PRAADIS EDUCATION
CHEMISTRY-XII
HYDROGEN

1. The element that is known as Rogue element is _____
a) beryllium
b) hydrogen
c) helium
d) lithium
Answer: b
Explanation: Hydrogen resembles with alkali metals as well as halogens at the same time it differs from both and certain characteristics, that is why hydrogen is called a Rogue Element. Finally, it's been placed in the first group.
2. Which of the following element is an alkali as well as halogen?
a) hydrogen
b) sodium
c) chlorine
d) magnesium
Answer: a
Explanation: Hydrogen is an alkali metal as well as a halogen because of its outer shell configuration as well as its high electronegative character, no other element has a type of duel characteristic in the periodic table.
3. Which of the following is hydrogen's electronic configuration?
a) 1s1
b) 1s2
c) 2s1

d) 2s2
Answer: a
Explanation: The electronic configuration of hydrogen is 1s1, as it has only one Proton. It belongs to the first group and is ready to gain one electron in order to become a noble gas like helium which is next to it.
4. The atomic number of hydrogen is 1.
a) true
b) false
Answer: a
Explanation: Atomic number of an element represents the number of protons in that particular element. Here as hydrogen has only one Proton, its atomic number is considered to be one, so the above statement is true.
5. Hydrogen is a _____
a) metal
b) metalloid
c) non-metal
d) solid
Answer: c
Explanation: Hydrogen is a nonmetal denoted by the symbol “H”, but it is placed in the first group, which consists of metals. This is because of the outer shell configuration of hydrogen and that it’s valency is 1. It’s highly electronegative in nature.
6. Hydrogen is the 1st element. The elements in the periodic table are arranged with respect to their _____
a) atomic numbers
b) molecular weights
c) atmospheric abundance
d) physical state

Answer: a
Explanation: We all know that the elements in the periodic table are arranged according to their atomic numbers and atomic numbers are nothing but the number of protons in that element. So hydrogen takes the first place.
7. Hydrogen has _____ ionization enthalpy.
a) high
b) low
c) zero
d) no
Answer: a
Explanation: Though hydrogen is placed in the first group which is of alkali metals, it has a very high ionization enthalpy this is because it has a characteristic of a halogen as well. We can say that hydrogen is an alkali metal and a halogen at a time.
8. The property of hydrogen of forming diatomic molecule is from _____
a) halogen
b) alkali metal
c) noble gas
d) d-block
Answer: a
Explanation: As we know that hydrogen is an alkali metal as well as a halogen. It has properties of both alkali metals and halogens, the property of formation of a diatomic molecule is from halogens, but not from alkali metals.
9. H+ Ion exist freely.
a) true
b) false
Answer: b

Explanation: The loss of electrons from hydrogen atom results in the hydrogen nucleus that is H+ of the size 1.5 x 10-3 pm and it is extremely small when compared to a normal at atomic and ionic sizes that are around 50 to 200 pm.

10. Reactivity of hydrogen is _____ compared to halogens.

a) high
b) low
c) zero
d) negative

Answer: b

Explanation: Though hydrogen has many properties of halogens, in terms of reactivity it shows very low similarity when compared to halogens. This is one of the reasons, it's probably not placed in halogens, but in alkali metals.

11. How much percent of the total mass of the Universe is dihydrogen?

a) 60
b) 17
c) 65
d) 70

Answer: d

Explanation: The most abundant element in the universe is dihydrogen, it comprises of 70% of the total mass of the universe. It is the principal element in the Solar atmosphere Jupiter and Saturn almost consists mostly of hydrogen.

12. Which of the following is not an isotope of hydrogen?

a) helium
b) protium
c) deuterium
d) tritium

Answer: a
Explanation: Hydrogen exists in the form of three isotopes namely protium, deuterium and tritium. The atomic numbers of all the three isotopes of Hydrogen are same i.e. 1, but their symbols, relative atomic mass, density, etc vary.

