

**CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD**  
General Certificate of Education Examination

**0715 CHEMISTRY 1**

**JUNE 2018**

**ADVANCED LEVEL**

Centre Number	
Centre Name	
Candidate Identification Number	
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 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 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 after. **DO NOT ATTEMPT TO LEAVE THE EXAMINATION HALL WITH IT.**

Turn Over

**Questions 1 - 35 (Thirty questions).**

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

1. What is the oxidation number of cobalt in the complex  $K_3[Co(C_2O_4)_3] \cdot 3H_2O$ ?

- A +6
- B -6
- C +3
- D -3

2. Atoms of isotopes of the same element are identical in which of the following aspects?

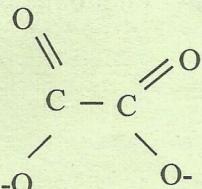
- A Mass number
- B Number of electrons
- C Sum of the number of protons and number of neutrons
- D Sum of the number of electrons and number of neutrons.

3. On analysis of a compound it was found to contain 29.1% of sodium, 40.5% sulphur and 30.4% oxygen. What is the empirical formula of the compound?

(R.A.M: Na = 23.0, O = 16.0, S = 32.0)

- A  $Na_2SO_3$
- B  $Na_2SO_4$
- C  $Na_2S_2O_3$
- D  $Na_2S_2O_7$

4. The structural formula of the oxalate ion is given below



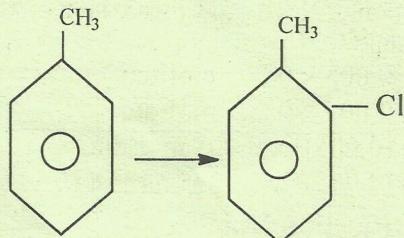
This ion is:

- A Monodentate
- B Tridentate
- C Hexadentate
- D Bidentate

5. Which of the following is the best description of the outermost electrons of a magnesium atom (atomic number 12)?

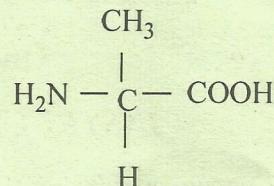
- A Two S electrons
- B Three P electrons
- C Two P electrons
- D One S electron

6. Select the reagent(s) and reaction condition(s) necessary for the conversion,

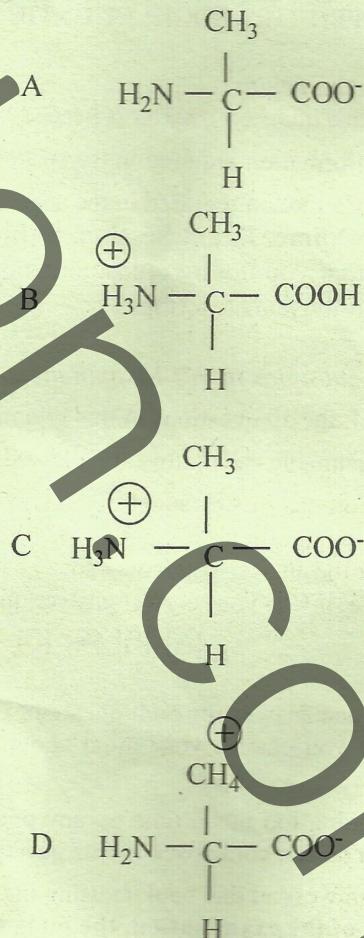


- A  $AlCl_3$ , UV light
- B  $Cl_2$ , UV light
- C  $AlCl_3$ , reflux
- D  $Cl_2$ ,  $AlCl_3$

