

Chemistry Class 11 NCERT Solutions: Chapter 9 Hydrogen Part 7

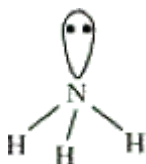
Q: 33. What do you expect the nature of hydrides is, if formed by elements of atomic numbers 15, 19, 23 and 44 with dihydrogen? Compare their behaviour towards water.

Answer

The elements of atomic numbers 15, 19, 23, and 44 are nitrogen, potassium, vanadium, and ruthenium respectively.

(1) Hydride of nitrogen

Hydride of nitrogen (NH_3) is a covalent molecule. It is an electron-rich hydride owing to the presence of excess electrons as a lone pair on nitrogen.



Q 33 1 Structure of Hydride of Nitrogen

(2) Hydride of potassium

Dihydrogen forms an ionic hydride with potassium owing to the high electropositive nature of potassium. It is crystalline and non-volatile in nature.

(3) Hydrides of Vanadium and Ruthenium

Both vanadium and ruthenium belong to the d-block of the periodic table. The metals of d-block form metallic or non-stoichiometric hydrides. Hydrides of vanadium and ruthenium are therefore, metallic in nature having a deficiency of hydrogen.

(4) Behaviour of hydrides towards water

Potassium hydride reacts violently with water as: $\text{KH}_{(s)} + \text{H}_2\text{O}_{(aq)} \rightarrow \text{KOH}_{(aq)} + \text{H}_2(g)$

Ammonia (NH_3) behaves as a Lewis base and reacts with water as:

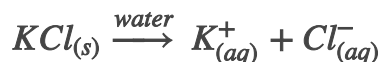


Hydrides of vanadium and Ruthenium do not react with water. Hence, the increasing order of reactivity of the hydrides is $(\text{V, Ru})\text{H} < \text{NH}_3 < \text{KH}$.

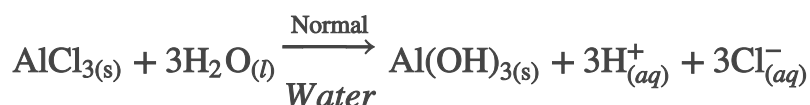
Q: 34. Do you expect different products in solution when aluminium (III) chloride and potassium chloride treated separately with (i) normal water (ii) acidified water, and (iii) alkaline water? Write equations wherever necessary.

Answer

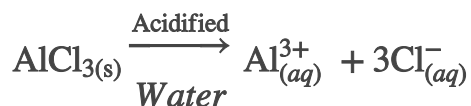
Potassium chloride (**KCl**) is the salt of a strong acid (**HCl**) and strong base (**KOH**). Hence, it is neutral in nature and does not undergo hydrolysis in normal water. It dissociates into ions as follows:



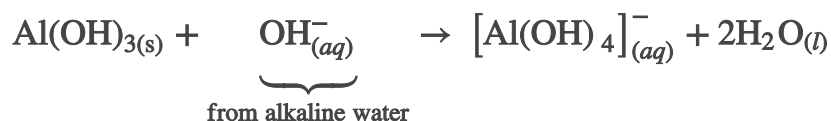
In acidified and alkaline water, the ions do not react and remain as such. Aluminium (III) chloride is the salt of a strong acid (**HCl**) and weak base [**Al(OH)₃**]. Hence, it undergoes hydrolysis in normal water.



In acidified water, **H⁺** ions react with **Al(OH)₃** forming water and giving **Al³⁺** ions. Hence, in acidified water, **AlCl₃** will exist as **Al³⁺_(aq)** and **Cl⁻_(aq)** ions.



In alkaline water, the following reaction takes place:



Q: 35.How does **H₂O₂** behave as a bleaching agent?

Answer

H₂O₂ or hydrogen peroxide acts as a strong oxidizing agent both in acidic and basic media.

When added to a cloth, it breaks the chemical bonds of the chromophores (colour producing agents). Hence, the visible light is not absorbed and the cloth gets whitened.