



Hydrogen Important Questions With Answers

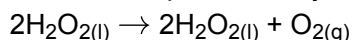
NEET Chemistry 2023

1. Which of the following act as a stabiliser for the storage of H_2O_2 ?

- a) Alkali b) Dust **c) Urea** d) None of these.

Solution : -

H_2O_2 decomposes slowly on exposure to light.



In the presence of metal surfaces or traces of alkali (present in glass containers), the above reaction is catalysed. It is, therefore, stored in wax-lined glass or plastic vessels in dark. Urea can be added as a stabiliser. It is kept away from dust because dust can induce explosive decomposition of the compound.

2. **Assertion:** A 30% solution of H_2O_2 is marketed a '100 volume' hydrogen peroxide.

Reason: 1 L of 30% H_2O_2 will give 100 mL of oxygen at STP.

- a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

Solution : -

One millilitre of 30% H_2O_2 solution will give 100 mL of oxygen at STP

3. Which of the following hydrides is electron-precise hydride?

- a) B_2H_6 b) NH_3 c) H_2O **d) CH_4**

Solution : -

Methane CH_4 is electron-precise hydride.

Diborane B_2H_6 is electron-deficient hydride

Ammonia NH_3 and water H_2O are electron-rich hydrides.

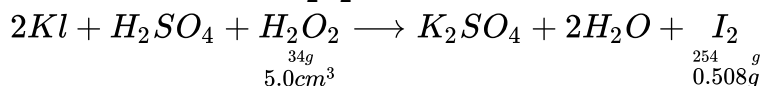
Elements of group 14 form electron-precise (having required number of electrons to write the Lewis structure) form precise hydrides.

4. 5.0 cm^3 of H_2O_2 liberates 0.508 g of iodine from an acidified KI solution. The strength of H_2O_2 solution in terms of volume strength at STP is

- a) 6.48 volumes **b) 4.48 volumes** c) 7.68 volumes d) none of these.

Solution : -

The reaction between H_2O_2 and the acidified KI solution is

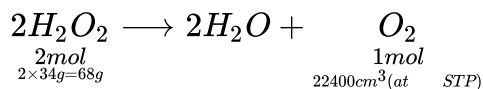


Then, Mass of H_2O_2 that liberates 0.508 g of I_2

$$\frac{34}{254} \times 0.508 = 0.068g$$

This much H_2O_2 is present in 5.0 cm^3 .

Hydrogen peroxide decomposes as follows:



Then 68 g of H₂O₂ gives 22400 cm³ of oxygen

1 g of H₂O₂ gives $\frac{22400cm^3}{68}$ of oxygen

0.068 g of H₂O₂ gives $\frac{22400cm^3}{68} \times 0.068g = 22.4$ cm³ of oxygen

Thus, S cm³ of H₂O₂ gives 22.4 cm³ of oxygen at STP

So, 1 cm³ of H₂O₂ gives $\frac{22.4}{5}$ cm³ of oxygen at STP = 4.48 cm³ at STP

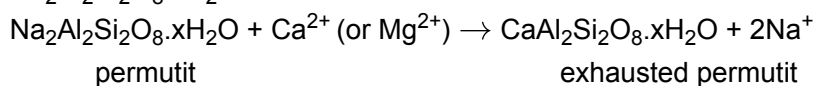
Therefore, strength of the given H₂O₂ sample = 4.48 volumes.

5. In a permutit, the calcium and magnesium ions of hard water are exchanged by:
 a) CO₃²⁻ and HCO₃⁻ ions of permutit **b) Na⁺ ions of permutit** c) Al³⁺ ions of permutit
 d) Si⁴⁺ ions of permutit.

Solution : -

Permutit is an artificial zeolite. It is sodium aluminium orthosilicate

Na₂Al₂Si₂O₈.xH₂O.



6. Elements of which of the following group(s) of periodic table do not form hydrides.
a) Groups 7, 8, 9 b) Group 13 c) Groups 15,16,17 d) Group 14

Solution : -

The metals of group 7, 8 and 9 do not form hydrides.

