



CHEMISTRY

BOOKS - S CHAND IIT JEE

FOUNDATION

HYDROGEN

Question Bank Fill In The Blanks To Make True Statement

1. ____ constitutes 90% of all matter in the universe



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2. ____ is the lightest element known.



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3. Hydrogen burns in air to form ____ .



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4. Hydrogen gas is collected by the ____ displacement of water.



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5. Hydrogen is usually prepared in the laboratory by the action of dilute sulphuric acid on granulated ____ .



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6. A substance which can remove oxygen from a compound is called a ____ .



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7. Hydrogen is used in the manufacture of ____ by the Haber's process.



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8. Liquid hydrogen is used as a ____ in rockets.





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9. A list of metals arranged in order of their decreasing reactivity is known as the ____ of metals.



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10. The activity series shows that ____ is the most reactive and ____ is the least reactive metal.



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11. When ____ is passed over red hot iron, oxide of iron and hydrogen are produced.



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12. Potassium, sodium, calcium react with cold water liberating ____ and forming the corresponding ____ .



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13. Hydrogen is ____ but it does not support combustion.



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14. When hydrogen is premixed with air or oxygen, it explodes with a ____ sound.



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15. Hydrogen is ____ soluble in water.





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16. Hydrogen gas is ___ to litmus.



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17. The metals ___ hydrogen in the activity series (except lead) liberate hydrogen with dil. ___ acid and ___ acid but not with ___ acid.



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18. Hydrogen reacts with many metal oxides to form ____ and ____ .



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19. Reduction is removal of ____ or addition of ____ .



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20. Oxidation is removal of ____ or addition of ____ .



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21. Reactions involving oxidations and reduction are known as ____ reactions because they always occur simultaneously.



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22. Plants and animal tissues are made up of compounds of hydrogen with carbon, oxygen and ____.



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Question Bank

1. Match the following:

Column I

- (1) Discoverer of hydrogen
- (2) Gave this gas its present name hydrogen.
- (3) Smell like that of a rotten egg
- (4) Hardening of vegetable oils by using hydrogen
- (5) Used as a fuel in rockets
- (6) Used for cutting and welding metals
- (7) Used in filling balloons
- (8) Does not displace hydrogen from acids.

Column II

- (a) Hydrogenation
- (b) Lead
- (c) Helium
- (d) Oxy-flame
- (e) Cavendish
- (f) Hydrogen sulphide gas (H_2S)
- (g) Liquid Hydrogen
- (h) Lavoisier



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2. From the following list of metals, choose the metal which fits into the given description.

Zinc, Sodium, Silver, Lead, Iron.

This metal reacts reversibly with steam when it is red hot and produces its oxide and hydrogen.



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3. From the following list of metals, choose the metal which fits into the given description.

Zinc, Sodium, Silver, Lead, Iron.

This metal reacts violently with cold water. It melts into a globule and darts about freely on the surface of water.



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4. From the following list of metals, choose the metal which fits into the given description.

Zinc, Sodium, Silver, Lead, Iron.

This metal does not react with dil. acid or water.



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5. From the following list of metals, choose the metal which fits into the given description.

Zinc, Sodium, Silver, Lead, Iron.

This metal reacts with both acids and hot concentrate alkalies to form hydrogen and a soluble salt.



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6. Name one metal in following fitting the given description. Also, write the equation of the reaction.

The metal reacts slowly with dil. HCl and dil. H_2SO_4 to produce hydrogen but the salts formed by the reaction are insoluble and thus form a coating over the metal that prevents the contact between the metal and the acid and the reaction stops.



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7. Give reason for the following:

Hydrogen can be used as a fuel.



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8. Give reason for the following:

Nitric acid, even in its dilute form, is not used in the preparation of hydrogen from metals.



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9. Give reason for the following:

Although hydrogen is lighter than air it cannot be collected by downward displacement of air.



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10. Give reason for the following:

Hydrogen burns with a pop sound in air.



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11. Give reason for the following:

Hydrogen has been replaced by helium or a mixture of hydrogen and helium to fill weather observation balloons.



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12. Give reason for the following:

Hydrogen is used as a reducing agent.



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13. Give reason for the following:

Concentrated sulphuric acid is not used in the laboratory preparation of hydrogen.



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14. Give reason for the following:

Zinc granules are preferred for the laboratory preparation of hydrogen rather than pure zinc.



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15. Give reason for the following:

Metals other than zinc are not used in the laboratory preparation of hydrogen.



