CHEMISTRY

BOOKS - EVERGREEN CHEMISTRY (ENGLISH)

STUDY OF COMPOUNDS OF NITROGEN - NITRIC ACID

Questions

1. Can you concentrate nitric acid beyond 68% by boiling, if not then how is it concentrated ?

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Worksheet 1 Give One Word

1. Molecular weight of nitric acid.

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2. Molecular formula of chile salt petre.

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3. A gas which dissolves in water to form the acid is known as.

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4. Hard crust formed when chile salt petre and sulphuric acid reacts together.

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5. Catalyst used in Ostwald's process.

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6. Mixtures which boil together.

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7. Brown gas formed by oxidation of NO.

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8. Material used to slow down the speed of gases in absorption tower.

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9. Concentration of nitric acid obtained in Ostwald's process.

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10. Nitric acid combines with proteins to form.

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Worksheet 1

1. Why gases entering should be pure ?

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2. Why all glass apparatus is used for preparation of nitric acid?

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3. Why nitric acid cannot be concentrated by boiling ?

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4. Why is excess air taken in Ostwald's process ?

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5. Answer the following questions related to Ostwald's process :

Volume of ammonia and air taken. .....

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6. Answer the following questions related to Ostwald's process :

Chamber where ammonia is oxidised. .....

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7. Answer the following questions related to Ostwald's process :

Chamber where nitric oxide is cooled. .....

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8. Answer the following questions related to Ostwald's process :

Chamber where nitric oxide gets converted to nitrogen dioxide. .....

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9. Answer the following questions related to Ostwald's process :

Chamber where nitrogen dioxide gets oxidised to nitric acid. .....

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10. Answer the following questions related to Ostwald's process :

Principle which governs the Ostwald's process.

.....

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11. Complete and balance following equation :

$CaCO_3 + HNO_3 \rightarrow$ _____ + _____ + _____

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12. Complete and balance following equation :

$KNO_3 + H_2SO_4 \xrightarrow{\text{below}200^\circ C}$ _____ + _____

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13. Complete and balance following equation :

$$NO_2 + O_2 + H_2O \xrightarrow{\text{above } 200^\circ C} \_\_\_\_\_$$

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14. Complete and balance following equation :

$$NH_3 + O_2 \rightarrow \_\_\_\_\_ + \_\_\_\_\_$$

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15. Complete and balance following equation :

$$NO + O_2 \rightarrow \_\_\_\_\_$$

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Worksheet 2 Give One Word

1. Yellow colour of nitric acid is due to dissolved.

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2. Nitric acid combines with proteins to form.

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3. Nitric acid turns orange coloured methyl orange_____.

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4. Black insoluble compound which on reacting with nitric acid tums into blue solution.

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5. A non-metal which reacts with conc. nitric acid leaving no residue behind.

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6. A metal which reacts with very dilute nitric acid evolving hydrogen.

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7. A solution used for dissolving noble metals.

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8. The gas liberated when metals like copper reacts with cold and dilute nitric acid.

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9. Chloride formed when nitric acid and hydrochloric acid react together.

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10. Commercial and common name of tri nitroglycerine is.

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Worksheet 2

1. A metal 'X' used to make calorimeters reacts with concentrated nitric acid to form a soluble salt Y. When few drops of ammonium hydroxide are added pale blue precipitates 'Z' are obtained. These precipitates dissolve in excess of ammonium hydroxide to form deep blue solution 'A'. Identify the metal X and give all the chemical equations.

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2. Complete and balance the following equation :

$Fe[OH]_3 + HNO_3 \rightarrow$

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3. Complete and balance the following equation :

$CuCO_3 + HNO_3 \rightarrow$

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4. Complete and balance the following equation :

$Ca[HSO_3]_2 + HNO_3 \rightarrow$

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5. Complete and balance the following equation :

$P_4 + HNO_3 \rightarrow$

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6. Complete and balance the following equation :

$Zn + HNO_3(\text{Very dilute}) \rightarrow$

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7. Complete and balance the following equation :

$Zn + HNO_3(\text{Cold, dilute}) \rightarrow$

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8. Complete and balance the following equation :

$Zn + HNO_3(\text{Hot and conc.}) \rightarrow$

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9. Complete and balance the following equation :

$HCl + HNO_3 \rightarrow$

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10. Give your observation :

Nitric acid is added to cellulose.