7. The structure of the amino acid alanine is



Give the structural formula of the species formed by alanine at pH 7



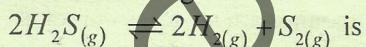
8. The rate equation for the reaction  
 $2\text{NO}_{(\text{g})} + \text{Cl}_{(\text{g})} \rightarrow 2\text{NOCl}_{(\text{g})}$   
Rate =  $K [\text{NO}_{(\text{g})}]^2 [\text{Cl}_{(\text{g})}]$   
What is the rate of the reaction if the concentration of  $\text{NO}_{(\text{g})}$  and  $\text{Cl}_{(\text{g})}$  are both  $0.005 \text{ mol dm}^{-3}$   
A  $k \times 0.005 \times 0.005 \text{ mol}^2 \text{dm}^{-6}$   
B  $k \times 0.005 \times 0.005 \text{ mol}^2 \text{dm}^{-6}$   
C  $k \times (0.005)^2 \times 0.005 \text{ mol}^3 \text{dm}^{-9}$   
D  $k \times (0.005)^2 \times 0.0075 \text{ mol}^3 \text{dm}^{-9}$
9. An alkene reacts with Ozone ozonolysis to form  $\text{CH}_3\text{CH}_2\text{CHO}$  and  $(\text{CH}_3)_2\text{CO}$ . The alkene could be.  
A  $\text{CH}_3\text{CH}=\text{CH CH}(\text{CH}_3)_2$   
B  $\text{CH}_3\text{CH}_2\text{CH}=\text{CH CH}_2\text{CH}_3$   
C  $\text{CH}_3\text{CH}=\text{C}(\text{CH}_3)_2$   
D  $\text{CH}_3\text{CH}_2\text{CH}=\text{C}(\text{CH}_3)_2$
10. Given the following standard electrode potentials for the following half cells  
 $\text{Cd}^{2+}(\text{aq}) / \text{Cd}_{(\text{s})} = -0.40\text{V}$   
 $\text{Ni}^{2+}(\text{aq}) / \text{Ni}_{(\text{s})} = -0.25\text{V}$   
Calculate the standard e.m.f of the cell  
 $\text{Cd}_{(\text{s})} / \text{Cd}^{2+}(\text{aq}) / \text{Ni}^{2+}(\text{aq}) / \text{Ni}_{(\text{s})}$   
A  $+0.65\text{V}$   
B  $+0.25\text{V}$   
C  $+0.15\text{V}$   
D  $-0.65\text{V}$
11. Which of the following compounds will give an orange precipitate when reacted with 2,4 dinitrophenylhydrazine and form a silver mirror on warming with ammoniacal silver nitrate?  
A  $\text{CH}_3\text{CH}_2\text{CH}_2\text{COCl}$   
B  $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CHO}$   
C  $\text{CH}_3\text{CH}_2\text{COCH}_2\text{CH}_3$   
D  $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH(OH)C}\equiv\text{CH}$
12. When dilute ammonia is added to a set of silver halide precipitates ( $\text{AgCl}$ ,  $\text{AgBr}$ ,  $\text{AgI}$ ) which of the following happens.  
A Silver bromide and silver iodide dissolves  
B Silver chloride dissolves easily and silver iodide hardly at all.  
C Silver iodide dissolves easily while the others hardly at all  
D Silver chloride and silver iodide dissolve.
13. A substance gave a green flame test colour. On heating it produced an acidic gas and another gas that rekindled a glowing splint. Which of the following could be the substance?  
A Barium nitrite  
B Barium nitrate  
C Barium carbonate  
D Copper carbonate
14. Which of the following best describes the shape and bond angles of the sulphate ion,  $\text{SO}_4^{2-}$ ?  
A Tetrahedral  
B Pyramidal,  
C Square planar  
D Trigonal planar,
15. How many molecules are there in  $32.5\text{ g}$  of chlorine molecule ( $\text{Cl}_2$ )  
(RMM of  $\text{Cl}_2 = 71$ , Avogadro number =  $6.022 \times 10^{23}$ )  
A  $2.76 \times 10^{23}$   
B  $4.58 \times 10^{23}$   
C  $9.15 \times 10^{23}$   
D  $5.51 \times 10^{23}$
16. Arrange the following in order of increasing acid strength, starting with the least acidic:  
 $\text{CCl}_3\text{COOH}$ ,  $\text{CH}_3\text{COOH}$ ,  $\text{CHCl}_2\text{COOH}$ ,  $\text{CH}_2\text{ClCOOH}$ .  
A  $\text{CCl}_3\text{COOH}$ ,  $\text{CHCl}_2\text{COOH}$ ,  $\text{CH}_2\text{ClCOOH}$ ,  $\text{CH}_3\text{COOH}$   
B  $\text{CH}_3\text{COOH}$ ,  $\text{CH}_2\text{ClCOOH}$ ,  $\text{CHCl}_2\text{COOH}$ ,  $\text{CCl}_3\text{COOH}$   
C  $\text{CH}_2\text{ClCOOH}$ ,  $\text{CHCl}_2\text{COOH}$ ,  $\text{CCl}_3\text{COOH}$ ,  $\text{CH}_3\text{COOH}$   
D  $\text{CH}_3\text{COOH}$ ,  $\text{CCl}_3\text{COOH}$ ,  $\text{CHCl}_2\text{COOH}$ ,  $\text{CH}_2\text{ClCOOH}$ .
17. Which one of the following oxides reacts with bases (alkalis) but does NOT dissolve in water at all?  
A  $\text{SnO}_2$   
B  $\text{PbO}_2$   
C  $\text{GeO}_2$   
D  $\text{SiO}_2$