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16. Give reason for the following:

Hydrogen obtained by the reaction of zinc and dilute sulphuric acid has a peculiar smell.



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17. Give reason for the following:

Hydrogen obtained by Bosch process is passed through Cuprous chloride



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18. Give reason for the following:

Hydrogen obtained by Bosch process is passed through Water under pressure



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19. Pure hydrogen burns in pure oxygen, with a flame that produces very high temperature and droplets of a colourless liquid fall.

(i) What is this flame called ? (ii) What is its colour and (iii) for what purpose is it used?



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20. Pure hydrogen burns in pure oxygen, with a flame that produces very high temperature and droplets of a colourless liquid fall.

Identify the liquid whose droplets fall.



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21. What is produced when hydrogen burns



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22. What is produced when hydrogen reacts with chlorine



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23. What is produced when hydrogen reacts with nitrogen



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24. What is produced when carbon monoxide and hydrogen react in the presence of a suitable catalyst ?



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25. What is produced when hydrogen is bubbled through boiling sulphur



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26. What is produced when when hydrogen combines with highly reactive metals at high temperatures



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27. In a redox reaction, what happens to (a) an oxidising agent, (b) a reducing agent



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28. What do you observe when hydrogen gas is passed through soap solution ?



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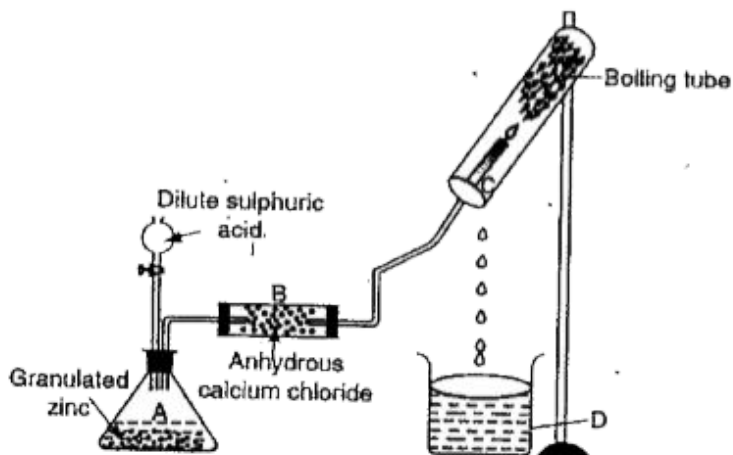
29. A hydrogen gas-filled jar is held with its mouth downwards. A lighted candle is taken into the jar. The candle gets extinguished but the gas burns with a pop sound.

What does this experiment show?



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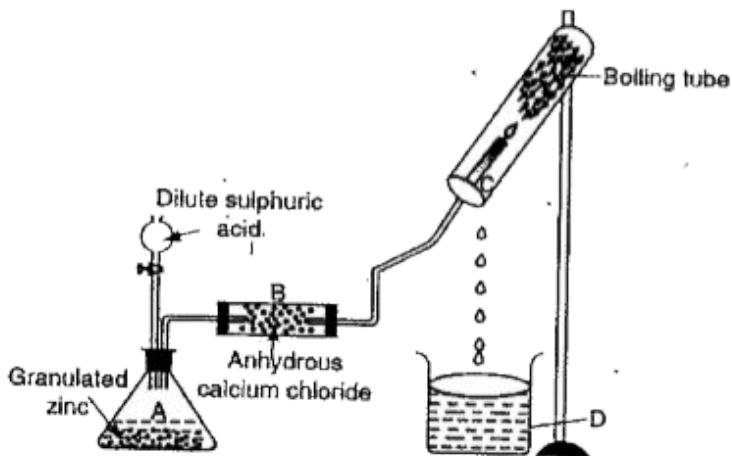
30. The following apparatus is set up to show that hydrogen burns in air to form water.



Write the chemical equations for the reaction in A.

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31. The following apparatus is set up to show that hydrogen burns in air to form water.