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11. Give your observation :

Conc. HNO_3 is poured on copper turnings.

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12. Give your observation :

Magnesium powder is dropped in very dilute solution of

nitric acid.

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13. Give your observation :

Dilute nitric acid is added to iron sulphide.

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14. Give your observation :

Dilute nitric acid is added to copper oxide.

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Additional Questions For Practice

1. How is nitric acid prepared in laboratory?

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2. Why should the temperature of the reaction mixture of nitric acid not be allowed to rise above $200^{\circ} C$?

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3. Draw a flow chart diagram for the manufacture of nitric acid by Ostwald's process.

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4. Briefly describe the manufacture of nitric acid by Ostwald's Process. Support your answer with relevant chemical equations.

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5. State two tests for dilute nitric acid.

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6. State four industrial uses of nitric acid.

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7. Write fully balanced equation for the reaction of dilute nitric acid with the following chemical : Sodium bicarbonate

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8. Write fully balanced equation for the reaction of dilute nitric acid with the following chemical : Calcium hydroxide

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9. Write fully balanced equation for the reaction of dilute nitric acid with the following chemical : Zinc carbonate

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10. Write fully balanced equation for the reaction of dilute nitric acid with the following chemical : Sodium hydroxide

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11. Nitric acid cannot be concentrated beyond 68% by the distillation of a dilute solution of HNO_3. State 'the

reason.

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12. Conc. nitric acid prepared in laboratory is yellow colour. Why? How is this colour removed ?

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13. Give the chemical name and formula of the substance formed as a brown ring in the test for nitrate radical.

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14. Explain with the help of a balanced equation, the brown ring test for nitric acid.

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15. Why is freshly prepared ferrous sulphate solution used for testing the nitrate radical in the brown ring test?

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16. Name the oxide of nitrogen which turns brown on exposure to air. How is it prepared ?

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17. What is aqua regia ?

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18. Under what conditions do the atmospheric nitrogen and oxygen react?

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19. Write a balanced equation for the following: Preparation of nitric acid from potassium nitrate.

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20. What is passive iron ?

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Questions From Previous Icse Board Papers

1. A. Potassium nitrate B. Lead nitrate C. Ammonium nitrate. Choose the chemicals from A, B and C to answer the following questions when they are heated.

(a) The chemical which leaves behind no residue.

(b) The chemical which gives oxygen as the only gas.

(c) The chemical which produces nitrogen dioxide.

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2. Write chemical equations for the following reactions :

Action of heat on sodium nitrate.

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3. Write chemical equations for the following reactions :

Formation of lead (II) oxide from lead nitrate.

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4. Ammonium chloride and sodium nitrite.

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5. Potassium nitrate and concentrated sulphuric acid.

Which of the above pairs of chemical are used in the laboratory preparation of :

1. nitric acid 2. ammonia gas.

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6. Dilute nitric acid is generally considered a typical acid except for its reaction with metals. In what way dilute nitric acid is different from other acids, when it reacts with metals.

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7. Write the equations for the reaction of dilute nitric acid with copper.

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8. Account for the yellow colour that appears in concentrated nitric acid when left standing in ordinary glass bottle.

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9. Write equation for the reaction between sulphur and concentrated nitric acid.

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10. Explain why only all glass apparatus should be used for the preparation of nitric acid by heating concentrated sulphuric acid and potassium nitrate.

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11. Write a chemical equation to illustrate the acidic nature of nitric acid.

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12. Name the products formed when ammonium nitrate is heated.

