



CHEMISTRY

BOOKS - NAGEEN CHEMISTRY (ENGLISH)

HYDROGEN

Example

1. Calculate the strength in g L^{-1} and normality of '30 volume' hydrogen peroxide

solution.



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2. Calculate the volume strength of a hydrogen peroxide solution containing 60.7gL^{-1} of H_2O_2 .



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[Review Exercises](#)

1. Why is hydrogen regarded as a unique element?



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2. Why should hydrogen be assigned a separate position in the periodic table?



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3. Why does hydrogen show properties similar to both alkali metals and halogens?



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4. Why does hydrogen show properties similar to both alkali metals and halogens?



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5. Name the isotopes of hydrogen and mention their relative abundance in naturally occurring hydrogen



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6. What do you understand by ortho- and para- dihydrogen?



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7. How is dihydrogen prepared on the commercial scale?



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8. Why are the reactions involving deuterium slower than those of protium?



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9. What happens when

a mixture of dihydrogen and chlorine is kept in sunlight.



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10. What happens when

dihydrogen is burnt in air.



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11. What happens when dihydrogen is passed over red hot coke,



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12. What happens when dihydrogen is passed over heated CuO?



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13. Mention some important uses of dihydrogen.



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14. What are hydrides and how are they classified?



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15. What are saline hydrides and how are they prepared? Give some examples.



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16. Mention the important properties of saline hydrides



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17. What type of lattice do the alkali metal hydrides possess?



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18. What are molecular hydrides and by which type of elements are they formed? Give some examples.



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19. Mention some important methods of preparation of molecular hydrides.



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20. Why are interstitial hydrides also called metallic hydrides? Give some examples of interstitial hydrides.



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21. Why are interstitial hydrides also called metallic hydrides? Give some examples of interstitial hydrides.



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22. What are polymeric hydrides? Give some examples.



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23. Mention some important uses of hydrides



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24. The boiling point of water is much higher than the expected one. How would you account for this fact?



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25. Write the masses in grams of one mole of each of the following:

Deuterium



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26. Write the masses in grams of one mole of each of the following:

Deuterium



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27. Write the masses in grams of one mole of each of the following:

oxide



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28. Write the masses in grams of one mole of each of the following:

water



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29. Why is H_2O molecule very stable even at higher temperatures?



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30. What happens when water is treated with Al_4Cl_3 ?



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31. What happens when water is treated with Ca_3P_2 ?



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32. What happens when water is treated with

F_2 ?



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33. What happens when water is treated with

Na ?



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34. Which of the following samples of water would not produce lather with soap?

A. Water containing dissolved NaCl

B. Water containing dissolved $MgSO_4$

C. Water containing dissolved



D. Water containing dissolved K_2SO_4 .

Answer:



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35. What is deionised water and how can it be prepared?



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36. What happens when a sample of water containing $Ca(HCO_3)_2$ is boiled ?



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37. What do you understand by softening of hard water?



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38. What do you understand by the hardness of water and what are the causes of hardness ?



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39. Write the chemical formulae of calgon and permutit. For what purpose are they generally used ?



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40. What is heavy water? Can it be used for drinking purposes?



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41. How is heavy water prepared? Compare its physical properties with those of ordinary water.



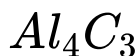
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42. What happens when heavy water reacts with Na



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43. What happens when heavy water reacts with



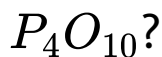
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44. What happens when heavy water reacts with



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45. What happens when heavy water reacts with



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46. Give a brief account of the biological and physiological effects of heavy water.



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47. Mention some important uses of heavy water.



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48. Describe the auto-oxidation process for the manufacture of H_2O_2 .



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49. What happens when

barium peroxide is treated with cold phosphoric acid



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50. What happens when

a 50% cold solution of sulphuric acid is subjected to electrolysis ?



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51. What happens when hydrogen peroxide is treated with potassium ferrocyanide solution ?



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52. What happens when ferrous sulphate is treated with hydrogen peroxide in acidic medium?



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53. How is a dilute solution of hydrogen peroxide concentrated?



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54. Explain, why hydrogen peroxide is used for restoring the colour of old lead paintings?



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55. What do you understand by the volume strength of hydrogen peroxide solution?



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56. Calculate the strength of a 40 volume hydrogen peroxide solution in gL^{-1}



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57. Calculate the volume strength of an $\frac{N}{10} H_2O_2$ solution.



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58. Describe the structure of hydrogen peroxide.



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59. Give a brief account of the oxidising, reducing and acidic nature of H_2O_2 .



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60. Give the important uses of hydrogen peroxide.



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Very Short Answer Type Questions

1. What is the most abundant element in the universe?



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2. Name the isotopes of hydrogen.



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3. What is common in the electronic configuration of H and alkali metals?



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4. In what respect electronic configuration of hydrogen and halogens are similar ?





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5. Can hydrogen exist in -1 oxidation state?



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6. To what extent does hydrogen exist in the earth's crust ?



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7. Which isotope of hydrogen is radioactive in nature?



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8. What happens when steam is passed over red hot iron ?



