Candidate's Name..... MARKING GUIDE ..... Joseph T. Kajura

Signature:.....

Random No.						Personal No.		

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545/1

CHEMISTRY

Paper 1

Oct. / Nov. 2020

1½ hours

UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Certificate of Education

CHEMISTRY

Paper 1

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES:

This paper consists of **50** *objective-type questions.*

Answer **all** *questions.*

You are required to write the correct answer; **A**, **B**, **C** *or* **D** *in* **blue** *or* **black** *ink in the box provided on the right-hand side of each question.*

Do **not** *use pencil. Any question answered in* **pencil** *will* **not** *be marked.*

For Examiners' Use Only
50

Turn Over

1. Which one of the following gases is used as fuel?

A. Methane.
B. Ammonia.
C. Oxygen.
D. Carbon monoxide.

A

2. Which one of the following particles are responsible for conducting electricity in molten sodium chloride?

A. Electrons.
B. Protons.
C. Neutrons.
D. Ions.

D

3. Crude oil can be separated into its components because the components have different

A. solubilities.
B. boiling points.
C. melting points.
D. densities.

B

4. The gas which is absorbed when air is bubbled through aqueous potassium hydroxide is

A. oxygen .
B. neon.
C. carbon dioxide.
D. nitrogen.

C

5. The period of an element in the Periodic Table is determined by the

A. size of its atom.
B. number of main energy levels in the atom.
C. chemical properties of the element.
D. valency of the element.

B

6. The main ore from which sodium is extracted is

A. *NaCl*.
B. $NaNO_3$.
C. Na_2SO_4.
D. Na_2CO_3.

A

7. The full symbol of the atom of an element W is ${}^{3}_{1}W$. What is the number of neutrons in W?

A. 1.
B. 2.
C. 3.
D. 4.

B

8. Which one of the following methods is suitable for separating a mixture of ammonium chloride, sodium chloride and iron filing?

A. Filtration then magnetisation.
B. Sublimation then crystallisation.
C. Filtration then crystallisation.
D. Magnetisation then sublimation.

D

9. Which one of the following pairs of substances reacts to form a salt and water only?

A. Ammonium nitrate and sodium hydroxide.
B. Zinc granules and dilute sulphuric acid.
C. Sodium carbonate and dilute sulphuric acid.
D. Potassium hydroxide and dilute hydrochloric acid.

D

10. To a solution containing lead(II) ions and calcium ions was added sodium hydroxide solution until in excess and filtered. Which one of the following was the observation made when aqueous ammonia was added to acidified filtrate until in excess?

A. White precipitate insoluble in excess.
B. Filtrate remained colourless.
C. Filtrate turned yellow.
D. White precipitate soluble in excess.

A

11. Chlorine is collected by upward displacement of air because it

A. is less dense than air.
B. is almost as heavy as air.
C. is denser than air.
D. does not react with air.

C

12. When a mixture of carbon and substance X was heated, there was no observable change. X is

A. Al_2O_3.
B. PbO.
C. Fe_2O_3.
D. CuO.

A

13. A non-metal ***R*** burns in excess oxygen to produce a neutral oxide. The identity of ***R*** is

A. carbon.
B. sulphur.
C. phosphorous.
D. hydrogen.

D

14. What is the percentage by mass of water of crystallisation in iron(II) sulphate-7- water ($FeSO_4\ 7H_2O$)?

($Fe=56$; $S=32$; $O=16$; $H=1$)

A. $\left(\frac{100\times126}{152}\right)$ g.
B. $\left(\frac{100\times 8}{170}\right)$ g.
C. $\left(\frac{100\times126}{278}\right)$ g.
D. $\left(\frac{100\times18}{122}\right)$ g.

C

15. The atomic numbers of elements *Z*, *V*, *T* and *X* are 2, 8, 12, and 16 respectively. Which one of the elements belongs to the same group in the Periodic Table as neon? (*Atomic number of neon = 10*)

A. Z.
B. V.
C. T.
D. X.

A

16. 120 kJ of heat was required to change 15 g of methanol (CH_3OH) into its vapour. Which one of the following is the molar heat of vapourisation of methanol?

