CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

CHEMISTRY 1 General Certificate Of Education Examination

0715

JUNE 2016 ADVANCED LEVEL

Centre Number	
Centre Name	
Candidate Identification No.	
Candidate Name	

Mobile phones are NOT allowed in the examination room.

MULTIPLE CHOICE QUESTION PAPER

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 "**0715 CHEMISTRY 1 - Advanced Level**"
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 you · HB pencil: **Candidate Name, Exam Session, Subject Code, Centre Number and Candidate 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 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 NO ATTEMPT TO LEAVE THE EXAMINATION HALL WITH IT.**

Questions I - 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. Which of the following factors increase the rate of a reaction?
   A Increase in temperature
   B Decrease in pressure
   C Increase in activation energy
   D Decrease in concentration of reactants

2. Radioactive isotopes can be used to calculate the age of materials because their decay rates are
   A dependent on the conditions of a reaction
   B unstable
   C constant
   D dependent on the amount of material present

3. An organic compound gives a positive test with Tollen's reagent (ammoniacal silver nitrate). This impliesthat the compound
   A is a ketone
   B is an aromatic aldehyde
   C can be an aliphatic aldehyde
   D is a carboxylic acid

4. A sample of hydrocarbon on complete combustion gave 1.32 g of carbon dioxide and 0.72 g of water. What would be the empirical formula of the hydrocarbon given the following relative atomic masses:
   H = 1.0; C= 12.0
   A CH_2
   B C_3H_4
   C C_3H_5
   D C_3H_8

5. Which of the following compounds is most ionic?
   A $BaCl_2$
   B $CaCl_2$
   C BaI_2
   D $CaBr_2$

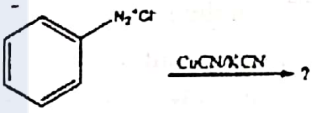
6. Calculate the pH of a 0.1 $moldm^{-3}$ solution of a fully dissociated tribasic acid.
   A 0.1
   B 0.3
   C 0.5
   D 1.0

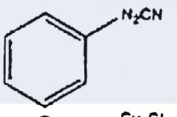
7. When a hydroxyl compound is treated with hot acidified potassium permanganate, the final oxidation product gives a positive iodoform test. What would be the likely formula of the hydroxyl compound?
   A $C_2H_5CH_2OH$
   B $CH_3CH(OH)C_2H_5$
   C $C_6H_5CH(OH)C_2H_5$
   D C_6H_5OH

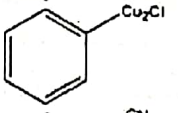
8. Which of the following compounds will form hydrogen bonds?
   A HF
   B $CHCl_3$
   C PH_3
   D SiH_4

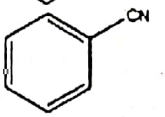
9. Iodine has a half-life of 8.07 days. What fraction of a sample of iodine-131 will be left after 16.14 days?
   A 1/2
   B 1/4
   C 1/8
   D 1/16

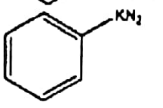
10. Give the product of the following reaction.



A 

B 

C 

D 

11. What is the colour observed in a flame test to indicate the presence of copper(II) ions in a compound?
   A Light green
   B Apple green
   C Light blue
   D Bluish green

Go on to the next page

12. How many isomers are in the compound with molecular formula, $C_2H_4Cl_2$?

A 1
B 2
C 3
D 4

13. Choose the species with a trigonal planar shape.

A NH_4^+
B BF_3
C NH_3
D H_3O^+

14. In the same period of the Periodic Table the atomic radii are largest for elements of group:

A 1 (alkali metals)
B 2 (alkaline earth metals)
C 14 (carbonto lead)
D 17 (halogens)

15. Which of the following pairs of liquids when mixed would give a higher boiling point than that predicted byRaoult's law?

