FORM TP 2024059

CANDIDATE – PLEASE NOTE!

PRINT your name on the line below and return this booklet with your answer sheet. Failure to do so may result in disqualification.

TEST CODE **01212010**

MAY/JUNE 2024

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

CHEMISTRY

Paper 01 – General Proficiency

1 hour 15 minutes

05 JUNE 2024 (p.m.)

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This test consists of 60 items. You will have 1 hour and 15 minutes to answer them.
2. In addition to this test booklet, you should have an answer sheet.
3. Each item in this test has four suggested answers lettered (A), (B), (C), (D). Read each item you are about to answer and decide which choice is best.
4. On your answer sheet, find the number which corresponds to your item and shade the space having the same letter as the answer you have chosen. Look at the sample item below.

Sample Item

The SI unit of length is the

(A) metre
(B) second
(C) newton
(D) kilogram

Sample Answer



The best answer to this item is "metre", so (A) has been shaded.

5. If you want to change your answer, erase it completely before you fill in your new choice.
6. When you are told to begin, turn the page and work as quickly and as carefully as you can. If you cannot answer an item, go on to the next one. You may return to that item later.
7. You may do any rough work in this booklet.
8. Figures are not necessarily drawn to scale.
9. You may use a silent, non-programmable calculator to answer items.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

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1. Which of the following processes demonstrates that matter is made up of minute particles?

(A) Diffusion
(B) Capillarity
(C) Distillation
(D) Evaporation

2. Sulfur and oxygen are in the same group of the periodic table because

(A) they can react with each other
(B) they can form covalent compounds
(C) they have the same number of electrons in their outer shell
(D) the atomic number of sulfur is 16 and the relative atomic mass of oxygen is 16

3. Which of the terms below describes the structure of copper?

(A) Simple molecular
(B) Macromolecular
(C) Ionic crystals
(D) Metallic

4. Particles of a solid cannot move about freely because the

(A) particles cannot be easily compressed
(B) forces of attraction are very strong
(C) forces of attraction are very weak
(D) particles have a high density

5. Which of the substances, represented by the options A, B, C and D in the following table, is MOST likely sodium chloride?

Substance	Boiling Point (°C)	Electrical Conductivity	
		Solid State	Aqueous State
(A)	1465	No	Yes
(B)	444	No	No
(C)	2600	Yes	No
(D)	–35	No	Yes

6. The mass of 'one mole of atoms of an element' refers to the quantity of

(A) one atom of the element
(B) an element which contains 6.0×10^{23} atoms
(C) an element which occupies 24.0 dm^3 at STP
(D) an element which combines completely with 12 g of carbon-12

7. Which of the following substances supplies protons as the only positive ions in aqueous solutions?

(A) Salt
(B) Ester
(C) Acid
(D) Alkali

8. Which of the following mixtures are arranged in order of INCREASING particle size?

(A) Solutions, colloids, suspensions
(B) Solutions, suspensions, colloids
(C) Colloids, solutions, suspensions
(D) Suspensions, colloids, solutions

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9. When 100 cm^3 of 2 mol dm^{-3} hydrochloric acid (in excess) are added to 5.0 g of granulated zinc, hydrogen gas is evolved at a certain rate. If 5.0 g of powdered zinc were used instead, the rate of producing hydrogen gas would

(A) increase because of the greater concentration of powdered zinc
(B) increase because of the increased surface area of powdered zinc
(C) decrease because of the decreased surface area of powdered zinc
(D) decrease because of the lower solubility of powdered zinc

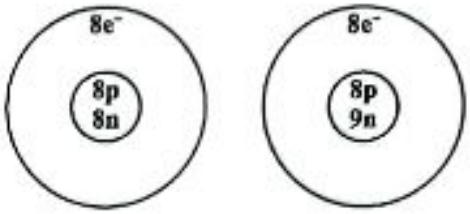
10. Sodium hydrogen carbonate and hydrochloric acid reacted to produce sodium chloride. The mixture effervesced. The effervescence is caused by the evolution of

