

GENERAL CERTIFICATE OF EDUCATION BOARD

General Certificate of Education Examination

JUNE 2024**ADVANCED LEVEL**

Centre Number	
Centre Name	
Candidate Identification Number	
Candidate Name	

Mobile phones are NOT allowed in the examination room.**MULTIPLE CHOICE QUESTION PAPER****Duration: One and a Half Hours****INSTRUCTIONS TO CANDIDATES**

Read the following instructions carefully before you start answering the questions in this paper. Make sure you have a soft HB pencil and an eraser for this examination.

1. USE A SOFT HB PENCIL THROUGHOUT THE EXAMINATION.
2. DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Before the examination begins:

3. Check that this question booklet is headed "Advanced Level- 0715 CHEMISTRY 1"
4. Fill in the information required in the spaces above.
5. Fill in the information required in the spaces provided on the answer sheet using your HB pencil:
Candidate Name, Exam Session, Subject Code and Candidate Identification Number.
Take care that you do not crease or fold the answer sheet or make any marks on it other than those asked for in these instruction.

How to answer the questions in this Examination

6. Answer ALL the 50 questions in this Examination. All questions carry equal marks.
7. Non-programmable calculators are allowed.
8. Each question has FOUR suggested answers: A, B, C and D. Decide on which answer is correct. Find the number of the question on the Answer Sheet and draw a horizontal line across the letter to join the square brackets for the answer you have chosen.

For example, if C is your correct answer, mark C as shown below:

[A] [B] [**C**] [D]

9. Mark only one answer for each question. If you mark more than one answer, you will score a zero for that question. If you change your mind about an answer, erase the first mark carefully, then mark your new answer.
10. Avoid spending too much time on any one question. If you find a question difficult, move on to the next question. You can come back to this question later.
11. Do all rough work in this booklet, using, where necessary, the blank spaces in the question booklet.
12. At the end of the examination, the invigilator shall collect first the answer sheet and then the question booklet. **DO NOT ATTEMPT TO LEAVE THE EXAMINATION HALL WITH IT.**

Questions 1- 35 (Thirty-five questions)

Directions: Each of the questions or incomplete statements in this section is followed by four suggested answers. Select the best answer in each case.

1. Molar mass is the mass of
 - A one molecule of a substance
 - B one mole of a substance
 - C one atom of a substance
 - D $1/12^{\text{th}}$ the mass of one molecule of a substance

2. The mass number of an atom is the sum of the number of
 - A protons and neutrons in the nucleus of an atom
 - B electrons and protons in an atom
 - C electrons, protons and neutrons in an atom
 - D protons in the nucleus of an atom.

3. Why are some ionic compounds like AgCl insoluble in water which is a polar solvent?
 - A Their lattice energy is higher than their solvation energy
 - B Their lattice energy is lower such that it cannot compensate for the solvation energy
 - C Their cations have a high charge density which needs high energy to be broken
 - D The hydration energy is higher than their lattice energy.

4. The mass of 1 mole of calcium is 40 g. What is the mass of one calcium atom?
 - A 6.02×10^{23}
 - B 6.02×10^{-23}
 - C 6.65×10^{23}
 - D 6.65×10^{-23}

5. Nitration of benzene takes place in the presence of a nitrating mixture. Identify the nitrating mixture amongst the following:
 - A dilute H_2SO_4 / dilute HNO_3
 - B Conc. H_2SO_4 /Conc. HNO_3
 - C NO_2^+
 - D HNO_3

6. When compound X is heated with concentrated ethanoic acid and concentrated sulphuric acid, compound Y of molecular formula $\text{C}_3\text{H}_6\text{O}_2$ is formed. The molecular formula of compound X is
 - A $\text{CH}_3\text{CH}_2\text{OH}$
 - B CH_3OH
 - C $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
 - D $(\text{CH}_3)_2\text{CO}$

7. 100 cm^3 of 0.10 M solution of a certain metal chloride required 200 cm^3 of 0.20 M solution of silver nitrate for complete precipitation of the chlorides. The right formula for the metal chloride could be?
 - A MCl_4
 - B MCl
 - C MCl_3
 - D MCl_2