A Propane and tetrachloromethane
B Propanol and ethanol
C Nitric acid and water
D Hexane and water

16. The reaction between ethanoyl chloride and the hydroxide ion to give an acid is classified as:

A electrophilicaddition
B electrophilic substitution
C nucleophilic substitution
D nucleophilicaddition

17. In the titration of ammonia solution with ethanoic acid solution, the endpoint can best be determined by using

A phenolphthalein indicator
B methyl orange indicator
C a colorimeter
D a pH meter

18. The standard redox potentials for copper and silver electrodes are +0.34 V and +0.80 V respectively. What cell emf will be obtained when the two half-cells are coupled?

A +0.46 V
B -0.46 V
C +1.14 v
D -1.14 V

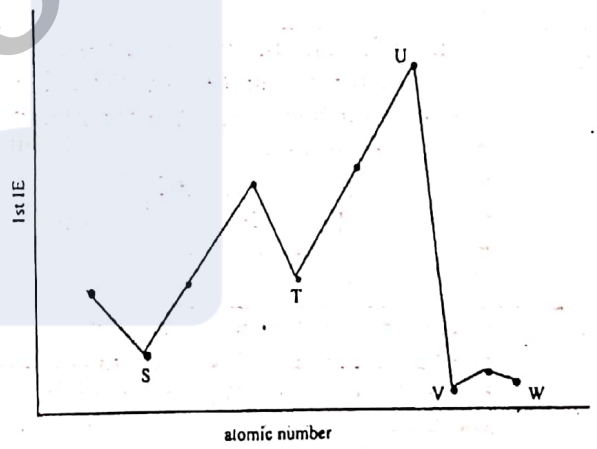
19. The enthalpy change for the equilibrium reaction, $2NO(g) + O_2 \leftrightharpoons 2NO_2(g)$ is $-113\ kJ\ mol^{-1}$. The proportion of $NO_2(g)$ in the equilibrium mixture could be increased by

A increasing the temperature
B adding nitrogen at constant volume
C increasing the pressure of the system
D adding a catalyst

20. Which of the following statements is **true** about 2-hydroxypropanoic acid?

A Is optically inactive
B Reacts with PCl_5 to form steamy white fumes of HCl
C Decolourizes acidified $KMnO_4$ solution
D Is an amino acid

21. The graph below represents the graph of first ionization energy against atomic number for some elements across period 2 and 3 of the Periodic Table. The elements S, T, U, V or W shown on the graph are not the usual symbols of the elements.



Which of the elements represents an alkali metal?

A S
B T
C U
D V

22. Propene, CH_3CHCH_2 and ethanal, CH_3CHO react with cyanide ion by different mechanisms. This can be explained in terms of the general principle that

A Nucleophiles attack a C = C carbon bond more readily than a C = O carbon bond
B Electrophiles attack a C = O carbon bond more readily than a C = C carbon bond
C Both nucleophiles and electrophiles attack a C = O carbon bond more readily than a C=C carbonbond
D Nucleophiles attack a C = O carbon bond more readily than a C = C carbon bond

23. Select the s-block element which would not give a hydroxide when reacted with water at room temperature.
A sodium
B magnesium
C lithium
D calcium

24. Three oxides have the structures: giant molecular, intermediate between giant molecular and giant ionic and giant ionic. These oxides could be respectively
A SiO_2, CO_2 and GeO
B CO_2, SiO_2 and SnO
C SiO_2, GeO_2 and SnO
D GeO, SnO_2 and PbO_2

25. Alkanes do not undergo many chemical reactions. This is because they are
A nonpolarand neutral
B polar and saturated
C neutral and saturated
D nonpolarandsaturated

26. The concentration (mol dm^{-3}) of nitrate ions in a mixture of 10 cm^3 of 0.02 mol dm^{-3} $Ca(NO_3)_2$ and 15 cm^3 of 0.30 mol dm^{-3} $NaNO_3$ is
A 0.196
B 0.188
C 0.320
D 0.034

27. The standard enthalpies of formation of ethyne, C_2H_2, carbon dioxide, CO_2 and water, H_2O, are +227.06,-394.07 and -286.26 kJmol^{-1} respectively. What is the enthalpy change of the reaction for 1mole of ethyne?

