WASSCE / WAEC MAY / JUNE 2006 CHEMISTRY PAPER 2 (OBJECTIVE TEST)

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S5052 June
W.A.S.S.C.E. 2006
CHEMISTRY 2
3 hours

2

Name: 239

Index Number:

THE WEST AFRICAN EXAMINATIONS COUNCIL

West African Senior School Certificate Examination

June 2006 — CHEMISTRY 2 — 3 hours

Do **not** *open this booklet until you are told to do so. While you are waiting, write your* **name** *and* **index number** *in the spaces provided at the top right-hand corner of this booklet and thereafter, read the following instructions carefully. This paper consists of* **two** *parts,* A *and* B. *Answer* Part A *on your Objective Test answer sheet and* Part B *in your answer booklet.* Part A *will last for* 1 hour *after which the answer sheet will be collected. Do* **not** *start* Part B *until you are told to do so.* Part B *will last for* 2 hours.

PART A — 1 hour

OBJECTIVE TEST

[50 marks]

1. Use **HB pencil** throughout.
2. If you have got a blank answer sheet, complete the top section as follows.
   (a) In the space marked *Name,* write in capital letters your **surname** followed by your **other names.**
   (b) In the spaces marked *Examination, Year, Subject* and *Paper,* write **'W.A.S.S.C.E.', '2006 June', 'CHEMISTRY'** and **'2'** respectively.
   (c) In the box marked *Index Number,* write your **index number** vertically in the spaces on the left-hand side. There are numbered spaces in line with each digit. Shade carefully the space with the same number as each digit.
   (d) In the box marked *Paper Code,* write the digits **505213** in the spaces on the left-hand side. Shade the corresponding numbered spaces in the same way as for your index number.
   (e) In the box marked *Sex,* shade the space marked **M** if you are **male,** or **F** if you are **female.**
3. If you have got a pre-printed answer sheet, check that the details are correctly printed, as described in **2** above. In the boxes marked *Index Number, Paper Code* and *Sex,* **reshade** each of the shaded spaces.
4. An example is given below. This is for a **male** candidate, whose **name** is **Chukwuma Adekunle Ciroma,** whose **index number** is **4251102068** and who is offering **Chemistry 2.**

THE WEST AFRICAN EXAMINATIONS COUNCIL

PRINT IN BLOCK LETTERS

Name: CIROMA (Surname) CHUKWUMA ADEKUNLE (Other Names) Examination: WASSCE Year: 2006 JUNE

Subject: CHEMISTRY Paper: 2

INDEX NUMBER	0	1	2	3	4	5	6	7	8	9
4					■					
2			■							
5						■				
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For Supervisors only.
If candidate is absent shade this space: ☐

PAPER CODE	0	1	2	3	4	5	6	7	8	9
5						■				
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3				■						

SEX

Indicate your sex by shading the space marked M (for Male) or F (for Female) in this box: M ■ F ☐

INSTRUCTIONS TO CANDIDATES

1. Use grade **HB pencil** throughout.
2. Answer each question by choosing one letter and shading it like this: [A] [B] [C] ■
3. Erase completely any answers you wish to change.
4. Leave extra spaces blank if the answer spaces provided are more than you need.
5. Do not make any markings across the heavy black marks at the right-hand edge of your answer sheet.

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Answer **all** *the questions.*

Each *question is followed by* **four** *options lettered* A *to* D. *Find out the correct option for eac question and shade* **in pencil** *on your answer sheet, the answer space which bears the same letter a the option you have chosen. Give only* **one** *answer to* ***each*** *question. An example is given below.*

Which of the following elements reacts with water?

A. Carbon
B. Iodine
C. Sodium
D. Sulphur

The correct answer is Sodium, *which is lettered* C *and therefore answer space* C *would be shaded.*

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

Think carefully before you shade the answer spaces; erase completely any answer you wish to change

Do all rough work on this question paper.

Now answer the following questions.

1. How many orbitals are in the d-sub shell?

A. 1
B. 3
C. 5
D. 7

2. An element **X** has isotopic masses of 6 and 7. If the relative abundance is 1 to 12.5 respectively what is the relative atomic mass of **X**?

A. 6.0
B. 6.1
C. 6.9
D. 7.0

3. An atom $^{238}_{92}\mathbf{X}$ decays by alpha particle emission to give an atom **Y**. The atomic number an mass number of **Y** are

A. 90 and 234 respectively.
B. 91 and 238 respectively.
C. 92 and 236 respectively.
D. 93 and 238 respectively.

4. An element with mass number 133 and atomic number 55 has

A. 55 electrons and 55 neutrons.
B. 55 electrons and 78 neutrons.
C. 78 electrons and 78 neutrons.
D. 78 electrons and 55 neutrons.