7. Match the following and identify the correct option.

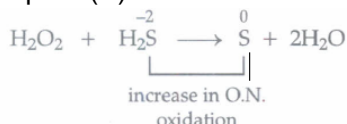
B₂H₆

- a) An electron deficient hydride** b) Non-Planar structure c) Synthesis gas
 d) Mg(HCO₃)₂ + Ca(HCO₃)₂

8. The reaction of H₂O₂ with hydrogen sulphide is an example of reaction:
a) Addition b) Oxidation c) Reduction d) Acidic

Solution : -

Since, H₂O₂ acts as an oxidizing agent, hence when it reacts with hydrogen sulphide (H₂S), it oxidizes H₂S to sulphur (S) and water is formed as a by-product.



9. Which of the following statements about hydrogen is incorrect?
 a) Hydronium ion, H₃O⁺ exists freely in solution. b) Dihydrogen does not act as a reducing agent.
c) Hydrogen has three isotopes of which tritium is the most common.
 d) Hydrogen never acts as cation in ionic salts.

Solution : -

Hydrogen has three isotopes of which protium ($\frac{1}{1}H$) is the most common. The percent abundance of protium, deuterium and tritium are 99.985, 0.0156 and 10⁻¹⁵ respectively.

10. In complex hydrides, hydride ions act as ligand and are coordinated to metal ions. These hydrides are good reducing agents. Which of the following hydrides is not a complex hydride?
 a) LiAlH₄ b) NaBH₄ **c) (AlH₃)_n** d) LiBH₄

Solution : -

(AlH₃)_n is a polymeric hydride like (BeH₂)_n, (MgH₂)_n, etc.
Whereas, LiAlH₄ and NaBH₄ and LiBH₄ are complex co-ordinate hydrides.

11. **Assertion:** Ice cube floats on water.

Reason: Density of ice is less than that of water.

- a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

12. Which of the following is not a process of preparation of hydrogen peroxide?

- a) Auto-oxidation of 2-ethylantraquinol. **b) By passing oxygen through boiling water.**
c) By oxidation of isopropyl alcohol. d) By reaction of barium peroxide with dil. H₂SO₄.

Solution : -

Preparation of 2-ethylantraquinol

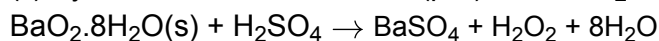
Preparation of H₂O₂



(i) 2-ethylantraquinol $\xrightarrow{H_2/pd}$ H₂O₂ + oxidized product



(ii) By reaction of barium oxide (per) with dil. H₂SO₄



(iii) By oxidation of isopropyl (alcohol)

13. The various types of hydrides and examples of each type are given below:

	Hydride type	Compound
(A)	Electron deficient	(i) LiH
(B)	Saline	(ii) CH ₄
(C)	Electron -precise	(iii) NH ₃
(D)	Interstitial	(iv) B ₂ H ₆
(E)	Electron rich	(v) CrH

Choose the correct matching from the codes given below:

- a) (A) - (ii), (B) - (iv), (C) - (v), (D) - (iii), (E) - (i) **b) (A) - (iv), (B) - (i), (C) - (ii), (D) - (v), (E) - (iii)**
c) (A) - (iv), (B) - (iii), (C) - (v), (D) - (ii), (E) - (i) d) (A) - (v), (B) - (iii), (C) - (iv), (D) - (ii), (E) - (i)

Solution : -

(A) electron deficient $\rightarrow B_2H_6$

(which can accept a lone pair of electron)

(B) saline (Ionic hydrides) $\rightarrow LiH$

(C) Electron precise $\rightarrow CH_4$

(which can neither accept nor give pair of e⁻ 14th group element makes this hydride)

(D) Interstitial $\rightarrow CrH$

(d block element from interstitial hydride)

(E) Electron rich $\rightarrow NH_3$

molecule which can donate pair of electron

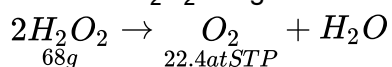
14. What will be the strength of 20 vol of H₂O₂ in terms of gram per litre?

- a) **60.71 gL⁻¹** b) 5.6 gL⁻¹ c) 30.62 gL⁻¹ d) 17 gL⁻¹

Solution : -

20 vol of H₂O₂ means:

1L of this H₂O₂ will give 20 L of oxygen at STP.