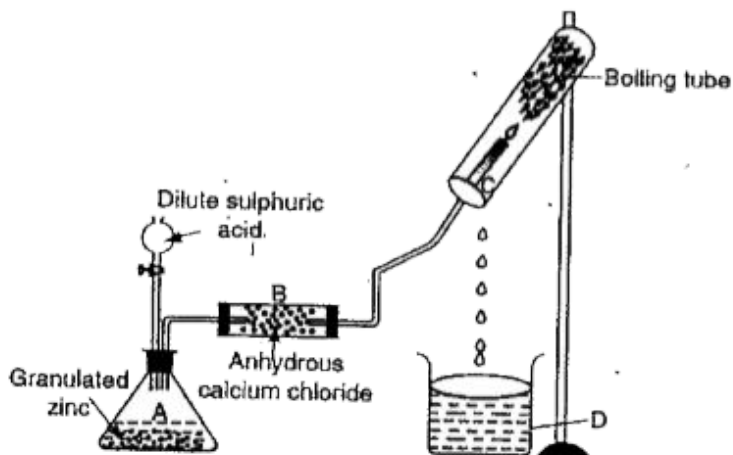


Why is anhydrous calcium chloride is kept in B?



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32. The following apparatus is set up to show that hydrogen burns in air to form water.



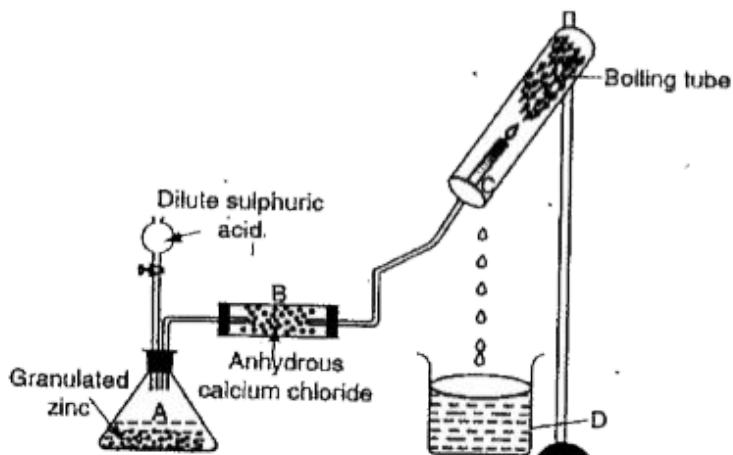
Write a chemical equation for the reaction at

C.



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33. The following apparatus is set up to show that hydrogen burns in air to form water.



How will you show that liquid D is water?

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34. Metallic hydrides react with water to form liquid 'A' and gas 'B'. In this context, answer the following question:

Identify 'A' and 'B'.



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35. Metallic hydrides react with water to form liquid 'A' and gas 'B'. In this context, answer the following question:

What would be the effect of adding neutral litmus solution to 'A'.



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36. Metallic hydrides react with water to form liquid 'A' and gas 'B'. In this context, answer the following question:

What would happen on bringing burning splinter in contact with gas 'B'.



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37. Match the statements in column A with those in column B.

Column A

- (1) A metal which reacts with cold water to form hydrogen
- (2) A gas which is inflammable and a non-supporter of combustion.
- (3) A process in which vanaspati ghee is prepared from vegetable oils
- (4) The removal of hydrogen or addition of oxygen
- (5) The addition of hydrogen or removal of oxygen

Column B

- (a) Reduction
- (b) Hydrogenation
- (c) Hydrogen
- (d) Sodium
- (e) Oxidation



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38. Fill in the boxes with alphabets to give correct answer.

I am a metal and react with cold water to

liberate hydrogen and form any hydroxide.

C		L				M
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39. Fill in the boxes with alphabets to give correct answer.

I am a metal and react with steam to form any oxide and produce hydrogen gas.

M				S		U	
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40. Fill in the boxes with alphabets to give correct answer.

I am formed when an active metal reacts with dilute acids and displaces hydrogen from the acid.

			T	
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41. Fill in the boxes with alphabets to give correct answer.

I am a gas which reacts with hydrogen to produce ammonia

			R				
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42. Fill in the boxes with alphabets to give correct answer.

We are formed when hydrogen combines with

highly reactive metals at high temperatures.

	Y						
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43. Fill in the boxes with alphabets to give correct answer.

I am a metal that is used in the process of hydrogenation.

N					L
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44. Fill in the boxes with alphabets to give correct answer.

It was I who discovered hydrogen.

C								H
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45. Fill in the boxes with alphabets to give correct answer.

Hydrogen prepared by the of hydrogen from

water, acids, and alkalies.

D											T
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46. Fill in the boxes with alphabets to give correct answer.

I am a flame which is produced when hydrogen and oxygen are burnt together and is used in the cutting and welding of metals.

O	Y									N
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F			M
---	--	--	---



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47. Fill in the boxes with alphabets to give correct answer.

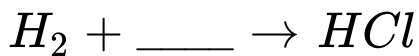
I am at the top in the metal activity series and displace hydrogen from water and acids very violently and explosively.