5. Which of the following pairs of species contains the same number of electrons?
[$_6C$, $_8O$, $_{10}Ne$, $_{11}Na$, $_{12}Mg$, $_{13}Al$, $_{17}Cl$]
A. Mg^{2+} and Al^{3+}
B. Cl^- and Ne
C. Na^+ and Mg
D. C and O^{2-}

6. An element X has electronic configuration $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$.
To which group of the periodic table does X belong?
A. I
B. II
C. III
D. IV

7. Which of the following sets of elements is arranged in order of **increasing** first ionization energies?
A. $_{11}Na$, $_3Li$, $_{19}K$, $_{37}Rb$
B. $_{37}Rb$, $_{19}K$, $_3Li$, $_{11}Na$
C. $_3Li$, $_{19}K$, $_{11}Na$, $_{37}Rb$
D. $_{37}Rb$, $_{19}K$, $_{11}Na$, $_3Li$

8. Which of the following electronic configurations represent that of a noble gas?
A. 2, 8, 8, 2
B. 2, 8, 2
C. 2, 8
D. 2, 6

9. Diamond is a hard substance because its carbon atoms are held by
A. delocalised electrons.
B. strong electrostatic forces.
C. van der Waals forces.
D. strong directional covalent bonds.

10. The presence of unpaired electrons in an atom of a d-block element accounts for its
A. ductility.
B. lustre.
C. malleability.
D. paramagnetism.

11. Elements which belong to the same group in the periodic table are characterized by

A. difference of +1 in the oxidation numbers of successive members.
B. presence of the same number of outermost electrons in the respective atoms.
C. difference of 14 atomic mass units between successive members.
D. presence of the same number of electron shells in the respective atoms.

12. The atomic numbers of elements **X** and **Y** are 20 and 17 respectively. Which of the follo compounds is likely to be formed by the combination of the two elements?

A. XY
B. XY_2
C. XY_3
D. X_2Y

13. What type of bond will be formed between elements **P** and **Q** if their electronegativity value 0.8 and 4.0 respectively?

A. Covalent bond
B. Co-ordinate bond
C. Ionic bond
D. Metallic bond

14. What type of chemical bonding is involved in the formation of NH_4^+ from a molecule of amm and a proton?

A. Covalent bonding
B. Co-ordinate covalent bonding
C. Electrovalent bonding
D. Hydrogen bonding

15. What is responsible for metallic bonding?

A. Attraction between the delocalized electrons and fixed positive lattice points (cations)
B. Attraction between positive and negative ions
C. Sharing of electrons between the metal atoms
D. Transfer of electrons from one atom to another

Use the following portion of the period table to answer Questions **16** *to* **18**.

I	II	III	IV	V	VI	VII	VIII
A							B
	C		D				
E						F	G

16. Which of the letters indicate elements which exist as diatomic gases?

A. **B** and **G**
B. **C** and **F**
C. **C** and **A**
D. **A** and **E**

17. Which of the letters represents an alkaline earth metal?

A. **F**
B. **E**
C. **D**
D. **C**

18. Which of the following pairs of letters denotes elements containing the same number of electron in their outermost shells?

A. **C** and **D**
B. **E** and **F**
C. **B** and **G**
D. **A** and **B**

19. If 1 mole of sodium contains 6×10^{23} atoms, how many atoms are contained in 0.6 *g* of sodium [Na = 23]

A. 1.56×10^{23}
B. 1.56×10^{22}
C. 3.6×10^{23}
D. 3.6×10^{22}

20. If 20 cm^3 of distilled water is added to 80 cm^3 of 0.50 $mol\ dm^{-3}$ hydrochloric acid, the ne concentration of the acid will be

A. 0.10 $mol\ dm^{-3}$.
B. 0.20 $mol\ dm^{-3}$.
C. 0.40 $mol\ dm^{-3}$.
D. 2.00 $mol\ dm^{-3}$.

21. Consider the reaction represented by the equation:

$$2NaHCO_{3(s)} \xrightarrow{heat} Na_2CO_{3(s)} + CO_{2(g)} + H_2O_{(g)}.$$

What volume of carbon (IV) oxide at s.t.p. is evolved when 0.5 moles of $NaHCO_3$ is heated'

[Molar volume = 22.4 dm^3 at s.t.p.]

