SC 5051
WASSCE (SC) 2024
CHEMISTRY 1
Objective Test
1 hour

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Name .....

Index Number .....

THE WEST AFRICAN EXAMINATIONS COUNCIL

Answer **all** *the questions.*

Each question is followed by four options lettered A *to* D. *Find the* **correct** *option for* **each** *question and shade in* **pencil** *on your answer sheet, the answer space which bears the same letter as 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. Sodium
C. Sulphur
D. Iodine

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

⊏A⊐ ▬B▬ ⊏C⊐ ⊏D⊐

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

Do **all** *rough work on this question paper.*

Now answer the following questions.

1. Which of the following gases could be collected by downward displacement of air?
   A. Sulphur(IV) oxide
   B. Hydrogen chloride
   C. Hydrogen
   D. Chlorine

2. Which of the following substances has the **lowest** boiling point?
   A. Water
   B. Tetrachloromethane
   C. Ethanol
   D. Aqueous sodium chloride

3. The branch of science that deals with the nature and properties of substances and how one substance can be converted to another is known as
   A. physics.
   B. geography.
   C. chemistry.
   D. biology.

4. The electron configuration $1s^2\ 2s^2\ 2p_x^{\ 2}$ contravenes the
   A. Hund's rule.
   B. Octet rule.
   C. Aufbau's principle.
   D. Pauli's exclusion principle.

5. The oxidation number of chromium in $Na_2Cr_2O_7$ is
   A. +12.
   B. +7.
   C. +6.
   D. +2.

6. The **most** important ore of aluminium is
   A. monazite.
   B. magnetite.
   C. haematite.
   D. bauxite.

7. Bases normally
   A. are non-metal oxides.
   B. turn litmus paper from red to blue.
   C. turn litmus paper from blue to red.
   D. are corrosive.

8. The product of the reaction between ethanol and excess acidified $K_2Cr_2O_7$ is
   A. CH_3CH_3.
   B. CH_3COOH.
   C. CH_3OCH_3.
   D. $CH_2 = CH_2$.

9. The product formed when concentrated sodium chloride solution is electrolysed using carbon electrodes is
   A. sodium oxochlorate(I).
   B. sodium hydroxide.
   C. hydrochloric acid.
   D. chloride water.

10. Which of the following statements about ammonium salt is **correct**? It
   A. is insoluble in water.
   B. does not decompose on heating.
   C. dissolves in water to form solution of pH > 7.
   D. dissolves in water to form solution of pH < 7.

11. Ethanedioic acid is an organic solid that can be purified by
   A. filtration.
   B. crystallization.
   C. distillation.
   D. decantation.

12. Which of the following functional groups is present in alkanoic acid?
   A. - CHO
   B. - COOR
   C. - OH
   D. - COOH

13. In ethanol, the attractive forces between adjacent molecules are
   A. van der Waal's forces only.
   B. hydrogen bonds and van der Waal's forces.
   C. hydrogen bonds only.
   D. covalent bonds only.

14. At 25 ^{0}C, the saturated solution of a salt in water was found to contain 0.24 g of the salt in 100 cm^3. What is the solubility of the salt in gdm^{-3}?
   A. 24.0
   B. 2.40
   C. 0.240
   D. 0.024

15. The reaction represented by the equation:

$$Ni^{2+}_{(aq)} + Fe_{(s)} \longrightarrow Ni_{(s)} + Fe^{2+}_{(aq)}$$

is a redox reaction because

A. Ni^{2+} ions are reduced and Fe acts as an reducing agent.
B. Ni^{2+} ions are reduced and Fe acts as an oxidizing agent.
C. Ni^{2+} ions are oxidized and Fe acts as an reducing agent.
D. Ni^{2+} ions are oxidized and Fe acts as an oxidizing agent.

16. Which of the following statements describes transition elements? They

A. form colourless salts.
B. possess variable oxidation state.
C. have low melting points.
D. are very reactive.

17. Aluminium is **suitable** for making alloys for aircraft construction because it

A. is amphoteric and allotropic.
B. has high density and also a non-conductor of electricity.
C. is light and very resistant to corrosion.
D. is hard and brittle.

18. Which of the following arrangements of elements is in order of **increasing** ionization energy?

A. P, Si, S, Al
B. Al, Si, P, S
C. S, P, Si, Al
D. Si, Al, S, P

19. Consider the reaction represented by the equation:

$$C_3H_{8(g)} + 5O_{2(g)} \longrightarrow 3CO_{2(g)} + 6H_2O_{(l)}$$

If 0.1 mole of $C_3H_{8(g)}$ was completely burnt, what volume of $CO_{2(g)}$ would be produced at stp?
[volume at stp = $22.4 dm^{-3}mol^{-1}$]

A. 0.10 dm^3
B. 0.30 dm^3
C. 2.24 dm^3
D. 6.72 dm^3

20. Naturally occurring Boron is made up of 19.9 % ^{10}B and 80.1 % ^{11}B. The relative atomic mass of Boron is

A. 10.0.
B. 10.5.
C. 10.8.
D. 21.0.

21. The number of shared pair of electrons in a molecule of methane is

A. 8.
B. 6.
C. 4.
D. 2.

22. Isotopes of the same element have similar chemical properties because they have the same number of

A. atoms.
B. neutrons.
C. protons.
D. nuclides.

23. Which of the following household liquids would be effective in treating someone with too much acid in the stomach?

A. Black coffee with pH 5.0
B. Milk of magnesia with pH 10.5
C. Tomato juice with pH 4.1
D. Strong salt solution with pH 7.0

24. The percentage by mass of oxygen in $MgSO_4.7H_2O$ is [Mr= 246]

A. 84.0 %.
B. 71.5 %.
C. 45.5 %.
D. 26.0 %.

25. Catalysts alter reaction rates by

A. aligning the reactant molecules properly.
B. increasing the surface area of reactants.
C. lowering the energy of reaction.
D. providing an alternative reaction pathway.