13. Which of the following is Radioactive?
a) protium
b) tritium
c) chlorine
d) deuterium
Answer: a
Explanation: Among the three isotopes of Hydrogen; protium, deuterium and tritium, a radioactive isotope is tritium and it emits beta rays and its half-life is 12.33 year. The other two isotopes protium deuterium are non Radioactive.
14. Protium has a greater relative abundance than tritium.
a) true
b) false
Answer: a
Explanation: Yes, the above statement is true because protium has a relative abundance greater than that of tritium. The relative abundance of protium is 99.98%, the relative abundance of deuterium as 0.0156% and tritium is 10-15%.

15. Which of the following statements is true regarding the density of isotopes of the hydrogen?
a) protium's density is greater than that of tritium
b) tritium's density is greater than that of deuterium
c) deuterium's density is greater than that of tritium
d) protium's density is greater than that of deuterium
Answer: b
Explanation: The density of tritium is greater than that of

deuterium and the density of deuterium is greater than that of protium. The density of protium is 0.09, the density of deuterium 0.18 and density of tritium is 0.27.

16. Which of the following as a greatest relative atomic mass?
a) tritium
b) protium
c) deuterium
d) all have equal mass
Answer: a
Explanation: Tritium has the greatest relative atomic mass than that of deuterium and protium. The relative atomic mass of protium, deuterium, and tritium are 1.0078, 2.0141 and 3.016 respectively. They do not have equal mass.
17. Deuterium has a melting point higher than that of hydrogen.
a) true
b) false
Answer: a
Explanation: The above statement is true because deuterium has a greater boiling point than that of hydrogen and tritium has a greater boiling point than that of deuterium. The boiling points of tritium, deuterium, and protium are 20.62, 18.73 and 13.96 in Kelvin respectively.
18. Which of the following option is true regarding the boiling point of hydrogen isotopes?
a) all three isotopes have an equal boiling point
b) deuterium has a greater boiling point than tritium
c) tritium has a greater boiling point than that of protium
d) protium has a higher boiling point than that of tritium
Answer: c
Explanation: The boiling points of tritium are greater than that of deuterium and that is greater than that of hydrogen. The

boiling points in kelvin of hydrogen, deuterium, and tritium are respectively 20.39, 23.67 and 25.
19. Deuterium is also known as _____
a) dark hydrogen
b) heavy hydrogen
c) light hydrogen
d) radioactive hydrogen
Answer: b
Explanation: Deuterium is one of the two stable isotopes of Hydrogen (the other one being the protium), it is known as heavy hydrogen as it has one neutron and one proton. The radioactive isotope of hydrogen is tritium.
20. What is the half-life of atomic hydrogen?
a) 0.33s
b) 1.33s
c) 2.33s
d) 3.33s
Answer: a
Explanation: Molecular hydrogen in presence of electric Arc is converted into atomic hydrogen. The enthalpy change for the reaction is 105.4 kcal/mol. This newly formed atomic hydrogen is very reactive and its half-life period is 0.33 seconds.
21. Which of the following mixture is known as water gas?
a) HCL
b) Oxygen and carbon dioxide
c) Hydrogen and deuterium
d) Carbon monoxide and hydrogen
Answer: d
Explanation: The mixture of carbon monoxide and hydrogen produced by a synthetic gas is known as water gas. This is from the water gas shift reaction, which was created by a

physicist from Italy. Water gas is made by blowing steam through white-hot coke.
22. What is the process of producing syngas from coal known as?
a) coal gasification
b) metal gasification
c) iron gasification
d) zinc gasification
Answer: a
Explanation: As the mixture of carbon monoxide and hydrogen is used for the synthesis of methanol and a number of Hydrocarbons, it is called synthesis gas or syngas. The process of reducing syngas from coal is known as coal gasification.
23. What are the products in the water gas shift reaction?
a) carbon dioxide and hydrogen
b) water and carbon dioxide
c) carbon monoxide and hydrogen
d) water and carbon monoxide
Answer: a
Explanation: At 773 Kelvin in the presence of ferric oxide and chromium oxide, the water gas (carbon monoxide and hydrogen) along with steam is transformed into carbon dioxide and hydrogen. This is also known as bosch process.
24. Pure zinc is not used in the production of hydrogen.
a) True
b) False
Answer: a
Explanation: In the process of preparation of dihydrogen, pure zinc is not used because it reacts slowly. Some impurities presence increases the rate of reaction due to the formation of electrochemical couples.

