CHEMISTRY 1
0715

GENERAL CERTIFICATE OF EDUCATION BOARD

General Certificate of Education Examination

JUNE 2025 **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 instructions.

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 which answer is appropriate. 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 the blank spaces in the question booklet.
12. **At the end of the examination, the invigilator shall collect the answer sheet first 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. Choose from the options a compound of the group 14 (IV) elements that will react readily with both aqueous NaOH and dilute HCl?
   A CO
   B CO_2
   C SiO_2
   D PbO

2. Which of the following substances is suitable for use as a primary standard?
   A $Ca(OH)_2$
   B NaOH
   C Na_2CO_3
   D $CaCO_3$

3. Identify the compound which will form an alcohol on boiling with aqueous sodium hydroxide.
   A CH_3COOH
   B $C_6H_5CH_2OH$
   C $CH_3CH{=}CH_2$
   D CH_3CH_2Cl

4. Choose the correct expression for the partial pressure of methanol in a mixture comprising 1.75 moles of methanol and 1.25 moles of ethanol given that the vapour pressure of pure methanol is 92 mmHg and vapour pressure of pure ethanol is 67 mmHg.
   A $\frac{1.25}{3} \times 67$
   B $\frac{1.75}{3} \times 92$
   C $\frac{1.25}{1.75} \times 92$
   D $\frac{1.75}{1.25} \times 67$

5. Indicate the type of isomerism that exist between: CH_3-O-CH_3 and CH_3CH_2OH
   A Position isomerism
   B Optical isomerism
   C Geometric isomerism
   D Functional group isomerism

6. What will be the number of moles of bicarbonate ions (HCO_3^-) in 24.6 g of $Ca(HCO_3)_2$ (RMM $Ca(HCO_3)_2$ = 122)
   A 0.4
   B 0.2
   C 2.43×10^{23}
   D 1.21×10^{23}

7. Identify the particle X in the following nuclear reaction:
   $^{27}_{13}Al + {}^{1}_{0}n \longrightarrow X + {}^{4}_{2}He$
   A $^{24}_{10}Ne$
   B $^{24}_{12}Mg$
   C $^{24}_{11}Na$
   D $^{23}_{11}Na$

8. Which of the following pairs of compounds would undergo a condensation reaction?
   A water/ethanol
   B Phenol/Pheylamine
   C Ethanal /ethylamine
   D ethanol/2,4-DNPH

9. Calculate the volume of 0.5 M NaOH which is needed to completely neutralize 25.0 cm^3 of 0.25 M HCl.
   A 6.25 cm^3
   B 12.5 cm^3
   C 25 cm^3
   D 50 cm^3

10. Transition metals form complexes with ligands because
    A They have lone pairs of electrons
    B They have catalytic properties
    C They have high charge density
    D They have low energy empty orbitals

11. What is the pH of a 0.2 M NaOH solution
    A 13.3
    B 12.4
    C 1.6
    D 0.7

12. Which spectroscopic technique can be used to identify Protons in an organic compound?
    A Infra-red spectroscopy
    B Ultra-violet spectroscopy
    C Nuclear magnetic resonance spectroscopy
    D Mass spectroscopy

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13. The maximum oxidation number of an element with electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2$ is:
A +6
B +5
C +3
D +2

14. An organic compound, A, of molecular formula $C_4H_{10}O$ undergoes oxidation to give a compound B, of molecular formula $C_4H_8O_2$. Compound A could be:
A $CH_3CH(OH)CH_3$
B $(CH_3)_3COH$
C $(CH_3)_2CHCH_2OH$
D $CH_3CH_2CHOHCH_3$

15. Given the half cells:
$Ag^+_{(aq)} + e^- \rightleftharpoons Ag_{(s)}$; $E^\theta = +0.80V$
and $Zn^{2+}_{(aq)} + 2e^- \rightleftharpoons Zn_{(s)}$; $E^\theta - 0.76V$
Calculate the emf of the cell.
A +1.56V
B − 1.56V
C + 0.04V
D − 0.04V

