Candidate's Examination Number .....

THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
FORM TWO SECONDARY EDUCATION EXAMINATION, 2008

0032 **CHEMISTRY**

Time: 2½ HOURS **ANSWERS**

INSTRUCTIONS

1. This paper consists of sections A, B and C.
2. Answer **ALL** questions.
3. Write your examination number at the top right corner of every page.
4. **ALL** writing must be in black or blue ink **EXCEPT** diagrams which must be in pencil.
5. Cellphones and calculators are not allowed in the examination room.
6. The following atomic masses may be used: $H = 1$, $O = 16$, $C = 12$, $Na = 23$, $S = 32$, $Ca = 40$

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

SECTION A (10 MARKS)

1. Questions (i) - (x) are multiple choice items. Select the best answer in each case and write its letter (A, B, C, or D) in the box provided.

(i) The process of collecting data through the senses is called:
A. Experimentation
B. Hypothesis
C. Observation
D. Conclusion
Correct: C
Reason: Observation involves using senses to gather data, unlike experimentation (testing), hypothesis (prediction), or conclusion (result).

(ii) A liquid that forms a green solution with iron(II) sulphate is likely to be:
A. Water
B. Ammonia
C. Hydrochloric acid
D. Ethanol
Correct: B
Reason: Ammonia reacts with iron(II) sulphate to form a green complex, while water or acids do not produce this color.

(iii) The chemical symbol for potassium is:
A. P
B. K
C. Po
D. Pt
Correct: B
Reason: Potassium's symbol is K, derived from its Latin name "kalium," unlike P (phosphorus), Po (polonium), or Pt (platinum).

(iv) The method used to separate a mixture of iodine and salt is:
A. Filtration
B. Sublimation
C. Evaporation
D. Decantation
Correct: B
Reason: Iodine sublimes (turns from solid to gas) when heated, allowing separation from salt, which remains solid.

(v) A non-luminous flame is produced when:
A. Air holes are closed
B. Gas supply is high

C. Air holes are fully open
D. Flame is yellow
Correct: C
Reason: Open air holes allow sufficient oxygen for complete combustion, producing a blue, non-luminous flame.

(vi) Which of the following elements is a noble gas?
A. Neon
B. Nitrogen
C. Sodium
D. Sulphur
Correct: A
Reason: Neon is a noble gas (Group VIII), chemically inert, unlike nitrogen, sodium, or sulphur.

(vii) The bond in a water molecule is:
A. Ionic
B. Covalent
C. Metallic
D. Electrovalent
Correct: B
Reason: Water (H_2O) has covalent bonds, as hydrogen and oxygen (both non-metals) share electrons.

(viii) A substance that causes severe burns on skin is:
A. Flammable
B. Corrosive
C. Toxic
D. Irritant
Correct: B
Reason: Corrosive substances, like strong acids, cause severe burns, unlike flammable (ignites), toxic (poisonous), or irritant (mild discomfort).

(ix) The electronic configuration of aluminium (atomic number 13) is:
A. 2:8:3
B. 2:8:2
C. 2:7:4
D. 2:8:4
Correct: A
Reason: Aluminium (13 electrons) has configuration 2:8:3 (2 in first shell, 8 in second, 3 in third).

(x) The gas used in balloons is:
A. Oxygen
B. Hydrogen
C. Helium
D. Carbon dioxide.

2. Match each item in List A with a correct response in List B by writing its letter below the number of the corresponding item in the table provided.

LIST A	LIST B
(i) Gas that produces a pop sound	A. Oxygen
(ii) Coating iron with paint	B. Rust prevention
(iii) Separates solids from liquids	C. Filtration
(iv) Element with atomic number 16	D. Sulphur
(v) Forms blue solution with copper(II) sulphate	E. Water
(vi) Apparatus for precise liquid dispensing	F. Pipette
(vii) Liquid used in batteries	G. Sulphuric acid
(viii) Method to obtain sugar from solution	H. Evaporation
(ix) Gas used in fire extinguishers	I. Carbon dioxide
(x) Element in group I, period 3	J. Sodium

Answers

LIST A	i	ii	iii	iv	v	vi	vii	viii	ix	x
LIST B	A	B	C	D	E	F	G	H	I	J

SECTION B

3. (a) Define the term "molecule".