25. What are the reactants and Lane's process?
a) iron and oxygen
b) hydrogen and oxygen
c) oxygen and water
d) iron and steam
Answer: d
Explanation: In Lane's process from superheated steam, iron filings are passed over and heated to about 1023 to 1073 Kelvin when hydrogen is formed. The concerned reaction is $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$ at 1023-1073 K.
26. What is sodium zincate made of?
a) Sodium and oxygen
b) Sodium, zinc, and oxygen
c) Zinc and oxygen
d) Sodium and zinc
Answer: b
Explanation: When zinc is reacted with sodium hydroxide in the presence of heat Sodium zincate and hydrogen are formed the chemical formula of sodium zincate is Na_2ZnO_2. Therefore Sodium Zincate is made of sodium, zinc, and oxygen.
27. The highly pure hydrogen is obtained when?
a) Water gas shift reaction occurs
b) Lane's process
c) Electrolysed with barium hydroxide solution
d) Hydrogen sulfate is reacted with zinc
Answer: c
Explanation: Highly pure dihydrogen (H_2) that is greater than 99.95% is obtained by electrolysis in warm aqueous barium hydroxide ($BaOH_{(aq)}$) solution between Nickel electrodes (Ni). This is one of the processes of commercial production of hydrogen.

28. Nickel and chromium actors a catalyst in case of hydrogen production from hydrocarbons.
a) true
b) false
Answer: a
Explanation: The commercial production of hydrogen from hydrocarbons by partial oxidation occurs when Nickel and chromium act as a catalyst at 1270 Kelvin, the natural gas in steam is transformed into carbon monoxide and hydrogen.
29. What is a brine solution?
a) salt
b) salt water
c) sweet
d) sweet water
Answer: b
Explanation: A Brine solution is nothing but water that has dissolved salt in it hydrogen is obtained as a byproduct in the manufacture of sodium hydroxide and chlorine by the electrolysis of brine solution (salt water).
30. Reduction occurs at the anode.
a) true
b) false
Answer: b
Explanation: Reduction is a process of gain of electrons and oxidation is a process of loss of electrons. In the electrolysis of acidified water, the reduction occurs at the cathode and oxidation occurs at the anode, the overall process is regarded as ionization in electrolysis.
31. Which of the following is not a property of dihydrogen?
a) colourless
b) odourless
c) tasteless
d) heavier than air

Answer: d
Explanation: Physical properties of dihydrogen include that it is colourless, odourless, tasteless, combustible gas. It is lighter than air and insoluble in water and is also neutral to Litmus. Therefore heavier than air is not a property of dihydrogen.
32. Dihydrogen is relatively inert at room temperature.
a) true
b) false
Answer: a
Explanation: The inertness of dihydrogen comparatively at 27 degree-celcius, is because of its high bond energy of the hydrogen bond. Therefore we can say the reactions involving dihydrogen occur at high temperatures only.
33. At high electric discharge hydrogen and oxygen combine to form _____
a) acid
b) water
c) hydrogen peroxide
d) salt
Answer: c
Explanation: At 970 Kelvin, an electric discharge 2 moles of hydrogen molecule combines with one mole of Oxygen in order to form 2 moles of water. This has an enthalpy change of about 285.9 KJ/mol, the enthalpy change is negative for the above process.
34. Which of the following statement is true regarding the order of reactivity of halogens?
a) Fluorine’s reactivity is greater than that of bromine
b) Florine’s reactivity is greater than that of fluorine
c) Iodine’s reactivity is greater than that of chlorine
d) Bromine’s reactivity is greater than that of chlorine
Answer: a
Explanation: The order of reactivity of halogens with

hydrogen is that Fluorine's reactivity is greater than that of chlorine and chlorine's reactivity is greater than that of bromine and bromine's reactivity is greater than that of Iodine.
35. What is the temperature required in presence of molybdenum and iron for nitrogen to combine with hydrogen?
a) 123 Kelvin
b) 273 Kelvin
c) 673 Kelvin
d) 473 Kelvin
Answer: c
Explanation: At 673 Kelvin and 200 atmospheric pressure, one mole of nitrogen combines with three moles of hydrogen in presence of iron and molybdenum in order to form 2 moles of ammonia and the enthalpy change is 92.6 KJ per Mol, the enthalpy here change is negative.
36. Sodium and hydrogen combine to form sodium hydride in presence of heat, what is the oxidising agent here?
a) nitrogen
b) sodium
c) hydrogen
d) oxygen
Answer: c
Explanation: In the formation of 2 moles of sodium hydride from two moles of sodium and one mole of hydrogen, the hydrogen acts as an oxidising agent. An oxidizing agent gains electrons from the other molecule and reduces itself.
37. How does vegetable oil gets converted into vegetable ghee?
a) nitrogenation
b) dehydrogenation
c) hydrogenation
d) oxygenation