($H=1$; $C=12$; $O=16$)

A. $\left(\frac{120\times15}{32}\right)$ kJmol^{-1}.
B. $\left(\frac{120\times32}{15}\right)$ kJmol^{-1}.
C. $\left(\frac{120\times30}{15}\right)$ kJmol^{-1}.
D. (120×15) kJmol^{-1}.

B

17. When a solution containing magnesium ions was added to an unknown solution *Z*, a white precipitate was formed. Solution *Z* contained

A. NO_3^-.
B. SO_4^{2-}.
C. CO_3^{2-}.
D. HCO_3^-.

C

18. 16.8 dm^3 of a gas ***R*** weighed 33 g at s.t.p. What is the formula mass of gas ***R***? (*1 Mole of gas occupies 22.4 dm^3 at s.t.p.*)

A. $\left(\frac{22.4\times16.8}{33}\right)g.$ B. $\left(\frac{22.4\times33}{16.8}\right)g.$

C. $\left(\frac{16.8\times33}{22.4}\right)g.$ D. $\left(\frac{22.4}{16.8\times33}\right)g.$

C

19. Which one of the following gases will dissolve in water to form a weak acid?

A. Hydrogen chloride.
B. Sulphur trioxide.
C. Sulphur dioxide.
D. Chlorine.

C

20. Which one of the following nitrates, when heated, produces oxygen as the only gaseous product?

A. Sodium nitrate.
B. Lead(II) nitrate.
C. Aluminium nitrate.
D. Copper(II) nitrate.

A

21. Silver nitrate decomposes according to the following equation.

$$2AgNO_3\ (s) \longrightarrow 2Ag(s) + 2NO_2(g) + O_2(g)$$

What mass of silver nitrate must be heated in order to produce 896 cm^3 of oxygen at s.t.p?
(*1 mole of a gas occupies 22400 cm^3 at s.t.p; N = 14; O = 16; Ag = 108*)

A. $\left(\frac{170\times896}{22400}\right)$ g. B. $\left(\frac{22400\times170\times2}{896}\right)$g.

C. $\left(\frac{2\times170\times896}{22400}\right)$ g. D. $\left(\frac{22400\times170}{896\times2}\right)$ g.

C

22. Which one of the following metals when reacted with cold dilute nitric acid will produce hydrogen?

A. Copper.
B. Iron.
C. Zinc.
D. Magnesium.

D

23. Hydrogen reacts with copper(II) oxide according to the following equation.

$$CuO(s) + H_2(g) \longrightarrow Cu(s) + H_2O(l)$$

What volume of hydrogen measured at s.t.p will react to form 3.2 g of copper?
(*Cu = 64; 1 mole of a gas occupies 22.4 dm³ at s.t.p*)

A. 0.112 dm³.
B. 1.12 dm³.
C. 1.20 dm³.
D. 11.20 dm³.

B

24. Metal *X* reacts with lead(II) oxide whereas metal *Y* does not. The ascending order of reactivity of *X*, lead and *Y* is

A. *Y* < *Pb* < *X*.
B. *Y* < *X* < *Pb*.
C. *X* < *Pb* < *Y*.
D. *X* < *Y* < *Pb*.

A

25. Atom ***Q*** has 5 electrons in its outer most energy level, whereas atom ***R*** has 7 electrons. What is the total number of electrons shared when ***Q*** and ***R*** combine?

A. 5.
B. 6.
C. 7.
D. 12.

B

26. The reagent which is used for testing the gaseous product formed when sodium hydrogencarbonate is heated is

A. concentrated ammonia solution.
B. aqueous silver nitrate.
C. aqueous calcium hydroxide.
D. concentrated hydrochloric acid.

C

27. Which one of the following processes is **not** carried out in water treatment?

A. Sedimentation.
B. Filtration.
C. Chlorination.
D. Distillation.

D

28. A gas ***Z*** was evolved when a mixture of copper(II) chloride and concentrated sulphuric acid was warmed. Which one of the following compounds would react with ***Z*** without effervescence?