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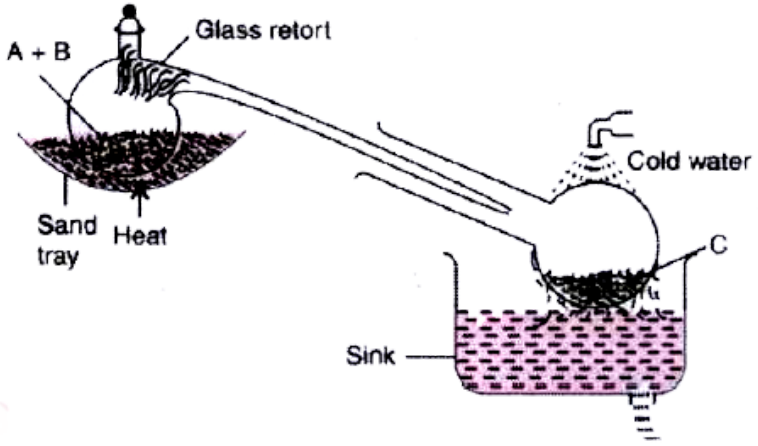
13. The figure given below illustrates the apparatus used in the laboratory preparation of nitric acid.

Name A (a liquid), B(a solid) and C(liquid). (Do not give the formulae)



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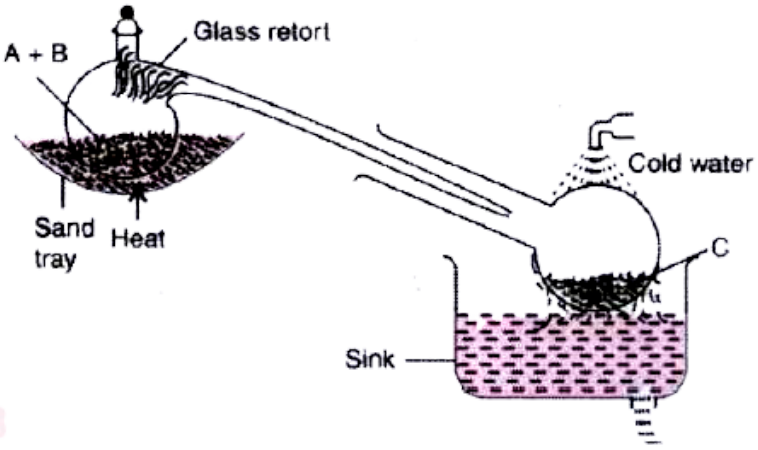
14. The figure given below illustrates the apparatus used in the laboratory preparation of nitric acid.

Write an equation to show how nitric acid undergoes decomposition.



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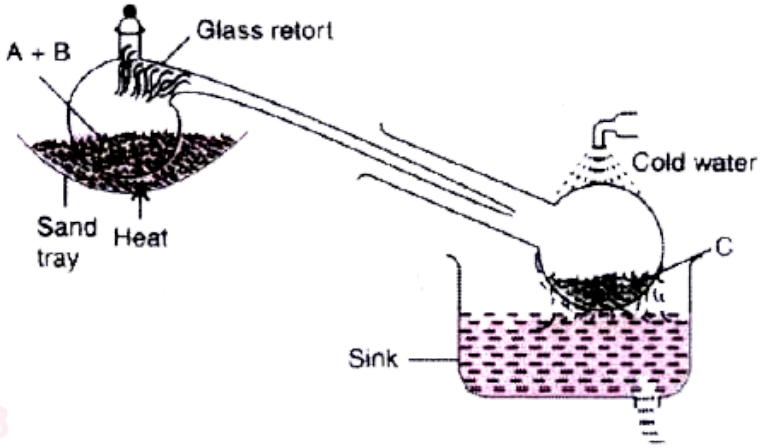
15. The figure given below illustrates the apparatus used in the laboratory preparation of nitric acid.

Write the equation for the reaction in which copper is oxidised by concentrated nitric acid.



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16. Copy and complete the following table relating to important industrial process. Output refers to the

product of the process not the intermediate steps.

Name of process	Inputs	Catalyst	Equation for catalysed reaction	Output
Haber Process	Hydrogen + Ammonia + Air			Nitric acid
Contact Process	Sulphur dioxide + Oxygen			

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17. What is the property of nitric acid which allows it to react with copper?

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18. Write the equation for dilute nitric acid and copper.

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19. Name the gas evolved in each case (formula is not acceptable).

The gas produced by the action of dilute nitric acid on copper.