Answer: c
Explanation: In presence of Nickel, as a catalyst at the temperature of 400 degrees Kelvin, vegetable oil is converted into vegetable ghee in presence of hydrogen and this process of transformation of oil into ghee is known as hydrogenation.
38. Hydrogen is used in the manufacture of _____
a) carbon dioxide
b) methanol
c) nitrogen dioxide
d) ozone
Answer: b
Explanation: In the presence of Cobalt, one mole of carbon monoxide in gaseous state combines with 2 moles of the hydrogen molecule in a gaseous state in order to form one mole of methanol in a liquid state. Hydrogen is used in the manufacture of methanol.
39. Hydrogen is used in an oxyhydrogen flame.
a) true
b) false
Answer: a
Explanation: Hydrogen is used to produce a temperature of 2850 degrees centigrade and the oxygen atomic hydrogen flame produces a temperature of 4000-degree centigrade, so it is used in an oxyhydrogen flame. So the above statement is true.
40. Is hydrogen used in the synthesis of ammonia?
a) cannot say
b) yes
c) no
d) not at all
Answer: b
Explanation: The largest single use of dihydrogen is that it is used in the synthesis of ammonia which is used in the

manufacture of nitric acid and also fertilizers, so there is an indirect use of hydrogen in the synthesis of fertilizers.
41. Manufacture of synthetic petrol involves _____
a) nitrogen
b) hydrogen
c) helium
d) neon
Answer: b
Explanation: Hydrogen is used in the manufacture of synthetic petrol, that is why heating dihydrogen with coal and heavy oils under the very high pressure and presence of catalyst we can manufacture synthetic petrol.
42. Which of the following is true regarding the uses of hydrogen?
a) it is used in the manufacture of synthetic petrol
b) it is used as an oxidizing agent in the extraction of metals
c) it is used in a fuel cell for generating mechanical energy
d) it is used as rocket fuel in its gaseous form
Answer: a
Explanation: The correct statement of the incorrect statements are; the dihydrogen is used as a reducing agent in the extraction of metals, it is used in a fuel cell for generating electrical energy and liquid hydrogen is used as rocket fuel.
43. Which of the following acts as a ligand in complex Hydrides?
a) H_2
b) H^-
c) H^+
d) H
Answer: b
Explanation: In complex hydrides like Lithium aluminium hydride or lithium sodium hydride, the hydrogen acts as a

ligand and it is attached to the central atom in complex hydrides, which are salt-like substances.
44. $(BeH_2)_n$ is a _____
a) covalent hydride
b) polymeric hydride
c) ionic hydride
d) metallic hydride
Answer: b
Explanation: Polymeric hydrides are formed by elements having electronegativity in the range of 1.4 to 2.0. Examples of polymeric hydrides are $(BeH_2)_n$, $(AlH_3)_n$ etc. They are joined to each other through hydrogen bonding in order to form a larger unit.
45. The oxidation state of hydrogen in hydrides is -1.
a) true
b) false
Answer: a
Explanation: The compounds of hydrogen with metals and nonmetals are called hydrides and their Oxidation state is -1. The examples are sodium hydride, calcium hydride, magnesium hydride etc. There are many types of hydrides like ionic hydrides, molecular hydrides covalent hydrides etc.
46. Hydrides made from group 1 and 2 are known as _____
a) complex hydrides
b) ionic hydrides
c) metallic hydrides
d) covalent hydrides
Answer: b
Explanation: Ionic hydrides are formed by elements of group 1 and 2 except beryllium and magnesium, by heating them in hydrogen. They are white colourless crystalline solid having a