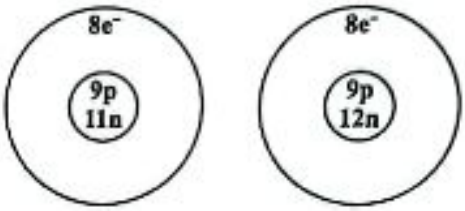
(A) oxygen
(B) hydrogen
(C) carbon dioxide
(D) hydrogen chloride

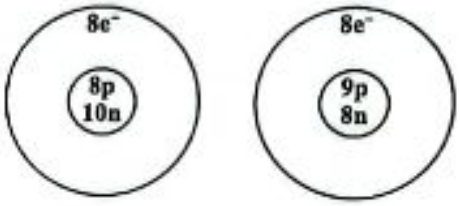
11. For more efficient processing, the pH of fresh sugar cane juice, which is usually 5.0–5.5, can be changed to 7.5–8.0 by adding

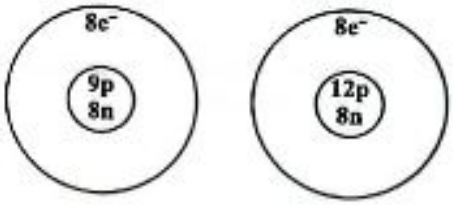
(A) limestone, $CaCO_3$
(B) slaked lime, $Ca(OH)_2$
(C) sodium chloride, NaCl
(D) acetic (ethanoic) acid, CH_3CO_2H

12. An element, X, has 8 electrons in its outer shell. Which of the following are possible isotopes of X?

(A)


(B)


(C)


(D)


13. An example of a substance with a giant covalent structure is

(A) sodium chloride
(B) solid iodine
(C) diamond
(D) copper

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14. Which of the following acids is weakly ionized in aqueous solutions?

(A) Hydrochloric acid
(B) Ethanoic acid
(C) Sulfuric acid
(D) Nitric acid

15. Which of the following is the correct formula for ammonium carbonate?

(A) NH_4CO_3
(B) $NH_4(CO_3)_2$
(C) $(NH_4)_2\ CO_3$
(D) $(NH_4)_2\ (CO_3)_2$

16. Which of the following features are true about the arrangement of electrons, protons and neutrons in an atom?

I. Protons and neutrons are found in the nucleus.
II. Electrons can be found anywhere inside the nucleus.
III. The number of protons is the same as the number of electrons.

(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

17. Which of the following electronic configurations represents an atom which will MOST readily form a positive ion?

(A) 2, 7
(B) 2, 8, 2
(C) 2, 8, 7
(D) 2, 8, 8, 2

18. Which of the atoms listed below would NOT form a positive ion?

(A) Chlorine
(B) Lithium
(C) Hydrogen
(D) Beryllium

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19. Which of the following compounds is covalent?

(A) Potassium chloride
(B) Calcium chloride
(C) Hydrogen chloride
(D) Magnesium chloride

20. Which of the following would be the LEAST suitable compound to add to sulfuric acid when preparing copper(II) sulfate?

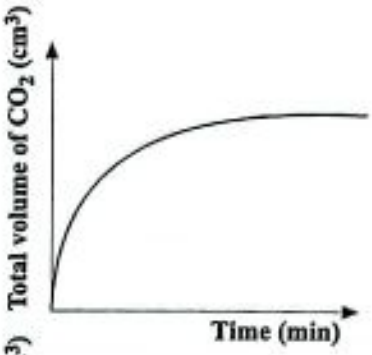
(A) Copper(II) oxide
(B) Copper(II) chloride
(C) Copper(II) carbonate
(D) Copper(II) hydroxide

21. The atomic number of Element D is 13. In which group of the periodic table would Element D be found?

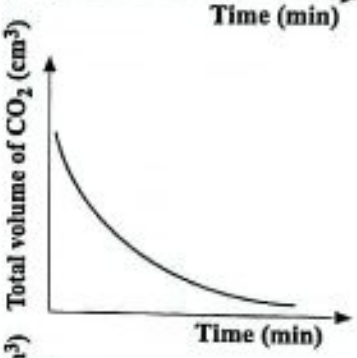
(A) 5
(B) 4
(C) 3
(D) 2

22. Some calcium carbonate was reacted with excess dilute hydrochloric acid. The volume of carbon dioxide evolved was recorded and plotted against time. Which of the following graphs represents the reaction?

