

Hydrogen

Question1

Decreasing order of the hydrogen bonding in following forms of water is correctly represented by

A. Liquid water

B. Ice

C. Impure water

[24-Jan-2023 Shift 1]

Options:

A. $A = B > C$

B. $B > A > C$

C. $C > B > A$

D. $A > B > C$

Answer: B

Solution:

Solution:

Ice > Liquid water > Impure water

Due to impurity extent of H-Bonding decreases.

Question2

In which of the following reactions the hydrogen peroxide acts as a reducing agent?

[24-Jan-2023 Shift 2]

Options:

A. $\text{PbS} + 4\text{H}_2\text{O}_2 \rightarrow \text{PbSO}_4 + 4\text{H}_2\text{O}$

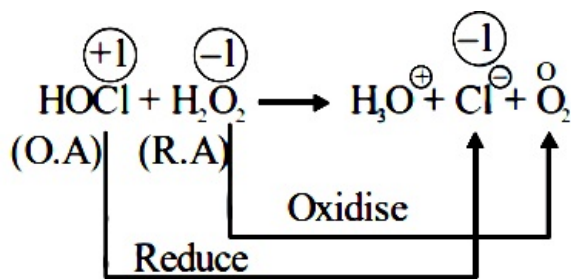
B. $2\text{Fe}^{2+} + \text{H}_2\text{O}_2 \rightarrow 2\text{Fe}^{3+} + 2\text{OH}^-$

C. $\text{HOCl} + \text{H}_2\text{O}_2 \rightarrow \text{H}_3\text{O}^+ + \text{Cl}^- + \text{O}_2$

D. $\text{Mn}^{2+} + \text{H}_2\text{O}_2 \rightarrow \text{Mn}^{4+} + 2\text{OH}^-$

Answer: C

Solution:



Question3

' 25 volume' hydrogen peroxide means
[25-Jan-2023 Shift 1]

Options:

- A. 1L marketed solution contains 250g of H_2O_2 .
- B. 1L marketed solution contains 75g of H_2O_2 .
- C. 100 mL marketed solution contains 25g of H_2O_2 .
- D. 1L marketed solution contains 25g of H_2O_2 .

Answer: B

Solution:

$$\text{Volume} = 11.35 \times \text{M}$$

Strength

$$\text{M} = \frac{25}{11.35} \text{M}$$

$$\begin{aligned}
 \text{g / L} &= 25 \times 34 / 11.35 \\
 &= 74.889
 \end{aligned}$$

Question4

Match List I with List II

List I	List II
A. Cobalt catalyst	I. $(\text{H}_2 + \text{Cl}_2)$ production
B. Syngas	II. Water gas production
C. Nickel catalyst	III. Coalgasification
D. Brine solution	IV. Methanol production

Choose the correct answer from the options given below :-
[25-Jan-2023 Shift 2]

Options:

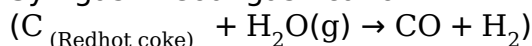
- A. A-IV, B-I, C-II, D-III
- B. A-IV, B-III, C-I, D-II
- C. A-II, B-III, C-IV, D-I
- D. A-IV, B-III, C-II, D-I

Answer: D

Solution:

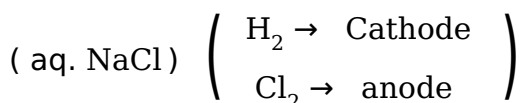
Cobalt catalyst → Methanol production

Syn gas → Coal gasification



Nickel catalyst → Water gas production

Brine solution → Production



Question5

Which of the given compounds can enhance the efficiency of hydrogen storage tank?

[29-Jan-2023 Shift 1]

Options:

- A. Li / P₄
- B. SiH₄
- C. NaNi₅
- D. Di-isobutylaluminium hydride

Answer: C

Solution:

Solution:

Refer NCERT

Question6

Given below are two statements:

Statement I : Nickel is being used as the catalyst for producing syn gas and edible fats.

Statement II : Silicon forms both electron rich and electron deficient

hydrides.

In the light of the above statements, choose the most appropriate answer from the options given below:

[29-Jan-2023 Shift 2]

Options:

- A. Both the statements I and II are correct
- B. Statement I is incorrect but statement II is correct
- C. Both the statements I and II are incorrect
- D. Statement I is correct but statement II is incorrect

Answer: D

Solution:

Solution:

Statement-I is correct.

Ni is used in Hydrogenation of unsaturated fat to make edible fats.

Statements-II is false as hydride of silicon is electron precise & neither electron deficient nor electron rich.

Question7

The strength of 50 volume solution of hydrogen peroxide is _____ g / L (Nearest integer).

Given:

Molar mass of H_2O_2 is 34gmol^{-1}

Molar volume of gas at STP = 22.7L.

[30-Jan-2023 Shift 2]

Answer: 150

Solution:

$$\text{Molarity} = \frac{50}{11.35}$$

$$\therefore \text{Strength in gm / L} = \frac{50}{11.35} \times 34$$

Question8

H_2O_2 acts as a reducing agent in

[31-Jan-2023 Shift 1]

Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R

Assertion A: Hydrogen is an environment friendly fuel.

Reason R: Atomic number of hydrogen is 1 and it is a very light element.

In the light of the above statements, choose the correct answer from the options given below

[1-Feb-2023 Shift 1]

Options:

A. A is true but R is false

B. Both A and R are true but R is NOT the correct explanation of A

C. A is false but R is true

D. Both A and R are true and R is the correct explanation of A

Answer: B

Solution:

Solution:

No pollution occurs by combustion of hydrogen and very low density of hydrogen.

Question11

O – O bond length in H_2O_2 is X than the O – O bond length in F_2O_2 . The O – H bond length in H_2O_2 is Y than that of the O – F bond in F_2O_2 .

Choose the correct option for X and Y from the given below.

[1-Feb-2023 Shift 2]

Options:

A. X - shorter, Y - shorter

B. X - shorter, Y -longer

C. X - longer, Y -longer

D. X - longer, Y - shorter

Answer: D

Solution:

Solution:

According to bent rule more electronegative atom occupy less s-characters so bond length increases. O – H bond will be short than O – F bond due to small size of H than F.

Question12

The starting material for convenient preparation of deuterated hydrogen peroxide (D_2O_2) in laboratory is:

[1-Feb-2023 Shift 2]

Options:

A. $K_2S_2O_8$

B. 2-ethylanthraquinol

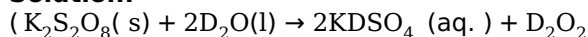
C. BaO_2

D. BaO

Answer: A

Solution:

Solution:



Question13

Given below are two statements: one is labelled as assertion and the other is labelled as reason .

Assertion: Loss of electron from hydrogen atom results in nucleus of $\sim 1.5 \times 10^{-3}$ pm size.