22.4 L of O₂, is produced from 68 g of H₂O₂

20 L of O₂, is produced from = $\frac{68 \times 20}{22.4} = 60.71 \text{ g L}^{-1}$ of H₂O₂

15. The order of reactivity of halogens towards hydrogen is

a) **F₂ > Cl₂ > Br₂ > I₂** b) I₂ > Br₂ > Cl₂ > F₂ c) Cl₂ > Br₂ > I₂ > F₂ d) Br₂ > Cl₂ > F₂ > I₂

16. H₂O₂ acts as a bleaching agent because of

a) reducing nature of H₂O₂ **b) oxidising nature of H₂O₂** c) acidic nature of H₂O₂
d) basic nature of H₂O₂

Solution : -

Due to oxidising nature of H₂O₂, it acts as a bleaching agent.

17. Why does H⁺ ion always get associated with other atoms or molecules?

a) Ionisation enthalpy of hydrogen resembles that of alkali metals. b) Its reactivity is similar to halogens.
c) It resembles both alkali metals and halogens.

d)

Loss of an electron from hydrogen atom results in a nucleus of very small size as compared to other atoms or ions. Due to small size it cannot exist free.

Solution : -

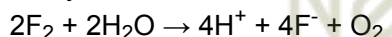
Loss of an electron from H atom results in H⁺ ion having extremely small size (-1.5 × 10⁻³ pm) as compared to normal atomic and ionic sizes of 50-200 pm. As a consequence, H⁺ does not exist freely and is always associated with other atoms or molecules.

18. Fluorine decomposes cold water to give

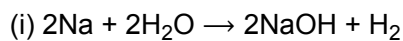
a) 4H⁺ + 4F⁻ and O₂ b) HF and H₂ c) HF only d) H₂F₂ and HFO₄.

Solution : -

Fluorine on reaction with cold water gives HF and oxygen. F₂ due to its high oxidizing power oxidizes water to oxygen and ozone by ripping apart hydrogen bond from water and bonding with fluorine to form hydrofluoric acid. The yield of Ozone is less as compared to oxygen thereby considering ozone as an impurity.



19. Given below are two reactions of water with sodium and carbon dioxide. What is the nature of water in these reactions?



a) In (ii) water acts as an oxidising agent and in (i) it acts as a reducing agent.

b) In (i) water acts as an oxidising agent while in (ii) it acts as a reducing agent.

c) In both, (i) and (ii) hydrogen acts as a reducing agent.

d) In both, (i) and (ii) hydrogen acts as an oxidising agent.

Solution : -

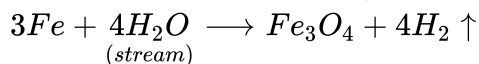
With sodium metal water acts as an oxidising agent and gets reduced to H₂, with CO₂ water acts as a reducing agent and is oxidised to oxygen.

20. A metal which does not react with cold water but reacts with steam to liberate H₂ gas is

a) Na b) Mg c) Au **d) Fe**

Solution : -

Na reacts with cold water, Mg reacts with hot water, Fe reacts with steam and Au does not react with water.



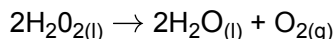
21. **Assertion:** H₂O₂ is stored in wax-lined glass or plastic vessels.

Reason : H₂O₂ decomposes slowly on exposure to light.

- a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion.
 c) If assertion is true but reason is false. d) If both assertion and reason are false.

Solution : -

H_2O_2 decomposes slowly on exposure to light.



In the presence of metal surfaces or traces of alkali (present in glass containers), the above reaction is catalysed. Hence, H_2O_2 is stored in wax-lined glass or plastic containers in dark.

22. Which of the following series of transitions in the spectrum of hydrogen atom fall in visible region?

- a) Balmer series** b) Paschen series c) Brackett series d) Lyman series

Solution : -

In H-spectrum, Balmer series transitions fall in visible region.

23. **Assertion:** All the three isotopes of hydrogen have almost the same chemical properties.

Reason: Isotopes differ from one another in respect of the presence of neutrons.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

Solution : -

Isotopes have almost the same chemical properties because they have the same electronic configuration.