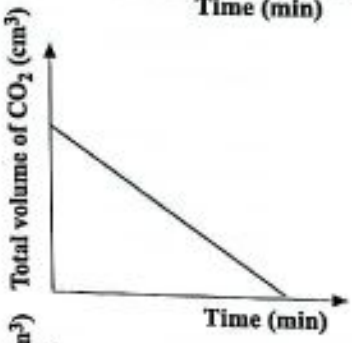
(A)



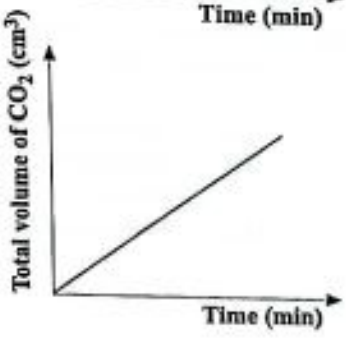
(B)



(C)



(D)



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Items 23 and 24 refer to the following equation.

$$NO_2(g) + SO_2(g) \rightarrow NO(g) + SO_3(g)$$

23. Which of the following compounds is reduced?

(A) NO
(B) NO_2
(C) SO_2
(D) SO_3

24. Which of the following compounds is the oxidizing agent?

(A) SO_2
(B) SO_3
(C) NO
(D) NO_2

25. A substance, Y, reacts with an ammonium salt to produce ammonia gas. Y must therefore be

(A) an ester
(B) an acid
(C) a base
(D) a salt

26. Which of the following compounds is NOT a normal salt?

(A) Potassium nitrate
(B) Sodium carbonate
(C) Potassium carbonate
(D) Sodium hydrogen carbonate

27. When an exothermic reaction occurs energy is

(A) absorbed from the environment
(B) released to the environment
(C) absorbed from the reactants
(D) released from the products

28. The particle $^{24}_{12}X^{2+}$ has 12 protons.

How many neutrons and electrons does the particle have?

	Neutrons	Electrons
(A)	12	10
(B)	12	12
(C)	24	10
(D)	24	12

29. Diamond and graphite are allotropes of carbon because

(A) they are the same physical forms of different elements
(B) they are different physical forms of the same element
(C) they both have the same molecular formula but different structural
(D) they both have different molecular but the same structural formula

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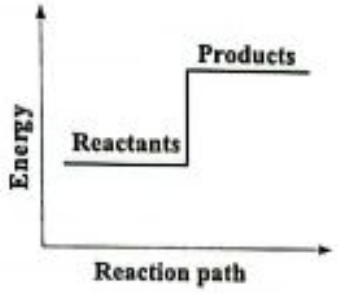
Item 30 refers to the following table.

Acid	P	Q	R	S
pH	2	3	4	5

30. The strongest acid is

(A) S
(B) R
(C) Q
(D) P

Item 31 refers to the following energy profile diagram.



31. From the energy profile diagram above, it can be said that the reactants

(A) give energy to products
(B) give out heat when they react
(C) absorb energy to form products
(D) cannot be converted into products

32. Which of the following substances conducts an electric current and remains chemically unchanged?

(A) Sulfur
(B) Copper
(C) Aqueous sodium chloride
(D) Aqueous copper (II) sulfate

33. Which metal reacts readily with water to produce a strongly alkaline solution?

(A) Na
(B) Fe
(C) Cu
(D) Al

34. Which of the following metals will NOT displace hydrogen from dilute hydrochloric acid?

(A) Zinc
(B) Iron
(C) Copper
(D) Aluminium

35. Which metal appears between copper and aluminium in the reactivity series and is an important component in haemoglobin?

(A) Magnesium
(B) Lead
(C) Zinc
(D) Iron

36. Which of the following compounds may be used to counteract the effects of acid rain on the soil?

(A) CaO
(B) H_2S
(C) SO_2
(D) CO

37. Which of the following elements would NOT form an acidic oxide when burnt in air?

(A) Sulfur
(B) Carbon
(C) Nitrogen
(D) Magnesium

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Item 38 refers to the following information.