Reason: Proton (H^+) always exists in combined form

In the light of the above statements, choose the most appropriate answer from the options given below:

[6-Apr-2023 shift 1]

Options:

A. Both A and R are correct and R is the correct explanation of A

B. A is correct but R is not correct

C. A is not correct but R is correct

D. Both A and R are correct but R is NOT the correct explanation of A.

Answer: D

Solution:

Solution:

Question14

Which of the following can reduce decomposition of H_2O_2 on exposure to light
[8-Apr-2023 shift 2]

Options:

- A. Dust
- B. Urea
- C. Glass containers
- D. Alkali

Answer: B

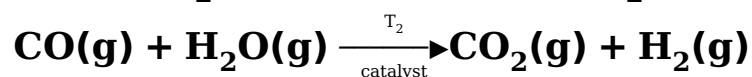
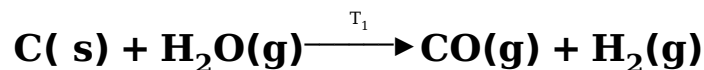
Solution:

Solution:

Urea acts as a stabilizer in the decomposition of H_2O_2

Question15

Given below are two reactions, involved in the commercial production of dihydrogen (H_2). The two reactions are carried out at temperature " T_1 " and " T_2 ", respectively



The temperatures T_1 and T_2 are correctly related as
[10-Apr-2023 shift 1]

Options:

- A. $T_1 = T_2$
- B. $T_1 < T_2$
- C. $T_1 > T_2$
- D. $T_1 = 100\text{K}, T_2 = 1270\text{K}$

Answer: C

Solution:

Solution:

$$T_1 = 1270\text{K}, T_2 = 673\text{K}$$

$T_1 > T_2$ on the basis of data

Question16

Which hydride among the following is less stable?
[11-Apr-2023 shift 2]

Options:

- A. HF
- B. NH_3
- C. BeH_2
- D. LiH

Answer: C

Solution:

Solution:
 BeH_2 is hypovalent

Question17

Match List I with List II

LIST I		LIST II	
Type of Hydride		Example	
A.	Electron deficient hydride	I.	MgH_2
B.	Electron rich hydride	II.	HF
C.	Electron precise hydride	III.	B_2H_6
D.	Saline hydride	IV.	CH_4

Choose the correct answer from the options given below:
[12-Apr-2023 shift 1]

Options:

- A. A-II, B-III, C-IV, D-I
- B. A-III, B-II, C-IV, D-I
- C. A-II, B-III, C-I, D-IV

D. A-III, B-II, C-I, D-IV

Answer: A

Solution:

(B₂H₆) – Electron deficient hydride

(Hf) - electron rich

CH₄ - electron precise hydride

MgH₂ - saline hydride

Question 18

Given below are two statements:

Statement I: Permutit process is more efficient compared to the synthetic resin method for the softening of water.

Statement II: Synthetic resin method results in the formation of soluble sodium salts.

In the light of the above statements, choose the most appropriate answer from the options given below:

[13-Apr-2023 shift 1]

Options:

A. Both the Statements I and II are correct

B. Statement I is incorrect but Statement II is correct

C. Statement I is correct but Statement II is incorrect

D. Both the Statements I and II are incorrect

Answer: D

Solution:

Solution:

Nowadays hard water is softened by using synthetic ion exchangers. This method is more efficient than zeolite process/Permutit process

Question 19

Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A : Isotopes of hydrogen have almost same chemical properties, but difference in their rates of reaction.

Reason R : Isotopes of hydrogen have different enthalpy of bond dissociation.

In the light of the above statements, choose the most appropriate

answer from the options given below :
[13-Apr-2023 shift 2]

Options:

- A. A is not correct but R is correct
- B. Both A and R correct but R is NOT the correct explanation of A
- C. Both A and R are correct and R is the correct explanation of A
- D. A is correct but R is not correct

Answer: C

Solution:

Solution:

Since the isotopes have the same electronic configuration, they have almost same chemical properties. The only difference is in their rates of reactions, mainly due to their different enthalpy of bond dissociation.

Question20

During water-gas shift reaction
[15-Apr-2023 shift 1]

Options:

- A. Water is evaporated in presence of catalyst.
- B. Carbon monoxide is oxidized to carbon dioxide
- C. Carbon is oxidized to carbon monoxide.
- D. Carbon dioxide is reduced to carbon monoxide.

Answer: B

Solution:

Solution:

Water gas shift reaction
 $\text{CO} + \text{H}_2\text{O} \rightarrow \text{CO}_2 + \text{H}_2$

Question21

The highest industrial consumption of molecular hydrogen is to produce compounds of element :
[24-Jun-2022-Shift-1]

Options:

- A. Carbon

B. Nitrogen

C. Oxygen

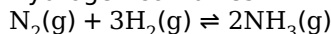
D. Chlorine

Answer: B

Solution:

Solution:

Hydrogen combines with nitrogen to produce Ammonia in Haber's process.



In this process, iron oxide is used with small amounts of K_2O and Al_2O_3 to increase the rate of attainment of equilibrium.

Optimum conditions for the production of ammonia are a pressure of 200 atm and a temperature of 700K.

Earlier, iron was used as a catalyst with molybdenum as a promoter in this reaction.

Question22

In the industrial production of which of the following, molecular hydrogen is obtained as a byproduct?

[24-Jun-2022-Shift-2]

Options:

A. NaOH

B. NaCl

C. Na metal

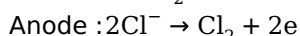
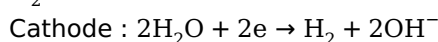
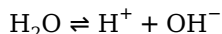
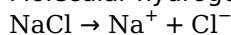
D. Na_2CO_3

Answer: A

Solution:

Solution:

Molecular hydrogen is produced as a byproduct in the industrial production of NaOH by electrolysis of aq NaCl solution



NaOH is crystallised from the remaining part of electrolyte.

Question23

Boiling of hard water is helpful in removing the temporary hardness by converting calcium hydrogen carbonate and magnesium hydrogen carbonate to

[26-Jun-2022-Shift-2]

Options:

- A. CaCO_3 and Mg(OH)_2
- B. CaCO_3 and MgCO_3
- C. Ca(OH)_2 and MgCO_3
- D. Ca(OH)_2 and Mg(OH)_2

Answer: A

Solution:



Question24

Hydrogen has three isotopes : protium (^1H), deuterium (^2H . or .D) and tritium (^3H . or .T). They have nearly same chemical properties but different physical properties. They differ in [28-Jun-2022-Shift-2]

Options:

- A. number of protons.
- B. atomic number.
- C. electronic configuration.
- D. atomic mass.

Answer: D

Solution:

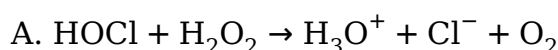
Solution:

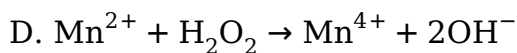
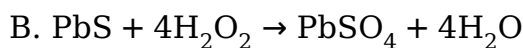
^1H , ^2H and ^3H have same atomic number but their atomic masses are different. Isotopes have same atomic number (i.e. same number of protons)

Question25

Which one of the following reactions indicates the reducing ability of hydrogen peroxide in basic medium? [29-Jun-2022-Shift-1]

Options:





Answer: C

Solution:

Solution:

Question26

High purity (> 99.95\%) dihydrogen is obtained by [25-Jul-2022-Shift-2]

Options:

A. reaction of zinc with aqueous alkali.

B. electrolysis of acidified water using platinum electrodes.

C. electrolysis of warm aqueous barium hydroxide solution between nickel electrodes.

D. reaction of zinc with dilute acid.

Answer: C

Solution:

Solution:

High purity (>99.95 %) H_2 is obtained by electrolysing warm aqueous $\text{Ba}(\text{OH})_2$ solution between nickel electrodes.