$2C_2H_2(g) + 5O_2(g) \rightleftharpoons 4CO_2(g) + 2H_2O(l)$

A -1301.46
B +1301.46
C -1814.77
D +1814.77

28. The change in the oxidation state of the vanadium atom when VO^{2+} is converted into VO_2^+ is
A -2
B -1
C 0
D +1

29. For the reaction sequence below;

The reagents (i) and (ii) are respectively
A CH_3COCl, H_2O/H^+
B CH_3COOH, H_2SO_4 (aq)
C CH_3CONH_2, HCl
D $(CH_3)_2CO$, H_2O/H^+

30. The first four successive ionization energies of an element X in kJ mol^{-1} are 900, 1758 14905 and 15100. Fromthe values it can be predicted that the element has
A three electrons in its outermost shell
B one electron in its outermost shell
C two electrons in its outermost shell
D four electrons in its outermost shell

31. An organic compound has the molecular formula, C_8H_8O. It produces an orange precipitate when reacted with 2,4-dinitrophenylhydrazine (2,4-DNPH) and gives a silver mirror with Tollen's reagent. What is the name of the compound?
A phenylethanal
B phenylpropanal
C octanal
D phenylethanone

32. Calculate the relative atomic mass (RAM) of an element, X, whose mass spectrometer's trace shows isotopes with the following percentage abundance: ^{24}X (78.3%), ^{25}X (10.8%) and ^{26}X (10.9%)
A 25.00
B 24.00
C 23.98
D 24.33

33. What is the general name given to the following reaction?
Fat/oil + Alkali ⟶ Soap + glycerol
A Esterification
B Saponification
C Condensation
D Neutralization

34. Consider the reactions represented by equations below:
I. $4NaClO_3(s) \longrightarrow 3NaClO_4(s) + NaCl(s)$
II. $3Cu(s) + 8HNO_3(aq) \longrightarrow 3Cu(NO_3)_2(aq) + 2NO(g) + 4H_2O$
III. $2NO_2(g) + H_2O(l) \longrightarrow HNO_3(aq) + HNO_2(aq)$
Which of the reactions involve disproportionation?
A I and II
B II and III
C I and III
D I, II and III

35. Who discovered the neutron?
A J. J. Thompson
B Ernest Rutherford
C James Chadwick
D Marie Curie

Questions 36 - 46 (Ten questions)
Directions: For each of the questions below, ONE or MORE of theresponses is (are) correct. Decide which ofthe responses is (are) correct. Then choose:

A if 1,2 and 3 are all correct
B if1 and 2 only are correct
C if 2 and 3 only are correct
D if 3 only is correct

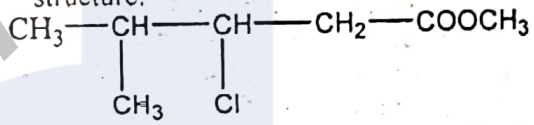
Directions Summarized			
A	B	C	D
1,2,3 correct	1,2 only	2,3 only	3 only

36. The element with electronic configuration $[Ar]\ 3d^{10}4s^24p^2$ is
1 a typical metal
2 in Group 14 (Group IV) of the Periodic Table
3 in period 4 of the Periodic Table
A
B
C
D

37. On combustion, it is found that 0.46 g of compound Y gives 0.88 g CO_2 and 0.54 g $H_2O(g)$. Given the relative atomic masses: H= 1.0; C = 2.0; O = 16.0, what would be the structural formula of compoundY?
1 CH_3CHO
2 CH_3CH_2OH
3 CH_3OCH_3
A
B
C
D

38. A compound of structural formula, $NH_2CH_2CO_2H$ can be obtained:
1 from the hydrolysis of ethanenitrile (acetonitrile)
2 by the action of ammonia on 2-chloroethanoic acid
3 from the hydrolysis of protein
A
B
C
D

39. Select the statement(s) which is/are true of the organic compound that has the following structure:



1 The subsituents are chloro, methyl and hydrogen groups
2 It is a carbonyl compound
3 The chloro and methyl groups are in positions 3 and 4 respectively on the parent chain
A
B
C
D