16. Consider the rate equation: Rate = $K[A]^2[B]$. Suggest the overall order of the reaction.
A 0
B 1
C 2
D 3

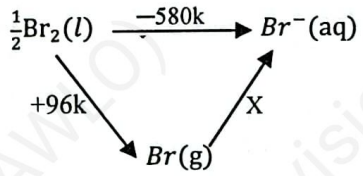
17. Which one of the following families of elements will dissolve in water to give a solution of low pH?
A Transition elements
B Halogens
C Alkali metals
D Group IV elements

18. Identify from the following, a reaction in which Sulphur is oxidized only.
A $2SO_{2(g)} + O_{2(g)} \longrightarrow 2SO_{3(g)}$
B $Fe(s) + S(s) \longrightarrow FeS(s)$
C $Na_2SO_3(aq) + S(s) \longrightarrow Na_2S_2O_3(aq)$
D $H_2(g) + S(s) \longrightarrow H_2S(g)$

19. State the units for the equilibrium process: $2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g)$.
A $moldm^{-3}$
B mol^2dm^{-6}
C $mol^{-2}dm^6$
D $mol^{-1}dm^3$

20. What is the IUPAC name for the compound $CH_3CH(CH_3)CH(CH_2CH_3)CH_2CH_2CH_3$.
A 3-ethyl-2-methyl hexane
B 4-ethyl-5-methyl hexane
C 3-isopropyl hexane
D 2-methyl-3-propyl pentane

21. From the energy diagram below, calculate the value of X in kJ.



A -676
B +676
C -484
D +484

22. Select the carboxylic acid which can form a silver mirror when heated with Tollen's reagent.
A Ethanoic acid
B Methanoic acid
C Benzoic acid
D Propanoic acid

23. Identify the molecule with the most polar covalent bond.
A HBr
B HI
C HCl
D HF

24. Which of the following reactions could be used to prepare gaseous hydrogen iodide in the laboratory?
A pass $H_2(g)$ over heated $I_2(s)$
B warm conc. HNO_3 with $I_2(s)$
C warn conc. H_3PO_4 with $NaI(s)$
D warm conc. H_2S with NaI and MnO_2

25. The Hoffmann degradation reaction is characterised by:
A Ring opening
B Ring closure
C Chain lengthening
D Chain shortening

26. Which of these s-block nitrates decompose to give the nitrite and oxygen?
A $LiNO_3$
B KNO_3
C $Ca(NO_3)_2$
D $Mg(NO_3)_2$

27. A sample of an organic compound was analysed to contain 1.2 g of carbon, 0.3 g of hydrogen and 2.4 g of oxygen. Determine the empirical formula of the compound. (RAM: C =12, H = 1, O = 16)
A C_2H_3O
B $C_2H_6O_2$
C $C_2H_6O_3$
D CH_3O

28. Identify the hydrohalic acid with the highest reducing power
A HF
B HCl
C HBr
D HI

29. Chloroethene (CH_2=CHCl) is a monomer used in producing a very important polymer commonly called:
A Polychloroethane
B Polyvinylchloride
C Chloropolyethene
D Polystyrene

30. What is the coordination number of cobalt in the complex: $[Co(EDTA)]^{2-}$
A 1
B 2
C 4
D 6

31. Determine the product (Y) of the reaction

$$C_6H_5NO_2 \xrightarrow[55°C - 60°C]{\text{Conc. } H_2SO_4/\text{Conc. } HNO_3} Y$$

A 1,2- Dinitrobenzene
B 1,3- Dinitrobenzene
C 1,4- Dinitrobenzene
D 1,2,3- Trinitrobenzene

32. Identify the structure of aminoethanoic acid (NH_2CH_2COOH) in acidic medium.
A $^+NH_3CH_2COOH$
B NH_2CH_2COOH
C $^+NH_3CH_2COO^-$
D $NH_2CH_2COO^-$

33. Select a compound of nitrogen which produces a mixture of acids when dissolved in water.
A HNO_3
B N_2O_5
C NO_2
D NH_3