P					S			
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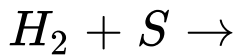
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48. Complete and balance the following equation :



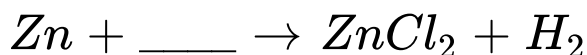
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49. Complete and balance the following equation :



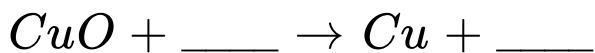
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50. Complete and balance the following equation :



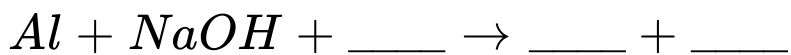
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51. Complete and balance the following equation :



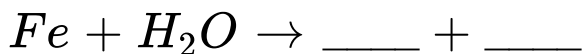
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52. Complete and balance the following equation :



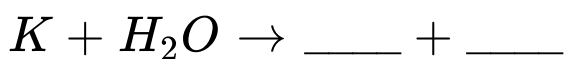
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53. Complete and balance the following equation :



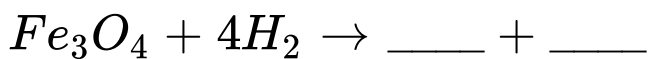
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54. Complete and balance the following equation :



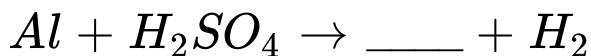
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55. Complete and balance the following equation :



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56. Complete and balance the following equation :



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57. He gave hydrogen its present name:

A. Faraday

B. Lavoisier

C. Fleming

D. Cavendish

Answer: B



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58. Hydrogen reacts with this element to form ammonia

A. Sulphur

B. Carbon

C. Oxygen

D. Nitrogen

Answer: D



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59. This is the least reactive metal in the metal activity series.

A. Sodium

B. Lead

C. Platinum

D. Zinc

Answer: C



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60. Which is the lightest gas ?

A. Nitrogen

B. Oxygen

C. Hydrogen

D. Helium

Answer: C



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61. Deuterium is an isotope of hydrogen. How many neutrons does it contain?

A. 1

B. 0

C. 2

D. 3

Answer: A



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62. This gas burns with a popping sound.

A. Oxygen

B. Nitrogen

C. Hydrogen

D. Chlorine

Answer: C



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63. Hydrogen burns to give a

- A. yellow flame
- B. blue flame
- C. pale yellow flame
- D. pale blue flame

Answer: D



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64. The catalyst used in the manufacture of ammonia by Haber process is

A. Iron

B. Nickel

C. Chromium

D. None of these

Answer: A



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65. Which one of the following is not an isotope of hydrogen?

A. Deuterium

B. Para hydrogen

C. Protium

D. Tritium

Answer: B



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66. The sum of the number of neutrons and protons in the three isotopes of hydrogen is :

A. 6

B. 4

C. 3

D. 5

Answer: A



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67. Which of the following statements is not correct about hydrogen?

A. Its molecule is diatomic

B. It shows a dual nature as exhibits similarity with both alkali metals and halogens.

C. It is not abundantly found in free state in nature.

D. It has 2 electrons in its valence shell and
so its valency is 2.

Answer: D



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68. For the reaction $PbO + H_2 \rightarrow Pb + H_2O$,
which of the following statements is wrong?

A. H_2 is a reducing agent.

B. PbO is an oxidising agent.

C. PbO is oxidised to Pb

D. H_2 is oxidised to H_2O

Answer: C



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69. In reacting with cold water, an active metal produces

A. oxygen

B. nitric acid

C. a base

D. none of these

Answer: C



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70. The metal oxide which is reduced by hydrogen is:

A. Al_2O_3

B. CuO

C. CaO

D. Na_2O

Answer: B



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71. Which of the following statements is not true for H^1 , H^2 and H^3 ?

A. They have similar electronic configuration.

B. They exist in nature in the ratio 1:2:3.

C. Their atomic masses are in the ratio 1: 2:

3.