Question27

Reaction of BeCl_2 with LiAlH_4 gives :

(A) AlCl_3

(B) BeH_2

(C) LiH

(D) LiCl (E) BeAlH_4

Choose the correct answer from options given below:

[26-Jul-2022-Shift-1]

Options:

A. (A), (D) and (E)

B. (A), (B) and (D)

C. (D) and (E)

D. (B), (C) and (D)

Answer: B

Solution:



Question28

Given below are two statements.

Statement I: Hydrogen peroxide can act as an oxidizing agent in both acidic and basic conditions.

Statement II: Density of hydrogen peroxide at 298K is lower than that of D_2O .

In the light of the above statements, choose the correct answer from the options given below.

[27-Jul-2022-Shift-1]

Options:

A. Both Statement I and Statement II are true.

B. Both Statement I and Statement II are false.

C. Statement I is true but Statement II is false.

D. Statement I is false but Statement II is true.

Answer: C

Solution:

Solution:

Depending on the nature of reducing agent H_2O_2 can act as an oxidising agent in both acidic as well as basic medium.

Density of $\text{D}_2\text{O} = 1.1\text{g / cc}$

Density of $\text{H}_2\text{O}_2 = 1.45\text{g / cc}$

Question29

The metal salts formed during softening of hardwater using Clark's method are :

[28-Jul-2022-Shift-1]

Options:

A. $\text{Ca}(\text{OH})_2$ and $\text{Mg}(\text{OH})_2$

B. CaCO_3 and Mg(OH)_2

C. Ca(OH)_2 and MgCO_3

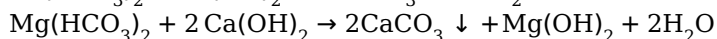
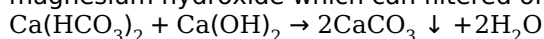
D. CaCO_3 and MgCO_3

Answer: B

Solution:

Solution:

In Clark's method, calculated amount of lime is added to hard water. It precipitates out calcium carbonate and magnesium hydroxide which can be filtered off.



Question30

For kinetic study of the reaction of iodide ion with H_2O_2 at room temperature :

(A) Always use freshly prepared starch solution.

(B) Always keep the concentration of sodium thiosulphate solution less than that of KI solution.

(C) Record the time immediately after the appearance of blue colour.

(D) Record the time immediately before the appearance of blue colour.

(E) Always keep the concentration of sodium thiosulphate solution more than that of KI solution.

Choose the correct answer from the options given below:

[28-Jul-2022-Shift-1]

Options:

A. (A), (B), (C) only

B. (A), (D), (E) only

C. (D), (E) only

D. (A), (B), (E) only

Answer: A

Solution:

Solution:

To minimize contamination, use freshly prepared starch solution to determine end point. As KI is used in excess to consume all the H_2O_2 the concentration of sodium thiosulphate solution is less than KI solution. After appearance of blue colour record the time immediately.

Question31

Given below are two statements.

Statement I: Stannane is an example of a molecular hydride.

Statement II : Stannane is a planar molecule.

In the light of the above statement, choose the most appropriate answer from the options given below.

[29-Jul-2022-Shift-2]

Options:

- A. Both Statement I and Statement II are true.
- B. Both Statement I and Statement II are false.
- C. Statement I is true but Statement II is false.
- D. Statement I is false but Statement II is true.

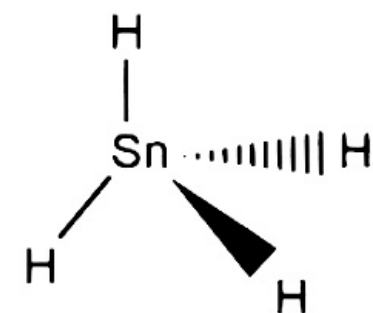
Answer: C

Solution:

Solution:

Stannane or tin hydride is an inorganic compound with formula SnH_4

Structure of SnH_4 is



$\therefore$ It is a non-planar molecule.

Question32

Calgon is used for water treatment. Which of the following statement is not true about Calgon?

[26 Feb 2021 Shift 2]

Options:

- A. Calgon contains the 2 nd most abundant element by weight in the Earth's crust.
- B. It is polymeric compound and is water solubl
- C. It is also known as Graham's salt.
- D. It does not remove Ca^{2+} ion by precipitation.

Answer: A

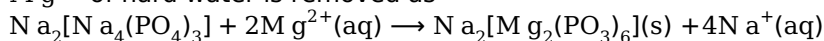
Solution:

Calgon is used to remove permanent hardness of water by removing cation Mg^{2+} .

Calgon is not an element, it is a compound. The 2nd most abundant element by weight in the Earth's crust is silicon (Si). So, the statement in option (a) is not true.

Calgon is sodium hexametaphosphate $(NaPO_3)_6$ or $Na_2[N_4(PO_3)_6]$. It is a polymeric water soluble compound. It is also named as Graham's salt.

Mg^{2+} of hard water is removed as



Calgon

Ca^{2+} ion cannot be removed by calgon as Ca^{2+} is larger in size than Mg^{2+} .

So, the statement of option (b), (c) and (d) are true.

Question33

Statements about heavy water are given below.

A. Heavy water is used in exchange reactions for the study of reaction mechanisms.

B. Heavy water is prepared by exhaustive electrolysis of water.

C. Heavy water has higher boiling point than ordinary water.

D. Viscosity of H_2O is greater than D_2O .

Which of the given statements are correct.

[26 Feb 2021 Shift 1]

Options:

A. A, B and C

B. Only A and B

C. Only A and D

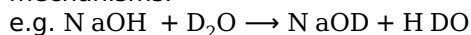
D. Only A and C

Answer: A

Solution:

Solution:

Statement A is true. Heavy water (D_2O) is used in exchange reactions as a tracer compound for the study of reaction mechanisms.



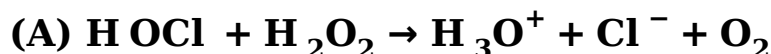
Statement B is true. Heavy water is prepared by prolonged exhaustive (multi-stage) electrolysis of ordinary water (H_2O) containing $NaOH$.

Statement C is true. Heavy water has higher boiling point (374.4K) than ordinary water (373K).

Statement D is false. Because viscosity (in centipoise) of D_2O is greater (1.107) than H_2O (0.8903).

So, statements A, B and C are correct (option-a).

Question34



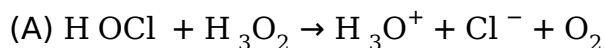
Choose the correct option.

[24feb2021shift1]

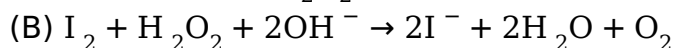
Options:

- A. H_2O_2 acts as reducing and oxidising agent respectively in equation (A) and (B)
- B. H_2O_2 acts as oxidising agent in equation (A) and (B)
- C. H_2O_2 acts as reducing agent in equation (A) and (B)
- D. H_2O_2 act as oxidizing and reducing agent respectively in equation (A) and (B)

Answer: C

Solution:

In this equation, H_2O_2 is reducing chlorine from +1 to -1.