34. Which of the following is an amphoteric oxide in period 3 of the periodic table?
A BeO
B MgO
C Al_2O_3
D SiO_2

35. The element X (where X is not the usual symbol of the element) has electronic configuration: $1s^2 2s^2 2p^6 3s^2 3p^3$. Identify the group and period to which X belongs.
A group III, period 3
B group III, period 5
C group V, period 3
D group V, period 2

Questions 36-45 (ten questions)
Directions: For each of the questions below, one or more responses is (are) correct. Decide which of the responses is (are) correct. Then choose:
A if 1,2 and 3 are all correct
B if 1 and 2 only are correct
C if 2 and 3 only are correct
D if 3 only is correct

SUMMARY OF DIRECTIONS			
A	B	C	D
1,2,3 correct	1,2 only	2,3 only	3 only

36. Which of the following statement(s) is/are true about the nitrate ion, NO_3^- ?
1. it has a trigonal planar shape
2. its bond angle is 120°
3. it has a trigonal pyramidal shape
A
B
C
D

37. Select the statement(s) that is/are characteristic of ideal mixtures.
1. Obey Raoult's law
2. Have components with similar chemical structures
3. Have components with different intermolecular forces

A
B
C
D

38. Amides can be prepared by:
1. Dehydration of ammonium salts of carboxylic acids
2. Reaction of ammonia with acid chlorides
3. Reaction of ammonia with esters

A
B
C
D

39. The reactivity of group 1 elements increases down the group because:
1. Ionization energy gets lower
2. Effective nuclear charge reduces
3. The outer electrons get more loosely bound.

A
B
C
D

40. Propanone (CH_3COCH_3) and propanal (CH_3CH_2CHO) differ in their reactions with:
1. phosphorus pentachloride
2. 2,4- dinitrophenylhydrazine
3. ammonical silver nitrate

A
B
C
D

41. Select the hydride(s) which when added to pure water will increase the pH
1. NH_3
2. NaH
3. HBr

A
B
C
D

42. Iodine ions are oxidised by peroxydisulphate ions according to the equation
$S_2O_8^{2-} + 2I^- \rightarrow 2SO_4^{2-} + I_2$.
Which method can be used to monitor rate?
1. Titrimetry
2. Colorimetry
3. Dilatometry

A
B
C
D

43. When phenylethanoate ($CH_3COOC_6CH_5$) is hydrolysed by excess NaOH(aq), the products of the reaction are:
1. phenoxide ion and ethanol
2. benzoate ion and ethanol
3. phenol and ethanoate ion

A
B
C
D

44. Choose the statement(s) that is/are true with respect to HBr.
1. It is prepared by the reaction of concentrated phosphoric acid with an alkali metal bromide.
2. Its boiling point is higher than that of HCl.
3. It is a weaker acid than HI

A
B
C
D

45. In an exothermic reaction,
1. Heat is released to the surroundings
2. Energy of reactants is higher than energy of products
3. Heat is absorbed from the surroundings.

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 fist statement is false, but the second statement is 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	Catenation is extensive in carbon but limited in silicon.	Carbon forms stronger C-C bonds than silicon due to its small size.
47	Nitrogen gas is evolved when R_2NH reacts with nitrous acid at < 5°C	The reaction of RNH_2 with nitrous acid can be used to distinguish it from R_2NH.
48	Atomic radius decreases across period 2 of the periodic table	Across period 2 of the periodic table, effective nuclear charge decreases as electrons are added to the same shell.
49	2-hydroxybenzoic acid has a lower boiling point than 4-hydroxybenzoic acid	The hydroxyl and carboxyl groups in 2-hydroxy benzoic acid are close to each other, hence form intramolecular hydrogen bonds while in 4-hydroxybenzoic acid, they are far apart and form intermolecular hydrogen bonds.
50	Scandium is not considered a transition metal.	Scandium has a completely filled 3d sub-shell.

STOP
GO BACK AND CHECK YOUR WORK