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9. Name the gas produced on treating calcium hydride with water.



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10. What type of zinc is used for the laboratory preparation of dihydrogen ?



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11. Which process of manufacture of dihydrogen makes use of red hot coke and steam ?



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12. Why is dihydrogen not much reactive at ordinary temperatures ?



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13. Write the hydrides of Sodium and Magnesium.



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14. What type of elements do form saline hydrides ?



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15. Do Be and Mg form saline hydrides ?



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16. Among the alkali metal hydrides, which hydride is most stable ?



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17. What type of lattices are formed by alkali metal and alkaline earth metal hydrides



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18. Name the groups whose elements prefer to form molecular hydrides.



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19. What type of hydrides are formed by transition elements ?



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20. What type of hydrides do not possess definite composition



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21. What type of hydrides are formed by Be and Mg?



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22. What is the shape of a water molecule ?



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23. How many hydrogen bonds can be formed by a water molecule?



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24. What type of forces are responsible for the aggregation of water molecules?



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25. What is the action of water on litmus ?



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26. Define hard water.



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27. What are the causes for

Temporary hardness



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28. What are the causes for

Permanent hardness



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29. Can temporary hardness be removed simply by boiling the hard water?



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30. Which chemical is used in softening of hard water by Clark's method?



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31. Write the chemical formula of sodium zeolite.



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32. What is the chemical composition of calgon ?



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33. What type of functional groups are present in cation exchange resins?



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34. How is the exhausted anion exchange resin regenerated ?



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35. How many electrons are required for one fluorine atom to attain the octet?



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36. Which gas is evolved when heavy water is made to react with calcium carbide?



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37. Name the product formed on dissolving SO_3 in heavy water.



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38. What is oxygenated water ?



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39. Name the organic compound used in the manufacture of H_2O_2 by auto-oxidation process.



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40. Can H_2O_2 act both as an oxidising and a reducing agent?



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41. What is the action of H_2O_2 on litmus?



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42. Why is hydrogen peroxide used as a bleaching agent ?



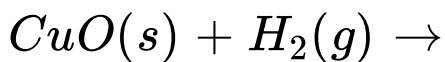
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43. Give an example each of an ionic hydride and a covalent hydride.



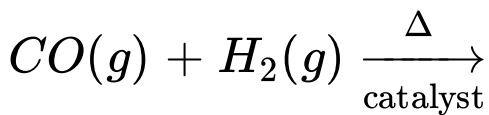
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44. Complete the following reactions :



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45. Complete the following reactions :



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Short Answer Type Questions

1. Describe some important properties in which hydrogen resembles alkali metals.



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2. Why does hydrogen show properties similar to both alkali metals and halogens?



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3. Discuss the resemblance of hydrogen with halogens.



Watch Video Solution

4. How does hydrogen occur in nature?





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5. Write a short note on the isotopes of hydrogen.



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6. What is isotopic effect? Explain with examples.



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7. How is dihydrogen obtained from acids and alkalis ? Give some examples.



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8. How is dihydrogen prepared in laboratory ?



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9. Why is granulated zinc and not pure zinc used in the laboratory preparation of dihydrogen?



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10. Discuss Lane's process for the manufacture of dihydrogen.



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11. How is dihydrogen prepared on commercial scale by Bosch process?



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12. What happens when acidulated water is subjected to electrolysis ?



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13. How does dihydrogen react with metals and non-metals ? Give some examples.



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14. What is chemical harmonium?





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15. Describe two reducing properties of dihydrogen?



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16. What is hardening of oils and how is it achieved?



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17. What happens when sodium is heated in a current of hydrogen



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18. What happens when di hydrogen reacts with chlorine in the presence of sunlight ?



Watch Video Solution

19. What happens when

dihydrogen is passed over heated CuO ?



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20. How would you prepare

dihydrogen from water by using a reducing agent ?



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21. How would you prepare dihydrogen from a substance other than water ?



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22. How would you prepare very pure dihydrogen in the laboratory?



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23. How would you prepare heavy hydrogen in the laboratory ?



Watch Video Solution

24. What are hydrides and how are they classified?



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25. What are saline hydrides and how are they prepared? Give some examples.



Watch Video Solution

26. Mention the important properties of saline hydrides



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27. Why is UH least reactive of all the saline hydrides?



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28. How do saline hydrides react with water?

Give some examples.



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29. What are molecular hydrides and by which type of elements are they formed? Give some examples.



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30. What are interstitial hydrides and how are they prepared?



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31. Discuss the important properties of interstitial hydrides.



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32. Discuss the structure of interstitial hydrides



Watch Video Solution

33. What are polymeric hydrides and by which type of metals are they formed? Give some examples.



Watch Video Solution

34. Discuss the structure of water molecule.



Watch Video Solution

35. How do water molecules form aggregates in the liquid state ?



Watch Video Solution

36. Discuss the structure of ice.



Watch Video Solution

37. Write chemical reactions to show the amphoteric nature of water.



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38. With suitable examples, show that water can act both as an oxidising and as a reducing agent.



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39. Water can hydrolyse halides, carbides, nitrides, etc. Explain with examples.