18. Which compound below can react with a mixture of aqueous potassium iodide and sodium chlorate(I) NaClO, to produce tri-iodomethane CHI<sub>3</sub>
- A CH<sub>3</sub>OH  
B CH<sub>3</sub>CH<sub>2</sub>CH(OH)CH<sub>3</sub>  
C CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>OH  
D CH<sub>3</sub>CO<sub>2</sub>H
- 
19. The most appropriate conditions used to prepare sulphur trioxide (SO<sub>3</sub>) are
- A Fe, 450°C, 1 atm  
B V<sub>2</sub>O<sub>5</sub>, 450°C, 250 atm  
C V<sub>2</sub>O<sub>5</sub>, 450°C, 1 atm  
D Fe, 500°C, 250 atm
- 
20. For the reaction.
- $$\text{H}_2\text{(g)} + \text{F}_2\text{(g)} \rightarrow 2\text{HF(g)}$$
- Calculate the energy of formation of HF.  
( H-H = +432KJ/mol; F-F = +152KJ /mol,  
H-F = +565 KJ mol)
- A -546 KJ /mol  
B + 546KJ/mol  
C -272 KJ/mol  
D +272KJ/mol
- 
21. The function of the electric field in a mass spectrometer is.
- A To knock electrons off the atom or molecules.  
B To accelerate electrons into the magnetic field.  
C To deviate the charges  
D To accelerate the positive ions into the magnetic field.
- 
22. One gram of a sample of <sup>210</sup><sub>83</sub>Bi decays to 0.25g after 10 days. The half life of <sup>210</sup><sub>83</sub>Bi in days is
- A 3  
B 5  
C 0.2  
D 2
- 
23. What is the relative atomic mass of silver given the following abundances of its isotopes <sup>107</sup>Ag = 51.3%, <sup>109</sup>Ag = 48.7%
- A 107.00  
B 108.00  
C 107.97  
D 108.00
- 
24. The atomic number of iron is 26. Which of the following is the correct electronic configuration for the Fe<sup>3+</sup> ion?  
(Fe = 26)
- A [Ar] 3d<sup>5</sup>4S<sup>2</sup>  
B [Ar] 3d<sup>5</sup>4S<sup>1</sup>  
C [Ar] 3d<sup>5</sup>4S<sup>0</sup>  
D [Ar] 3d<sup>6</sup>4S<sup>1</sup>
- 
25. For a liquid mixture that shows positive deviation from Raoult's Law
- A The components should be miscible in all proportions  
B The intermolecular forces in pure components are weaker than in the mixture.  
C There should be no change in boiling point of the mixture  
D The mixture has a lower boiling point than the components,
- 
26. The concentration (mol dm<sup>-3</sup>) of hydroxide ion in a solution of Sr(OH)<sub>2</sub> 0.05 mol dm<sup>-3</sup> is.
- A 0.100  
B 0.010  
C 0.025  
D 0.050
- 
27. To what group of the Periodic Table is the element with the following successive ionization energies(KJ/mol) likely to belong:  
786, 1581, 3236, 4360, 16000
- A Group 1  
B Group 2  
C Group 3  
D Group 4
- 
28. Given the following chemical equations,  
 $\text{Ca(s)} + \frac{1}{2}\text{O}_{2(\text{g})} \rightarrow \text{CaO(s)}$   
 $\Delta H = -635 \text{ KJmol}^{-1}$   
 $\text{CaCO}_{3(\text{s})} \rightarrow \text{CaO}_{(\text{s})} + \text{CO}_{2(\text{g})};$   
 $\Delta H = +178.3 \text{ KJmol}^{-1}$   
The standard enthalpy change for the reaction  
 $\text{Ca}_{(\text{s})} \frac{1}{2}\text{O}_{2(\text{g})} + \text{CO}_{2(\text{g})} \rightarrow \text{CaCO}_{3(\text{s})}$  is :
- A -813.3 KJmol<sup>-1</sup>  
A +813.3KJmol<sup>-1</sup>  
C - 456.5 KJmol<sup>-1</sup>  
D +456.5KJmol<sup>-1</sup>
-

