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CHEMISTRY

Class 10th (KPK)

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CLASS:_____ SECTION: _____

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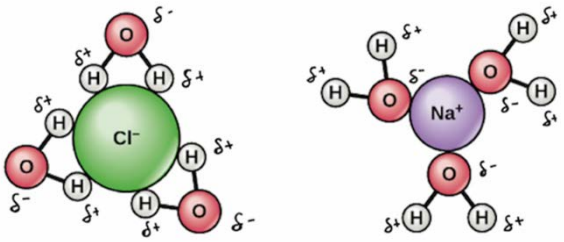
UNIT: 15

ENVIRONMENTAL CHEMISTRY II:WATER
SHORT QUESTIONS: -

Q: Identify the factor which are responsible for dissolving polar substance in water?
A: Factors affecting solubility:
Water because of its polarity and ability to form hydrogen bonds, water makes an excellent solvent, meaning that it can dissolve different kinds of molecules.
Explanation: Water molecules have a polar arrangement of the oxygen and hydrogen atoms—one side (hydrogen) has a positive electrical charge and the other side (oxygen) had a negative charge. This allows the water molecule to become attracted to many other different types of molecules. Water can become so heavily attracted to a different molecule, like salt ($NaCl$) that it can disrupt the attractive forces that hold the sodium and chloride in the salt molecule together and, thus, dissolve it.



2: Explain why it is advisable to drink boiled water?
A: Water treatment process improves the quality of water. In the treatment process, the removal of suspended and dissolved solids and kills the harmful bacteria and microbes, makes the water clean and safer for drinking. If we drink the untreated or contaminated water, there is a great risk of being seriously ill. Boiling water is a safe precaution to prevent waterborne diseases like diarrhea, Dysentery cholera, and Typhoid fever etc. So it is always advisable to drink treated or boiled water.
3: Why ice floats on the surface of water?
A: The density of most of the solids and liquids increases with decrease in temperature. However, water shows a unique behavior in this regard because of hydrogen bonding. A water molecule is made from one oxygen atom and two hydrogen atoms strongly joined to each other. Water molecules are also attracted to each other by weaker chemical bonds (hydrogen bonds) between the positively-charged hydrogen atoms and the negatively charged oxygen atoms of neighboring water molecules. As the water cools below 4 C, the hydrogen bonds adjust to hold the negatively charged oxygen atoms

apart. This produces a crystal lattice, which is commonly known as ice. When water is cooled down below 4℃, its density decreases. At 0℃, the density of water becomes 0.91 g/cm. Thus, ice is lighter than liquid water and therefore floats on the surface of water.

4: Explain the importance of water and its quality?

A: Water is an important requirement in our life. After air, the importance of water takes the second place for survival on earth. Earth is the only planet in the solar system that contains water. It is very difficult to survive even a few days without drinking water.

Water quality: It describes the condition of the water, including chemical, physical, and biological characteristics. Water quality is measured by several factors, such as the concentration of dissolved oxygen, bacteria levels, the amount of salt or the amount of material suspended in the water .it saves us from many waterborne diseases. When water quality is poor, it affects not only aquatic life but the surrounding ecosystem as well.

5: What is eutrophication? How does it pollute water?

A: Eutrophication: The excessive amount of nutrients such as nitrogen, phosphorous, nitrates etc. in water bodies is called eutrophication. Eutrophication can have serious effects, like algal blooms that block light from getting into the water and harm the plants and animals that need it. If there's enough overgrowth of algae, it can prevent oxygen from getting into the water and creating a dead zone where no organisms can survive. Hence this results in the death of aquatic animals.

6: How chemistry helps to maintain clean swimming pools?

A: Chemistry helps to maintain a clean swimming pool by killing bacteria and other microorganisms by using chlorine based disinfectants. It can be easily applied, measured and controlled. It is fairly persistent and relatively cheap. Chlorine itself does not kill when it is added into water, but it reacts with water to form hypochlorous acid (HOCl) and hydrochloric acid (HCl).$\mathbf{Cl_{2(g)} + H2O_{(l)} \rightarrow HOCl_{(aq)} + HCl_{(aq)}}$ Both kill microorganisms and bacteria by attacking the lipids in the cell walls and destroying the enzymes and structures inside the cell, makes them harmless. HOCl is unstable and produce atomic oxygen (O) which bleach the dyes and kill the germs by oxidations. Hypochlorous acid is able to oxidize the organisms in several seconds.

$\mathbf{HOCl_{(aq)} \rightarrow HCl_{(aq)} + [0]}$

7: Make the distinction between soft and hard water?

Soft water: Soft water contains fewer minerals such as Sodium. The formula is H_2O.Soft water is that water, which easily produces good lather and does not scum with soap because it has less minerals than hard water

Hard water: Hard water contains more minerals such as Calcium bicarbonate, Magnesium bicarbonate, Calcium Sulphate, Magnesium Sulphate, Calcium Chloride and Magnesium Chloride. The formula is D_2O. Hard water is that water, which produces little lather and forms scum with soap. Because of the high mineral quantity in hard water it leaves residue on things Due to the minerals counteracting the soap particles will not forming the foaming.