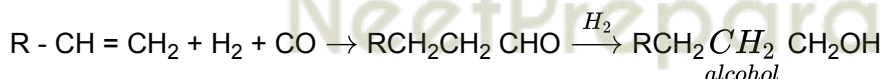
24. Alkenes combine with carbon monoxide and hydrogen in presence of octacarbonyldicobalt as catalyst under high temperature and pressure to form

a) aldehydes which can be further reduced to alcohols by hydrogen

b) alkanes which are formed by addition of hydrogen c) alcohols formed by reaction of CO and hydrogen

d) ketones which can be further reduced to aldehydes by hydrogen.

Solution : -



25. Match the column I with column II and mark the appropriate choice.

Column - I		Column - II	
(A)	Clark's method	(i)	$Na_6P_6O_{18}$
(B)	Calgon's method	(ii)	$NaAlSiO_4$
(C)	Ion- exchange method	(iii)	RSO_3H
(D)	Synthetic resins method	(iv)	$Ca(OH)_2$

a) (A) \rightarrow (i), (B) \rightarrow (iii), (C) \rightarrow (iv), (D) \rightarrow (ii) b) (A) \rightarrow (ii), (B) \rightarrow (iii), (C) \rightarrow (iv), (D) \rightarrow (i)

c) (A) \rightarrow (iii), (B) \rightarrow (ii), (C) \rightarrow (i), (D) \rightarrow (iv) **d) (A) \rightarrow (iv), (B) \rightarrow (i), (C) \rightarrow (ii), (D) \rightarrow (iii)**

Solution : -

All method used below are method of removing Henderson of water

26. Syngas is a mixture of:

- a) $CO_2 + H_2$ **b) $CO + H_2$** c) $CO + CO_2$ d) $CO + O_2$

Solution : -

Syngas also known as synthetic gas, is the name given to a mixture of CO and H_2 .

27. Which of the following is not a property of hydrogen?

- a) It is a colourless, odourless gas. b) It is highly combustible. **c) It is highly poisonous gas.**
 d) It is lighter than air.

Solution : -

Hydrogen is a non-poisonous gas. Hydrogen is a colourless, odorless gas. It is highly combustible. It is lighter than air.

28. Which of the following is not a disadvantage of using hard water?

- a) In production of steam in boilers b) Formation of scales in cooking utensils
 c) In cooking, bathing and washing **d) In ion exchangers**

Solution : -

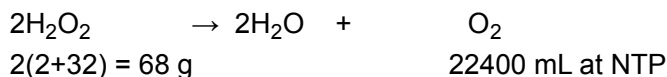
In an ion exchange using hard water is not a disadvantage since it becomes soft by exchanging anions or cations. Na^+ , Ca^{2+} and Mg^{2+} ions (from water) are exchanged with H^+ ions (from cation exchange resins). Cl^- , SO_4^{2-} and NO_3^- ions (from water) are exchanged with OH^- ions (from anion exchange resins).

29. A commercial sample of hydrogen peroxide is labelled as 10 volume. Its percentage strength is nearly:

- a) 3%** b) 1% c) 90% d) 10%

Solution : -

1 mL of 10 volume H_2O_2 = 10 mL of O_2 at NTP.



22400 mL of O_2 at NTP are obtained from 68 g of H_2O_2

10 mL of O_2 at NTP are obtained from $\frac{68}{22400} \times 10$ g of H_2O_2

10 mL of O_2 at NTP are obtained from $\frac{68}{2240}$ g of H_2O_2

1 ml of H_2O_2 solution contains $\frac{68}{2240}$ g of H_2O_2 .

100 ml of H_2O_2 solution contains $\frac{68}{2240} \times 100 = 3\%$ of H_2O_2 .

30. Which of the following represents the chemical equation involved in the preparation of H_2O_2 from barium peroxide?

- a) $\text{BaO}_2 \cdot 8\text{H}_2\text{O} + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + \text{H}_2\text{O}_2 + 8\text{H}_2\text{O}$** b) $\text{CH}_3\text{CHOHCH}_3 + \text{O}_2 \rightarrow \text{CH}_3\text{COCH}_3 + \text{H}_2\text{O}_2$
 c) $\text{BaO}_2 + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{BaCO}_3 + \text{H}_2\text{O}_2$ d) $\text{Ba}_3(\text{PO}_4)_2 + 3\text{H}_2\text{SO}_4 \rightarrow 3\text{BaSO}_4 + 2\text{H}_3\text{PO}_4$

Solution : -

Barium peroxide react with sulfuric acid to produce Hydrogen peroxide and Barium sulfate.