8. H_2O_2 decomposes according to the equation: $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$. What is the rate of disappearance of H_2O_2 with respect to the rate of formation of O_2 gas?
 - A 2
 - B 1
 - C 1/2
 - D 2/3

9. Identify the energy change(s) involved in the reaction $\text{Li(g)} + \text{F(g)} \rightarrow \text{Li}^+(\text{g}) + \text{F}^-(\text{g})$
 - A Atomization and ionization of Lithium.
 - B ionization of Lithium and electron affinity of Fluorine
 - C Ionization of Lithium and ionization of Fluorine
 - D Lattice energy of Lithium and Fluorine

10. The Bragg's equation is given by $2ds\sin\theta = n\lambda$. d in the equation represents:
 - A Distance between two atoms
 - B Distance between two layers
 - C Distance between x-rays
 - D Wave length

11. Which of the following oxides is solid and acidic ?
 - A PbO_2
 - B CO_2
 - C SnO_2
 - D SiO_2

12. Identify the pair of s-block elements that show diagonal relationship.
- Li/Be
 - B/Si
 - Li/Mg
 - Be/Al
-
13. What are isomers?
- Atoms of same element with different atomic mass but same atomic number
 - They are different forms of same element in same physical state
 - Compounds with same molecular formula but different structural formulae
 - Compounds of same elements but different physical states.
-
14. Catenation as applied to carbon
Chemistry is the ability for carbon to
- form compounds involving only carbon atoms
 - undergo hybridization
 - form strong bonds with oxygen
 - form strong bonds with itself
-
15. The ground state electronic configuration of nitrogen with atomic number 7 using s p d f notation is:
- $1s^2 2s^2 3p^3$
 - $1s^2 2s^1 2p^4$
 - $1s^2 2s^2 2p^3$
 - $1s^2 2s^1 3p^4$
-
16. A cell is constructed using the following two half cells:
 $Ni^{2+}(aq) + 2e^- \rightarrow Ni(s); E^\theta = -0.25V$
 $Ag^+(aq) + e^- \rightarrow Ag(s); E^\theta = +0.80V$.
- Choose the correct cell diagram of the cell.
- $Ni(s) / Ni^{2+}(aq) // Ag^+(aq) / Ag(s)$
 - $Ag(s) / Ag^+(aq) // Ni(s) / Ni^{2+}(aq)$
 - $Ag(s) / Ag^+(aq) // Ni^{2+}(aq) / Ni(s)$
 - $Ni(s) / Ni^{2+}(aq) // Ag(s) / Ag^+(aq)$
-
17. The overall reaction
 $(CH_3)_2CHBr + KOH \rightarrow (CH_3)_2CHOH + KBr$
- is best described as
- Electrophilic substitution
 - Free radical substitution
 - Nucleophilic Substitution
 - Elimination'
-
18. The sulphates and carbonates of Mg, Ca, and Sr are insoluble or sparingly soluble in water because
- the metals are hard
 - their lattice energies are higher than the hydration energies of their ions
 - the hydration energies of the ions are larger than their lattice energies
 - the cations have a high charge density
-
19. Raoult's law is stated as:
- The vapour pressure above a mixture of liquids is the sum of the partial pressure of its various components
 - The partial vapour pressure of a component in a liquid mixture is the product of its mole fraction and the total pressure of the mixture
 - The partial vapour pressure of a component in a liquid mixture is inversely proportional to its mole fraction
 - The partial vapour pressure of a component in a liquid mixture is the product of its mole fraction and its pure vapour pressure
-
20. Why is it that lithium is the only metal in group I of the periodic table without a 4th ionization energy?
- It has the smallest atomic radius
 - It is the most unreactive metal in group I
 - It has only three electrons in its atoms
 - It has the highest effective nuclear charge
-
21. The correct systematic name for the compound $[Co(en)_2Cl_2]NO_3$ is
- Dichlorobisethylenediamine cobaltate(III) nitrate
 - Bisethylenediaminedichlorocobaltate(III) nitrate
 - Bisethylenediaminedichlorocobalt(III)nitrate
 - Dichlorobisethylenediaminecobalt(III)nitrate

22. Hoffmann degradation is used to convert Etanamide (CH_3CONH_2) to methylamine (CH_3NH_2). Give the reagent and reaction condition.

