SMZ

ZANZIBAR EXAMIATION COUNCIL

FORM THREE ENTRANCE EXAMINATION

043 **CHEMISTRY**

Time: 2:30 Hours **ANSWERS** **MONDAY 28th DECEMBER 2020**

Instructions

1. This paper consists of sections A and B and C.
2. Answer **all** questions in Section A and B, and any Two in section C, Question 9 is compulsory
3. All writings must be in **blue** or **black** ink.
4. Communication devices and any unauthorized materials are **not** allowed in the assessment room .
5. Write your **Assessment Number** at the top right hand corner of every page.
6. The following atomic masses may be used:

   H = 1. C = 12, O = 16, , Ca = 40, Na = 23

1. Multiple Choice Questions
Choose the correct answer and write its letter in the table below.

i. A person who studies chemistry is called a
A. Scientist
B. Chemist
C. Biologist
D. Chemical
Answer: B. Chemist
A chemist specializes in the study of chemistry and its applications.

ii. Item which can easily catch fire is known as
A. Toxic
B. Corrosive
C. Flammable
D. Explosive
Answer: C. Flammable
Flammable items ignite easily when exposed to heat or flames.

iii. Bunsen burner produces the hottest flame when
A. The air hole is closed
B. The air hole is fully opened
C. The air hole is half opened
D. The gas tap is opened
Answer: B. The air hole is fully opened
When the air hole is fully opened, sufficient oxygen mixes with gas, producing a non-luminous and hotter flame.

iv. Positively charged ion is called
A. Anion
B. Neutral ion
C. Cation
D. Radical
Answer: C. Cation
A cation is formed when an atom loses electrons, resulting in a positive charge.

v. The main physical states of matter are
A. Two
B. Four
C. Three
D. Five
Answer: C. Three
The three main states of matter are solid, liquid, and gas.

vi. One of the following is an example of a chemical change
A. Rusting of iron
B. Melting of ice
C. Cloud changing into rain
D. Magnetizing of iron
Answer: A. Rusting of iron
Rusting is a chemical change involving the reaction of iron with oxygen and water to form iron oxide.

vii. When oxygen reacts with sodium it forms
A. Acidic oxide
B. Neutral oxide
C. Basic oxide
D. Amphoteric oxide
Answer: C. Basic oxide
Sodium reacts with oxygen to form sodium oxide, which is a basic oxide.

viii. A gas that is used as a fuel
A. Nitrogen
B. Methane
C. Oxygen
D. Water vapour
Answer: B. Methane
Methane is a common fuel used in households and industries.

ix. Pure water boils at
A. 80°C
B. 70°C
C. 100°C
D. 1000°C
Answer: C. 100°C
Pure water boils at 100°C under standard atmospheric pressure.

x. Common salt dissolves more in
A. Kerosene
B. Water
C. Petrol
D. Diesel
Answer: B. Water
Water is a universal solvent, making it easier for salt to dissolve in it.

2. Matching Items
Match the meanings in LIST A with their corresponding situations in LIST B.

LIST A
i. Swallowing, inhaling or absorbing harmful substance in the body
ii. Loss of consciousness caused by lack of sufficient blood and oxygen to the brain
iii. The condition in which the body system is unable to take enough blood to the vital organs
iv. Blockage of upper part of the airway by food or other objects
v. Skin injury that causes a change in the color of the skin
vi. Injuries resulting from the body coming into contact with heat or harmful chemicals
vii. The condition in which the lungs are not getting enough oxygen causing difficulty in breathing
viii. Occurs when a person comes into direct contact with electricity
ix. The loss of blood usually occurs from a visible wound
x. The removal of the content of the stomach through the mouth

LIST B
A. Bleeding
B. Burns
C. Fainting
D. Bruises
E. Nose bleeding
F. Poisoning
G. Vomiting
H. Choking
I. Shock
J. Electrical shock
K. Suffocation
L. Drowning

Answers

| LIST A | i | ii | iii | iv | v | vi | vii | viii | ix | x |

| LIST B | F | C| I | H | D | B | K | J | A | G |

3. Fill in the blanks.

i. Charcoal is made by the dry distillation of wood in a limited supply of air.
ii. In the periodic table, elements are arranged according to the order of their atomic numbers.
iii. Water can exist in different physical states, namely solid, liquid and gas
iv. Heat is the energy of being transferred
v. Atoms can be represented by symbols that indicate their respective mass and atomic numbers.

4. (a). Define the term Chemistry.
Chemistry is the branch of science that studies the composition, structure, properties, and changes of matter.

b. Mention any five fields where the knowledge of chemistry can be applied.
i. Medicine
ii. Agriculture
iii. Food processing
iv. Environmental protection
v. Industry

5. (a). Define the following terms:
i. Boiling point
The boiling point is the temperature at which a liquid changes to a gas throughout the liquid.
ii. Period
A period is a horizontal row in the periodic table where elements have the same number of electron shells but differ in chemical properties.