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40. Are all the five H_2O molecules in $CuSO_4 \cdot 5H_2O$ equivalent? If not, discuss their modes of linkage.



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41. What do you understand by the hardness of water and what are the causes of hardness ?



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42. What do you understand by the temporary hardness and permanent hardness of water ?



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43. What do you understand by softening of hard water? How is the water having temporary hardness softened ?



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44. Describe any two methods that may be used to remove permanent hardness of water.



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45. Describe calgon process used for softening of hard water.



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46. Describe the permutit process used for water softening.



Watch Video Solution

47. What is deionised water and how is it prepared ?



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48. Discuss the principle and method of softening of hard water by synthetic ion-exchange resins.



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49. What is heavy water and how is it prepared?



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50. What happens when heavy water is treated

with

Na



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51. What happens when heavy water reacts

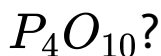
with

CaO



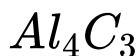
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52. What happens when heavy water reacts with



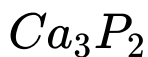
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53. What happens when heavy water is treated with



Watch Video Solution

54. What happens when heavy water is treated with



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55. What is deuterolysis? Give two examples.



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56. What do you understand by the exchange reactions of heavy water ? Give some

examples.



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57. Give a brief account of the biological and physiological effects of heavy water.



Watch Video Solution

58. Mention some important uses of heavy water.



Watch Video Solution

59. Explain, why water has high boiling and melting points as compared to H_2S .



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60. Give one reaction each to show that water can act as

(i) an acid,

(ii) abase,

(iii) an oxidizing agent,



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61. Give one reaction each to show that water can act as a base, .



[Watch Video Solution](#)

62. Give one reaction each to show that water can act as

(i) an acid,

(ii) a base,

(iii) an oxidizing agent,



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63. Give one reaction each to show that water can act as a reducing agent.



[Watch Video Solution](#)

64. Give one reaction each to show that water can act as a ligand.



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65. How do water molecules get linked in different types of hydrates ?



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66. Why does hard water not form lather with soap ?



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67. Describe the auto-oxidation process for the manufacture of H_2O_2 .



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68. How is an aqueous solution of hydrogen peroxide concentrated to get 100% pure H_2O_2 ?



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69. What happens when

hard water containing $CaSO_4$ is treated with calgon.



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70. What happens when

ozone is passed in an aqueous solution of KI .



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71. What happens when acidified ferrous sulphate solution is treated with ozone.



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72. What happens when H_2O_2 reacts with chlorine.



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73. What happens when

H_2O_2 is treated with acidified potassium permanganate solution?



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74. Distinguish clearly between

hard and soft water



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75. Distinguish clearly between temporary and permanent hardness.



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76. Describe the structure of hydrogen peroxide.



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77. How is hydrogen peroxide manufactured from H_2SO_4 ? Describe the process.



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78. What precautions should be observed for the safe storage of hydrogen peroxide ?



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79. Describe some important oxidising properties of hydrogen peroxide



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80. Describe some important reducing properties of hydrogen peroxide



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81. Why does H_2O_2 act both as an oxidising and a reducing agent?



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82. What do you understand by the volume strength of H_2O_2 ? Illustrate with an example



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83. Mention some important uses of hydrogen peroxide



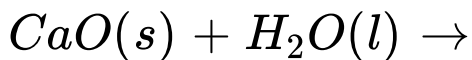
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84. What is understood by 'Water gas shift reaction' ? Discuss its use for the preparation of hydrogen.



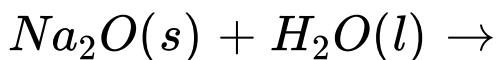
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85. Complete the following reactions :



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86. Complete the following reactions :



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87. Compare the structures of H_2O and H_2O_2 .



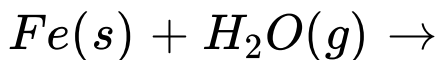
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88. Explain, why hydrogen peroxide is stored in coloured/plastic bottles.



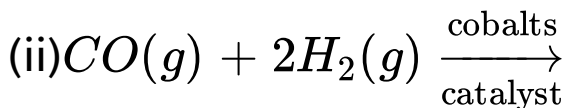
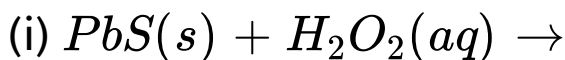
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89. Complete the following equations :



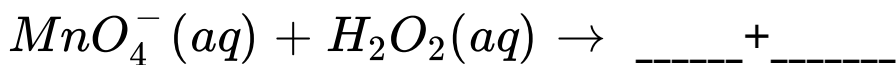
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90. Complete the following equations



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91. Complete and balance the following equations:



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92. Explain, why water has high boiling and melting points as compared to H_2S .



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93. Molarity of pure water is



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94. Distinguish clearly between

hard and soft water



Watch Video Solution

95. Distinguish clearly between

temporary and permanent hardness.



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96. Write two reactions to explain amphoteric nature of water .



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97. What is meant by hydrogen economy?