A. Lead(II) nitrate.
B. Iron(II) sulphide.
C. Zinc carbonate.
D. Sodium sulphite.

A

29. What volume of a 2 M sodium hydroxide solution contains 4.0 g of sodium hydroxide?
(*H = 1; O = 16; Na = 23*)

A. 200.0 cm^3.
B. 100.0 cm^3.
C. 50.0 cm^3.
D. 12.5 cm^3.

C

30. A solution *W*, gives a pink colour with phenolphthalein indicator. Which one of the following solutions can change the colour of the resultant solution from pink to colourless?

A. Aqueous hydrogen chloride.
B. Potassium hydroxide solution.
C. Aqueous ammonia.
D. Sodium carbonate.

A

31. The reaction scheme below shows the processes undergone by substance **T** to form polyethene.

T $\xrightarrow{\text{process 1}}$ **Ethene** $\xrightarrow{\text{process 2}}$ **Polyethene**

Which one of the following is substance **T**, process 1 and process 2 respectively?

A. Glucose, dehydration, cracking.
B. Ethane, cracking, dehydration.
C. Ethanol, dehydration, polymerisation.
D. Ethyne, polymerisation, hydrogenation.

C

32. When dilute sulphuric acid was added to substance **Q**, a colourless gas with a rotten egg smell was produced. Which one of the following is substance **Q**?

A. Iron filings.
B. Iron(II) sulphate.
C. Iron(II) sulphite.
D. Iron(II) sulphide.

D

33. Sodium hydrogencarbonate reacts with sulphuric acid according to the following equation.

$2NaHCO_3(aq) + H_2SO_4(aq) \longrightarrow Na_2SO_4(aq) + 2CO_2(aq) + 2H_2O(l)$

The volume of a 0.03M sulphuric acid required to react completely with 20.0 cm^3 of a 0.05 M sodium hydrogencarbonate solution is

A. $\left(\frac{0.05\times20.0}{0.03}\right)$ cm^3.

B. $\left(\frac{0.05\times20.0\times2}{0.03}\right)$ cm^3.

C. $\left(\frac{2\times20.0}{0.03\times0.05}\right)$ cm^3.

D. $\left(\frac{0.05\times20.0}{0.03\times2}\right)$ cm^3.

D

34. Excess dilute ammonia solution was added to a solution containing both iron(II) and copper(II) ions, and the resultant mixture filtered. Which one of the following was the colour of the filtrate?

A. Brown.
B. Green.
C. Deep blue.
D. Colourless.

C

35. Which one of the following is the mass of aluminium atoms containing the same number of atoms as 17.8 g of chlorine atoms? ($Al = 27$; $Cl = 35.5$)

A. $\left(\frac{17.8\times27}{35.5}\right)$ g.

B. $\left(\frac{35.5\times27}{17.8}\right)$ g.

C. $\left(\frac{17.8\times27}{2\times35.5}\right)$ g.

D. $\left(\frac{35.5\times2}{17.8\times27}\right)$ g.

A

36. The form of carbon which has the highest density is

A. soot.
B. coke.
C. graphite.
D. diamond.

D

37. The electronic configuration of an ion Y^- is 2:8:8. What is the atomic number of element Y?

A. 8.
B. 17.
C. 18.
D. 19.

B

38. Which one of the following salts is prepared by precipitation method?

A. Magnesium sulphate.
B. Copper(II) sulphate.
C. Zinc chloride.
D. Lead(II) iodide.

D

39. When excess magnesium powder is added to 50 cm^3 of 1M copper(II) sulphate solution, the temperature of the solution rose from 25 °C to 39 °C. The molar heat of displacement of copper is

(*Density of solution = 1 gcm^3; specific heat capacity of solution = 4.2 $JK^{-1}g^{-1}$*)

A. −29.4 $kJmol^{-1}$.
B. −58.8 $kJmol^{1}$.
C. −88.2 $kJmol^{-1}$.
D. −117.6 $kJmol^{-1}$.

B

40. 20 cm^3 of 0.1 M hydrochloric acid reacted completely with 25 cm^3 of sodium carbonate solution. What is the concentration of the sodium carbonate solution in moles per litre?

