S.3 CHEMISTRY ASSESSMENT TEST

TIME: 100 MINUTES TOPIC: IONIC CHEMISTRY

INSTRUCTIONS: ***Attempt all questions***

SECTION A

PART I

1. Which one of the following anions reacts with silver ions in solution to form precipitate that dissolves in aqueous ammonia solution?
   A. $SO_4^{2-}(aq)$ B. $Cl^-(aq)$ C. $CO_3^{2-}(aq)$ D. $NO_3^-(aq)$
2. Which one of the following hydroxides will dissolve in ammonia solution?
   A. $Zn(OH)_2$. B. $Al(OH)_3$. C. $Pb(OH)_2$. D. $Fe(OH)_3$.
3. Zinc carbonate was heated and the residue allowed to cool. Which one of the following is the colour of the residue?
   A. Black B. Yellow C. White D. Reddish-brown
4. Which one of the following ions will produce a white precipitate with acidified barium nitrate solution?
   A. Cl^- B. SO_4^{2-} C. CO_3^{2-} D. HCO_3^{2-}
5. Which one of the following substances is not decomposed when strongly heated?
   A. K_2CO_3 B. $NaNO_3$ C. FeSO4 D. $NaHCO_3$
6. Which one of the following equations represents a redox reaction
   A. $Pb^{2+}(aq) + SO_4^{2-}(ag) \longrightarrow PbSO_4(s)$
   B. $CO_3^{2-}(ag) + 2H^+(ag) \longrightarrow H_2O(l) + CO_2(g)$
   C. $Fe(s) + 3Cl_2(g) \longrightarrow 2FeCl_3(s)$
   D. $HCl(ag) + NaOH(ag) \longrightarrow NaCl(ag) + H_2O(l)$
7. The formula of the ion formed when excess ammonia is added to aqueous solution of copper(II) ions is,
   A. $Cu(OH)_4^{2+}$ B. $Cu(OH)_4^{2-}$ C. $Cu(NH3)_4^{2+}$ *D*. $Cu(NH3)_4^{2-}$
8. Which one of the following carbonates doesn't decompose when heated?
   A. $(NH_4)_2CO_3$ B. K_2CO_3 C. $CaCo_3$ D. $FeCO_3$
9. Which one of the following pairs of ions can be distinguished using acidified barium nitrate solutions?
   A. CO_3^{2-}(aq) and SO_3^{2-}(aq) B. CO_3^{2-}(aq) and CO_4^{2-}(aq)
   C. CO_3^{2-}(aq) and HCO_3^{2-}(aq) D. Cl^- (aq) and I^- (aq)
10. Which one of the following ions will react with sodium hydroxide to form a green precipitate which will dissolve to form a reddish-brown solution when reacted with concentrated nitric acid?
    A. Cu^{2+}(aq) B. Fe^{2+}(aq) C. Pb^{2+}(aq) D. Fe^{3+}(aq)
11. Which one of the following anions when in solution will form a white precipitate when treated with acidified dilute silver nitrate solution?
    A. Sulphate B. Sulphite C. Chloride D. Carbonate

PART II

Each of the questions 6 to 10 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 the 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 in not correct but the reason is a correct statement.

INSTRUCTIONS SUMMARISED:

	Assertion	Reason
A.	True	True(Reason is a correct explanation)
B.	True	True(Reason is not a correct explanation)
C.	True	Incorrect
D.	Incorrect	Correct

12.	Copper(II) hydroxide dissolves in excess aqueous ammonia	**Because**	Copper(II) hydroxide dissolves in excess aqueous ammonia	☐
13.	When aqueous potassium iodide is added to a solution of lead(II) nitrate, a yellow precipitate is observed.	**Because**	Lead (II) iodide is insoluble in water	☐
14.	Copper (II) hydroxide dissolves in excess aqueous ammonia	**Because**	Copper (II) ion forms a complex ion with ammonia	☐
15.	Zinc hydroxide is soluble in excess aqueous ammonia	**Because**	Zinc hydroxide is amphoteric	☐

PART III

Each of the questions from 16 to 20, 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. **C. If 2 and 4 only are correct.**

B. If 1 and 3 only are correct. **D. If 4 only is correct.**

16. Which of the following ions reacts with sodium hydroxide solution to form a precipitate that is soluble in excess sodium hydroxide solution? ☐