In this equation, H_2O_2 is reducing iodine from 0 to -1.

Therefore, in both the reactions H_2O_2 acts as a reducing agent.

Question35

The functional groups that are responsible for the ion-exchange property of cation and anion exchange resins, respectively, are [17 Mar 2021 Shift 2]

Options:

- A. $-\text{SO}_3\text{H}$ and $-\text{N H}_2$
- B. $-\text{SO}_3\text{H}$ and $-\text{COOH}$
- C. $-\text{N H}_2$ and $-\text{COOH}$
- D. $-\text{N H}_2$ and $-\text{SO}_3\text{H}$

Answer: A

Solution:**Solution:**

The functional group responsible for the ion-exchange property of cation is $-\text{SO}_3\text{H}$ and that of anion is $-\text{N H}_2$. Cation resins attract positively charged ions and contain acidic group like $-\text{SO}_3\text{H}$ or $-\text{COOH}$ groups. While anion resins attract negatively charged ions and contains basic groups like $-\text{N H}_2$.

Question36

**The incorrect statement(s) about heavy water is (are)
(A) used as a moderator in nuclear reactor.**

(B) obtained as a by-product in fertilizer industry.

(C) used for the study of reaction mechanism.

(D) has a higher dielectric constant than water.

Choose the correct answer from the options given below:

[17 Mar 2021 Shift 1]

Options:

A. (B) only

B. (C) only

C. (D) only

D. (C) and (D) only

Answer: C

Solution:

Dielectric constant of water is greater than heavy water (D_2O).

A. It is widely used as moderator in nuclear reactors.

B. It can be prepared as a by-product in some fertiliser industries.

C. It is used in exchange reactions for the study of the reaction mechanism.

D.

Species	Dielectric constant (C^2/NM^2)
D_2O	78.06
H_2O	78.39

Question37

The correct statements about H_2O_2 are

a. used in the treatment of effluents.

b. used as both oxidising and reducing agents.

c. the two hydroxyl groups lie in the same plane.

d. miscible with water.

Choose the correct answer from the options given below.

[16 Mar 2021 Shift 2]

Options:

A. (A), (B), (C) and (D)

B. (A), (B) and (D)

C. (B), (C) and (D)

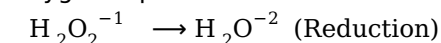
D. (A), (C) and (D)

Answer: B

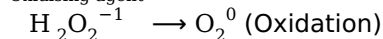
Solution:

H_2O_2 act as both oxidising and reducing agent.

Oxygen is present in -1 oxidation state, so it can be oxidised to O_2 as well as reduced to water.

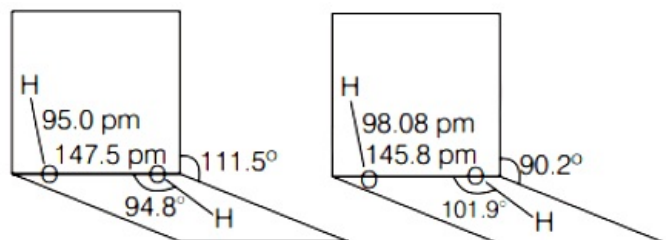


Oxidising agent



Reducing agent

H_2O_2 is miscible with water due to intermolecular H-bonding. Due to open book like structure both $-\text{OH}$ groups are not in same plane and hence, H_2O_2 is non-planar.



(a) Gas phase

(b) Solid phase

(a) H_2O_2 structure in gas phase, dihedral angle is 111.5° .

(b) H_2O_2 structure in solid phase at 110K, dihedral angle is 90.2° .

H_2O_2 used in treatment of effluents.

Question38

Given below are two statements.

Statement I H_2O_2 can act as both oxidising and reducing agent in basic medium.

Statement II In the hydrogen economy, the energy is transmitted in the form of dihydrogen. In the light of the above statements, choose the correct answer from the options given below:

[16 Mar 2021 Shift 1]

Options:

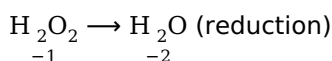
- A. Both statement I and statement II are false
- B. Both statement I and statement II are true.
- C. Statement I is true but statement II is false.
- D. Statement I is false but statement II is true.

Answer: B

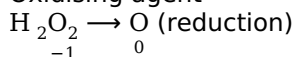
Solution:

Solution:

H_2O_2 can act as both oxidising and reducing agent in basic medium as in hydrogen peroxide oxygen is present in intermediate-1 oxidation state. So, it can get oxidised to O_2 and reduced to water.



Oxidising agent



Reducing agent

In the hydrogen economy, the energy is transmitted in the form of dihydrogen and not as electric power.
So, both statement I and statement II are true.

Question39

**The number of neutrons and electrons, respectively, present in the radioactive isotope of hydrogen is :-
[27 Jul 2021 Shift 2]**

Options:

- A. 1 and 1
- B. 3 and 1
- C. 2 and 1
- D. 2 and 2

Answer: C

Solution:

Radioactive isotope of hydrogen is Tritium (${}_1^3\text{T}$)

No. of neutrons ($A - Z$) = $3 - 1 = 2$

No. of electrons = 1

Question40

**Isotope(s) of hydrogen which emits low energy β^- particles with $t_{1/2}$ value > 12 years is/are
[22 Jul 2021 Shift 2]**

Options:

- A. Protium
- B. Tritium
- C. Deuterium
- D. Deuterium and Tritium

Answer: B

Solution:

Solution:

${}_1^1\text{H}$ and ${}_1^2\text{H}$ are stable while ${}_1^3\text{H}$ is radioactive.

Question41

**The single largest industrial application of dihydrogen is :
[20 Jul 2021 Shift 2]**

Options:

- A. Manufacture of metal hydrides
- B. Rocket fuel in space research
- C. In the synthesis of ammonia
- D. In the synthesis of nitric acid

Answer: C

Solution:

Solution:

Informative, according to ncert uses of di hydrogen.

In fact N H_3 largest production is used to manufacture nitrogenous fertilisers.

Question42

Given below are two statements : One is labelled as Assertion A and other is labelled as Reason R.

Assertion A : The dihedral angles in H_2O_2 in gaseous phase is 90.2° and in solid phase is 111.5° .

Reason R : The change in dihedral angle in solid and gaseous phase is due to the difference in the intermolecular forces.

Choose the most appropriate answer from the options given below for A and R.

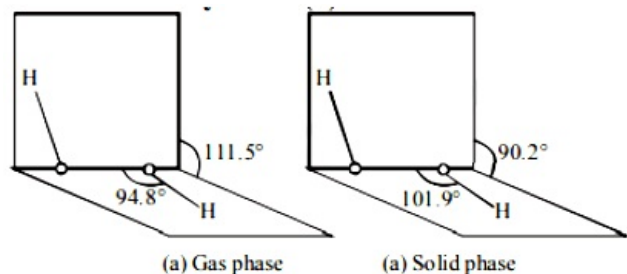
[20 Jul 2021 Shift 1]

Options:

- A. A is correct but R is not correct.
- B. Both A and R are correct but R is not the correct explanation of A.
- C. Both A and R are correct and R is the correct explanation of A.
- D. A is not correct but R is correct.