- A $\text{Br}_2/\text{AgNO}_3$ and heat
- B Br_2/KBr and heat
- C Br_2/KOH and heat
- D $\text{Br}_2/\text{ethanol}$ and reflux

23. Which of the following is NOT a property of d-block elements?

- A They have variable oxidation states
- B They form complexes
- C They have low melting points
- D They form coloured compounds

24. Indicate the type of organic reaction that ethene ($\text{CH}_2=\text{CH}_2$) and hydrogen chloride could undergo

- A Condensation reaction
- B Nucleophilic addition
- C Electrophilic addition
- D Nucleophilic substitution

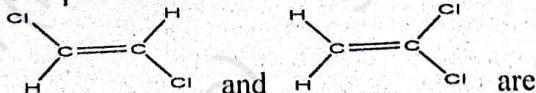
25. Bronsted-Lowry defined a base as

- A an electron pair donor
- B an electron pair acceptor
- C a proton donor
- D a proton acceptor

26. The weakest bond among the following is

- A F-F
- B Cl-Cl
- C Br-Br
- D Cl-I

27. The pair of isomers



- A Chain isomers
- B Geometric isomers
- C Position isomers
- D Functional group isomers

28. The first five ionization energies of element X and Y are X: 500 4600 6900 13400 17600
Y: 790 1600 3200 4400 16100. A compound formed between X and Y is

- A XY
- B X_2Y_3
- C X_3Y_2
- D X_4Y_3

29. In structure determination, the method that identifies the bond type and functional group in the molecule is

- A X-ray diffraction
- B Ultra-violet spectroscopy
- C Infra-red spectroscopy
- D Nuclear magnetic resonance

30. The value of the equilibrium constant for the reaction: $\text{H}_{2(g)} + \text{I}_{2(g)} \rightleftharpoons 2\text{HI}_{(g)}$ can be

- altered by
- A Adding a suitable catalyst
 - B Increasing the temperature
 - C Increasing the total pressure
 - D Adding iodine to the system

31. Which of the compounds below is the most reactive with the nitrating mixture (Conc $\text{HNO}_3/\text{Conc H}_2\text{SO}_4$)?

- A Benzene
- B Methylbenzene
- C Nitrobenzene
- D Benzoic acid

32. The data below is for the kinetic study of the reaction



Conc. $\text{A}/\text{mol dm}^{-3}$	0.40	0.28	0.20	0.14
Time / sec $\times 10^2$	8	12	16	20

From the data, the order of the reaction is

- A 0
- B 2
- C 3
- D 1

33. The condensed formula for 2-chloro-2-methylpropanal is

- A $\text{CH}_3\text{CH}(\text{Cl})\text{CHO}$
- B $(\text{CH}_3)_2\text{C}(\text{Cl})\text{CHO}$
- C $(\text{CH}_3)_2\text{C}(\text{Cl})\text{CH}_2\text{CHO}$
- D $\text{CH}_3\text{CH}_2\text{C}(\text{CH}_3)\text{ClCHO}$

34. Which of the following is the correct definition of atomic radius?
- Half the distance between two identical atoms joined by a single covalent bond
 - Half the distance between the nuclei of two identical atoms joined by a single covalent bond
 - Half the distance between two adjacent atoms of neighbouring molecules which are not chemically bonded
 - Half the distance between two adjacent atoms of neighbouring molecules that are covalently bonded.

35. Which of the chlorides below will react with water to give its corresponding dioxides?

- NaCl
- SiCl₄
- PCl₃
- S₂Cl₂

Questions 36-45 (Ten Questions).