high melting point and boiling point and they are easily decomposed by water, carbon dioxide or Sulphur dioxide.
47. What is used for removing the last traces of water from organic compounds?
a) Hydrogen
b) Lithium aluminium hydride
c) Ionic hydrides
d) Molecular hydrides
Answer: c
Explanation: Ionic hydrides are very strong reducing agents. Alkali metal hydrides are used for making Lithium aluminium hydride, sodium Boron hydride etc and they are also used for removing last traces of water from organic compounds.
48. Molecular hydrides of formed from _____
a) f-block elements
b) p- block elements
c) d-block elements
d) s- block elements
Answer: b
Explanation: Molecular hydrides are also called as covalent hydrides and they are formed by elements of p-block those having higher electronegativity than hydrogen. They are again divided into electron deficient hydrides, electron precise hydrides and electron rich hydrides.
49. Which of the following is an example Of electron rich hydride?
a) methanol
b) methane
c) aluminium hydride
d) ammonia
Answer: d
Explanation: Electron rich hydrides are the hydrides which have a greater number of electrons than required to form

normal covalent bonds. Examples are the hydrides of group 15, 16 and 17, the excess electrons in these hydrides, are present as lone pairs of electrons.

50. Methane is a electron _____ hydride.

a) poor

b) deficient

c) rich

d) precise

Answer: d

Explanation: Electron precise hydrides are the hydrides which have an exact number of electrons, that are needed to form normal covalent bonds. Few examples are the hydrides of group 14 like methane, Silicon hydride etc.

51. Aluminium hydride is an electron deficient hydride.

a) true

b) false

Answer: a

Explanation: Aluminium hydride is a molecular hydride, because it does not have a required number of electrons to form the normal covalent bonds. So, aluminium hydride is also called as an electron-deficient hydride, therefore the above statement is true.

52. Interstitial hydrides are also called as _____

a) complex hydrides

b) molecular hydrides

c) ionic hydrides

d) metallic hydrides

Answer: d

Explanation: Metallic hydrides are also known as interstitial hydrides, these are formed when the transition metals and the rare Earth metals combine with hydrogen. Molecular hydrides are nothing but covalent hydrides, where are ionic hydrides are formed from S block elements.

53. Metallic hydrides are powerful _____ agents.
a) oxidizing
b) reducing
c) combining
d) separating
Answer: a
Explanation: The metallic hydrides are powerful reducing agents. They are formed from the combination of transition metals and rare Earth metals with hydrogen and they also exhibit metallic properties. They are non-stoichiometric hydrides.
54. $LaH_{2.76}$ is an example of _____
a) molecular hydrides
b) metallic hydrides
c) covalent hydrides
d) ionic hydrides
Answer: b
Explanation: The metallic interstitial hydrides' composition varies with temperature and pressure, they are non-stoichiometric in nature and example for this is $LaH_{2.76}$. These hydrides are formed when transition metals and rare Earth metals combine with hydrogen.
55. The hydride gap is related to group _____
a) 7, 8
b) 7, 9
c) 7, 8, 9
d) 8, 9
Answer: c
Explanation: Metals of the group 7, 8 and 9 do not form hydrides under standard temperature and pressure and this region of the periodic table is called hydride gap. So the hydride gap is related to group 7, 8 and 9.

56. Water is amphoteric in nature.
a) true
b) false
Answer: a
Explanation: Yes, the above statement is true because water is amphoteric in nature. It acts as an acid when it is with a strong base and acts as a base when it is with strong acid. It is an oxidizing as well as a reducing agent.
57. Water reacts with _____
a) metalloids
b) metals only
c) nonmetals only
d) both metals and nonmetals
Answer: d
Explanation: In redox reactions, water reacts with metals and nonmetals both. For example, take the reaction of sodium with water, the products are sodium hydroxide and hydrogen, whereas fluorine reacts with water in order to form hydrogen cation and fluorine anion with oxygen.
58. Water is of how many types in hydrated salt?
a) 1
b) 5
c) 4
d) 3
Answer: b
Explanation: In hydrated salt, there are five types of water. The five types of water in hydrated salt are i. coordinated water, ii. hydrogen bonded water, iii. lattice water, iv. clathrate water and v. zeolite water.
59. Compounds can undergo hydrolysis with water.
a) false
b) true