Answer: D

Solution:



(a) H_2O_2 structure in gas phase, dihedral angle is 111.5° . (b) H_2O_2 structure in solid phase at 110K, dihedral angle is 90.2° .

Hence given statement (A) is not correct But statement (B) is correct.

Question43

Which one of the following statements is incorrect?

[31 Aug 2021 Shift 2]

Options:

- A. Atomic hydrogen is produced when H_2 molecules at a high temperature are irradiated with UV radiation.
- B. At around 2000K, the dissociation of dihydrogen into its atoms is nearly 8.1%.
- C. Bond dissociation enthalpy of H_2 is highest among diatomic gaseous molecules which contain a single bond.
- D. Dihydrogen is produced on reacting zinc with HCl as well as NaOH(aq) .

Answer: B

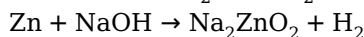
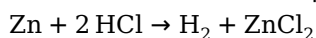
Solution:

Solution:

Statement (b) is incorrect. The corrected statement is :

At around 2000 K, the dissociation of dihydrogen into its atoms is only $\sim 0.081\%$.

Bond dissociation enthalpy of H_2 molecule is highest due to very strong attraction between the atoms.



$\text{H}-\text{H}$ bond dissociate by increasing temperature and shining UV light.

Question44

Which one of the following methods is most suitable for preparing deionised water?

[26 Aug 2021 Shift 1]

Options:

- A. Synthetic resin method
- B. Clark's method
- C. Calgon's method

D. Permutit method

Answer: A

Solution:

Solution:

Synthetic resin method is most suitable for preparing deionised water. Deionised water is obtained by passing water through cation exchange and an anion exchange resin.

Question45

The oxide that gives H_2O_2 most readily on treatment with H_2O is [27 Aug 2021 Shift 2]

Options:

A. PbO_2

B. Na_2O_2

C. SnO_2

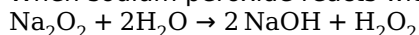
D. $\text{BaO}_2 \cdot 8\text{H}_2\text{O}$

Answer: B

Solution:

Solution:

When sodium peroxide reacts with water, it is hydrolysed and forms sodium hydroxide and hydrogen peroxide.



The reaction is highly exothermic.

Therefore, the option (b) is correct.

Question46

Given below are two statements.

One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) Heavy water is used for the study of reaction mechanism.

Reason (R) The rate of reaction for the cleavage of O-H bond is slower than that of O-D bond.

Choose the most appropriate answer from the options given below.

[26 Aug 2021 Shift 2]

Options:

A. Both (A) and (R) are true but (R) is not the correct explanation of (A).

B. Both (A) and (R) are true and (R) is the correct explanation of (A).

C. (A) is false but (R) is true.

D. (A) is true but (R) is false.

Answer: D

Solution:

Solution:

Assertion is true but Reason is false.

Heavy water (D_2O) is used as a moderator in nuclear reactor and in exchange reaction for study of reaction mechanisms.

As bond energy of $O - H < \text{Bond energy of } O - D$. Reaction rate for cleavage of $O - H$ bond is faster than $O - D$ bond.

Question47

**Hydrogen peroxide reacts with iodine in basic medium to give
[1 Sep 2021 Shift 2]**

Options:

A. IO_4^-

B. IO^-

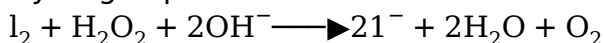
C. I^-

D. IO_3^-

Answer: C

Solution:

Hydrogen peroxide reacts with iodine in basic medium to give I^- (Iodide ion).



Question48

5g of zinc is treated separately with an excess of

(A) dilute hydrochloric acid and

(B) aqueous sodium hydroxide.

The ratio of the volumes of H_2 evolved in these two reactions is:

[Jan.09, 2020 (II)]

Options:

A. 1 : 2

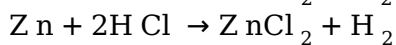
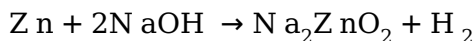
B. 1 : 1

C. 1 : 4

D. 2 : 1

Answer: B

Solution:



NaOH and HCl reacts with a certain amount of zinc to produce equal number of moles of H_2 .

Question49

Hydrogen has three isotopes (A), (B) and (C). If the number of neutron(s) in (A), (B) and (C) respectively, are (x), (y) and (z), the sum of (x), (y) and (z) is:

[Jan. 08, 2020(II)]

Options:

A. 3

B. 2

C. 4

D. 1

Answer: A

Solution:

	${}^1_1\text{H}$	${}^2_1\text{H(D)}$	${}^3_1\text{H(T)}$
Number of neutron	0	1	2
	(x)	(y)	(z)

Total number of neutrons in three isotopes of hydrogen = $0 + 1 + 2 = 3$

Question50

The hardness of a water sample containing 10^{-3}M MgSO_4 expressed as CaCO_3 equivalents (in ppm) is _____.(molar mass of MgSO_4 is

120.37g / mol)

[NV, Jan. 09, 2020(I)]

Answer: 100

Solution:

10^{-3} molar $MgSO_4 \equiv 10^{-3}$ moles of $MgSO_4$ present in 1L solutions.

$10^{-3}M MgSO_4 \equiv 10^{-3}M CaCO_3$

$10^{-3}M CaCO_3 = 10^{-3} \times 100gCaCO_3$ in 1L water $ppm_{(intermof CaCO3)} = \frac{10^{-3} \times 100}{1000} \times 10^6$

$ppm_{(interm of CaCO3)} = 100ppm$

Question51

Amongst the following, the form of water with the lowest ionic conductance at 298K is:

[Jan. 09,2020 (II)]

Options:

- A. distilled water
- B. saline water used for intravenous injection
- C. water from a well
- D. sea water

Answer: A

Solution:

Solution:

In distilled water, there are only neutral water molecules therefore, it does not conduct electricity.

Question52

In comparison to the zeolite process for the removal of permanent hardness, the synthetic resins method is:

[Jan. 07, 2020 (I)]

Options:

- A. less efficient as it exchanges only anions
- B. more efficient as it can exchange both cations as well as anions
- C. less efficient as the resins cannot be regenerated
- D. more efficient as it can exchange only cations

Answer: B

Solution:

Synthetic resin method is more efficient than zeolite process as it can exchange both cations as well as anions.

Question 53

Among statements (A)-(D), the correct ones are:

(A) Decomposition of hydrogen peroxide gives dioxygen.

(B) Like hydrogen peroxide, compounds, such as KClO_3 , $\text{Pb(NO}_3)_2$ and NaN_3 when heated liberate dioxygen.

(C) 2-Ethylanthraquinone is useful for the industrial preparation of hydrogen peroxide.

(D) Hydrogen peroxide is used for the manufacture of sodium perborate.

[Jan. 07, 2020 (II)]

Options:

A. (A) (B), (C) and (D)

B. (A), (B) and (C) only

C. (A), (C) and (D) only

D. (A) and (C) only

Answer: A

Solution:

Solution:

All the statements are correct.