D. They are all isotopes of hydrogen.

Answer: B



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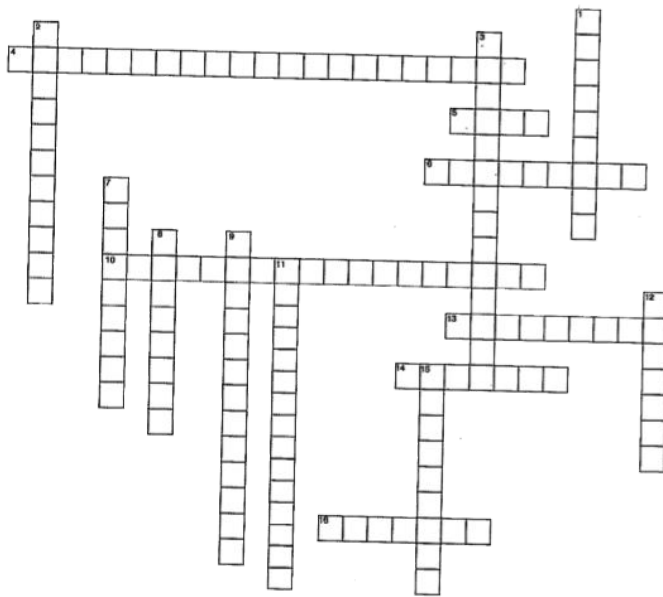
72. Prepare a concept map for hydrogen under the following heads:

Discovery, Occurrence, Characteristics, Preparation, Properties—Physical and Chemical, Uses, Test.



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73. Solve the following crossword with the help of the given clues :



Clues :

ACROSS

4. A list of metals arranged in order of their decreasing order.

5. Liquid hydrogen used as a _____ in rockets.

6. A chemical reaction involving removal of hydrogen or addition of oxygen.

10. High temperature flame produced by burning hydrogen in oxygen. Used for cutting and welding metals.

13. An isotope of hydrogen whose nucleus has one proton and one neutron. Also called heavy hydrogen.

14. A radioactive isotope of hydrogen whose nucleus has one proton and two neutrons.

16. The most abundant isotope of hydrogen. Its nucleus consists of a single proton. It does not have any neutron and its atomic mass is 1.

DOWN

1. Discoverer of hydrogen gas.

2. Water formed of oxygen and deuterium. It is like ordinary water but has higher freezing and boiling points.

3. A substance which can remove oxygen from a compound.

7. Scientist who gave hydrogen its present name.

8. A colourless, odourless and tasteless gaseous element that is the lightest and most abundant element in the universe.

9. Solidification of liquid vegetable oils by combining them chemically with hydrogen gas.

11. Reactions in which oxidation and reduction always occur simultaneously.

12. Gas produced by the action of hydrogen with nitrogen gas in the presence of iron as a catalyst.

15. A chemical reaction involving removal of oxygen or addition of hydrogen.



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Question Bank True Or False

1. Hydrogen is the lightest of all elements known to us.



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2. Hydrogen molecule is bivalent.



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3. The removal of hydrogen from a compound is called reduction.



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4. When steam is passed over red hot iron, the substance formed are:



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5. Hydrogen is highly soluble in water.(True / False)



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6. Copper, mercury, silver, gold and platinum are placed below hydrogen in the metal activity series.(True / False)



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7. Hydrogen is combustible and a supporter of combustion.(True / False)



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8. The reaction between hydrogen and nitrogen to form ammonia is reversible.(True / False)



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9. In the laboratory, hydrogen is prepared by the action of dilute nitric acid on zinc.(True / False)



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10. Hydrogen is collected in the laboratory by upward displacement of water.(True / False)



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11. Hydrogen turns red litmus blue. (True / False)



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12. Hydrogen occurs only, in traces in elemental form on Earth but it widely occurs in the form of compounds. (True / False)



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13. Hydrogen is a good reducing agent. It reduces metallic oxides into metals. (True / False)



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14. Hydrogen has a dual position in the periodic table. (True / False)



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15. Conc. H_2SO_4 reacts with Zinc to liberate hydrogen.



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16. All metals react with acids to give hydrogen. (True / False)



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17. The reaction between hydrogen and oxygen is highly exothermic. (True / False)



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18. Reactive metals like potassium and sodium react gently with cold water to liberate hydrogen. (True / False)



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Question Bank Fill In The Blanks By Choosing The Correct Answer From The Given Alternatives

1. Hydrogen burns in _____ (nitrogen/oxygen) to form water.



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2. Sodium is more reactive than ____ (potassium/calcium).



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3. Hydrogen is ____ (combustible/non-combustible)



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4. Hydrogen is _____ (soluble/insoluble) in water.



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5. Hydrogen is _____ (heavier/lighter) than air.



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6. Sodium reacts _____ (violently/gentle) with cold water.



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7. Hydrogen is a _____ (reducing/oxidising) agent.



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8. The reaction between steam and red hot iron is _____ (reversible/irreversible).