Directions: For each of the questions below, ONE or MORE of the response(s) is (are) correct. Decide which of the response(s) is (are) correct. Then choose;

- if 1, 2 and 3 are all correct
- if 1 and 2 only are correct
- if 2 and 3 only are correct
- if 3 only is correct

Direction summarised			
A	B	C	D
1,2,3 correct	1 and 2 only	2 and 3 only	3 only

36. Which properties of the s-block elements increase down the groups?

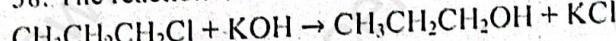
- Electronegativity
- First ionization energy
- Metallic character

-
-
-
-

37. Hydrogen fluoride is a weaker acid than hydrogen iodide. The reason for this observation is(are),
- H-F bond is longest and weakest in the halide series
 - H-F bond is shortest and strongest in the halide series
 - It is difficult for HF to release a proton in aqueous solutions

-
-
-
-

38. The reaction



- Is an example of a bimolecular nucleophilic substitution reaction.
- Forms an unstable intermediate species
- Proceeds by the S_N1 mechanism

-
-
-
-

39. Which of the following gives a colour change on warming?

- CH₃CH₂OH and acidified potassium dichromate
- CH₃CHO and Fehling's solution
- (CH₃)₃COH and potassium dichromate

-
-
-
-

40. A student wanted to measure accurately 10 cm³ of dilute hydrochloric acid.

Which of the glassware will you advise the student to use?

- Volumetric flask
- Pipette
- Burette

-
-
-
-

41. Some properties of carbon not common to the other elements of group 4 are

1. Covalency of four
2. Catenation
3. Formation of stable multiple bonds

A
B
C
D

42. The relative molecular mass of a substance is the

1. Molar mass of the substance without units
2. Mass of a molecule compared to $\frac{1}{12}$ th the mass of an atom of the carbon-12 isotope
3. Mass of its molecules compared to $\frac{1}{12}$ th the mass of an atom of the carbon-12 isotope.

A
B
C
D

43. Identify the element(s) which form(s) hydrides in which hydrogen bonding occur.

1. Oxygen
2. Fluorine
3. Nitrogen

A
B
C
D

44. During the industrial preparation of sulphuric acid, it is usually advisable to?

1. Absorb $\text{SO}_{3(g)}$ in oleum rather than water
2. Use low temperatures and a catalyst to convert SO_2 to SO_3
3. Use very high pressure to convert SO_2 to SO_3

A
B
C
D

45. The following is true about sulphur and its compounds.

1. SO_2 is produced in a stage in the contact process
2. Sulphuric acid is used to manufacture sulphuric acid
3. Sulphur has an oxidation state of 0 (zero) in S_8

A
B
C
D

Questions 46-50 (five questions)

Directions: Each of the following questions consists of a statement in the left hand column followed by a second statement in the right hand column. Decide whether the first statement is true or false. Decide whether the second statement is true or false. Then choose

- A. If both statements are true and the second statement is a **CORRECT** explanation of the first statement.
- B. If both statements are true and the second statement is **NOT** a **CORRECT** explanation of the first statement.
- C. If the first statement is true, but the second statement is false.
- D. If the first statement is false, but the second statement true.

SUMMARY OF DIRECTIONS

	First Statement	Second Statement	
A	True	True	SECOND STATEMENT IS A CORRECT EXPLANATION OF THE FIRST.
B	True	True	SECOND STATEMENT IS NOT A CORRECT EXPLANATION OF THE FIRST.
C	True	False	
D	False	True	

	FIRST STATEMENT	SECOND STATEMENT
46.	Primary amines have lower boiling points than their corresponding alcohols of similar molecular weight	The intermolecular hydrogen bonds in amines are weaker than in alcohols
47	Fluorine is the strongest oxidizing agent in the group of the halogens.	Down group VII, the Van der Waal's forces of attraction increase in strength as number of electrons increases.
48	Ethanal and propanone differ in their reaction with iodine in sodium hydroxide	Ethanal undergoes nucleophilic addition reaction faster than propanone
49	Hydrogen gas and hydrogen chloride gas both form hydrogen ion (H^+) when dissolved in water.	Hydrogen gas is non-polar while hydrogen chloride gas is polar.
50	2-hydroxypropanoic acid forms two isomers which are mirror images of each other.	Organic compounds with an asymmetric carbon atom have the ability to rotate plane polarized light.

STOP

GO BACK AND CHECK YOUR WORK