It was found that magnesium metal displaces zinc ions in zinc sulfate, while zinc metal displaces lead ions in lead sulfate.

38. What is the order of reactivity of the metals, from most reactive to least reactive?

(A) Pb, Zn, Mg
(B) Mg, Zn, Pb
(C) Zn, Mg, Pb
(D) Zn, Pb, Mg

39. Which of the following statements is true of carbon monoxide?

(A) It is an acidic gas.
(B) It is very soluble in water.
(C) It turns lime water milky.
(D) It reduces iron(II) oxide.

40. Which of the following statements explains why, over time, aluminium products do NOT deteriorate in air as do iron products?

(A) Aluminium is lower than iron in the activity series, therefore it reacts less readily with air than iron.
(B) Aluminium is higher up in the activity series than iron, therefore it is more resistant to corrosion than iron.
(C) Both metals form oxide coats but the aluminium oxide prevents further reaction while the iron oxide does not.
(D) Both metals form hydroxide coats but the aluminium hydroxide prevents further reaction while the iron hydroxide does not.

41. Ammonia may be produced in the laboratory by heating a mixture of ammonium chloride and

(A) ammonium sulfate
(B) calcium hydroxide
(C) calcium chloride
(D) copper

Item 42 refers to the following table which shows the reaction of four metals, W, X, Y and Z, with water or steam. The table also shows the products formed when the nitrates of each metal are heated.

Metals	Reaction with Water/Steam	Products Formed When Nitrate is Heated
W	No reaction	Metal, NO_2 and O_2
X	Reacts with steam but not with cold water	Oxide, NO_2 and O_2
Y	Reacts rapidly with cold water	Nitrite and oxygen
Z	Reacts slowly with cold water	Oxide, NO_2 and O_2

42. In which of the following pairs of metals is the first metal MOST likely to displace the second metal from solution?

(A) W, X
(B) X, Y
(C) Z, Y
(D) Z, X

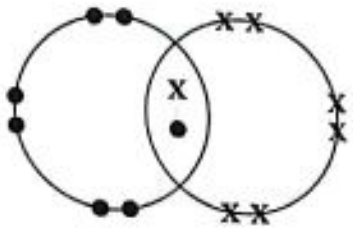
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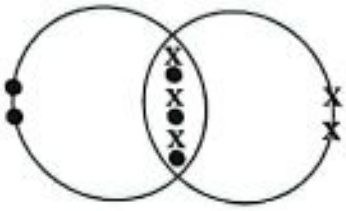
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43. Which of the following diagrams BEST illustrates bonding in hydrogen bromide?

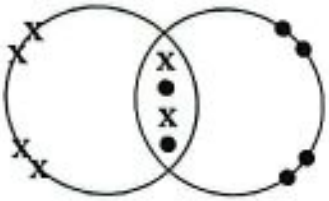
(A)



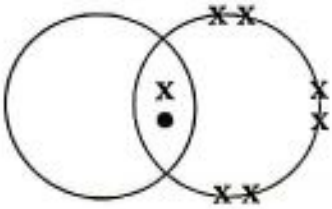
(B)



(C)



(D)



Item 44 refers to the following information.

A compound when treated with concentrated hydrochloric acid gives off a greenish-yellow gas which bleaches moist red litmus paper.

44. The gas given off is

(A) chlorine
(B) sulfur dioxide
(C) hydrogen sulfide
(D) nitrogen dioxide

45. On adding aqueous hydrochloric acid to a solution in a test tube, a gas is given off which extinguishes a burning splint. This shows the presence of

(A) ammonium ions
(B) carbonate ions
(C) nitrate ions
(D) sodium ions

46. Which acid reacts with copper to produce an acidic, reddish-brown gas?

(A) Nitric acid
(B) Sulfuric acid
(C) Ethanoic acid
(D) Hydrochloric acid

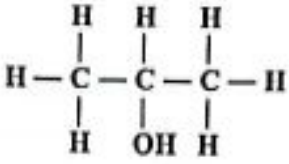
47. Methane (CH_4) reacts with chlorine gas in the presence of sunlight by a substitution reaction. Which of the following substances would be products of the reaction?