1. $Cu^{2+}_{(aq)}$ 2. $Al^{3+}_{(aq)}$ 3. $Fe^{3+}_{(aq)}$ 4. $Pb^{2+}_{(aq)}$

17. Which of the following nitrates will decompose on heating to form a nitrate? ☐

1. Calcium nitrate
2. Potassium nitrate
3. Magnesium nitrate
4. Sodium nitrate

18. Which one(s) of the following oxides dissolve(s) in both aqueous sodium hydroxide and dilute nitric acid? ☐

1. Magnesium oxide
2. Aluminium oxide
3. Copper(II) oxide
4. Lead(II) oxide

19. The hydroxide(s) which is/are soluble in excess ammonia solution is/are ☐

1. lead(II) hydroxide
2. zinc hydroxide
3. aluminium hydroxide
4. copper(II) hydroxide

20. Oxidation is a reaction in which
    1. oxygen is removed from a substance
    2. hydrogen is removed from a substance
    3. hydrogen is added to a substance
    4. electron is lost from a substance

SECTION B

21. (a) When a sample of copper (II) nitrate was strongly heated, a reddish – brown gas was evolved.
    (i) identify the gas **(½ mark)**

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    (ii) Write the formula of the residue. **(½ mark)**

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(b). A sample of copper (II) nitrate contaminated with zinc nitrate was dissolved in water and the solution was treated with excess sodium hydroxide solution and then filtered. Identify the cation in the

(i) filtrate…… **(01 mark)**

(ii) residue ……**(01 mark)**

(c) The residue from (b) was strongly heated.
(i) State what was observed. **(01 mark)**

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……

(ii) Write equation for the reaction that took place. **(1 ½ marks)**

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22. Name one reagent that can be used to differentiate between the following pairs of ions and in each case state what would be observed when each of ions is treated separately with the reagent you have named.
    (a) $HCO_3^-(aq) and\ CO_3^{2-}(aq)$
        (i) Reagent…… **(01mark)**
        (ii) Observation. **(01mark)**

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(b) $Pb^{2+}(aq)$ and $Zn^{2+}(aq)$
        (i) Reagent…… **(01mark)**
        (ii) Observation. **(01mark)**

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……..……

(c) $SO_4^{2-}(aq) and\ Cl^-(aq)$

(i) Reagent……..**(01mark)**

(ii) Observation. **(01mark)**

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……..……

(d) $Pb^{2+}(aq)$ *and* $Al^{3+}(aq)$

(i) Reagent……. **(01mark)**

(ii) Observation. **(01mark)**

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……..……

(e) $Ca^{2+}(aq)$ *and* $Mg^{2+}(aq)$

(i) Reagent……. **(01mark)**

(ii) Observation. **(01mark)**

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23. (a) When a white solid T was heated with sodium hydroxide solution, an alkaline gas X was formed. Identify the cation in T. **(½ mark)**

…...……

(b) When an aqueous solution of T was treated with lead (II) nitrate solution, a bright yellow precipitate was formed. Identify the anion in T. **(½ mark)**

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(c) Write ionic equation for the reaction leading to formation of

(i) gas X in (a) **(1 ½ marks)**

……..…

……..……

(ii) the yellow precipitate in (b) **(1 ½ marks)**

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……..……

(d) Chlorine was bubbled through an aqueous solution of T. state what was observed. **(01 mark)**

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24. The table below shows some tests that were carried out on a certain substance Z and the observations made.

Test	Observation
1. solid Z was heated	A colourless gas evolved which turned lime water milky.
2. Aqueous sodium hydroxide was added to aqueous solution of Z.	No apparent change
3. Dilute hydrochloric acid was added to a solution of Z	Effervescence and a gas that turned lime water milky evolved.
4. (i) Aqueous magnesium chloride was added to a solution of Z	No apparent change
(ii) Resultant solution from 4(i) was heated	Write precipitate formed.

(a) What deduction can you make concerning the solubility of the hydroxide of the metal ion in Z? **(01mark)**

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……..……

(b) State the:

(i) likely anions present in Z……..... **(01mark)**

(ii) anion actually present in Z…… **(01mark)**

(c) (i)Identify the white precipitate in test 4(ii). **(½mark)**

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(ii) Write an equation to show the reaction resulting in the formation of the substance you have identified in (c)(i). **(1½marks)**

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END!!!

"Don´t ask what the world needs. Ask what makes you come alive, and go do it."