Answer: b
Explanation: Yes, a number of compounds such as calcium hydride(CaH), calcium phosphide(Ca_3PO_4), etc can undergo hydrolysis with water. Therefore we can say that compounds can undergo hydrolysis with water.
60. Do ice float on Water?
a) may be
b) yes
c) cannot say
d) no
Answer: b
Explanation: Ice floats on water, this is because of the density of ice i.e. mass per unit volume (density of ice is 0.9167 g/cm^3 and density of water is $1g/cm^3$) is lesser than that of water. This is the reason, ice floats over water.
61. The type of hardness that occurs due to the presence of bicarbonate of calcium and magnesium ions hardness is _____
a) half hardness
b) temporary hardness
c) permanent hardness
d) momentary hardness
Answer: b
Explanation: The water which forms come with soap is known as hard water. The hardness that occurs due to the presence of bicarbonates of calcium and magnesium is temporary hardness. Temporary hardness can be removed by boiling and Clark's process.
62. What is the most efficient method to get water with zero degrees hardness?
a) Electrolysis
b) Permutit process
c) Synthetic resins

d) Calgon process
Answer: b
Explanation: Permutit is hydrated sodium aluminum silicate, it exchanges it's sodium ions for divalent ions of calcium and magnesium, permutit when fully exhausted can be regenerated by treating with 10% of sodium chloride solution. It is the most efficient method to get water with zero degrees of hardness.
63. Which of the following is a method of removing temporary hardness?
a) boiling
b) adding washing soda
c) adding caustic soda
d) adding sodium phosphate
Answer: a
Explanation: The methods that are used for removing the temporary hardness of water are by boiling and by Clark's process. Adding washing soda, caustic soda and sodium phosphates are for permanent hardness removal.
64. What is Calgon?
a) potassium Phantom metaphosphate
b) sodium penta metaphosphate
c) potassium hexametaphosphate
d) sodium hexametaphosphate
Answer: d
Explanation: Permanent hardness is removed by Calgon process. In this process, Calgon is referred to Sodium hexametaphosphate and its chemical formula is given by $Na_6P_6O_{18}$. This Calgon when added to hard water forms soluble complex.
65. Which of the following, do you think are the synthetic resins present in removal of permanent hardness?
a) cation exchange resins only

b) anion exchange resins only
c) both cation exchange resins and anion exchange resins
d) neither cation exchange resins nor anion exchange resins
Answer: c
Explanation: There are two types of synthetic resins used for removal of permanent hardness. They are cation exchange resins which are big molecules containing sulfonic acid group and an anion exchange resins which are also big molecules containing amino acids.
66. What is the hybridization of water?
a) spd
b) sp^3
c) sp^2
d) sp
Answer: b
Explanation: Water has a hybridization of sp^3. In a water molecule oxygen has two lone pairs and two bonded hydrogens. Its structure is V in shape and has a bent structure. Water has a chemical formula of H_2O.
67. Pure water is a good conductor.
a) true
b) false
Answer: b
Explanation: As pure water is not a good conductor, we add a little amount of an acid or alkali or salt in order to make it a good conductor. The above-given statement that pure water is a good conductor, is considered to be false.
68. Water has a maximum density at _____ degree centigrade.
a) 32
b) 100
c) 0
d) 4
Answer: d

Explanation: Water has a maximum density at 4-degree centigrade, this is because at 4-degree centigrade, as opposite forces are in balance that is like the formation of Ice and maintaining of the liquid phase of water. Any less than 4-degree centigrade or greater than 4-degree centigrade, the water density is lesser than that of 4-degree centigrade.

69. Dielectric constant of water is _____

a) 1
b) higher
c) 0
d) lower

Answer: b

Explanation: Water has a high dielectric constant and that is 78.39. The interaction of water with ionic substances is effective along with the release of energy in a noted quantity because of the Ion dipole interaction. This is applicable to the intercations with polar substances also.

70. Urea's dissolution is because of _____

a) carbon bond
b) oxygen Bond
c) hydrogen bond
d) nitrogen bond

Answer: c

Explanation: The dissolution of covalent compounds like urea, glucose, and ethanol is due to the tendency of these molecules to form a hydrogen bond with water. Urea's dissolution as because of the hydrogen bond.