26. Ethane of volume 400 cm^3 was completely burnt in excess oxygen according to the following equation:

$$2C_2H_{6(g)} + 7O_{2(g)} \longrightarrow 6H_2O_{(g)} + 4CO_{2(g)}.$$

Calculate the volume of steam that would be produced.

A. 1200 cm^3
B. 600 cm^3
C. 400 cm^3
D. 200 cm^3

27. A saturated solution at 30 °C will normally produce crystals at a temperature of

A. 20 °C.
B. 35 °C.
C. 40 °C.
D. 50°C.

28. The following organic compounds are polymers **except**

A. fats.
B. proteins.
C. starch.
D. rubber.

29. According to the collision theory of reaction rates, which of the following conditions is **not** required for **two** molecules to react? The molecules **must**

A. possess enough speed to overcome intermolecular forces of attraction.
B. collide in an orientation that makes formation of product possible.
C. collide with enough energy to overcome the activation energy barrier.
D. come into contact without loss of energy on colliding with each other.

30. A weak acid is one which

A. slightly ionize in water.
B. does not produce salt with alkali.
C. completely ionize in water.
D. is not corrosive.

31. Which of the following conditions are necessary for the preparation of alkanoates from alkanols and alkanoic acids?
A. Water and aqueous HCl
B. NaOH and heat
C. Conc. H_2SO_4 and heat
D. Water and NaOH

32. The volume of 22 g of CO_2 at stp is equivalent to
[C = 12, O = 16, molar volume at stp = 22.4 dm^3]
A. 5.6 dm^3.
B. 11.2 dm^3.
C. 22.4 dm^3.
D. 22.0 dm^3.

33. Pairs of outermost shell electrons which are **not** used in bonding are
A. electrovalent electrons.
B. valence electrons.
C. bonding pairs.
D. lone pairs.

34. $_8X^{2-}$ and $_{10}Y$ are
A. isoelectronic.
B. allotropes.
C. isotopes.
D. isomers.

35. Pure water contaminated with quicklime will have a pH of
A. 8.
B. 7.
C. 6.
D. 1.

36. The electron configuration of $_{29}Cu$ is
A. $1s^2\ 2s^2\ 2p^6\ 3s^2 4s^1\ 3d^{10}$.
B. $1s^2\ 2s^2\ 2p^5\ 3s^2 3p^6\ 4s^2 3d^{10}$.
C. $1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^9$.
D. $1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^1\ 3d^{10}$.

37. When s and p block elements react, the bond formed is
A. dative-covalent.
B. metallic.
C. covalent.
D. electrovalent.

38. The **hardest** form of carbon is
A. graphite.
B. diamond.
C. coke.
D. charcoal.

39. The metallic bonding in aluminum is strong because of large number of
A. valence electrons.
B. lone pair electrons.
C. immobile electrons.
D. delocalized electrons.

40. How many covalent bonds are formed by Nitrogen?
A. 4
B. 3
C. 2
D. 1

41. When an element exists in **two** or **more** forms in the same physical state, it exhibits
A. isomerism.
B. isobars.
C. allotropy.
D. isotopy.

42. An atom of an element in the ground state contains 8 valence electrons. The element is considered as a
A. halogen.
B. noble gas.
C. semi-metal.
D. metal.

43. The **main** function of limestone in the blast furnace during the extraction of iron is to
A. supply carbon(IV) oxide.
B. act as a reducing agent.
C. remove impurities.
D. act as a catalyst.

44. Which of the following is a monomer of polythene?
A. Ethane
B. Ethene
C. Vinyl chloride
D. Ethanol

45. Which of the following compounds is formed by the oxidation of ethanol?
A. CH_3CO_2H
B. CH_3OH
C. $C_2H_5CO_2H$
D. $C_2H_4CO_2H$

46. Tetraoxosulphate(VI) acid is considered as a heavy chemical because
A. it is used to manufacture heavy chemicals.
B. it is an inorganic chemical.
C. a high tonnage is produced every year.
D. its relative molecular mass is high.

47. How many isomers can be formed from a compound with molecular formula C_5H_{12}?
A. Four
B. Three
C. Two
D. One

48. The oxidation number of iron in its free state is
A. +3.
B. +2.
C. +1.
D. 0.

49. Water pipes are produced from
A. polyvinyl chloride.
B. polystyrene.
C. perspex.
D. polyethene.

50. Consider the reaction represented by the following equation:

$$_xAl + {}_yCl_2 \longrightarrow {}_zAlCl_3$$

The value of x, y and z respectively are
A. 1, 1 and 1.
B. 1, 2 and 1.
C. 2, 2 and 3.
D. 2, 3 and 2.

END OF PAPER