A. 1.12 dm^3
B. 2.24 dm^3
C. 5.6 dm^3
D. 56.0 dm^3

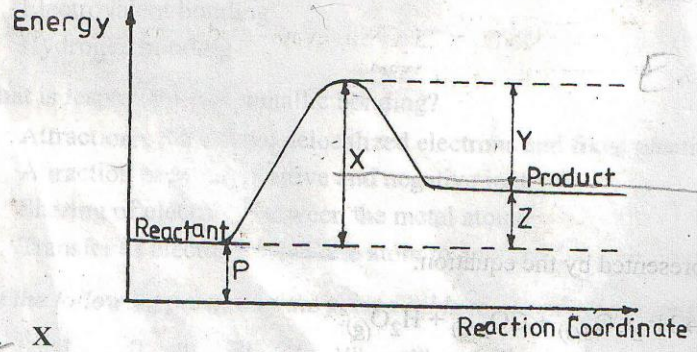
Turn o

22. Which of the following gases will have the **lowest** rate of diffusion under the same conditio
[N = 14, O = 16, Cl = 35.5, Ar = 40]
A. Argon
B. Chlorine
C. Nitrogen
D. Oxygen

23. Consider the reaction:
$H^+_{(aq)} + OH^-_{(aq)} \longrightarrow H_2O_{(l)}$.
The energy change taking place in the reaction above is enthalpy of
A. formation.
B. hydration.
C. neutralization.
D. solution.

24. Which of the following processes is an endothermic reaction?
A. Dissolving NH_4Cl crystals in water
B. Addition of concentrated H_2SO_4 to water
C. Dissolving NaOH pellets in water
D. Passing SO_3 gas into water

25. In the energy profile diagram below, which letter represents the activation energy for the reve reaction?



A. **X**
B. **Y**
C. **Z**
D. **P**

26. Which of the following aqueous solutions turns red litmus to blue?
A. NaCl
B. CH_3COONa
C. $AlCl_3$
D. NH_4Cl

27. Which of the following methods **cannot** be used to distinguish between a strong acid and a weak acid?

A. Conductivity measurement
B. Measurement of pH
C. Measurement of heat of neutralization
D. Action on starch iodide paper

28. The indicator used in neutralizing CH_3COOH and NaOH solutions has a pH range of

A. 3 – 5.
B. 7 – 8.
C. 8 – 10.
D. 10 – 12.

29. When aqueous ammonia is added to one of the following solutions, a white precipitate which dissolves in excess ammonia is formed. Identify the solution.

A. $ZnCl_{2(aq)}$
B. $Pb(NO_3)_{2(aq)}$
C. $CuSO_{4(aq)}$
D. $FeSO_{4(aq)}$

30. When 50 cm^3 of a saturated solution of KNO_3 at 25°C was evaporated to dryness, 10 g of dry salt was obtained. What is the solubility of KNO_3 at 25°C?

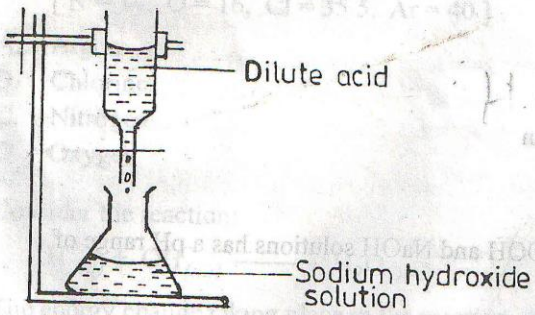
[$KNO_3 = 101$]

A. 0.10 $mol\ dm^{-3}$
B. 2.0 $mol\ dm^{-3}$
C. 5.0 $mol\ dm^{-3}$
D. 10.0 $mol\ dm^{-3}$

31. Which of the following compounds absorbs moisture from the atmosphere and dissolves in it?

A. $FeCl_3$ Deliquescente
B. $MgSO_4 \cdot 7H_2O$
C. Na_2SO_4
D. KCl

32. Consider the diagram below:



The set-up is used for the preparation of a salt by

A. double decomposition.
B. crystallization.
C. neutralization.
D. direct combination.

33. Consider the equation for the equilibrium reaction

$$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)};\ \Delta H = -92\ kJmol^{-1}$$

The equilibrium constant for the reaction can be expressed as

A. $K_c = \dfrac{2[NH_3]}{3[H_2][N_2]}$.

B. $K_c = \dfrac{[NH_3]^2}{[N_2][H_2]^3}$.

C. $K_c = \dfrac{3[H_2][N_2]}{2[NH_3]}$.

D. $K_c = \dfrac{[N_2][H_2]^3}{[NH_3]^2}$.

34. Consider the reaction represented by the equation:

$$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)};\ \Delta H = -197\ kJmol^{-1}$$

Which of the following conditions will **not** increase the yield of sulphur (VI) oxide?

