Candidate's Name MARK	LING GUIDE	Joseph J. K.
Signature: Koth	Random No.	Personal No.
(Do not write your School / Centre 545/1 CHEMISTRY	Name or Number anywhere	e on this booklet.)
Paper 1 Oct. / Nov. 2020		



# 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.

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**Turn Over** 

. Which one of the following gases is used as fuel?	
A. Methane. B. Ammonia. C. Oxygen. D. Carbon monoxide.	A
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 component different	s have
	, 11a v C
A. solubilities. B. boiling points	
C. melting points.	B
D. densities.	
The gas which is absorbed when air is bubbled through aqueous potassi hydroxide is	um
A. oxygen.	
B. neon. C. carbon dioxide	
C. carbon dioxide. D. nitrogen.	_
and a second sec	
5 The period of an element in the Periodic Table is determined by the	1 1
A. size of its atom.	
B. number of main energy levels in the atom	0
c. chemical properties of the element.	6
D. valency of the element.	
The main ore from which sodium is extracted is	
A. NaCl.	
B. NaNO <sub>3</sub> .	Λ
C. $Na_2SO_4$ .	Hi
D. $Na_2CO_3$ .	

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	10	2				
			J			
	D.	CuO.	- ic			
	B. C.	$PbO$ . $Fe_2O_3$ .	1			
	A.	Al <sub>2</sub> O <sub>3</sub> .	A Transfer			
	OUSC	to vable change. A is	- Sy Page			
12.	When	en a mixture of carbon and substance X was heated, there was no				
	D.	does not react with air.	1 (N 1)			
	C.	is denser than air.				
	B.	is almost as heavy as air.	7.1			
	A.	is less dense than air.	Part of			
11.	Chlo	orine is collected by upward displacement of air because it	$(1 - 2) \cdot v = 0.1$			
	D.	White precipitate soluble in excess.	thre don't			
	C.	Filtrate turned yellow.				
	B.	White precipitate insoluble in excess. Filtrate remained colourless.	wat was			
	A.		X a			
	was	the observation made when aqueous ammonia was added to acidified ate until in excess?	7 15 1			
	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					
10.	To a		Responsi			
	D.	Sodium carbonate and dilute sulphuric acid.  Potassium hydroxide and dilute hydrochloric acid.	Hat altor 9			
	B. C.	Zinc granules and dilute sulphuric acid	2012 2012 2012 2012 2012 2012 2012 2012			
	A.	Ammonium nitrate and sodium hydroxide.				
	wate	er only?	e itti			
9.	Whi	ich one of the following pairs of substances reacts to form a salt and				
	D.	Magnetisation then sublimation.	100			
	C.	ritration then crystallisation				
	A. B.	Filtration then magnetisation. Sublimation then crystallisation.				
	uiiii	montum chloride, sodium chloride and iron filing?	Paris Lytter			
8.	8. Which one of the following methods is suitable for separating a mixture of					
		4.	or one of and I			
	C. D.	3.	rypative C			
	B.	2.	aucoda (13)			
	A.	1.	-glgius - si			
	neutro	e full symbol of the atom of an element $W$ is ${}^{3}W$ . What is the number of rons in $W$ ?	11. pl (6)2			
7.	The	e full symbol of a	he identity			

- A non-metal R burns in excess oxygen to produce a neutral oxide. The identity of R is
  - carbon. A.
  - B. sulphur.
  - C. phosphorous.
  - D. hydrogen.



What is the percentage by mass of water of crystallisation in iron(II) sulphate-7- water (FeSO<sub>4</sub> 7H<sub>2</sub>O)?

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

- A.  $\left(\frac{100\times126}{152}\right)$  g.

C.  $\left(\frac{100 \times 126}{278}\right)$  g.

D.



- 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.
- ., *je par j*e **B.** . V

  - D.



120 kJ of heat was required to change 15 g of methanol (CH<sub>3</sub>OH) 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<sup>-1</sup>. B.  $\left(\frac{120\times32}{15}\right)$  kJmol<sup>-1</sup>.



C.  $\left(\frac{120\times30}{15}\right)$  kJmol<sup>-1</sup>.

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- D.  $(120 \times 15) \text{ kJmol}^{-1}$ .
- 12 When a solution containing magnesium ions was added to an unknown solution Z, a white precipitate was formed. Solution Z contained
  - A.
  - B.
  - C.
  - HCO2. D.



- 18. 16.8 dm<sup>3</sup> 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 dm3 at s.t.p.)
  - A.  $\left(\frac{22.4 \times 16.8}{32}\right) g$ .
- B.  $\left(\frac{22.4\times33}{16.8}\right)g$ .



- $\left(\frac{16.8\times33}{32.4}\right)$ g.
- 19. Which one of the following gases will dissolve in water to form a weak acid?
  - Hydrogen chloride. A.
  - B. Sulphur trioxide.
  - C. Sulphur dioxide.
  - D. Chlorine.



- 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.



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<sup>3</sup> of oxygen at s.t.p?

(1 mole of a gas occupies 22400 cm<sup>3</sup> at s.t.p; N = 14; O = 16; Ag = 108)

A.  $\left(\frac{170 \times 896}{22400}\right)$  g.

- B.  $\left(\frac{22400 \times 170 \times 2}{906}\right)$ g.
- C.  $\left(\frac{2\times170\times896}{22400}\right)$  g. D.  $\left(\frac{22400\times170}{896\times2}\right)$  g.



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

5

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



**Turn Over** 

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?

 $(Cu = 64; 1 \text{ mole of a gas occupies } 22.4 \text{ dm}^3 \text{ at s.t.p})$ 

A.  $0.112 \text{ dm}^3$ .

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- B. 1.12 dm<sup>3</sup>.
- C.  $1.20 \, dm^3$ .
- D. 11.20 dm<sup>3</sup>.