I. H_2
II. CH_3Cl
III. HCl

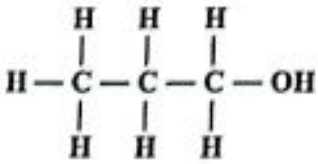
(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

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Item 48 refers to two organic compounds, I and II, of molecular formula C_3H_8O, with the following structures.



Compound I

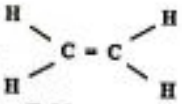


Compound II

48. Compounds I and II are known as the

(A) isomers of C_3H_8O
(B) isotopes of C_3H_8O
(C) condensed formulae of C_3H_8O
(D) empirical formulae of C_3H_8O

49. Which of the following about ethane is correct?

(A) Structural formula 
(B) Molecular formula – C_2H_4
(C) Empirical formula – CH_2
(D) General formula – C_nH_{2n+2}

50. What is the name of the catalysed reaction which uses an alcohol and an organic acid?

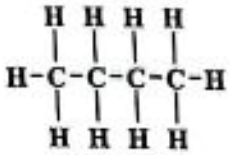
(A) Addition
(B) Isomerism
(C) Esterification
(D) Polymerization



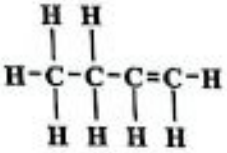
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51. Which of the following hydrocarbon structures represents an alkane with a branched chain?

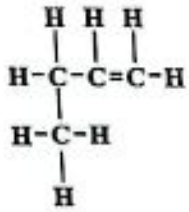
(A)



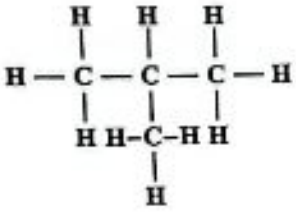
(B)



(C)



(D)



52. Cellulose is an example of a polysaccharide that can be used for

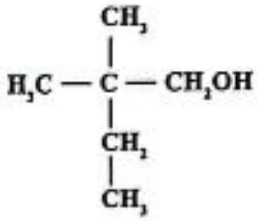
(A) guttering
(B) pipe fittings
(C) garbage bags
(D) paper making

53. Which of the following tests can be used to distinguish between an alkane and an alkene?

I. Burning
II. Conductivity
III. Adding bromine solution

(A) I only
(B) II only
(C) III only
(D) I and III only

Item 54 refers to the following compound.



54. The compound shown above represents an

(A) alcohol
(B) alkane
(C) alkene
(D) ester

55. Which of the following organic compounds has a pH less than 7?

(A) Propene
(B) Vinegar
(C) Ethanol
(D) Methane

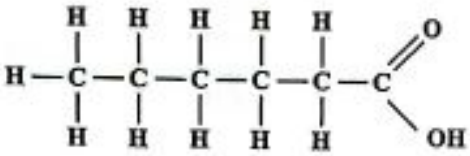
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56. A polyamide is formed by a condensation reaction between a molecule containing

(A) at least one -COOH group with another containing at least one $-NH_2$ group
(B) at least one -OH group with another containing at least one -COOH group
(C) at least one -OH group with another containing at least one $-NH_2$ group
(D) two -OH groups with another containing two -COOH groups

Item 57 refers to the following compound.



57. The compound belongs to which of the following homologous series?

(A) Alkanes
(B) Alcohols
(C) Alkenes
(D) Alkanoic acids

58. Which of the following is NOT formed from condensation polymerization?

(A) Polysaccharides
(B) Polyalkenes
(C) Polyamides
(D) Polyesters

59. Which of the following compound reacts with sodium carbonate to produce a gas which turns lime water milky?

(A) CH_3COOCH_3
(B) CH_3COONa
(C) CH_3COOH
(D) C_2H_5OH

60. Which of the following compounds is an alkene?

(A) C_2H_4
(B) C_2H_6
(C) $CH_3(CH_2)_3OH$
(D) $CH_3(CH_2)_2COOH$

END OF TEST

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.

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