[Watch Video Solution](#)

98. Explain the correct context in which the following terms are used:

Diprotium



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99. Explain the correct context in which the following terms are used:

dihydrogen



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100. Explain the correct context in which the following terms are used:

proton



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101. Explain the correct context in which the following terms are used:

hydron.



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102. Is it correct to say that hydrogen can behave as a metal? If it is correct, mention the conditions under which such behaviour is possible.



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103. Write a short note on the isotopes of hydrogen.



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104. Does hydrogen show allotropy? How many allotropes of dihydrogen are known and what is their importance?



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105. Name the class of hydrides to which H_2O , B_2H_6 , NaH and LaH_3 belong.



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106. Hydrogen forms three types of bonds in its compounds. Giving suitable examples, explain each type of bonding.



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107. Elements with atomic numbers 17 and 20 form compounds with hydrogen. Write the formula of these two compounds and compare their chemical behaviour in water.



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108. What is the difference between the terms 'hydrolysis' and 'hydration' ?



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109. What is meant by hydrogenation?



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110. What are the advantages in using hydrogen as a fuel ?



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111. Why are ionic hydrides frequently used to remove traces of water from organic compounds?



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112. Although D_2O resembles H_2O chemically, yet it is a toxic substance. Explain



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113. Why is ice less dense than water and what kind of attractive forces must be overcome to melt ice ?



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114. Describe some unusual properties of water.



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115. Why do lakes freeze from top towards bottom ?



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Essay Long Answer Type Questions

1. Comment on the dual position of Hydrogen in the periodic table.

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2. Describe the methods used for the manufacture of dihydrogen. How does it react with metals and non-metals ? Describe its important uses.

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3. How would you prepare

dihydrogen from water by using a reducing agent ?



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4. How would you prepare dihydrogen from acids? Describe its laboratory preparation.



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5. How would you prepare dihydrogen from alkalis? Describe its laboratory preparation.



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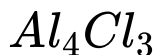
6. Discuss the structure of water molecule.



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7. With the help of balanced chemical equations, describe how does water react with

the following:



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8. With the help of balanced chemical equations, describe how does water react with the following:



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9. With the help of balanced chemical equations, describe how does water react with the following:

Mg



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10. With the help of balanced chemical equations, describe how does water react with the following:

Cl_2





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11. What are hydrides and how are they classified?



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12. What do you understand by hardness of water? Describe the permutit and calgon processes used to remove the permanent hardness of water.



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13. What is deionised water? Describe the process used to obtain it.



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14. Describe the important processes used for the preparation of hydrogen peroxide. How is a dilute solution of hydrogen peroxide concentrated and what precautions are taken to store it ?



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15. Hydrogen peroxide can act both as an oxidising and a reducing agent. Justify this statement by giving examples. What do you understand by the volume strength of H_2O_2 ?



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16. Why should hydrogen be assigned a separate position in the periodic table?



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17. Hydrogen forms compounds with elements having atomic numbers 9, 11, 12 and 17. Mention their chemical formulae and compare their chemical behaviour.



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18. What are interstitial hydrides and how do they differ from molecular hydrides?



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19. Describe the industrial applications of hydrogen which depend on the heat liberated when its atoms are made to combine on the surface of a metal,



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20. Describe the industrial applications of hydrogen which depend on

its effect on unsaturated organic systems in the presence of a catalyst,



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21. Describe the industrial applications of hydrogen which depend on its ability to combine with nitrogen under specific conditions.



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22. How is dihydrogen prepared

in the laboratory in pure form,



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23. How would you prepare

dihydrogen from water by using a reducing agent ?



Watch Video Solution

24. How is dihydrogen prepared

from hydrocarbons ?



Watch Video Solution

25. How is heavy water prepared from ordinary water ? Discuss its important physical and chemical properties.



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26. Describe the structure of the common form of ice.



Watch Video Solution

27. Discuss the principle and method of softening of hard water by organic ion exchange resins.



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28. Write chemical reactions to justify that hydrogen peroxide can function as an oxidising as well as reducing agent.



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29. Compare the chemical properties of H_2O and H_2O_2 .



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1. Hydrogen is evolved by the action of cold dil.

HNO_3 , on

A. Fe

B. Mn

C. Cu^+

D. AL

Answer: B



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2. Give reasons :

Hydrogen is not prepared by reacting conc

H_2SO_4 with Zn

A. Cu

B. Zn

C. Fe

D. Al

Answer: A



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3. When the same amount of zinc is treated separately with excess of sulphuric acid and excess of sodium hydroxide, the ratio of volumes of hydrogen evolved is

(a) 1:1

(b) 1:2

(c) 2:1

(d) 9:4

A. 1 : 1

B. 1 : 2

C. 2 : 1

D. 9: 4

Answer: A



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4. Which of the following metals absorbs hydrogen ?