8: Why water is universal solvent?

A: Water is called the universal solvent because more substances dissolve in water than in any other chemical. This is due to polarity of each water molecule. The hydrogen side of water molecule carries slight positive charge, while oxygen side carries slight negative charge. This helps water dissociate ionic compounds into positive and negative ions. The positive part of ionic compound is attracted to oxygen side of water while negative part is attracted to hydrogen side of water. For example, consider what happens when salt dissolves in water. Salt is sodium chloride($NaCl$). The sodium portion of the

compounds carries a positive charge, while the chlorine part carries a negative charge. The two ions are connected by an ionic bond. The hydrogen and oxygen in the water, on the other hand, are connected by covalent bonds. Hydrogen and oxygen atoms from different water molecules are also connected via hydrogen bonds. When salt is mixed with water, the water molecules orient so that the negative charge oxygen anions faces the sodium ion, while the positive-charged hydrogen cations face the chloride ion. Although ionic bonds are strong, the net effect of the polarity of all the water molecules is enough to pull the sodium and chlorine atoms apart. Once the salt is pulled apart, its ions become evenly distributed, forming a homogeneous solution.

9: Give some of the disadvantages of the detergents?

A: Disadvantages:
1).The major disadvantage of detergent is that they are non - biodegradable. Microorganisms like bacteria cannot decompose detergent, while these microorganisms can easily decompose soap.
2) They causes soil and water pollution
3) Excessive alkalis used in some detergent can damage the fabric.
4) Colour may run out while using cheaper variety of detergent.
5) More amount of water is required for rinsing to remove foam, otherwise it will damage the fabric

10: Identify the different toxic substances in household wastes?

A: Household waste products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be "household hazardous waste". It is hazardous to human health and the environment. The following are the toxic household waste substances: Aerosols, Batteries, Automotive, Chemicals, Fertilizer, Fluorescent light bulbs, Hair color, Kerosene, Lawn and garden pesticides Nail polish, Shampoo and Thermometers with mercury

LONG QUESTIONS:

1a): Enlist the main sources of water?

A: Water is one of the most abundant natural resources present on earth. There are two main sources of water;

1**. Oceans (97.5%)**

2. Fresh water (2.5%) Fresh **water is further subdivided into:**

Lakes
Rivers
Ground water
Glaciers and ice caps.

The distribution of water on the Earth's surface is extremely uneven. Only 2.5% of water on the surface is fresh; the remaining 97.5% resides in the ocean. Of freshwater, 69% resides in glaciers, 30% underground, and less than 1% is located in lakes, rivers, and swamps. Only one percent of the water on the Earth's surface is usable by humans, and 99% of the usable quantity is situated underground.

b): How would you categorize physical properties of water?

A: Physical properties of water:

Pure water is colourless, odourless and a tasteless liquid.
Water exists in nature in all the three states i.e. solid, liquid and gas.
Freezing point of water is 0°C and boiling point is 100°C.
Pure water is neutral to litmus. It does not change the colour of the litmus.
Pure water has minimal electrical conductivity, but it's conductivity increases as electrolyte dissolved in it. Water is a polar molecule.
It has heat capacity of 4.18J/g℃ Water conduct heat and have high surface tension.

C): Predict the product of reaction, (i). K (ii). Cl_2 (iii). CaO (iv). CH_3CHOOH (v). C, with water?

A: Reaction With Alkali Metals: Potassium (K) react with water forming potassium hydroxide (KOH), and produce Hydrogen gas. $2K_{(s)} + 2H_2O_{(l)} \rightarrow 2KOH_{(aq)} + H_2(g)\uparrow$

Reaction with Chlorine: Chlorine gas reacts with water to produce hydrochloric acid (HCl) and hypochlorous acid (HOCl). It produces atomic oxygen which can killed the germs by oxidation.

$Cl_{2(g)} + H_2O_{(g)} \rightarrow HCl + HOCl_{(aq)}$ $HOCl_{(aq)} \rightarrow HCl_{(aq)} + [O]$

Reaction with Calcium Oxide: Water reacts with calcium oxide (quicklime) forming calcium hydroxide (slaked lime).$CaO_{(s)} + H_2O_{(aq)} \rightarrow Ca(OH)_{2(aq)}$

Hydrolysis Reaction: It is defined as the reaction in which H-OH bond of water molecule is broken down by the action of salt with water. When salt is added into water the solution becomes basic or acidic due to hydrolysis reaction. In this reaction water splits into H+ and OH- ions $CH_3COONa_{(aq)} + H_2O_{(l)} \rightarrow CH_3COOH_{(aq)} + NaOH_{(aq)}$ (Salt of weak acid) (weak acid)(Strong Base)**Reaction with Carbon:** When steam is passed over a red-hot carbon, a mixture of hydrogen and carbon monoxide, known as water gas is produced.

$C_{(s)} + H_2O_{(g)} \rightarrow CO_{(s)} + H_{2(g)}\uparrow$

Red hot carbon Water Gas

2: Water is an excellent solvent. Explain how this property is beneficial for life but sometimes harmful for us?

