

S.3 CHEMISTRY ASSESSMENT TEST 1

TIME: 80 MINUTES

TOPIC: NITROGEN AND ITS COMPOUNDS

SECTION A

PART I

1. Which one of the following is not a property of ammonia? It is
A. an alkaline gas
B. soluble in water
C. a reducing agent
D. is denser than air ☐
2. Which one of the following oxides can be reduced by dry ammonia?
A. Copper(II) oxide
B. Zinc oxide
C. Lead oxide
D. Calcium oxide ☐
3. Ammonia burns oxygen to yield
A. nitrogen and water
B. nitrogen and hydrogen
C. nitric acid
D. nitric acid, nitrogen and water ☐
4. Fuming nitric acid was heated and the gas evolved was collected over water. This gas was
A. nitrogen dioxide
B. nitrogen monoxide
C. oxygen
D. hydrogen ☐
5. Which one of the following equations shows the reaction which does not take place during the manufacture of nitric acid from ammonia?
A. $2NO_{(g)} + O_{2(g)} \longrightarrow 2NO_{2(g)}$
B. $2H_2O_{(l)} + 4NO_{2(g)} + O_{2(g)} \longrightarrow 4HNO_{3(aq)}$
C. $4NH_{3(g)} + 3O_{2(g)} \longrightarrow 2N_{2(g)} + 6H_2O_{(l)}$
D. $4NH_{3(g)} + 5O_{2(g)} \longrightarrow 4NO_{(g)} + 6H_2O_{(l)}$ ☐
6. Which of the following substances are formed when concentrated nitric acid reacts with copper?
A. Copper(II) nitrate and nitrogen dioxide
B. Copper(II) nitrate and nitrogen monoxide
C. Copper(II) nitrate and nitrogen dioxide
D. Copper(II) nitrate and dinitrogen oxide ☐
7. Which one of the following metals reacts with cold dilute nitric acid?
A. Calcium
B. Copper
C. Silver
D. Lead ☐
8. Which one of the following substances is used as a catalyst in the manufacture of nitric acid?
A. Vanadium(V) oxide
B. Platinised asbestos
C. Manganese(IV) oxide
D. Finely divided iron ☐
9. Which one of the following gases forms white fumes with ammonia?
A. Chlorine
B. Carbon dioxide
C. Sulphur dioxide
D. Hydrogen chloride ☐
10. Dilute nitric acid reacts with copper to produce
A. copper nitrate, water and nitrogen dioxide
B. copper nitrate, water and nitrogen monoxide
C. copper nitrate, water and ammonia
D. copper nitrate, water and hydrogen ☐

11. Which one of the following metals will burn in nitrogen to form a white solid that will dissolve in water to produce ammonia? ☐
- A. Magnesium B. Potassium C. Sodium D. Copper
12. Which one of the following substances is used as a catalyst in the manufacture of nitric acid from ammonia? ☐
- A. Nickel B. Iron C. Platinum D. Vanadium(V) oxide

PART II

13. Nitric acid can be produced by reacting any nitrate with sulphuric acid Because Sulphuric acid is a strong acid than nitric acid ☐
14. Ammonia reacts with copper(II) oxide to form nitrogen. Because Copper(II) oxide is oxidized by ammonia ☐
15. Ammonia is prepared by reacting ammonium salt with calcium hydroxide. Because Calcium hydroxide is a base ☐
16. Concentrated nitric acid reacts with sulphur to form sulphur Because The concentrated is an oxidizing agent ☐
17. Ammonium nitrate (NH_4NO_3) is a better fertiliser than ammonium sulphate ($(NH_4)_2SO_4$) Because Ammonium nitrate has a higher percentage of nitrogen than ammonium sulphate ☐

PART III

18. Which one of the following substances is/are formed when concentrated nitric acid reacts with sulphur? ☐
1. Sulphuric acid. 3. Nitrogen dioxide
2. Nitrogen monoxide 4. Sulphur dioxide
19. Which of the following is/are formed when ammonia is passed over heated copper(II) oxide? ☐
1. A brown solid 3. A colourless liquid
2. A reddish brown gas 4. A black solid
20. Nitric acid shows the following property or properties. ☐
1. Turns litmus blue 3. Is a powerful reducing agent
2. Forms salts with bases 4. Produces carbon dioxide with carbonates

SECTION B

1. In the preparation of ammonia in the laboratory, a mixture of ammonium chloride and calcium hydroxide is heated. The gas evolved is passed into a tower packed with calcium oxide before it is collected using upward delivery method.

(a) (i) Write an equation for the reaction that leads to the formation of ammonia. (1½marks)

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(ii). State why ammonia is passed into the tower packed with calcium oxide. (1½marks)

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(iii). Give a reason why ammonia is collected using upward delivery method. (1½marks)

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(b) (i) Name one reagent that can be used to identify ammonia. (01mark)

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(ii). State what would be observed if ammonia was treated with the reagent you have named in (b)(i). (01mark)

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(c) Name the catalyst that is used in the oxidation of ammonia during the manufacture of nitric acid. (½mark)

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2. Ammonia reacts with oxygen in the presence of hot platinum to produce a colourless gas X, which eventually gives brown fumes.

(a) Identify X..... (½mark)

(b) Write equation to show the formation of

(i) X (01 ½ marks)

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(ii) the brown fumes. (01 ½ marks)

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(c) State the

(i) role of platinum (½mark)

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(ii) industrial application of the reaction in (b). (½mark)

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3. (a) (i) Name two substances from which nitric acid can be prepared in the laboratory. (02marks)

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(b). Write an equation for the reaction between the substances you have named in (c)(i).(1½marks)

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- (c). Write an equation for the reaction between fuming nitric acid and copper. (1½marks)
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SECTION C

1. (a) Nitrogen can react with hydrogen in the presence of a catalyst which is finely divided to form ammonia in the Haber process.
 - (i) State the source of;
 - nitrogen (½mark)
 - Hydrogen (½ mark)
 - (ii) Name the catalyst used in the reaction (½mark)
 - (iii) Explain why the catalyst is finely divided (1½mark)
 - (iv) Write equation for the reaction leading to the formation of ammonia. (01marks)
 - (v) State two other factors which can affect the yield of ammonia in the Haber process. (01mark)
- (b). Write equation for the reaction to show that ammonia can
 - (i) act as a reducing agent. (1½marks)
 - (ii) burn in oxygen in absence of heated platinum. (1½marks)
- (c). Ammonia obtained by the Haber process can be converted to nitrogen (II) oxide.
 - (i) Write equation for the reaction leading to the conversion of ammonia to nitrogen (II) oxide. (1½marks)
 - (ii) State the conditions for the reaction. (01mark)
- (d). Write equation(s) to show how nitrogen(II) oxide can be converted to nitric acid. (03marks)
- (e). When aqueous ammonia was added drop wise until in excess to a solution of copper(II) nitrate, a blue precipitate P which dissolved in excess ammonia to give a deep blue solution was formed.
 - (i) Identify P. (01mark)
 - (ii) Write the formula and name of the cation in the deep blue solution. (01mark)
2. (a) (i) Draw a labeled diagram of the setup of the apparatus that can be used to prepare a dry sample of ammonia in the laboratory. (5½marks)
- (ii). Write equation for the formation of ammonia. (1½marks)
- (b) Write equation for the reaction between ammonia and
 - (i) hydrogen chloride (1½marks)
 - (ii) lead(II) oxide (1½marks)
 - (iii) Water (1 ½ marks)
 - (iv) aqueous solution of lead(II) nitrate (1½marks)

END!!!

“Don’t ask what the world needs. Ask what makes you come alive, and go do it.”