A. Zn

B. Pd

C. Al

D. K

Answer: B



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5. The composition of the nucleus of deuterium is

A. one electron, one proton

B. one proton, one neutron

C. one neutron, one electron

D. two protons, one electron

Answer: B



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6. Hardness of water is due to

(a) Ca^{2+} and K^+

(b) Mg^{2+} and K^+

(c) Ca^{2+} and Mg^{2+}

(d) Ba^{2+} and Zn^{2+}

A. Ca^{2+} and K^+

B. Mg^{2+} and K^+

C. Ca^{2+} and Mg^{2+}

D. Ba^{2+} and Zn^{2+}

Answer: C



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7. To test whether a given clear liquid is water, of the following methods, the best one could be

A. Smell the liquids

B. Add anhydrous copper sulphate and
look for a colour change

C. Taste the liquid

D. Moisten litmus paper with the solution.

Answer: B



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8. Water is said to be permanently hard when it contains

A. chlorides and sulphates of Mg and Ca

B. bicarbonates of Na and K

C. carbonates of Na and K

D. phosphates of Na and K.

Answer: A



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9. Zeolite, which shows ion exchange ability

A. is an ion exchange resin

B. is a close packed assemblage of silicon
and oxygen atoms

C. is a sodium aluminium silicate

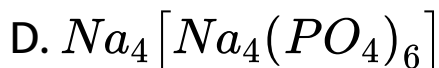
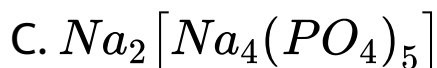
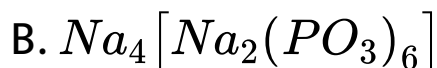
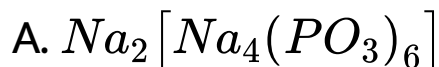
D. can provide H^+ ions in place of Na^+
ions.

Answer: C



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10. Calgon used as a water softner is

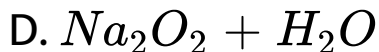
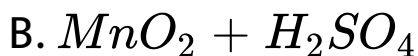
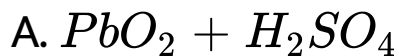


Answer: A



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11. H_2O_2 is commonly prepared in laboratory by the reaction of



Answer: C



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12. Which of the following statements is incorrect?

A. H_2O_2 can act as an oxidising agent.

B. H_2O_2 can act as a reducing agent

C. H_2O_2 has acidic properties.

D. H_2O_2 has basic properties.

Answer: D



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13. The reaction $H_2S + H_2O_2 \rightarrow S + 2H_2O$

manifests

- A. acidic nature of H_2O_2
- B. alkaline nature of H_2O_2
- C. oxidising action of H_2O_2
- D. reducing action of H_2O_2

Answer: C



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14. The compound that can work both as an oxidising and a reducing agent is

(a) $KMNO_4$

(b) H_2S

(c) BaO_2

(d) None

A. $KMNO_4$

B. H_2S

C. BaO_2

D. None

Answer: D



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15. An aqueous solution of hydrogen peroxide is

(a) Alkaline

(b) Neutral

(d) Strongly Acidic

(d) Weakly Acidic

A. alkaline

B. neutral

C. strongly acidic

D. weakly acidic

Answer: B



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16. Which of the following is a true structure of H_2O_2 in solid phase?

A. $H - O - O - H$

B. 

C. 

D. 

Answer: B



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17. Commercial 10 volume H_2O_2 is a solution with a strength approximately

A. 0.3

B. 0.1

C. 0.03

D. 1 %.

Answer: C



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18. The volume strenght of 1.5 NH_2O_2 solution is

A. 4.8

B. 8.4

C. 3

D. 8

Answer: B



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19. In the periodic table, hydrogen should be

A. placed in group 1

B. placed in group 14

C. placed in group 17

D. assigned a separate position.

Answer: D



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20. When hydrogen gas is bubbled through acidified $KMnO_4$, colour is not discharged.

The colour of the acidified $KMnO_4$ solution can be discharged by

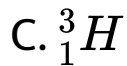
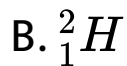
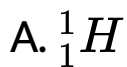
- A. heating the solution
- B. cooling the solution
- C. adding some zinc pieces
- D. adding some copper pieces.

Answer: C



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21. Which of the following isotopes of hydrogen is radioactive?



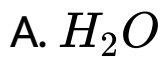
D. none of these.

Answer: C



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22. Which of the following is (are) molecular hydride(s)



Answer: A::D



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23. Which of the following hydrides are non-stoichiometric?

A. Saline

B. Metallic

C. Molecular

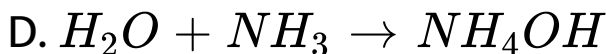
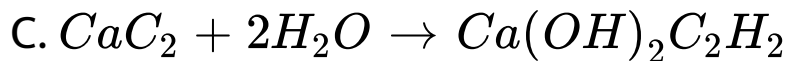
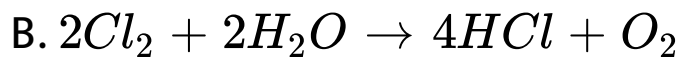
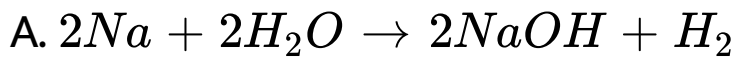
D. Polymeric

Answer: B



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24. In which of the following reactions does water act as a reducing agent?



