

Hydrogen and It's Compounds

Question1

Identify the hydride which is not correctly matched with the example given in brackets ?

AP EAPCET 2025 - 26th May Morning Shift

Options:

A.

Saline hydride-(NaH)

B.

Electron rich hydride-(H₂O)

C.

Electron deficient hydride- (B₂H₆)

D.

Electron precise hydride-(HF)

Answer: D

Solution:

Among the given options (d) does not match correctly.

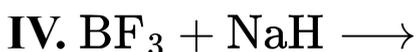
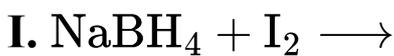
Electron precise hydrides are compounds of hydrogen with other elements that have the exact number of valence electron needed to form normal covalent bond. e.g. CH₄.



Question2

Which of the following reactions give H_2 as one of the products?

(Reactions are not balanced)



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Options:

A.

I, II and III only

B.

II and IV only

C.

I and III only

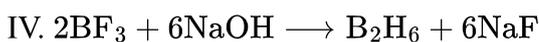
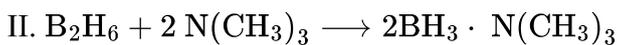
D.

II, III and IV only

Answer: C

Solution:

All reactions are as follows,



Thus, reactions given in I and III only gives H_2 as one of the products.

Question3

Which of the following property is less for D_2O than H_2O ?

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Options:

A.

Dielectric constant

B.

Viscosity

C.

Density

D.

Melting point

Answer: A

Solution:

The dielectric constant of D_2O is less than H_2O , D_2O is heavier. This difference in mass affects the vibrational frequencies of the molecule and their ability to align with an electric field.

Question4

Which set of elements form electron precise hydrides?

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Options:



A.

B, Al, Ga

B.

C, Si, Ge

C.

N, P, As

D.

B, C, N

Answer: B

Solution:

C, Si, Ge form electron precise hydrides. Electron precise hydrides are compounds where total number of valence electrons is exactly enough to

form covalent bonds between all the atoms in the molecules resulting in forming a complete octet.

Question5

**4 mL of ' X volume' H_2O_2 on heating gives 80 mL of oxygen at STP.
The value of X is**

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Options:

A.

10

B.

20

C.

15

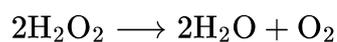
D.

40

Answer: B

Solution:

The decomposition of H_2O_2 is



4 mL of H_2O_2 solution produces 80 mL of O_2

$$\begin{aligned} 1 \text{ mL of } \text{H}_2\text{O}_2 &= \frac{80}{4} \text{ mL of } \text{O}_2 \\ &= 20 \text{ mL of oxygen} \end{aligned}$$

Question 6

Compound ' X ' is prepared commercially by the electrolysis of brine solution.

Which of the following is not the use of ' X '?

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Options:

A.

Manufacture of paper

B.

Petroleum refining

C.

Antichlor

D.



Mercirising cotton fabrics

Answer: C

Solution:

Sodium hydroxide (NaOH) is commercially prepared by electrolysis of brine solution among the given options. Antichlor is not a use of sodium hydroxide.

Antichlor is a substance used to remove residual chlorine from material that has been bleached.

Question7

The incorrect statement in the following is

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Options:

A.

ionic hydrides are crystalline in nature.

B.

group 14 elements form electron precise hydrides.

C.

covalent hydrides are non-volatile compounds.

D.

generally, saline hydrides react violently with water.

Answer: C

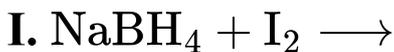
Solution:

Among the given options statement given in option (c) is incorrect regarding covalent hydrides. Covalent hydrides can be volatile or non volatile.



Question 8

In which of the following reactions, hydrogen is one of the products?



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Options:

A. II, III

B. I, II

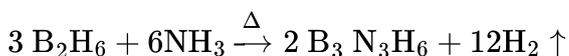
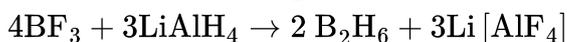
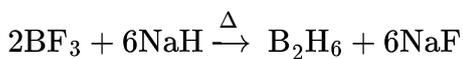
C. I, IV

D. III, VI

Answer: C

Solution:

The reaction and their products are



Hence, reaction given in (I) and (IV) give hydrogen as one product.