(*Reaction ratio of hydrochloric acid to sodium carbonate is 2:1*)

A. $\frac{20\times0.1}{25\times2}$.
B. $\frac{20\times0.1\times2}{25}$.
C. $\frac{20\times0.1\times2}{1000\times25}$.
D. $\frac{20\times0.1}{25}$.

A

*Each of the questions **41** to **45** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*

Select

A. *if both the assertion and reason are* **true** *statements and the reason is a* **correct** *explanation of the assertion.*

B. *if both the assertion and reason are* **true** *statements but the reason is* **not** *a* **correct** *explanation of the assertion.*

C. *if the assertion is* **true** *but the reason is* **not** *a* **correct** *statement.*

D. *if the assertion is* **not correct** *but the reason is a* **correct** *statement.*

'TRUCTIONS SUMMARISED:

	Assertion	Reason
A	True	True and is a correct explanation.
B	True	True but is **not** a correct explanation.
C	True	Incorrect.
D	Incorrect	Correct.

41. 2 M hydrochloric acid react with zinc powder faster than the same mass of zinc granules **because** zinc powder contains a greater number of zinc atoms than the granules. C

42. Chlorine is more reactive than iodine although the two elements are in the same family **because** chlorine is a gas whereas iodine is solid at room temperature. B

43. When a mixture of charcoal and copper(II) oxide was heated, the colour changed from black to brown **because** copper(II) oxide is a basic oxide. B

44.	Aluminium does **not** react with water to form hydrogen	**because**	aluminium is below hydrogen in the activity series.	C
45.	Aqueous sulphur dioxide does not conduct electricity	**because**	it is a weak acid.	D

In each of the questions **46** to **50**, *one or more of the answers given may be correct.*

Read each question carefully and then indicate the correct answer according to the following:

A. If 1, 2 and 3 only are correct.

B. If 1 and 3 only are correct.

C. If 2 and 4 only are correct.

D. If 4 only is correct.

46. Aqueous hydrogen chloride conducts electricity whereas a mixture of hydrogen chloride and tetrachloromethane does not because hydrogen chloride

1. is soluble in water.
2. is a covalent compound.
3. does not dissolve in organic solvent.
4. ionises in water.

D

47. In which of the following equations does nitric acid act as an oxidising agent?

1. $3Cu(s) + 8HNO_3(aq) \longrightarrow 3Cu(NO_3)_2(aq) + 4H_2O(l) + 2NO(g)$
2. $CaO(s) + 2\,HNO_3(aq) \longrightarrow Ca(NO_3)_2(aq) + H_2O(l)$
3. $S(s) + 6HNO_3(aq) \longrightarrow H_2SO_4(aq) + 2H_2O(l) + 6NO_2(g)$
4. $PbCO_3(s) + 2\,HNO_3(aq) \longrightarrow Pb(NO_3)_2(aq) + CO_2(g) + H_2O(l)$

B

48. Which of the following ions is/are present in a solution formed when chlorine is bubbled into cold dilute sodium hydroxide solution?

1. $Na+$.
2. Cl^-.
3. OCl^-.
4. ClO_3^-.

A

49. Which of the following is /are the property(ies) of the gas(es) produced when ammonium carbonate is heated?

1. Forms white fumes with concentrated hydrochloric acid.
2. Turns potassium dichromate paper green.
3. Turns limewater milky.
4. Has no effect on litmus.

B

50. Which of the following reactions can be used to produce sulphur dioxide that is required for the manufacture of sulphuric acid by the contact process?

1. $Cu(s) + 2H_2SO_4(aq) \longrightarrow CuSO_4(aq) + 2H_2O(l) + SO_2(g)$
2. $4FeS_2(s) + 11O_2(g) \longrightarrow 2Fe_2O_3(s) + 8SO_2(g)$
3. $2H_2SO_4(aq) + Na_2SO_3(aq) \longrightarrow 2NaHSO_4(aq) + H_2O(l) + SO_2(g)$
4. $S(s) + O_2(g) \longrightarrow SO_2(g)$

C

END