Answer: B



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25. In $CuSO_4 \cdot 5H_2O$

A. all the five water molecules act as ligands

B. all the five H_2O molecules are attached to Cu^{2+} ion

C. four H_2O molecules are coordinated to central Cu^{2+} ion while the fifth H_2O molecule is attached to SO_4^{2-} by hydrogen bonds

D. all the five water molecules occupy interstitial sites in the crystal lattice.

Answer: C



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26. The exhausted permutit can be regenerated by percolating a

- A. 10% HCl solution
- B. 10% H_2SO_4 solution
- C. 10% NaOH solution
- D. 10% NaCl solution.

Answer: D



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27. Soft water obtained on ion-exchange treatment

- A. contains free H^+ ions
- B. contains free OH^- ions
- C. contains resin molecules
- D. is perfectly deionised.

Answer: D



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28. 100% pure H_2O_2 from a 90% sample can be obtained by

- A. evaporation on a water bath
- B. distillation under reduced pressure
- C. vacuum distillation
- D. cooling in dry ice and ether.

Answer: D



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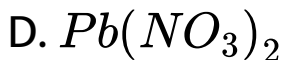
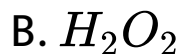
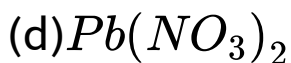
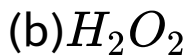
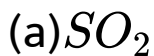
29. In the liquid state, water molecules are held together by



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30. An inorganic substance liberates O_2 when heated, turns an acidified solution of KI brown and reduces acidified $KMnO_4$. The substance

is



Answer: B



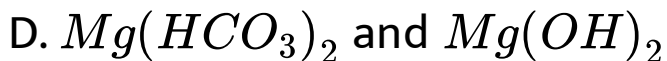
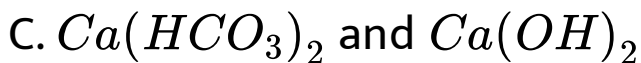
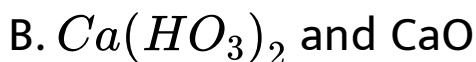
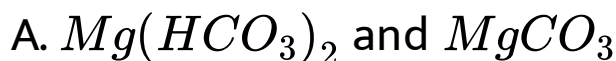
31. The method used to remove temporary hardness of water is:

- A. ion-exchange method
- B. synthetic resins method
- C. Calgon's method
- D. Clark's method.

Answer: D



32. The temporary hardness of a water sample is due to compound X. Boiling this sample converts X to compound Y. X and Y, respectively, are :



Answer: A



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33. 100mL of a water sample contains 0.81g of calcium bicarbonate and 0.73g of magnesium bicarbonate. The hardness of this water sample expressed in terms of equivalents of CaCO_3 :

(molar mass of calcium bicarbonate is 162g mol^{-1} and magnesium bicarbonate is 146g mol^{-1})

A. 100 ppm

B. 1,000 ppm

C. 5,000 ppm

D. 10,000 ppm.

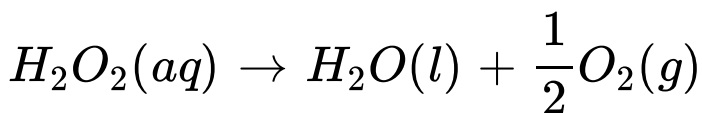
Answer: D



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34. The strength of H_2O_2 is expressed in several ways like molarity, normality, % (w/V), volume strength, etc. The strength of "10 V" means 1 volume of H_2O_2 on decomposition

gives 10 volumes of oxygen at 1 atm and 273 K
or 1 litre of H_2O_2 gives 10 litre of O_2 at 1 atm
and 273 K The decomposition of H_2O_2 is
shown as under :



H_2O_2 can act as oxidising as well as reducing
agent. As oxidizing agent H_2O_2 is converted
into H_2O and as reducing agent H_2O_2 is
converted into O_2 . For both cases its n-factor
is 2. \therefore Normality of H_2O_2 solution
 $= 2 \times$ molarity of H_2O_2 solution

What is the percentage strength (%w/V) of
"11.2 V" H_2O_2

A. 0.017

B. 0.34

C. 0.034

D. 13.6%.

Answer: C



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35. The maximum prescribed concentration of copper in drinking water is:

A. 5 ppm

B. 0.5 ppm

C. 3 ppm

D. 0.05 ppm

Answer: C



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True Or False Type Questions

1. Metals constitute about 75%-80% of the known elements. True/False



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2. The name hydrogen was given by Antoine Lavoisier. True/False.



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3. During the electrolysis of fused sodium hydride, hydrogen gets liberated at cathode.



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4. Protium is the lightest isotope of hydrogen.



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5. Dihydrogen can be prepared by heating Al with water.



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6. Water gas is the gaseous form of water.



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7. Ice has an open cage structure.



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8. Water can act as an oxidising as well as a reducing agent.



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9. Water containing dissolved common salt may be regarded as hard water.



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10. Permanent hardness can be removed by boiling water with washing soda.