Question9

Identify the incorrect statement.

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Options:

- A. Saline hydrides on electrolysis liberate dihydrogen gas at anode.
- B. CH_4 is electron precise hydride.
- C. Chromium hydride conducts heat and electricity.
- D. Hydrides of group 15 elements behave as Lewis acids.

Answer: D

Solution:

Let's go through each option step by step:

Option A: Saline hydrides (ionic hydrides like NaH or CaH_2) contain the hydride ion (H^-). During electrolysis, the hydride ions lose electrons (oxidation) at the anode:



This makes Option A correct.

Option B: Methane (CH_4) is described as an electron precise hydride because all of its bonds are localized two-electron bonds, satisfying the octet rule for the carbon atom. Therefore, this statement is also correct.

Option C: Chromium hydride falls under the category of metallic (or interstitial) hydrides. Such hydrides typically have a metallic lattice structure and, as a result, conduct heat and electricity. So, Option C is correct.

Option D: Hydrides of group 15 elements (like NH_3 , PH_3 , etc.) possess a lone pair on the central element. This lone pair usually makes them behave as Lewis bases (electron pair donors), not Lewis acids (electron pair acceptors). Hence, Option D is incorrect.

The incorrect statement is Option D.

Question10

The method for preparation of water gas is

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Options:

- A. burning coke in excess of air.



B. oxidation of C in limited supply of oxygen.

C. passing steam over hot coke.

D. passing air over hot coke.

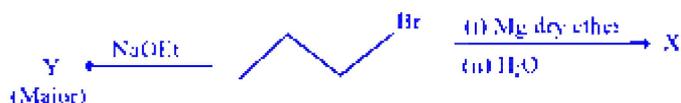
Answer: C

Solution:

Water gas is produced by alternately passing steam and air over a bed of red-hot coke or coal that is kept at a high temperature. It consists of a mixture of carbon monoxide (CO) and hydrogen (H₂).

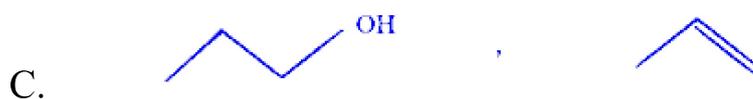
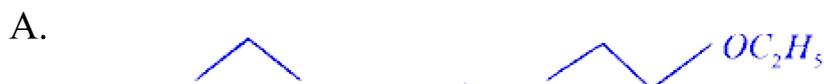
Question11

The major products X and Y respectively from the following reactions are



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Options:

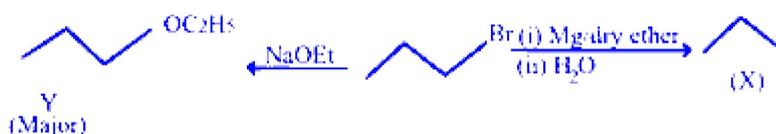


D.



Answer: C

Solution:



Question 12

The hydrides of which group elements are examples of electron precise hydrides?

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Options:

- A. Group 14 elements
- B. Group 13 elements
- C. Group 15 elements
- D. Group 16 elements

Answer: A

Solution:

Electron precise hydrides are those in which every bond is a localized two-electron, two-center bond—that is, the bonding can be described fully by standard Lewis structures without invoking multi-center bonding. Let's break down the options:



Group 13 elements (like boron) form hydrides such as BH_3 . However, BH_3 is electron deficient (having only 6 valence electrons around boron) and typically exists as diborane (B_2H_6) where bridging hydrogen atoms create three-center two-electron bonds. This makes them non-electron precise.

Group 14 elements (like carbon) form hydrides such as methane (CH_4). In CH_4 , carbon has four valence electrons and forms four bonds with hydrogen atoms. Each CH bond is a two-electron bond with the electron count exactly sufficient to satisfy the octet rule—this is the hallmark of an electron precise hydride.

Group 15 hydrides (e.g., ammonia, NH_3) and Group 16 hydrides (e.g., water, H_2O) also obey the octet rule and have conventional two-electron bonds. They are electron precise, but the term is most typically used in discussions contrasting them with electron deficient species (like those of Group 13).

Since the question asks for an example, the most classic and illustrative case is found in the hydrides of Group 14 elements.

Thus, the correct answer is:

Option A: Group 14 elements.