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20. Name the gas evolved in each case (formula is not acceptable).

The gas produced on heating sodium nitrate.

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21. Write a fully balanced equation for the following case : Lead nitrate is heated in a dry test tube.

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22. Correct the following statements :

For example : "Chlorine is a bleaching agent'.

Should read : 'Moist chlorine is a bleaching agent'.

Copper reacts with nitric acid to produce nitrogen dioxide.

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23. Name the compound responsible for the brown ring during the brown ring test of nitrate ion.

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24. By the addition of only one solution how would you distinguish between dilute hydrochloric acid and dilute nitric acid ?

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25. Choose from the list of substances, as to what matches the description given below:

[Acetylene gas, aqua fortis, coke, brass, barium chloride,

bronze, platinum].

A catalyst used in the manufacture of nitric acid by Ostwald's process.

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26. What would you observe in the following ?

Copper is heated with concentrated nitric acid in a hard glass test tube.

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27. Choose the correct answer from the options given below :

The brown ring test is used for detection of :

A. CO_3^{2-}

B. NO_3^-

C. SO_3^{2-}

D. Cl^-

Answer:

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28. What is the special feature of the apparatus that is used in the laboratory preparation of nitric acid?

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29. Why should the temperature of the reaction mixture of nitric acid not be allowed to rise above $200^{\circ} C$?

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30. Write balanced chemical equation for the following:

Ferric hydroxide reacts with nitric acid.

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31. Name the gas in the following:

The gas produced when copper reacts with concentrated nitric acid.

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32. State one observation for the following:

Zinc nitrate crystals are strongly heated.

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33. Some word/words are missing in the following statement. You are required to rewrite the statement in the correct form using the appropriate word/words: Magnesium reacts with nitric acid to liberate hydrogen gas.

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34. Give balanced equation for the following reaction :

Dilute nitric acid and Copper carbonate.

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35. Identify the gas evolved in the following reaction when :

Sulphur is treated with concentrated nitric acid.

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36. Give balanced equation for the following: Oxidation of carbon with concentrated nitric acid.

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37. Fill in the blank from the choices given within brackets:

Cold, dilute nitric acid reacts with copper to form ..... (Hydrogen, nitrogen dioxide, nitric oxide)

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38. Write balanced equation for the following:

Action of heat on a mixture of copper and concentrated nitric acid.

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39. State the condition required for the following reaction to take place :

Catalytic oxidation of ammonia to nitric oxide.

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40. Give balanced equation for the following:

Laboratory preparation of nitric acid.

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41. State one appropriate observation for -When crystals of copper nitrate are heated in a test tube .

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42. Dilute nitric acid is generally considered a typical acid but not so in its reaction with metals. Explain ?

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43. Concentrated nitric acid appears yellow when it is left standing in a glass bottle. Explain ?

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44. All glass apparatus is used in the laboratory preparation of nitric acid. Explain ?

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45. Write balanced chemical equation for the following:

Action of hot and concentrated Nitric acid on copper.

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46. Fill in the blanks using the appropriate words given below:

(Sulphur dioxide, nitrogen dioxide, nitric oxide, sulphuric acid)

Cold, dilute nitric acid reacts with copper to give ..... .

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47. Fill in the blanks using the appropriate words given below:

(Sulphur dioxide, nitrogen dioxide, nitric oxide, sulphuric acid)

Hot, concentrated nitric acid reacts with sulphur to form ..... .

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48. Write a balanced chemical equation for the following:

Action of cold and dilute nitric acid on copper.

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49. Give a balanced chemical equation for each of the following:

Action of conc. Nitric acid on Sulphur.

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50. Give a balanced chemical equation for each of the following:

Laboratory preparation of Nitric acid.

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51. Give a balanced chemical equation for each of the following:

Reaction of Ammonia with Nitric acid.

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52. Name the gas that is produced in the following case:

Action of cold and dilute nitric acid on copper.

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53. What is the type of salt formed when the reactants are heated at a suitable temperature for the preparation of Nitric acid ?

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54. State why for the preparation of Nitric acid, the complete apparatus is made up of glass.

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