

## Hydrogen

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Question 1.

When water is dropped over sodium peroxide, the colourless gas produced is:

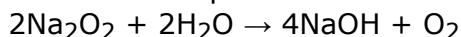
- (a) DiNitrogen
- (b) DiOxygen
- (c) DiHydrogen
- (d) Hydrogen Peroxide

▼ [Answer](#)

Answer: (b) DiOxygen

Explanation:

When sodium peroxide dissolves in water:



Question 2.

The atomic weights of isotopes of all element are different due to different number of \_\_\_\_\_.

- (a) Protons
- (b) Electrons
- (c) Neutrons
- (d) None of Above

▼ [Answer](#)

Answer: (c) Neutrons

Explanation:

Isotopes are variants of a particular chemical element which differ in neutron number, and consequently in nucleon number. All isotopes of a given element have the same number of protons but different numbers of neutrons in each atom.

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Question 3.

During the reaction of natural gas and steam the catalyst used is

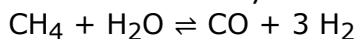
- (a) Fe
- (b) Zn
- (c) Ni
- (d) Cr

▼ [Answer](#)

Answer: (c) Ni

Explanation:

Steam reforming of natural gas is the most common method of producing commercial bulk hydrogen at about 95% of the world production of 500 billion m<sup>3</sup> in 1998, or 70 million tonnes by 2018. Hydrogen is used in the industrial synthesis of ammonia and other chemicals. At high temperatures (700 – 1100°C) and in the presence of a metal-based catalyst (nickel), steam reacts with methane to yield carbon monoxide and hydrogen.



Question 4.

Cavendish in 1766 discovered.

- (a) Nitrogen
- (b) Oxygen

- (c) Hydrogen
- (d) Helium

▼ Answer

Answer: (c) Hydrogen

Explanation:

Henry Cavendish FRS was an English natural philosopher, scientist, and an important experimental and theoretical chemist and physicist. He is noted for his discovery of hydrogen, which he termed "inflammable air". He described the density of inflammable air, which formed water on combustion, in a 1766 paper, On Factitious Airs. Antoine Lavoisier later reproduced Cavendish's experiment and gave the element its name.

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Question 5.

Dihydrogen gas may be prepared by heating caustic soda on

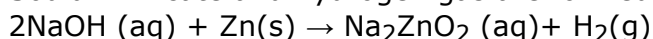
- (a) Cu
- (b) Zn
- (c) Na
- (d) Ag

▼ Answer

Answer: (b) Zn

Explanation:

When a base reacts with a metal salt in hydrogen gas is formed. In this reaction metal is zinc & base is Sodium hydroxide. When sodium hydroxide solution is heated with zinc granules then Sodium zincate and hydrogen gas are formed.



The salt formed by the reaction between a base and a metal, the metal is present as a part of the Negative ion. In the sodium zincate salt ( $\text{Na}_2\text{ZnO}_2$ ) formed by the reaction between Sodium Hydroxide and Zinc metal, the zinc metal is present as a part of a negative ions, zincate ion ( $\text{ZnO}_2^{-2}$ ). All the metals do not react with bases to form salt and hydrogen gas. The main product formed in this reaction is sodium zincate ( $\text{Na}_2\text{ZnO}_2$ )

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Question 6.

Hydrogen set free at the time of its preparation from its compound in atomic form are called \_\_\_\_\_.

- (a) Nascent Molecular Hydrogen
- (b) Nascent Atomic Hydride
- (c) Both (1) and (2)
- (d) Nascent Hydrogen

▼ Answer

Answer: (a) Nascent Molecular Hydrogen

Explanation:

The hydrogen set free at the time of its preparation from its compounds is also in atom form and is commonly known nascent hydrogen. The newly born hydrogen is in atomic form that is why it is called nascent hydrogen.

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Question 7.

Which substance does not speed up decomposition of  $\text{H}_2\text{O}_2$

- (a) Glycerol
- (b) Pt
- (c) Gold
- (d)  $\text{MnO}_2$

▼ Answer

Answer: (b) Pt

Explanation:

Glycerol, phosphoric acid or acetanilide is added to  $\text{H}_2\text{O}_2$  to check its decomposition.

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Question 8.