Isopropyl Alcohol oxidises to Acetone and water, and not hydrogen peroxide.

CO_2 reacts with water to form carbonic acid. It then reacts with barium peroxide to form barium carbonate and hydrogen peroxide. Barium carbonate is insoluble and is easy to remove by filtration. this process is widely used to manufacture H_2O_2 .

Barium phosphate reacts with Sulphuric acid to form Barium sulfate and Phosphoric acid.

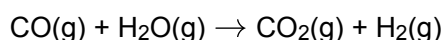
31. The production of dihydrogen obtained from coal gasification can be increased by reacting carbon monoxide of syngas mixture with steam in presence of a catalyst iron chromate. What is this process called?

- a) Hydrogen reaction **b) Water-gas shift reaction** c) Coal-gas shift reaction d) Syn gasification

Solution : -

The production of dihydrogen can be increased by reacting carbon monoxide of syngas with steam. This is called water-gas shift reaction.

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Catalyst

32. A water sample is said to contain permanent hardness if water contains

- a) sulphates and chlorides of calcium and magnesium** b) carbonates of calcium and magnesium
 c) bicarbonates of calcium and magnesium d) sulphates and chlorides of sodium and potassium.

Solution : -

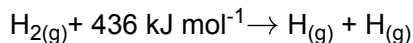
Permanent hardness of water is due to sulfates and chlorides of calcium and magnesium. Temporary hardness of water is due to bicarbonates of calcium and magnesium.

33. If a mole of hydrogen molecule is heated to a high temperature then which of the following reactions take place?

- a) $\text{H}_2(\text{g}) + 436 \text{ kJ mol}^{-1} \rightarrow \text{H}(\text{g}) + \text{H}(\text{g})$ b) $2\text{H}_2(\text{g}) + 820 \text{ kJ mol}^{-1} \rightarrow 2\text{H}_2(\text{g})$
 c) $\text{H}_2(\text{g}) + \text{H}_2(\text{g}) + 436 \text{ kJ mol}^{-1} \rightarrow \text{H}^+(\text{aq}) + \text{H}^-(\text{aq})$ d) $\text{H}_2(\text{g}) + 200 \text{ kJ mol}^{-1} \rightarrow \text{H}(\text{g}) + \text{H}(\text{g})$

Solution : -

The amount of energy required to break H - H bond of 1 mole of hydrogen is 436 kJ mol^{-1}



34. Dihydrogen forms three types of hydrides. (i) hydrides are formed by alkali metals and alkaline earth metals. (ii) hydrides formed by non-metals and (iii) hydrides formed by d and f-block elements at elevated temperature. Complex metal hydrides that are powerful reducing agents are:

a)

(i)	(ii)	(iii)	(iv)	(v)
Covalent	Molecular	Saline	NaH	LiH

b)

(i)	(ii)	(iii)	(iv)	(v)
Molecular	Covalent	Ionic	LiAlH_4	CaH_2

c)

(i)	(ii)	(iii)	(iv)	(v)
Ionic	Covalent	Interstitial	LiAlH_4	CaH_2

d)

(i)	(ii)	(iii)	(iv)	(v)
Covalent	Saline	Interstitial	LiAlH_4	NaBH_4

35. Match the following and identify the correct option.

Temporary hardness of water

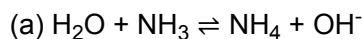
- a) $\text{Mg}(\text{HCO}_3)_2 + \text{Ca}(\text{HCO}_3)_2$ b) An electron deficient hydride c) Synthesis gas
 d) Non-Planar structure

36. Match the reactions of column I with their types given in column II and mark the appropriate choice.

Column - I		Column - II	
(A)	$\text{H}_2\text{O} + \text{NH}_3 \rightleftharpoons \text{NH}_4^+ + \text{OH}^-$	(i)	Self ionisation of H_2O
(B)	$\text{FeCl}_3 + 3\text{H}_2\text{O} \rightarrow \text{Fe}(\text{OH})_3 + 3\text{HCl}$	(ii)	Decomposition
(C)	$\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$	(iii)	Acidic nature of H_2O
(D)	$2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$	(iv)	Hydrolysis