29. When a mixture of sodium ethanoate,  $\text{CH}_3\text{COO}^-\text{Na}^+$  and soda lime is heated the type of organic reaction that occurs is.

- A Condensation
- B Substitution
- C Decarboxylation
- D Addition

30. The expression for the equilibrium constant for the following reaction.

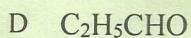
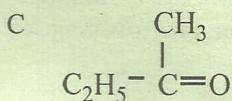
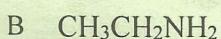
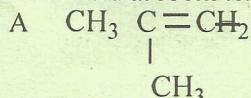


$$K_c = \frac{[H_2]^2 [S_2]}{[H_2S]^2}$$

If  $[H_2S] = 4.84 \times 10^{-3} \text{ mol dm}^{-3}$ ,  $[H_2] = 1.50 \times 10^{-3} \text{ mol dm}^{-3}$  and the equilibrium constant for the reaction is  $2.25 \times 10^{-4}$ . Calculate the  $[S_2]$  at equilibrium.

- A  $2.25 \times 10^{-3}$
- B  $3.5 \times 10^{-3}$
- C  $4.84 \times 10^{-3}$
- D  $2.34 \times 10^{-3}$

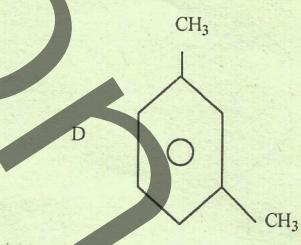
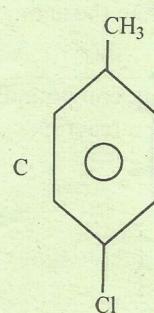
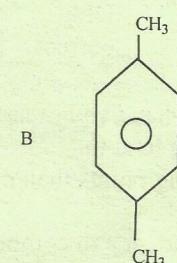
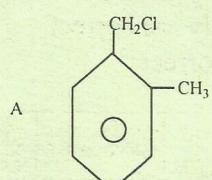
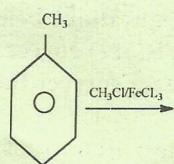
31. Which of the following compounds will liberate nitrogen gas when reacted with nitrous acid at room temperature?



32. The line emission spectrum of an element is proof that electrons,

- A Are in quantized energy levels
- B Have negligible mass
- C Are negatively charged
- D Have wave-like properties

33. Predict the possible product of the following reaction.



34. In which of the following pairs is the species with the larger radius placed first.

- A  $\text{F}_e^{2+}, \text{F}_e^{3+}$
- B O, S
- C Cl,  $\text{Cl}^-$
- D Li<sup>+</sup>, F<sup>-</sup>