Water shows anomalous behavior between

- (a) 0 to 4 °C
- (b) 0 to 5 °C
- (c) 0 to -4 °C
- (d) 4 to 0 °C

▼ Answer

Answer: (a) 0 to 4 °C

Explanation:

Water shows a wide range of anomalies compared to similar liquids or hydrides of other group 16 elements. One of the most talked-about anomalies is the formation of ice from liquid water and how the density changes when we cool the water.

O is a small atom and highly electronegative compared to Hydrogen. So O attracts the covalent clouds of O-H towards itself, thus making water a polar molecule. The hydrogen bonding in water molecules causes high boiling point and liquid state compared to other hydrides of group 16.

When we cool water from higher temperature, the density steadily decreases. At 4 degree C it is the highest. But below 4 degree C, the H-bonds break between the molecules and the molecules get drifted further apart, the volume increases and density decreases. The crystalline form of water is ice. At atmospheric pressure ice crystallises in the hexagonal form, but at very low temperatures it condenses to cubic form leaving gap between the structures, thus increasing the volume again.

Density of ice is less than that of water. Therefore, an ice cube floats on water. In winter season ice formed on the surface of a lake provides thermal insulation which ensures the survival of the aquatic life.

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Question 9.

Which of the following pair of substance will not evolve  $\text{H}_2$  gas

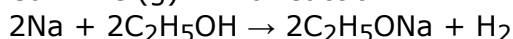
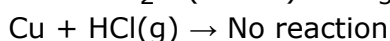
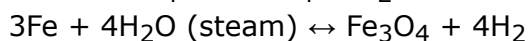
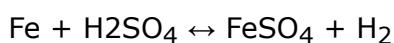
- (a) Iron and aqueous  $\text{H}_2\text{SO}_4$
- (b) Copper and  $\text{HCl(aq)}$
- (c) Sodium and Ethanol
- (d) Iron and Steam

▼ Answer

Answer: (b) Copper and  $\text{HCl(aq)}$

Explanation:

Copper is a noble metal. As it lies below hydrogen in the electrochemical series. Therefore it can't displace hydrogen from dilute  $\text{HCl}$ . While iron and sodium lie above hydrogen in the electrochemical series. so they can liberate  $\text{H}_2$  either from steam or  $\text{H}_2\text{SO}_4$  solution.



Question 10.

Tritium \_\_\_\_\_ radio active isotope.

- (a) Beta-Emitting
- (b) Alpha – Emitting
- (c) Gamma-Emitting
- (d) None of the Above

▼ Answer

Answer: (a) Beta-Emitting

Explanation:

Tritium is a beta-emitting radioactive isotope of hydrogen. Its nucleus consists of one proton and two neutrons, making it three times as heavy as a hydrogen nucleus (with its one proton) and one-and-a-half times as heavy as deuterium (which contains one proton and only one neutron).

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Question 11.

The maximum density of water at 40C is :

- (a) 1.0 g / cm<sup>3</sup>
- (b) 0.998 g / cm<sup>3</sup>
- (c) 0.918 g / cm<sup>3</sup>
- (d) 1.2 g / dm<sup>3</sup>

▼ Answer

Answer: (a) 1.0 g / cm<sup>3</sup>

Explanation:

Water never has an absolute density because its density varies with temperature. Water has its maximum density of 1 g/cm<sup>3</sup> at 4 degrees Celsius. When the temperature changes from either greater or less than 4 degrees, the density will become less than 1 g/cm<sup>3</sup>. Water has the maximum density of 1 g/cm<sup>3</sup> only when it is pure water. Other factors affect water's density such as whether it is tap or fresh water or salt water. These variations of water change its density because what's in the water has its own density.

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Question 12.

Water gas is mixture of hydrogen H<sub>2</sub> and

- (a) CO
- (b) CO<sub>2</sub>
- (c) Cl<sub>2</sub>
- (d) SO<sub>2</sub>

▼ Answer

Answer: (a) CO

Explanation:

Water gas is a combustion fuel containing carbon monoxide (CO) and hydrogen gas (H<sub>2</sub>). Water gas is made by passing steam over heated hydrocarbons.

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Question 13.