- Metal X reacts with lead(II) oxide whereas metal Y does not. The ascending order of reactivity of X, lead and Y is
  - $A. _{A} Y < Pb < X.$ 
    - B. Y < X < Pb.
    - C. X < Pb < Y.
    - D. X < Y < Pb.



- 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., 195.,
  - B. 6.
  - C. 7.1950
  - D. 12.



- 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.



- 27. Which one of the following processes is not carried out in water treatment?
  - A. Sedimentation.
    - B. Filtration.
    - C. Chlorination.
    - D. Distillation.



- 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.



29. What volume of a 2 M sodium hydroxide solution contains 4.0 g of sodium hydroxide?

$$(H = 1; O = 16; Na = 23)$$

- A.  $200.0 \text{ cm}^3$ .
- B.  $100.0 \text{ cm}^3$ .
- C. 50.0 cm<sup>3</sup>.
- D.  $12.5 \text{ cm}^3$ .



- 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.



- 31. The reaction scheme below shows the processes undergone by substance T to form polyethene.
  - $T \xrightarrow{process 1} Ethene \xrightarrow{process 2} Polyethene$

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.



- 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.



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

 $2NaHCO_3(aq) + H_2SO_4(aq) \longrightarrow Na_2SO_4(aq) + 2CO_2(aq) + 2H_2O(1)$ 

The volume of a 0.03M sulphuric acid required to react completely with 20.0 cm3 of a 0.05 M sodium hydrogenearbonate solution is

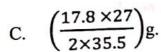
- A.  $\left(\frac{0.05 \times 20.0}{0.03}\right)$  cm<sup>3</sup>.
- B.  $\left(\frac{0.05 \times 20.0 \times 2}{0.03}\right) \text{ cm}^3$ .



- C.  $\left(\frac{2 \times 20.0}{0.03 \times 0.05}\right) \text{ cm}^3$ . D.  $\left(\frac{0.05 \times 20.0}{0.03 \times 2}\right) \text{ cm}^3$ .
- 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?
  - Brown. A.
  - B. Green.
  - Deep blue. C.
  - D. Colourless.



- 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)
  - $\left(\frac{17.8\times27}{25.5}\right)$  g.
- B.  $\left(\frac{35.5 \times 27}{17.8}\right)$  g.



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



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





graphite. C.

diamond. D.



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

8. A.

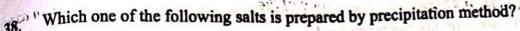
17. B.

C. 18.

19. D.

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- A. Magnesium sulphate.
- B. Copper(II) sulphate.
- C. Zinc chloride.

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In Lead(II) iodide.



When excess magnesium powder is added to 50 cm<sup>3</sup> 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<sup>3</sup>; specific heat capacity of solution =  $4.2 \text{ JK}^{-1}\text{g}^{-1}$ )

- A. -29.4 kJmol<sup>-1</sup>.
- B.  $-58.8 \, kJmol^{1}$ .
- C. -88.2 kJmol<sup>-1</sup>.
- D.  $-117.6 \, kJmol^{-1}$ .



40. 20 cm<sup>3</sup> of 0.1 M hydrochloric acid reacted completely with 25 cm<sup>3</sup> 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.  $\frac{20\times0.1}{25\times2}$ 

 $B. \quad \frac{20\times0.1\times2}{25}$ 

C.  $\frac{20 \times 0.1 \times 2}{1000 \times 25}$ 

D.  $\frac{20 \times 0.1}{25}$ 



Turn Over

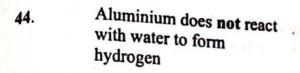
Each of the questions 41 to 45 consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.

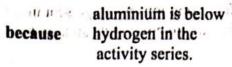
## Select

- 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	l.	Reason	1 - pay smill or of h	
	A True	True and	True and is a correct explanation.		
	B True	True but	is not a corre	ect explanation.	10111
	C True	Incorrect	<b>L</b>		6 Trans.
	D Incorrect	Correct.			X - E -
41.	2 M hydrochloric acid react with zinc powder faster than the same mass of zinc granules		because	zinc powder contains greater number of zinc atoms than the granules.	
42.	Chlorine is more than iodine altho- two elements are same family	ugh the	because	chlorine is a gas whereas iodine is solid at room temperature.	B
43.	When a mixture of and copper(II) ox heated, the colou from black to bro	tide was r changed	because	copper(II) oxide is a basic oxide.	B







45. Aqueous sulphur dioxide does not conduct electricity

because

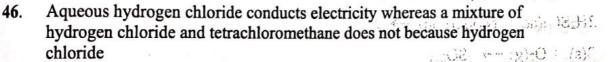
it is a weak acid.



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.



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



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

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

1 1

- fftti fir Which of the following ions is/are present in a solution formed when when when chlorine is bubbled into cold dilute sodium hydroxide solution?
  - 1. Na+
  - 2. CI
  - 3. OCT.
  - 4.  $ClO_3^-$



M

- 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.

11:21

- Turns limewater milky. 3.
- Has no effect on litmus. 4.



- 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.  $Cu(s) + 2H_2SO_4(aq) \rightarrow CuSO_4(aq) + 2H_2O(1) + SO_2(g)$



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- $4\text{FeS}_2(s) + 11O_2(g) \rightarrow 2 \text{Fe}_2O_3(s) + 8SO_2(g)$ 2.
- $2H_2SO_4(aq) + Na_2SO_3(aq) \rightarrow 2NaHSO_4(aq) + H_2O(1) + SO_2(g)$ 3.
- $S(s) + O_2(g) \rightarrow SO_2(g)$ 4. .