alkali metal.

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(b) By giving reason(s), indicate elements which are;

(i) placed in the same group.

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(ii) placed in the same period.

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9. (a) (i) What is the name given to the arrangement of the electrons around the nucleus?

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(ii) What is the name of the layers in which the electrons are arranged?

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(iii) If each layer in (a) (ii) can hold a maximum number of electrons given by the formula $2n^2$, what does n represent? 1(

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(iv) By using the formula presented in (a) (iii), calculate the number of electrons in the layers K, L, M and N.

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(b) A sample of bromine contains 55% of the isotope with mass number 79; and 45% of the isotope with the mass number 81. Calculate the relative atomic mass of bromine.

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SECTION C (15 Marks)

Answer question **ten (10)**.

10. An experiment was conducted to find out the relationship between solubility of potassium nitrate salt in water against temperature. The results were recorded as shown in the following table:

Mass of the salt (g)	10	30	50	65	87	113
Mass of water (g)	100	100	100	100	100	100
Temperature (°C)	0	20	30	40	50	60

With reference to the experiment:

(a) Provide the statement of the problem.

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(b) Give the hypothesis.

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(c) Identify;

(i) the dependent variable.

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(ii) the independent variable.

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(iii) the controlled variable.

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(d) Present the data collected in a tabular form.

(e) Make an interpretation of the data given.

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(f) Make an inference and conclusion.

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