40. Which of the following will react with transition metals to form complex ions in which the ligand is bidentate
1 Aminoethanoic acid, $H_2NCH_2CO_2H$
2 Ethanedioc acid, $H_2C_2O_4$
3 Ethane-1,2-diammine, $H_2NCH_2CH_2NH_2$
A
B
C
D

41. What type of bond(s) exists in sodium tetrahydridoborate or sodium borohydride, $NaBH_4$?

1 Ionic bonds
2 Covalent bonds
3 Hydrogen bonds

A
B
C
D

---

42. Given the following redox potentials;

Electrode	$E^{\emptyset}$ (V)
$\frac{1}{2} I_2$ (aq)/I^- (aq)	+0.54
Fe^{3+} (aq)/Fe^{2+} (aq)	+0.77
$\frac{1}{2} Br_2$ (aq)/Br^- (aq)	+1.07
$\frac{1}{2} Cl_2$ (aq)/Cl^- (aq)	+1.36

Which of the following statements may likely be made?

1 I^-(aq) is likely to reduce Fe^{3+} (aq) to Fe^{3+} (aq)
2 Fe^{2+} (aq) is likely to reduce $\frac{1}{2} Cl_2$(aq) to Cl^-(aq)
3 Br^- (aq) is likely to reduce Fe^{3+} (aq) to Fe^{2+}(aq)

A
B
C
D

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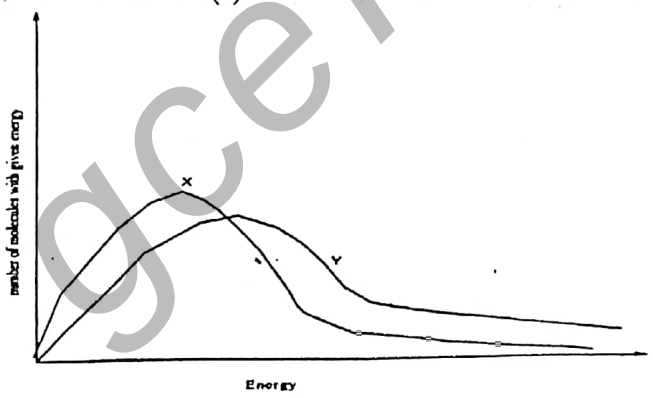
43. The diagram below shows the Maxwell-Boltzmann energy distribution curves for molecules of a gas under two sets of conditions, X and Y. Which of the following statement(s) is/are correct?



1 An increase in temperature is required to produce curve Y from X
2 The total area under the curve X represents the total number of molecules of the gas
3 The total area under the curve X is the same as that under curve Y

A
B
C
D

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44. In which of the following reaction(s) will ΔH be positive?

1 $O^+(g) + e \longrightarrow O(g)$
2 $O(g) + e \longrightarrow O^-(g)$
3 $O^-(g) + e \longrightarrow O^{2-}(g)$

A
B
C
D

---

45. Which of the following compounds would react with acidified potassium dichromate solution on warming?

1 $(CH_3)_3COH$
2 CH_3OH
3 $(CH_3)_2CHOH$

A
B
C
D

---

46. Which of the following statement(s)is/are correct concerning Group 17(Group VII) elements?

1 They will all disproportionate when reacted with a cold dilute solution of sodium hydroxide
2 The melting and boiling temperatures of the hydrides increase down the group
3 Their ionic radii are larger than those of their atomic radii

A
B
C
D

Questions 47 - 50 (Four questions)

1) 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 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
47. An aqueous solution of ammonium chloride $NH_4Cl(s)$ is likely to have a pH greater than 7	An equimolar mixture of ammonia and ammonium chloride solution functions as a buffer
48. Propene, $CH_3CH=CH_2$ can act as a monomer in an addition polymerization process	The carbon-carbon double bond in propene can result from the reaction of chloropropane with an alcoholic solution of potassium hydroxide
49. Chromium forms the highest number of oxidation states among the elements of the first transition metal series.	Cr^{3+} salt are green and Cr^{6+} salts are orange
50. Nitrogen gas is relatively unreactive towards other substances	The nitrogen to nitrogen bond dissociation energy is very high.