Question 54

Dihydrogen of high purity (>99.95%) is obtained through:

[Sep. 06, 2020 (II)]

Options:

A. the reaction of Zn with dilute HCl.

B. the electrolysis of acidified water using Pt electrodes.

C. the electrolysis of brine solution.

D. the electrolysis of warm Ba(OH)_2 solution using Ni electrodes.

Answer: D

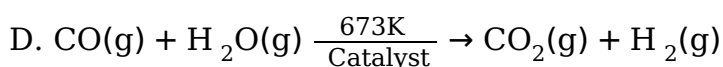
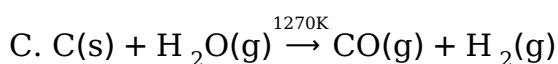
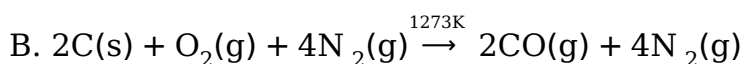
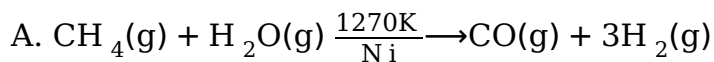
Solution:

Dihydrogen of high purity (>99.95%) is obtained by the electrolysis of Ba(OH)_2 using Ni electrodes.

Question55

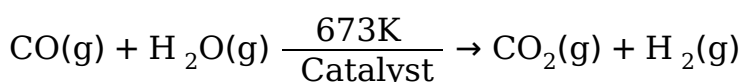
**The equation that represents the water-gas shift reaction is:
[Sep. 05,2020(I)]**

Options:



Answer: D

Solution:



This reaction is called water gas shift reaction.

Question56

**The one that is NOT suitable for the removal of permanent hardness of water is :
[Sep. 05, 2020 (II)]**

Options:

A. Clark's method

B. Ion-exchange method

C. Calgon's method

D. Treatment with sodium carbonate

Answer: A

Solution:

Solution:

Clark's method is used to remove temporary hardness, using lime water (or) Ca(OH)_2 from water.

Question57

Hydrogen peroxide, in the pure state, is:
[Sep. 05, 2020 (II)]

Options:

- A. non-planar and almost colorless
- B. linear and blue in color
- C. linear and almost colorless
- D. planar and blue in color

Answer: A

Solution:

Solution:

H₂O₂ has open book like structure, which is nonplanar. It is a colourless viscous liquid but in large quantity appears blue in colour.

Question58

The volume strength of 8.9M H₂O₂ solution calculated at 273 K and 1 atm is _____. (R = 0.0821LatmK⁻¹mol⁻¹) (rounded off to the nearest integer)
[NV, Sep. 03, 2020 (I)]

Answer: 100

Solution:

$$\text{Molarity of H}_2\text{O}_2 \text{ solution} = \left\{ \frac{\text{Volume strength}}{11.2} \right\}$$

$$\text{Volume strength} = 8.9 \times 11.2 = 99.68\text{V} \sim \text{eq}100\text{V}$$

Question59

The strengths of 5.6 volume hydrogen peroxide (of density 1g / mL) in terms of mass percentage and molarity (M), respectively, are:
(Take molar mass of hydrogen peroxide as 34g / mol)
[Sep. 03, 2020 (II)]

Options:

- A. 1.7 and 0.5
- B. 0.85 and 0.25
- C. 1.7 and 0.25
- D. 0.85 and 0.5

Answer: A

Solution:

$$\text{For H}_2\text{O}_2 \text{ Molarity} = \frac{\text{Volume strength}}{11.2} = \frac{5.6}{11.2} = 0.5\text{M}$$

$$\text{Molarity} = \frac{\%(\text{w} / \text{w}) \times 10 \times d}{\text{GM M}}$$

$$\Rightarrow 0.5 = \frac{\%(\text{w} / \text{w}) \times 10 \times 1}{34}$$

$$\Rightarrow \%(\text{w} / \text{w}) = \frac{0.5 \times 34}{10} = 1.7$$

Question60

The correct statements among (a) to (d) regarding H₂ as a fuel are :

- (i) It produces less pollutants than petrol.
- (ii) A cylinder of compressed dihydrogen weighs ~30 times more than a petrol tank producing the same amount of energy.
- (iii) Dihydrogen is stored in tanks of metal alloys like NaNi₅
- (iv) On combustion, values of energy released per gram of liquid dihydrogen and LPG are 50 and 142kJ , respectively.

[Jan.11, 2019 (I)]

Options:

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

Answer: D

Solution:

Solution:

option (i), (ii) and (iii) are correct.

Question61

NaH is an example of:

[Jan. 11, 2019 (I)]

Options:

- A. Electron-rich hydride
- B. Metallic hydride
- C. Saline hydride
- D. Molecular hydride

Answer: C

Solution:

Solution:

NaH is an ionic hydride which is also known as saline hydride.

Question 62

The total number of isotopes of hydrogen and number of radioactive isotopes among them, respectively, are:

[Jan. 10, 2019 (I)]

Options:

- A. 3 and 1
- B. 3 and 2
- C. 2 and 1
- D. 2 and 0

Answer: A

Solution:

Solution:

There are three isotopes of H out of which only tritium is radioactive, which emits low energy β^- particles. Its half life is 12.33 years.

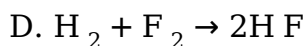
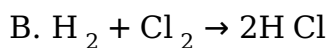
Question 63

Among the following reactions of hydrogen with halogens, the one that requires a catalyst is:

[Jan. 10, 2019 (II)]

Options:

- A. $\text{H}_2 + \text{I}_2 \rightarrow 2\text{HI}$



Answer: A

Solution:

Solution:

The reaction between I_2 and H_2 requires catalyst, whereas all other halogens react with H_2 without the requirement of a catalyst.

Question64

The isotopes of hydrogen are:

[Jan. 9, 2019 (I)]

Options:

- A. Tritium and protium only
- B. Protium and deuterium only
- C. Protium, deuterium and tritium
- D. Deuterium and tritium only

Answer: C

Solution:

Solution:

Hydrogen has three isotopes:

Protium (${}_1\text{H}^1$), deuterium (${}_1\text{H}^2$) and tritium (${}_1\text{H}^3$).

Question65

The hardness of a water sample (in terms of equivalents of CaCO_3) containing 10^{-3}M CaSO_4 is:

(molar mass of $\text{CaSO}_4 = 136\text{gmol}^{-1}$)

[Jan. 12, 2019 (I)]

Options:

- A. 10ppm
- B. 50ppm
- C. 90ppm

D. 100ppm

Answer: D

Solution:

$$10^{-3}\text{M CaSO}_4 \equiv 10^{-3}\text{M CaCO}_3$$

$\Rightarrow 10^{-3}\text{M CaCO}_3$ means 10^{-3} moles of CaCO_3 are present in 1L

Molar mass of $\text{CaCO}_3 = 40 + 12 + 48 = 100\text{g / mol}$

$$10^{-3}\text{mol} = \frac{W}{100\text{g / mol}}$$

$$W = 10^{-3} \times 100\text{g} = 100\text{mg}$$

i.e. 100mg of CaCO_3 is present in 1L solution.