- a) (A) \rightarrow (ii), (B) \rightarrow (i), (C) \rightarrow (iii), (D) \rightarrow (iv) b) (A) \rightarrow (iii), (B) \rightarrow (ii), (C) \rightarrow (iv), (D) \rightarrow (i)
 c) (A) \rightarrow (i), (B) \rightarrow (ii), (C) \rightarrow (iv), (D) \rightarrow (iii) **d) (A) \rightarrow (iii), (B) \rightarrow (iv), (C) \rightarrow (i), (D) \rightarrow (ii)**

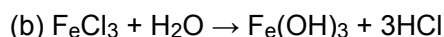
Solution : -



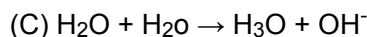
Here NH_3 is Lewis base and H_2O

acid as acid to it represents

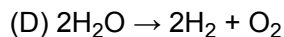
acidic nature of H_2O



it is an example of hydrolysis reaction which produces acid and base



self ionisation of water

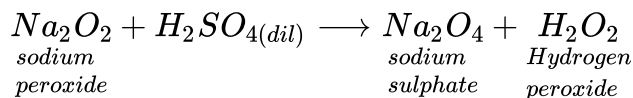


Decomposition of water in their corresponding molecule

37. When sodium peroxide is treated with dilute sulphuric acid, we get_____.

- a) sodium sulphate and water b) sodium sulphate and oxygen c) sodium sulphate, hydrogen and oxygen
d) sodium sulphate and hydrogen peroxide

Solution : -



38. Match the column I with column II and mark the appropriate choice.

Column I	Column - II
(A) NaH	(i) Interstitial hydride
(B) CH ₄	(ii) Molecular hydride
(C) VHO. ₅₆	(iii) Ionic hydride
(D) B ₂ H ₆	(iv) Electron -deficient hydride

- a) (A) → (iii), (B) → (iv), (C) → (ii) (D) → (i) b) (A) → (ii), (B) → (iv), (C) → (iii), (D) → (i)
 c) (A) → (i), (B) → (ii), (C) → (iv), (D) → (iii) **d) (A) → (iii), (B) → (ii), (C) → (i), (D) → (iv)**

Solution : -

NaH is an ionic compound and is made of sodium cations (Na⁺) and hydride anions (H⁻). It has the octahedral crystal structure with each sodium ion surrounded by six hydride ions.

CH₄ forms molecular or covalent hydrides. These are mainly formed by p - block elements and some s - block elements.

The third compound has an oxidation number of hydrogen which is zero. So it belongs to Interstitial hydride. In B₂H₆ the Boron atom is surrounded by 6 electrons, so it is electron deficient due to its incomplete octet.

39. Heavy water is obtained by

- a) boiling water b) heating H₂O₂ **c) prolonged electrolysis of H₂O** d) All of these.

Solution : -

Heavy water is obtained by prolonged electrolysis of H₂O which involves multi-stage electrolysis of ordinary water containing alkali.

40. Some statements about heavy water are given below:

- (a) Heavy water is used as a moderator in nuclear reactors.
 (b) Heavy water is more associated than ordinary water.
 (c) Heavy water is more effective solvent than ordinary water.

Which of the above statements are correct?

- a) (a) and (c) **b) (a) and (b)** c) (a), (b) and (c) d) (b) and (c)

Solution : -

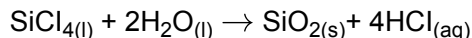
Heavy water is used for slowing down the speed of neutrons and used as moderators. Boiling point of heavy water is more than that of ordinary water, so it is more associated.

41. Hydrolysis of SiCl₄ gives

- a) Si(OH)₄ b) SiOCl₂ **c) SiO₂** d) H₂SiO₄

Solution : -

Hydrolysis of SiCl₄ gives SiO₂ (silica or silicon dioxide).



42. Which of the following metals does not liberate hydrogen from acids?

- a) Fe **b) Cu** c) Mg d) Zn

Solution : -

Copper, silver, gold and platinum being less reactive than hydrogen cannot displace hydrogen from acids.