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11. The cation exchange resin is of the type resin $-H^+$ while anion exchange resin is of the type resin $-OH^-$.



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12. Hydrogen peroxide cannot be stored in a simple glass bottle.



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13. The dilute aqueous solution of H_2O_2 turns blue litmus red. True/False



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14. What type of elements do form saline hydrides ?



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15. What type of hydrides are formed by transition elements ?



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[Fill In The Blanks Type Questions](#)

1. Hydrogen was first detected by The name hydrogen was given by



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2. On electrolysis of NaH, hydrogen is liberated at:



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3. For the preparation of H_2 in the laboratory ,
..... zinc is preferred over pure zinc because
the former is



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4. The musical sound produced by moving a
long wide tube up and down over a burning
jet of hydrogen is called



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5. In $BaCl_2 \cdot 2H_2O$, water molecules occupy
in the crystal lattice.



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6. The exhausted permutit can be regenerated
by percolating a



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7. Give the two uses of Hydrogen peroxide.





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8. 20 volume H_2O_2 means that one litre of the given sample will give litres of O_2 at S.T.P.



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9. Polymeric hydrides are formed by the elements having electronegativity value between and



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10. How do saline hydrides react with water?

Give some examples.



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11. The bond angle in H_2O molecule is



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12. The abnormal behaviour of water is due to the presence of bonds in it.



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13. The permutit which has the formula is an inorganic exchanger.



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14. The anion exchange resin consists of groups such as



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15. Heavy water is used as a in nuclear reactors



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Assertion Reason Type Questions

1. Why should hydrogen be assigned a separate position in the periodic table?

A. If both Assertion and Reason are
CORRECT and Reason is the CORRECT

explanation of the Assertion.

B. If both Assertion and Reason are

CORRECT but Reason is not the CORRECT

explanation of the Assertion.

C. If Assertion is CORRECT but Reason is

INCORRECT.

D. If Assertion is INCORRECT but Reason is

CORRECT.

Answer: B



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2. Assertion : In several properties, hydrogen resembles halogens of group 17.

Reason : Both hydrogen and halogens are short of one electron to attain a stable configuration similar to those of noble gases.

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

C. If Assertion is CORRECT but Reason is INCORRECT.

D. If Assertion is INCORRECT but Reason is CORRECT.

Answer: A



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3. Why is granulated zinc and not pure zinc used in the laboratory preparation of dihydrogen?

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

C. If Assertion is CORRECT but Reason is
INCORRECT.

D. If Assertion is INCORRECT but Reason is
CORRECT.

Answer: C



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4. Assertion : Dihydrogen exhibits nuclear spin isomerism.

Reason : The two electrons present in a H_2 molecule always spin in the opposite direction

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

C. If Assertion is CORRECT but Reason is INCORRECT.

D. If Assertion is INCORRECT but Reason is
CORRECT.

Answer: B



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5. Assertion : Saline hydrides are ionic in nature.

Reason : Saline hydrides are formed by the elements having high electronegativity values.

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

C. If Assertion is CORRECT but Reason is INCORRECT.

D. If Assertion is INCORRECT but Reason is CORRECT.

Answer: C



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6. Assertion : Soft water lathers with soap but not hard water.

Reason : Hard water reacts with soap to form insoluble salts which form scum, not lather.

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are
CORRECT but Reason is not the CORRECT
explanation of the Assertion.

C. If Assertion is CORRECT but Reason is
INCORRECT.

D. If Assertion is INCORRECT but Reason is
CORRECT.

Answer: D



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Ncert Text Book Exercise With Hints And Solutions

1. Justify the position of hydrogen in the periodic table on the basis of its electronic configuration.



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2. Write the names of isotopes of hydrogen.
What is the mass ratio of these isotopes?



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3. Why does hydrogen occur in a diatomic form rather than in a monoatomic form under normal conditions?



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4. How can the production of dihydrogen, obtained from 'coal gasification', be increased?



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5. Describe the bulk preparation of dihydrogen by electrolytic method. What is the role of an electrolyte in this process ?



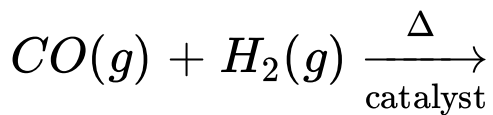
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6. Complete the following reactions :



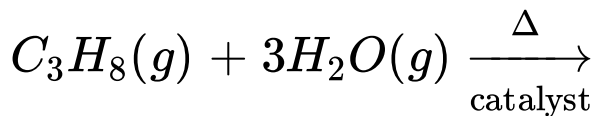
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7. Complete the following reactions :



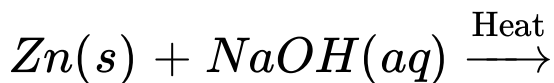
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8. Complete the following reactions :



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9. Complete the following reactions :



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10. Discuss the consequences of high enthalpy of H-H bond in terms of chemical reactivity of dihydrogen



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11. What do you understand by (i) electron-deficient, (ii) electron-precise, and (iii) electron-rich compounds of hydrogen? Provide justification with suitable examples.