A. Increase in temperature
B. Decrease in temperature
C. Increase in pressure
D. Addition of O_2 into the mixture

35. Electrolysis is applied in the following processes **except**

A. electroplating.
B. extraction of aluminium.
C. extraction of iron.
D. purification of copper.

36. The oxidation number of iodine in the iodate ion (IO_3^-) is

A. –5.
B. –1.
C. +1.
D. +5.

37. Metals can be extracted from their ores by a process involving

A. reduction.
B. oxidation.
C. hydrolysis.
D. decomposition.

38. Consider the reaction:

$$2Al_{(s)} + 6H^+_{(aq)} \longrightarrow 2Al^{3+}_{(aq)} + 3H_{2(g)}.$$

What is the total number of moles of electrons transferred from the aluminium atoms to the hydrogen ions?

A. 3
B. 4
C. 5
D. 6

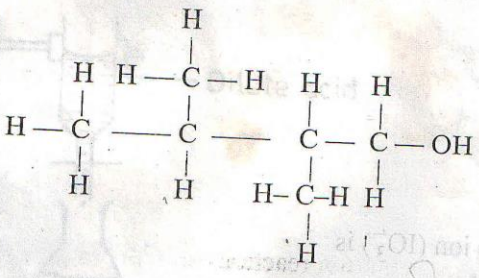
39. In the reaction represented by the equation:

$$5Fe^{2+}_{(aq)} + MnO^-_{4(aq)} + 8H^+_{(aq)} \longrightarrow 5Fe^{3+}_{(aq)} + Mn^{2+}_{(aq)} + 4H_2O_{(l)},$$

which species is reduced?

A. Fe^{2+}
B. MnO_4^-
C. H^+
D. Fe^{3+}

Use the structure of the compound below to answer Questions **40** *and* **41**.



40. The name of the compound is

A. 2, 3-dimethylbutan-1-ol.
B. 2, 3-dimethylbutan-4-ol.
C. 2-methylpentan-1-ol.
D. 3-methylpentan-1-ol.

41. The product of the complete oxidation of the compound will be an

A. alkane.
B. alkanal.
C. alkanoic acid.
D. alkanone.

42. Which of the following industrial processes is chlorine **not** used?

A. Production of polyvinylchloride (PVC)
B. Manufacturing of hydrochloric acid
C. Manufacturing of common salt
D. Manufacturing of domestic bleach

43. What type of reaction occurs between vegetable oil and plant ash extract?

A. Displacement
B. Dehydration
C. Neutralization
D. Saponification

44. Which of the following compounds is an alkanoate?

A. CH_3COOH
B. CH_3COOCH_3
C. CH_3CH_2OH
D. CH_3CH_2COOH

45. What is C_aH_b in the following equation?

$$C_aH_b + 5O_2 \longrightarrow 3CO_2 + 4H_2O$$

A. C_3H_4
B. C_3H_6
C. C_3H_8
D. C_5H_{10}

46. Which of the following equations represents a substitution reaction?

A. $C_4H_{10(g)} + Cl_{2(g)} \longrightarrow C_4H_9Cl_{(g)} + HCl_{(g)}$
B. $C_2H_{4(g)} + HCl_{(g)} \longrightarrow C_2H_5Cl_{(l)}$
C. $C_2H_{2(g)} + 2H_{2(g)} \longrightarrow C_2H_{6(g)}$
D. $C_3H_{4(g)} + 4O_{2(g)} \longrightarrow 3CO_{2(g)} + 2H_2O_{(g)}$

47. Greenhouse effect can be reduced by controlling

A. water evaporation.
B. burning of wood and fossil fuel.
C. the use of aerosols.
D. the use of artificial fertilizers.

48. Waste plastics accumulate in the soil and pollute the environment because plastic materials are

A. insoluble in water.
B. non-biodegradable.
C. easily affected by heat.
D. inflammable.

49. Which of the following substances is an ore of iron?

A. Bauxite
B. Cassiterite
C. Haematite
D. Steel

50. The ammonium compound used in the manufacture of dry cells is

A. NH_4NO_3.
B. $(NH_4)_2SO_4$.
C. NH_4Cl.
D. $(NH_4)_2CO_3$.

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YOU WILL BE PENALIZED SEVERELY IF YOU ARE FOUND LOOKING AT THE NEXT PAGE BEFORE YOU ARE TOLD TO DO SO.