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9. Metals displace hydrogen of acids to form _____ (bases/salts).



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Self Assessment Sheet Fill In The Blanks

1. _____ constitutes 90% of all matter in the universe and is the lightest element known.



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2. Hydrogen can be obtained by its _____ from water, acids and alkalies by metals.



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3. Hydrogen is prepared in the laboratory by the reaction between _____ and _____ sulphuric acid and is collected by _____ displacement of water.



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4. Hydrogen burns with a pale blue flame producing ____ .



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5. A ____ agent is a substance which can remove oxygen from a compound.



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6. Hydrogen has ____ isotopes.



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7. _____ hydrogen is used as a fuel in rockets.



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8. The catalyst used for hydrogenation of vegetable oils is _____.



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9. _____ is produced when steam is passed over hot coke ($1000^{\circ}C$).



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10. Hydrogen can be commercially obtained by _____ of acidulated water.



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Self Assessment Sheet True Or False

1. Hydrogen is a supporter of combustion.



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2. Hydrogen burns in air with a pop sound.

This property is used as a test for hydrogen.



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3. Protium is heavy hydrogen.



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4. Aluminium reacts with alkalis to liberate hydrogen.



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5. Chlorine acts explosively with hydrogen in diffused sunlight.



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6. Hydrogen is not normally evolved when using a metal and dilute nitric acid.



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7. Silver being below hydrogen in the metal activity series displaces hydrogen readily from either water or dilute acids.



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8. Tritium which is a radioactive isotope of hydrogen contains 1 proton and 1 neutron.



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Self Assessment Sheet

1. Match correctly:

- | | |
|--|--------------------|
| 1. Isotope of hydrogen that combines with oxygen to form heavy water | a. Hydrogen |
| 2. The act or process of turning a gas into a liquid | b. Bosch Process |
| 3. Production of hydrogen by passing superheated steam over white hot charcoal | c. Haber's Process |
| 4. Manufacture of ammonia | d. Deuterium |
| 5. Extraction of pure metals from their oxides | e. Liquefaction |



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2. Balloon 'A' is filled with air and Balloon 'B' is filled with H_2 gas. Which balloon rises higher up in the sky and why?



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3. How is hydrogen prepared in the laboratory?



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4. What happens when hydrogen burns in air?



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5. What is oxy-hydrogen flame?



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6. Hydrogen is a good reducing agent. What do you understand by this statement ? Explain with the help of copper oxide as an example.



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7. What would you observe when equal volumes of hydrogen and chlorine are exposed to diffused sunlight and direct sunlight?



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8. What happens when hydrogen is bubbled through boiling sulphur?



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9. How is ammonia formed ?



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10. What is produced when carbon monoxide and hydrogen react in the presence of a suitable catalyst ?



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11. What is a redox reaction ?



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12. Give equations to express the reaction between steam and red hot iron



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13. Give equations to express the reaction between calcium and water



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14. Give equations to express the reaction between steam and red hot coke



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15. Hydrogen gas will not reduce:

A. heated cupric oxide

B. heated ferric oxide

C. heated stannic oxide

D. heated aluminium oxide

Answer: D



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16. The most reactive metal according to the metal activity series is

A. iron

B. potassium

C. platinum

D. copper

Answer: B



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17. Which of the following statements is incorrect about hydrogen?

A. Hydrogen has one electron in its outermost shell.

B. It is the lightest gaseous element.

C. It is not easily liquefied.

D. It is a strong oxidising agent.

Answer: D



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18. Which of the following metals does not give hydrogen with acids ?

A. Iron

B. Copper

C. Aluminium

D. Magnesium

Answer: B



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19. On adding water to sodium, the solution formed is

A. neutral

B. alkaline

C. acidic

D. amphoteric

Answer: B



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20. Write balanced chemical equation only for the reaction of hydrogen with potassium



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21. Write balanced chemical equation only for the reaction of hydrogen with chlorine



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22. Write balanced chemical equation only for the reaction of hydrogen with lead oxide



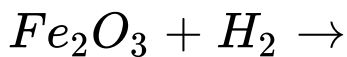
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23. Write balanced chemical equation only for the reaction of hydrogen with carbon monoxide



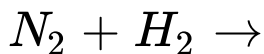
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24. Complete and balance the following equation



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25. Complete and balance the following equation



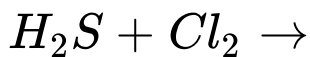
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26. Complete and balance the following equation



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27. Complete and balance the following equation



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28. Complete and balance the following equation



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