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12. What do you understand by (i) electron-deficient, (ii) electron-precise, and (iii) electron-rich compounds of hydrogen? Provide justification with suitable examples.





[Watch Video Solution](#)

13. What do you understand by (i) electron-deficient, (ii) electron-precise, and (iii) electron-rich compounds of hydrogen? Provide justification with suitable examples.



[Watch Video Solution](#)

14. What characteristics do you expect from an electron-deficient hydride with respect to its structure and chemical reactions?



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15. Carbon hydrides of the type, C_nH_{2n+2} do not act as Lewis acid or Lewis base. They behave as normal covalent hydrides because



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16. What do you understand by the term 'non-stoichiometric hydrides' ? Do you expect this

type of hydrides to be formed by alkali metals'? Justify your answer.



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17. How do you expect the metallic hydrides to be useful for hydrogen storage? Explain.



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18. How does the atomic hydrogen or oxy-hydrogen torch function for cutting and

welding purposes ? Explain.



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19. Among NH_3 , H_2O , HF and H_2S which would have highest magnitude of hydrogen bonding ?



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20. Saline hydrides are known to react with water violently producing fire. Can CO_2 , a well

known fire extinguisher, be used in this case?

Explain.



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21. Arrange the following:

CaH_2 , BeH_2 and TiH_2 in order of increasing electrical conductance.



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22. Metal hydrides are ionic, covalent or molecular in nature . Among LiH, NaH, KH, RbH, CsH, the correct order of increasing ionic character is



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23. Arrange the following:

H-H, D-D and F- F in order of increasing bond dissociation enthalpy.



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24. Arrange the following:

NaH , MgH_2 and H_2O in order of increasing reducing property.



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25. Compare the structures of

H_2O and H_2O_2 .



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26. What do you understand by the term 'auto-protolysis' of water? What is its significance?



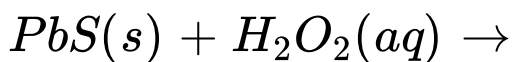
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27. Consider the reaction of water with F_2 and suggest, in terms of oxidation and reduction, which species are oxidised/reduced.



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28. Complete the following chemical reactions.

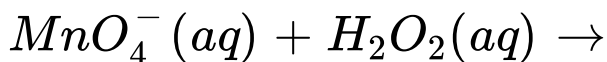


Classify the above into (a) hydrolysis, (b) redox and (c) hydration reactions.



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29. Complete the following chemical reactions.



Classify the above into (a) hydrolysis, (b) redox and (c) hydration reactions.





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30. Complete the following chemical reactions.

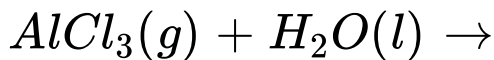


Classify the above into (a) hydrolysis, (b) redox and (c) hydration reactions.



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31. Complete the following chemical reactions.

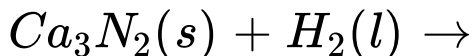


Classify the above into (a) hydrolysis, (b) redox and (c) hydration reactions.



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32. Complete the following chemical reactions.



Classify the above into (a) hydrolysis, (b) redox and (c) hydration reactions.



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33. Describe the structure of the common form of ice.



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34. What causes the temporary and permanent hardness of water ?



Watch Video Solution

35. Discuss the principle and method of softening of hard water by synthetic ion-exchange resins.



Watch Video Solution

36. Write chemical reactions to show the amphoteric nature of water.



Watch Video Solution

37. Write chemical reactions to justify that hydrogen peroxide can function as an oxidising as well as reducing agent.



Watch Video Solution

38. What is meant by demineralised water?



Watch Video Solution

39. Is demineralised or distilled water useful for drinking purposes? If not, how can it be made useful?



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40. Describe the usefulness of water in biosphere and biological systems.



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41. What properties of water make it useful as a solvent? What types of compound can it (i) dissolve, and (ii) hydrolyse ?



Watch Video Solution

42. What properties of water make it useful as a solvent? What types of compound can it (i) dissolve, and (ii) hydrolyse ?



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43. Knowing the properties of H_2O and D_2O , do you think that D_2O can be used for drinking purposes?



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44. What is the difference between the terms 'hydrolysis' and 'hydration' ?



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45. How can saline hydrides remove traces of water from organic compounds?



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46. What do you expect the nature of hydrides is, if formed by elements of atomic numbers 15, 19, 23 and 44 with dihydrogen? Compare their behaviour towards water.



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47. Do you expect different products in solution when aluminium(III) chloride and potassium chloride treated separately with (i) normal water (ii) acidified water, and (iii) alkaline water? Write equations wherever necessary.



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48. How does H_2O_2 behave as a bleaching agent?



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49. What do you understand by the terms:

(i) hydrogen economy

(ii) hydrogenation

(iii) syngas

(iv) water-gas shift reaction

(v) fuel-cell



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50. What do you understand by the terms :
hydrogenation



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51. What do you understand by the terms :
'syngas'



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52. What do you understand by the terms :

water-gas shift reaction



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53. What do you understand by the terms :

fuel-cell ?



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