Metals that are more reactive than hydrogen can displace hydrogen from acids. These metals include sodium, potassium, lead and zinc.

43. Non-stoichiometric hydrides are produced by

- a) palladium, vanadium** b) manganese, lithium c) nitrogen, fluorine d) carbon, nickel

Solution : -

The hydrogen deficient compounds formed by the reaction of d-block and f-block elements with dihydrogen are called Non-stoichiometric compounds.

The d-block and f-block element form non-stoichiometric hydride because of the vacant d- and f-orbitals along with the small size.

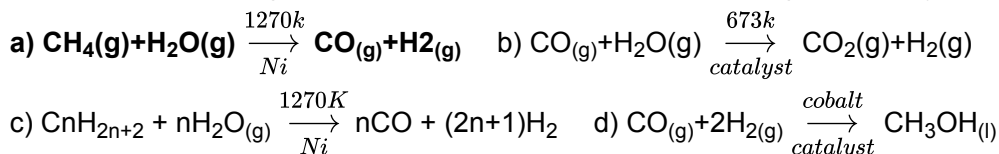
Their elemental composition proportions cannot be represented in integers. They disobey the law of constant composition. Among the elements given, only vanadium and palladium form non-stoichiometric hydrides.

44. Only one element of _____ forms hydride.
a) group 6 b) group 7 c) group 8 d) group 9

Solution : -

From group 6, only one element i.e., chromium forms CrH.

45. Which of the following reactions is an example of use of water gas in the synthesis of other compounds?



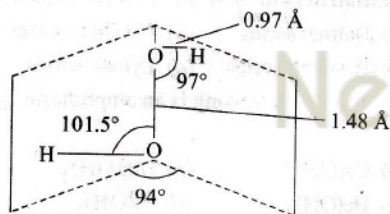
Solution : -

The mixture of CO and H₂ is called water gas. As this mixture of CO and H₂ is used for the synthesis of methanol and a number of hydrocarbons, it is also called 'synthesis gas' or 'syngas'

46. The structure of H₂O₂ is
a) planar **b) non-Planar** c) spherical d) linear

Solution : -

H₂O₂ shows non-planar structure. It has a half opened book like structure in which the two O-H groups lie on the two pages of the book.



O-O single bond distance is 1.48 Å

47. Number of hydrogen-bonded water molecules are associated in CuSO₄·5H₂O is:
a) Five **b) One** c) Four d) Three

Solution : -

In CuSO₄·5H₂O, Cu is coordinated with 4 water molecules and two more oxygen atoms from Sulphate ion. Now fifth water molecule is hydrogen-bonded and is deeply embedded in a crystal. It is not coordinated. Only 4 water molecules are coordinated and the fifth is the only hydrogen bonded.

48. Match the column I with column II and mark the appropriate choice.

Column - I	Column - II
(A) Syngas	(i) Na ₆ P ₆ O ₁₈
(B) Calgon	(ii) NaAlSiO ₄
(C) Permutit	(iii) CO+H ₂
(D) Producer gas	(iv) CO+N ₂

- a)** (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv) **b)** (A) → (iii), (B) → (i), (C) → (ii), (D) → (iv)
c) (A) → (iii), (B) → (ii), (C) → (iv), (D) → (i) **d)** (A) → (iii), (B) → (ii), (C) → (i), (D) → (iv)

49. **Assertion:** Permanent hardness of water can be removed by using washing soda.
Reason: Washing soda reacts with soluble calcium and magnesium chlorides and sulphates in hard water to form insoluble carbonates.
- a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

50. Some statements about heavy water are given below:
(i) Heavy water is used as a moderator in nuclear reactors.
(ii) Heavy water is more associated than ordinary water.
(iii) Heavy water is more effective solvent than ordinary water.

Choose the correct answer:

- a) (i) and (ii) b) (i), (ii) and (iii) c) (ii) and (iii) d) (i) and (iii)

Solution : -

Heavy water is used for slowing down the speed of neutrons in nuclear reactors, hence used as moderator.

Boiling point of heavy water is greater (374.42 K) to that of ordinary water (373 K), hence heavy water is more associated.

Dielectric constant of ordinary water is greater than that of heavy water, hence ordinary water is a better solvent.