Hardness of water = Number of milligram of CaCO_3 per litre of water.

$\therefore$ Hardness of water = 100ppm

Question66

The temporary hardness of water is due to:

[Jan. 9, 2019 (II)]

Options:

A. Na_2SO_4

B. NaCl

C. $\text{Ca}(\text{HCO}_3)_2$

D. CaCl_2

Answer: C

Solution:

Solution:

Only bicarbonates cause temporary hardness, whereas chlorides and sulphates cause permanent hardness.

Question67

The volume strength of 1M H_2O_2 is:

(Molar mass of $\text{H}_2\text{O}_2 = 34\text{gmol}^{-1}$)

[Jan. 12, 2019 (II)]

Options:

A. 5.6

B. 16.8

C. 11.35

D. 22.4

Answer: C

Solution:

Solution:

Volume strength = $11.35 \times \text{molarity} = 11.35$

Question68

**The chemical nature of hydrogen peroxide is:
[Jan. 10, 2019 (I)]**

Options:

- A. Oxidising agent in acidic medium, but not in basic medium.
- B. Reducing agent in basic medium, but not in acidic medium.
- C. Oxidising and reducing agent in acidic medium, but not in basic medium.
- D. Oxidising and reducing agent in both acidic and basic medium.

Answer: D

Solution:

Solution:

H_2O_2 acts as oxidising agent as well as reducing agent in both acidic and basic medium.

H_2O_2 acts as oxidant:

$\text{H}_2\text{O}_2 + 2\text{H}^+ + 2\text{e}^- \rightarrow 2\text{H}_2\text{O}$ (acidic medium)

$\text{H}_2\text{O}_2 + 2\text{e}^- \rightarrow 2\text{OH}^-$ (basic medium)

H_2O_2 acts as reductant:

$\text{H}_2\text{O}_2 \rightarrow 2\text{H}^+ + \text{O}_2 + 2\text{e}^-$ (acidic medium)

$\text{H}_2\text{O}_2 + 2\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 2\text{e}^-$ (basic medium)

Question69

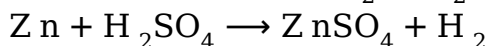
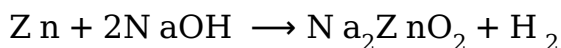
**The metal that gives hydrogen gas upon treatment with both acid as well as base is :
[April 12, 2019(I)]**

Options:

- A. magnesium
- B. mercury
- C. zinc
- D. iron

Answer: C

Solution:



Zn is an amphoteric element.

Question70

The correct statements among (a) to (d) are:

(i) saline hydrides produce H_2 gas when reacted with H_2O .

(ii) reaction of LiAlH_4 with BF_3 leads to B_2H_6 .

(iii) PH_3 and CH_4 are electron – rich and electron – precise hydrides, respectively,

(iv) HF and CH_4 are called as molecular hydrides.

[April 10, 2019 (II)]

Options:

A. (i), (ii), (iii) and (iv)

B. (iii) and (iv) only

C. (i), (iii) and (iv) only

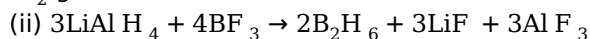
D. (i), (ii) and (iii) only

Answer: A

Solution:

Solution:

(i) Saline hydrides with water produces H_2 gas.



(iii) PH_3 is electron rich whereas CH_4 is electron precise hydride.

(iv) HF and CH_4 are molecular hydrides as they are covalent molecules.

Question71

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:

[April 12, 2019 (II)]

Options:

A. $\text{Mg}(\text{HCO}_3)_2$ and $\text{Mg}(\text{OH})_2$

B. $\text{Ca}(\text{HCO}_3)_2$ and $\text{Ca}(\text{OH})_2$

C. $\text{Mg}(\text{HCO}_3)_2$ and MgCO_3

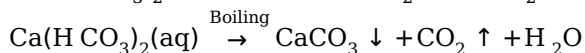
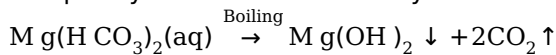
D. $\text{Ca}(\text{HCO}_3)_2$ and CaO

Answer: A

Solution:

Solution:

Temporary hardness is caused by bicarbonates of calcium and magnesium. On boiling following changes occurs,



Question72

**The synonym for water gas when used in the production of methanol is :
[April 10, 2019 (I)]**

Options:

A. natural gas

B. fuel gas

C. laughing gas

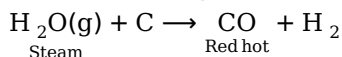
D. syn gas

Answer: D

Solution:

Solution:

When steam is passed over red hot coke, an equimolar mixture of CO and H_2 is obtained.



The gaseous mixture thus obtained is called water gas or syn gas (synthesis gas).

Question73

**The number of water molecules(s) not coordinated to copper ion directly in $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, is:
[April 9, 2019 (I)]**

Options:

A. 2

B. 3

C. 1

D. 4

Answer: C

Solution:

Solution:

In $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, four H_2O molecules are directly coordinated to the central metal ion while one H_2O molecule is hydrogen bonded.

Question74

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 is:

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

[April 8, 2019 (I)]

Options:

A. 5, 000ppm

B. 1,000 ppm

C. 100ppm

D. 10, 000ppm

Answer: D

Solution:

$$\text{Moles of Ca(HCO}_3)_2 = \frac{0.81}{162} = 0.005$$

$$\text{Moles of Mg(HCO}_3)_2 = \frac{0.73}{146} = 0.005$$

Hardness in terms of CaCO_3 in ppm

$$= \frac{(0.005 + 0.005) \times 100}{100} \times 10^6$$

$$= 10^4 \text{ppm}$$

Question75

The strength of 11.2 volume solution of H_2O_2 is: [Given that molar mass of H = 1gmol^{-1} and O = 16gmol^{-1}]

[April 8, 2019 (II)]

Options:

A. 13, 6%

B. 3.4%

C. 34%

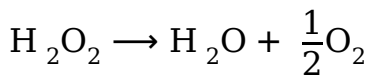
D. 1.7%

Answer: B

Solution:

11.2V strength of H_2O_2 means,

11.2L of O_2 is liberated at STP.