Question 13

The correct statements among the following are

- (i) saline hydrides produce H_2 gas when reacted with water**
- (ii) presently $\sim 77\%$ of the industrial dihydrogen is produced from coal**
- (iii) commercially marketed H_2O_2 contains $3\% \text{H}_2\text{O}_2$**

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Options:

- A. (i), (ii), (iii)
- B. (i), (iii), only
- C. (ii), (iii) only
- D. (i), (ii) only

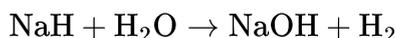
Answer: B

Solution:

Let's analyze each statement one by one:

Statement (i): Saline hydrides produce H_2 gas when reacted with water.

Saline (or ionic) hydrides (such as NaH or LiH) react with water to form the corresponding hydroxide and hydrogen gas. For example:



This statement is correct.

Statement (ii): Presently $\sim 77\%$ of the industrial dihydrogen is produced from coal.

Most industrial hydrogen is produced by the steam reforming of natural gas (methane), not from coal gasification. Globally, the majority of hydrogen comes from hydrocarbon sources like natural gas.

Therefore, this statement is not correct.

Statement (iii): Commercially marketed H_2O_2 contains 3% H_2O_2 .

Over-the-counter hydrogen peroxide solutions are commonly sold as a 3% solution. This is routinely labeled and used for antiseptic purposes.

This statement is correct.

Given the above analysis, only statements (i) and (iii) are correct.

Thus, the correct option is:

Option B: (i), (iii) only.

Question 14

Two statements are given below :

I. In dry cleaning, the solvent $Cl_2C = CCl_2$ was earlier used and now it is replaced by liquefied CO_2

II. In bleaching of paper, H_2O_2 was used earlier and now it is replaced by chlorine gas. Correct answer is

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Options:

A. Statement I, Statement II both are correct.

B. Statement I, Statement II both are incorrect.



C. Statement I is correct but Statement II is incorrect.

D. Statement I is incorrect but Statement II is correct.

Answer: C

Solution:

Statement I is correct, but Statement II is incorrect.

Statement I: In dry cleaning, the solvent $\text{Cl}_2\text{C} = \text{CCl}_2$ (also known as perchloroethylene) was traditionally used, but it has now been replaced by liquefied CO_2 due to environmental concerns and safety issues associated with perchloroethylene.

Statement II: The correct statement is that earlier, chlorine gas was used to bleach paper. Today, this has been largely replaced by H_2O_2 (hydrogen peroxide).

Hydrogen peroxide is preferred because its decomposition products—water and oxygen—are not harmful to the environment. This makes it a safer and more environmentally friendly option compared to chlorine gas, which can produce toxic by-products.

Question15

In which of the following reaction, dihydrogen is not evolved?

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Options:

A. Oxidation of sodium borohydride with iodine.

B. Hydrolysis of boranes.

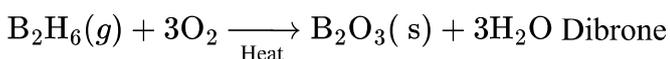
C. Heating the adduct formed by reaction of ammonia with diborane.

D. Burning of diborane in oxygen.

Answer: D

Solution:

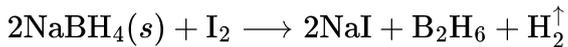
In option (d), dihydrogen is not released.



In all other options, dihydrogen is released.

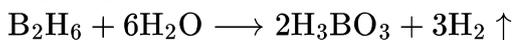


Oxidation of sodium borohydrate.

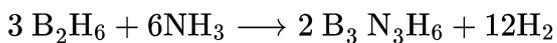


Hydrolysis of boranes

Hydrolysis of boranes



Ammonia with diborane



Question16

Calcium carbide + $\text{D}_2\text{O} \longrightarrow \underline{X} + \text{Ca}(\text{OD})_2$. The hybridisation of carbon atom(s) in X

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Options:

A. sp^2

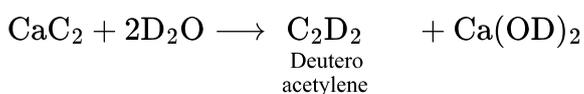
B. sp

C. sp^3

D. dsp^2

Answer: B

Solution:



The hybridisation of carbon atoms in deutero acetylene is sp .