A group of atoms bonded together, representing the smallest unit of a compound or element that retains its chemical properties.

(b) Name three types of chemical bonds.

Ionic, Covalent, Metallic

(c) Give one example of a compound formed by each bond type in (b).

(i) Ionic: Sodium chloride (NaCl)

(ii) Covalent: Water (H_2O)

(iii) Metallic: Copper (Cu)

These bonds arise from electron transfer (ionic), sharing (covalent), or delocalization (metallic), with examples showing typical compounds or elements.

4. (a) What is meant by the term "covalent bond"?

A chemical bond formed by the sharing of electrons between non-metal atoms to achieve a stable electron configuration.

(b) Draw diagrams to show the electron arrangement in:

(i) A nitrogen atom (atomic number 7)

2 electrons in first shell, 5 in second (2:5).

(ii) A nitrogen molecule (N_2)

Each nitrogen atom shares 3 electrons, forming a triple bond, with each having 2:8 configuration effectively.

(c) State the type of bond formed between hydrogen and oxygen in water.

Covalent bond

Hydrogen and oxygen share electrons in H_2O, forming covalent bonds due to their non-metal nature.

5. (a) Define the term "suspension".

A heterogeneous mixture where solid particles are dispersed in a liquid or gas but settle over time.

(b) List three properties of a suspension.

(i) Cloudy appearance

(ii) Particles settle on standing

(iii) Particles can be separated by filtration

(c) Name one method to separate mud from muddy water.

Filtration

Filtration traps mud particles while allowing water to pass through, separating the suspension.

6. (a) What is meant by the term "extinguisher"?

A device or substance used to put out a fire by removing one or more elements of the fire triangle.

(b) Name three types of fire extinguishers.

Water, Carbon dioxide, Dry powder

(c) State one precaution when using a water extinguisher.

Do not use on electrical or oil fires

Water conducts electricity and can spread oil fires, making it unsafe for certain fire types.

7. (a) Define the term "isotope".

Atoms of the same element with the same number of protons but different numbers of neutrons.

(b) Calculate the number of neutrons in:

(i) Carbon-12 (atomic number 6)

Neutrons = Mass number - Atomic number = 12 - 6 = 6

(ii) Carbon-14 (atomic number 6)

Neutrons = 14 - 6 = 8

(c) State one use of isotopes in science.

Carbon-14 dating

Isotopes like carbon-14 are used to determine the age of organic materials in archaeology.

8. (a) What is meant by the term "hazard symbol"?

A pictogram on chemical containers indicating the specific danger posed by the substance, such as flammability or toxicity.

(b) List three hazard symbols found in a chemistry laboratory.

Flammable, Corrosive, Toxic

(c) State the meaning of one symbol listed in (b).

Flammable: Indicates the substance can ignite easily.

Hazard symbols warn of risks, with flammable signaling fire danger, critical for lab safety.

9. (a) Define the term "hydrogen".

A colorless, odorless gas (H_2) with atomic number 1, highly flammable and used in various reactions.

(b) Describe a laboratory test for hydrogen gas.

Introduce a lit splint to the gas; hydrogen produces a “pop” sound due to rapid combustion.

(c) Name one industrial use of hydrogen.

Ammonia production

Hydrogen is used in the Haber process to produce ammonia for fertilizers.

10. (a) What is meant by the term "water hardness"?

The presence of dissolved calcium and magnesium ions in water, affecting its ability to form lather with soap.

(b) Name two types of water hardness.

Temporary hardness, Permanent hardness

(c) State one method to remove temporary hardness from water.

Boiling

Boiling precipitates calcium bicarbonate, removing temporary hardness.