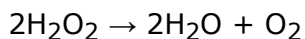
The volume of oxygen gas evolved at STP by decomposition of 0.68 g "20 volume" hydrogen peroxide is:

- (a) 112 ml
- (b) 224 ml
- (c) 56 ml
- (d) 336 ml

▼ Answer

Answer: (b) 224 ml

Explanation:



$$2 \times 34 \text{ g} = 22400 \text{ ml}$$

As  $2 \times 34 \text{ g} = 68 \text{ g}$  of  $\text{H}_2\text{O}_2$  liberates

22400 ml  $\text{O}_2$  at STP

Therefore, 0.68 g of  $\text{H}_2\text{O}_2$  liberates

$$= (0.68 \times 22400)/(68) = 224 \text{ ml}$$

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Question 14.

Which of the following statements regarding hydrogen peroxide is/are incorrect?

- (a) As aerating agent in production of sponge rubber
- (b) As an antichlor
- (c) For restoring white colour of blackened lead painting
- (d) All of the above

▼ Answer

Answer: (d) All of the above

Explanation:

$\text{H}_2\text{O}_2$  show all these properties

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Question 15.

\_\_\_\_\_ on water decolourises  $\text{H}_2\text{O}_2$

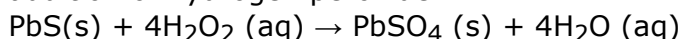
- (a)  $\text{O}_3$
- (b) Acidic  $\text{KMnO}_4$  solution
- (c) Black Suspension of Lead Sulphide(  $\text{PbS}$ )
- (d) None of these

▼ Answer

Answer: (c) Black Suspension of Lead Sulphide( $\text{PbS}$ )

Explanation:

Lead sulphide (black suspension) on reaction with hydrogen peroxide forms lead sulphate and water. Lead sulphate as well as water are colourless, therefore lead sulphite decolourises on addition of hydrogen peroxide.



Question 16.

The number of electron hydrogen contains in its K shell is

- (a) 1
- (b) 2
- (c) 3
- (d) 4

▼ Answer

Answer: (a) 1

Explanation:

The maximum number of electrons present in a shell is given by the formula  $2n^2$ , where "n" is the orbit number or energy level index, 1, 2, 3 , ..... Hence the maximum number of electrons in different shells are as follows:

First orbit or K-shell will be  $= 2 \times 1^2 = 2$

Hydrogen (H), lithium (Li), and sodium (Na), all have one electron in their outermost shells. This means that they can achieve a stable configuration and a filled outer shell by donating or losing an electron.

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Question 17.

On shaking  $\text{H}_2\text{O}_2$  with acidified potassium dichromate and ether, ethereal layer becomes:

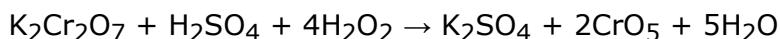
- (a) Green
- (b) Red
- (c) Blue
- (d) Brown

▼ Answer

Answer: (c) Blue

Explanation:

This is due to the formation of  $\text{CrO}_5$



So it is Blue

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Question 18.

Hydrogen atom contains one electron. But, the spectrum of hydrogen contains number of lines.

- (a) Single
- (b) Multiple
- (c) Cannot be determined
- (d) None of the Above

▼ Answer

Answer: (b) Multiple

Explanation:

In a sample of hydrogen gas, the number of hydrogen molecules is present. These molecules dissociate and produce hydrogen atoms when heated. Each hydrogen atom contains one electron. The hydrogen atoms absorb different amounts of energy and go to different excited states. From there, they take different paths and come back to ground state. Since different paths are associated with different energies, different spectral lines are formed in the spectrum.

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Question 19.

$\text{H}_2\text{O}_2$  used in rocket has the concentration:

- (a) 50%
- (b) 90%
- (c) 70%
- (d) 30%

▼ Answer

Answer: (b) 90%

Explanation:

$\text{H}_2\text{O}_2$  is used as an oxidant for rocket fuel. Usually, 90% concentration of  $\text{H}_2\text{O}_2$  is used.

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Question 20.

Hydrogen has isotopes

- (a) 2
- (b) 3
- (c) 4
- (d) 5

▼ Answer

Answer: (c) 4

Explanation:

Hydrogen has three main isotopes; Protium ( $^1\text{H}$ ), deuterium ( $^2\text{H}$ ) and tritium ( $^3\text{H}$ ). These isotopes

form naturally in nature. Protium and deuterium are stable. Tritium is radioactive and has a half-life of about 12 years. Scientists have created four other hydrogen isotopes ( $4\text{H}$  to  $7\text{H}$ ), but these isotopes are very unstable and do not exist naturally. The main isotopes of hydrogen are unique because they are the only isotopes that have a name.

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