(b). Give explanations for the following cases in the periodic table:
i. Group I elements are called alkali metals.
Group I elements are called alkali metals because they react with water to form alkaline solutions and are highly reactive.

ii. Electronegativity increases from left to the right across the period.
Electronegativity increases from left to right across a period due to the increase in nuclear charge, which pulls the bonding electrons closer.

iii. Potassium is more reactive than sodium.
Potassium is more reactive than sodium because it has a larger atomic radius, making it easier to lose its outermost electron.

iv. Neon and Argon do not form compounds with any element.
Neon and Argon do not form compounds because they have a stable electronic configuration with a complete outer electron shell.
6. (a). Give the meaning of the following terms:

i. Element
An element is a pure substance that cannot be broken down into simpler substances by chemical means.

ii. Solvent
A solvent is a substance that dissolves a solute to form a solution.

iii. Compound
A compound is a substance made of two or more elements chemically combined in fixed proportions.

(b). Write down the symbols of the following elements:
i. Iodine: I
ii. Magnesium: Mg
iii. Aluminium: Al
iv. Neon: Ne

(c). i. Classify the following elements into metals and non-metals:

Metals	Non-metals
Calcium	Carbon
Lithium	Oxygen
	Nitrogen

ii. Why is air a mixture and not a compound?
Air is a mixture because its components (like oxygen, nitrogen, and carbon dioxide) are not chemically combined and can be separated physically.

7. a. i. Name four importance of water in everyday life.
- Essential for drinking and hydration.
- Used in agriculture for irrigation.
- Important for cleaning and sanitation.
- Used in industries as a coolant or solvent.

ii. How can you test the presence of water in the air?
The presence of water in the air can be tested by cooling the air and observing the condensation of water droplets on a cold surface.

b. Name two physical properties of water.
i. Water is colorless and odorless.
ii. Water has a high specific heat capacity.

8. a. What is the meaning of scientific procedure?
A scientific procedure is a systematic method used in experiments to investigate and analyze phenomena to derive conclusions.
b. Mention three types of variables as used in scientific procedures:
i. Independent variable
ii. Dependent variable
iii. Controlled variable

c. Write the missing steps A, B, and C in the scientific procedures:

Step	Name
A	Problem identification
B	Experimentation
C	Conclusion

9. (a). i. Study the table below which shows reactions between some non-metals with oxygen, then fill the blanks.

Non-metals	How it burns	Colour of the flame	Name of product formed
Carbon	Reacts with oxygen slowly	Yellow-white flame	Carbon dioxide
Phosphorus	Burns brightly	White flame	Phosphorus (V) oxide
Sulphur	Burns with a blue flame.	Blue flame	Sulphur dioxide

ii. Outline two chemical properties of oxygen.
- Supports combustion by combining with other substances to release heat and light.
- Reacts with metals and non-metals to form oxides.

iii. List down any two uses of oxygen.
- Used in welding and cutting metals.
- Used in hospitals for respiration in patients.

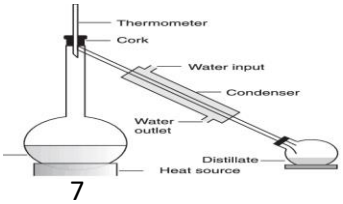
iv. How can oxygen be tested in the laboratory?
Oxygen can be tested using a glowing splint. If the splint relights, oxygen is present.

9. b. i. Name the methods that can be used to separate the following mixtures:

Mixture	Method
Iodine and sand	Sublimation
Oil from groundnut	Extraction
Pure water from muddy water	Filtration
Water from the mixture of oil	Separating funnel
Water and ethanol	Distillation

ii. Draw the following apparatus:

- Liebig condenser:



- Tripod stand:

10. (a). Define the term fuel.
Fuel is a substance that is burned to produce heat or energy, often used for heating, cooking, or powering engines.

b. List two classes of fuels according to their occurrence.
- Natural fuels (e.g., wood, coal)
- Artificial fuels (e.g., petrol, kerosene)

c. List down five sources of energy which are environmentally friendly.
- Solar energy
- Wind energy
- Hydropower
- Geothermal energy
- Biomass energy

d. Mention four ways in which energy can be converted from one form to another.
- Chemical energy to heat energy (e.g., burning wood)
- Electrical energy to mechanical energy (e.g., using an electric motor)
- Solar energy to electrical energy (e.g., solar panels)
- Kinetic energy to electrical energy (e.g., hydropower).

11. (a). Briefly explain three sub-atomic particles.
- Protons: Positively charged particles located in the nucleus of an atom.
- Neutrons: Neutral particles located in the nucleus, contributing to atomic mass.
- Electrons: Negatively charged particles orbiting the nucleus in energy levels.

(b). What is isotopy?
Isotopy is the occurrence of atoms of the same element having the same atomic number but different mass numbers due to a varying number of neutrons.

(c). Consider the following atoms $^{6}C_{12}$ and $^{6}C_{13}$, find their:
i. Atomic number and mass number of each atom.
- Atomic number of $^{6}C_{12}$: 6
- Mass number of $^{6}C_{12}$: 12
- Atomic number of $^{6}C_{13}$: 6
- Mass number of $^{6}C_{13}$: 13

ii. Number of neutrons in each atom.
- Neutrons in 6C12: 12 - 6 = 6
- Neutrons in 6C13: 13 - 6 = 7

iii. What do you observe from these two atoms?
These atoms are isotopes of carbon, having the same atomic number but different mass numbers.