35. Which of these elements form two stable oxides?

- A Silicon
- B Beryllium
- C Sulphur
- D Argon

**QUESTION 36-45**

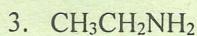
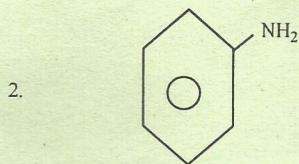
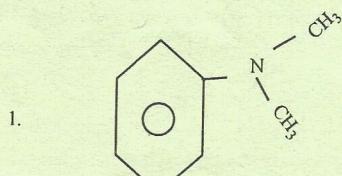
**Directions:** For each of the questions below ONE or MORE of the responses is(are) correct. Decide which of the responses is (are) correct then choose

- 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

Directions summarised			
A	B	C	D
1,2,3 All correct	1,2 Only correct	2,3 Only correct	3 Only correct

36. Elements on the left-hand end of each period of the Periodic Table tend to.
1. Have lower melting points than those at the right-hand end.
  2. Have a greater tendency to combine with metals than with non-metals
  3. Be more metallic than those on the right-hand end.

37. Which of the following compounds would undergo a diazotization reaction?



38. Correct statements about the structure of the chlorate(V) ion ( $\text{ClO}_3^-$ ) include.
1. There is delocalization of electrons in the ion.
  2. All the oxygen-chlorine-oxygen bond angles are identical
  3. The chlorine atom has no lone pair (s) of electrons

39. The stages in the mechanism by which propene reacts with a hydrogen halide,  $\text{Hx}$  include.

- 1 Addition of the  $\text{H}^+$  ion to the less substituted carbon atom of the double bond.
- 2 The formation of a stable carbocation
- 3 Attack of the carbocation by the  $\text{x}^-$  ion.

40. In general at room temperature
- 1 covalent compounds are all gases but ionic compounds may be solids liquids or gases
  - 2 Ionic compounds are all solids, but covalent compounds are liquids or gases
  - 3 Ionic compounds are all solids but covalent compounds may be solids, liquids or gases

41. Phenol is a stronger acid than ethanol because.
1. It is more soluble in water than ethanol so that the phenol molecules have a better chance of donating protons to water molecules.
  2. The ethanol molecule is stabilized by delocalization which inhibits the donation of a proton by the OH group.
  3. The phenoxide ion is stabilized by delocalization involving the benzene ring, this cannot happen with the ethoxide ion.

42. Which of the following statements is/are true of a good acid-base indicator.
1. it is a weak acid whose conjugate base has a different colour in basic solution.
  2. It changes colour over a narrow range of pH
  3. It has a different colour at the end point of an acid-base titration.

43. The high reactivity of Fluorine in group VII (Group 17) K is due to
1. the weaker F-F bond
  2. the extremely high oxidizing power of fluorine
  3. the small size of the atoms or ions.

44. Benzamide,  $\text{C}_6\text{H}_5\text{CONH}_2$
1. is an amino acid
  2. can be converted to phenylamine (aniline) on warming with bromine and concentrated aqueous sodium hydroxide.
  4. On hydrolysis with mineral acid forms benzoic phenyl(methanoic) acid.

45. Transition elements or their compounds have the following characteristics.
1. Some are paramagnetic
  2. They are used as catalysts in many industrial processes
  3. They have variable oxidation states with different colours.

**Questions 46 - 50 (Six 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 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.

### DIRECTIONS SUMMARISED

	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	TRUE	TRUE	

#### FIRST STATEMENT

#### SECOND STATEMENT

46. $\text{HClO}_4$ is a stronger acid than $\text{HClO}_3$	The higher the oxidation state of the chlorine atom of the chlorine atom, the more electron density it pulls from the O – H bond and the more easily the proton is lost.
47. An aqueous solution of sodium ethanoate is likely to be alkaline ( $\text{pH} > 7$ )	Sodium ethanoate is an electrolyte and ionizes completely in aqueous solution
48. Beryllium and aluminum are diagonally related.	Beryllium and aluminium have similar electronegativities
49. Pentane has a higher boiling point than n-butane..	Pentane has more branched chain isomers than butane
50. Ionic compounds are usually insoluble in non polar solvents	When an ionic compound dissolves in a polar solvent the salvation energy is higher than the lattice energy

**STOP**

**GO BACK AND CHECK YOUR WORK**