11.2L of O_2

at STP = 0.5mol

$\therefore$ No. of moles of $\text{H}_2\text{O}_2 = 1\text{mol}$

i.e., 1 L of given H_2O_2 solution has 1 mole of H_2O_2

(i.e., 34g)

$$\text{Strength} = \frac{34}{1000} \times 100 = 3.4\%$$

Question 76

**Hydrogen peroxide oxidises $[\text{Fe}(\text{CN})_6]^{4-}$ to $[\text{Fe}(\text{CN})_6]^{3-}$ in acidic medium but reduces $[\text{Fe}(\text{CN})_6]^{3-}$ to $[\text{Fe}(\text{CN})]^{4-}$ in alkaline medium. The other products formed are respectively:
[2018]**

Options:

A. ($\text{H}_2\text{O} + \text{O}_2$) and H_2O

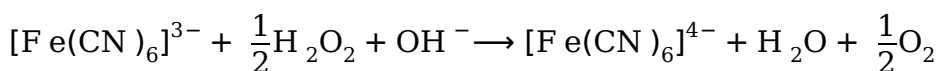
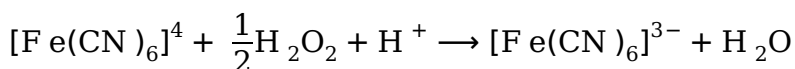
B. ($\text{H}_2\text{O} + \text{O}_2$) and ($\text{H}_2\text{O} + \text{OH}^-$)

C. H_2O and ($\text{H}_2\text{O} + \text{O}_2$)

D. H_2O and ($\text{H}_2\text{O} + \text{OH}^-$)

Answer: C

Solution:



Question77

Identify the incorrect statement regarding heavy water:
[Online April 9, 2016]

Options:

- A. It reacts with SO_3 to form deuterated sulphuric acid (D_2SO_4)
- B. It is used as a coolant in nuclear reactors.
- C. It reacts with CaC_2 to produce C_2D_2 and Ca(OD)_2 .
- D. It reacts with Al_4C_3 to produce CD_4 and Al(OD)_3 .

Answer: B

Solution:

Solution:

Heavy water acts as moderator. This is used in nuclear reactors to slow down the speed of fast moving neutrons.

Question78

Which physical property of dihydrogen is wrong ?
[Online April 11,2015]

Options:

- A. Odourless gas
- B. Tasteless gas
- C. Colourless gas
- D. Non-inflammable gas

Answer: D

Solution:

H_2 is a highly inflammable gas.

Question79

Which one of the following statements about water is FALSE?
[2016]

Options:

- A. There is extensive intramolecular hydrogen bonding in the condensed phase.

- B. Ice formed by heavy water sinks in normal water.
- C. Water is oxidized to oxygen during photosynthesis.
- D. Water can act both as an acid and as a base.

Answer: A

Solution:

There is extensive intermolecular hydrogen bonding in the condensed phase instead of intramolecular H-bonding.

Question80

**Permanent hardness in water cannot be cured by:
[Online April 10, 2015]**

Options:

- A. Treatment with washing soda
- B. Boiling
- C. Calgon's method
- D. Ion exchange method

Answer: B

Solution:

Solution:

Only temporary hardness which is due to HCO_3^- (bicarbonate) ions is removed by boiling.

Question81

**From the following statements regarding H_2O_2 , choose the incorrect statement:
[2015]**

Options:

- A. It has to be stored in plastic or wax lined glass bottles in dark
- B. It has to be kept away from dust
- C. It can act only as an oxidizing agent
- D. It decomposes on exposure to light

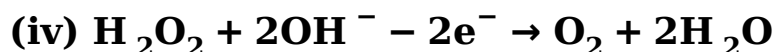
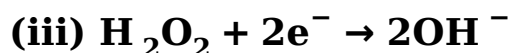
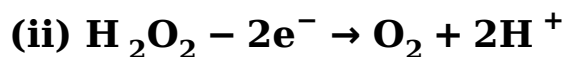
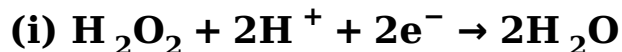
Answer: C

Solution:

H_2O_2 has oxidizing and reducing properties both.

Question82

In which of the following reactions H_2O_2 acts as a reducing agent?



[2014]

Options:

A. (i), (iii)

B. (ii),(iv)

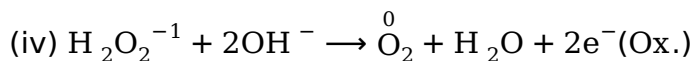
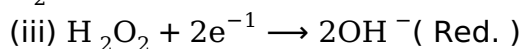
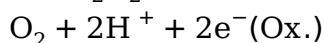
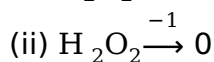
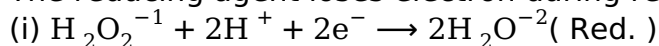
C. (i), (ii)

D. (iii),(iv)

Answer: B

Solution:

The reducing agent loses electron during redox reaction i.e. oxidised itself.

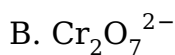
**Question83**

Hydrogen peroxide acts both as an oxidising and as a reducing agent depending upon the nature of the reacting species. In which of the following cases H_2O_2 acts as a reducing agent in acid medium?

[Online April 12, 2014]

Options:

A. MnO_4^-



Answer: A

Solution:

Solution:

H_2O_2 acts as a reducing agent only in presence of strong oxidising agents (i.e., MnO_4^-) in acidic as well as alkaline medium. $2\text{KMnO}_4 + 3\text{H}_2\text{SO}_4 + 5\text{H}_2\text{O}_2 \rightarrow \text{K}_2\text{SO}_4 + 2\text{MnSO}_4 + 8\text{H}_2\text{O} + 5\text{O}_2$

Question84

**The numbers of protons, electrons and neutrons in a molecule of heavy water are respectively:
[Online April 23,2013]**

Options:

A. 8, 10, 11

B. 10, 10, 10

C. 10, 11, 10

D. 11, 10, 10

Answer: B

Solution:

Heavy water is D_2O hence

number of electrons = $2 + 8 = 10$

number of protons = 10

Atomic mass of $\text{D}_2\text{O} = 4 + 16 = 20$,

hence number of neutron

= atomic mass – number of protons

= $20 - 10 = 10$

Question85

**Very pure hydrogen (99.9) can be made by which of the following processes?
[2012]**

Options:

A. Reaction of methane with steam

B. Mixing natural hydrocarbons of high molecular weight

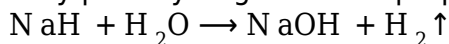
C. Electrolysis of water

D. Reaction of salts like hydrides with water

Answer: D

Solution:

Very pure hydrogen can be prepared by the action of water on sodium hydride.



Question86

In context with the industrial preparation of hydrogen from water gas ($\text{CO} + \text{H}_2$), which of the following is the correct statement?

[2008]

Options:

A. CO and H_2 , are fractionally separated using differences in their densities

B. CO is removed by absorption in aqueous Cu_2Cl_2 solution

C. H_2 is removed through occlusion with Pd

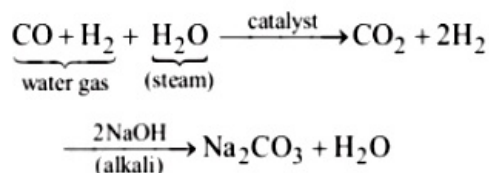
D. CO is oxidised to CO_2 with steam in the presence of a catalyst followed by absorption of CO_2 in alkali

Answer: D

Solution:

Solution:

On the industrial scale, hydrogen is prepared from water gas according to following reaction sequence



Question87

Which of the following statements in relation to the hydrogen atom is correct?

[2005]

Options:

- A. 3s, 3p and 3d orbitals all have the same energy
- B. 3s and 3p orbitals are of lower energy than 3d orbital
- C. 3p orbital is lower in energy than 3d orbital
- D. 3s orbital is lower in energy than 3p orbital

Answer: A

Solution:

Note: In one electron species, such as H-atom, the energy of orbital depends only on the principal quantum number, n.
i.e. is $2s = 2p < 3s = 3p = 3d < 4s = 4p = 4d = 4f$