A: Water is the best-known solvent. It can dissolve more substances than any other solvent. Due to this fact, it is termed as a universal solvent. This property is very beneficial for us but sometimes become harmful for us, because mostly salts (pollutants) dissolve in water and cause water pollution. This characteristic property of water is due to the following reasons;

i: Polarity of water molecules

ii: Hydrogen bonding in water

iii: Dielectric constant

i: Polarity of water molecules: The water molecule has polar structure. The hydrogen on one end of the water molecule is partially positive.while the oxygen on the other end is partially negative. It is due to the electronegativity difference between oxygen (O=3.5) and hydrogen (H=2.1) atoms. When an ionic compound is added into water, oppositely charged ions are surrounded by water molecules. These oppositely charged ions of ionic compounds are pulled by the water molecules and it becomes soluble in water. For example,$NaCl$,KCl, are soluble in water. When an ionic compound such as sodium chloride ($NaCl$) is added to water, the sodium ion (Na^+) of NaCl is attracted towards the partial negative pole (O-δ) of water molecule while the chloride ion (Cl^+) is attracted towards the partial positive pole ($H^+\delta$) of water molecule. The ionic bond break down in NaCl, which causes the sodium chloride to split in water and dissolves. The water molecules orient in such a way that the negative poles are towards the positive ions. Similarly, the positive poles of water molecules orient themselves around the negative ions. A hydration shell is formed around the ions, which prevents Na^+ and Cl^- from attracting each other.

ii: Hydrogen bonding in water: Water molecule is composed of oxygen and hydrogen atoms. The hydrogen on one end of the water molecule is partially positive .while the oxygen on the other end is partially negative. Because of the presence of two nonbonding electrons (lone pairs of electrons) on oxygen, water molecule forms four hydrogen bonds with other H_2O molecule. These water molecules are arranged in a tetrahedral manner. Hydrogen bonding makes water unique. Covalent compounds, which have polar ends also form hydrogen bond with water. This behavior enables water to dissolve some of the covalent compounds having hydroxyl group (OH^-) very easily. For example, sugar ($C_{12}H_{22}O_{11}$), alcohol like methyl alcohol (CH_3OH) etc. will dissolve easily. **iii: Dielectric constant:** Dielectric constant is based on the coulomb law in which the force of attraction between two oppositely charged bodies “x” and “y” is directly proportional to the product of charges and inversely proportional to the square of distance between them r^2 .**Mathematically it can be written as:**

$\boldsymbol{Force} \propto \frac{(x)(y)}{r2}$ $\boldsymbol{Foece} = \frac{(x)(y)}{Dr2}$Where D is the proportionality constant and is called the dielectric constant of water. Greater the value of D the smaller will be the force of attraction and vice versa. Water has a high dielectric constant of 80 at 18℃. Thus, the positive and negative ions of a polar salt dissolved in water will have less force of attraction and would remain soluble, while other liquids have small value of dielectric constant compared to water and therefore, these are not good solvents.**3a): Classify temporary hard water and permanent hard water?**

A: There are two types of hard water;

1: Temporary hard water2: Permanent hard water

1: Temporary hard water: The temporary hardness of water is due to the dissolved Calcium bicarbonate and Magnesium bicarbonate. These salts are soluble in water and are present in the form of

positive and negative ions as shown below:
$Ca(HCO_3)_{2(aq)} \rightarrow Ca^{2+}((_{aq0} + 2HCO_3^-{}_{(aq)}$ $Mg(HCO_3)_{2(aq)} \rightarrow Mg^{2+}{}_{(aq)} + 2HCO_3^-{}_{(aq)}$ **2: Permanent hard water:** The permanent hardness of water is due to the presence of chlorides (Cl-) or sulphates (SO_4^{-2}) of calcium and magnesium i.e. $MgCl_2$, $MgCO_3$ and $CaCl_2$. These salts are soluble in water and produce the respective ions in water. Simple boiling of the water cannot decompose these salts.$CaCl_{2(aq)} \rightarrow Ca^{2+} + 2Cl^-{}_{(aq)}MgCl_{2(aq)} \rightarrow Mg^{2+} + 2Cl^-{}_(CaSO_{4(aq)}) \rightarrow Ca^{2+}((_{aq)} + SO_4{}^{-2}{}_{(aq)}$ $MgSO_4 \rightarrow Mg^{2+} + SO_4{}^{-2}{}_{(aq)}$**b): What methods could be adopted to remove the temporary hardness of water? A: Methods for Removal of Temporary Hardness:**
i: By boiling the temporary hard water: Temporary hardness of water can be easily removed by simple boiling the water. This hardness is caused by the presence of dissolved calcium bicarbonate, $Ca(HCO_3)_2$, which decomposes on heating. The calcium carbonate ($CaCO_3$) is formed. The calcium carbonate is insoluble and settles down as precipitate at the bottom. , $Ca(HCO_3)_{2(aq)} \rightarrow CaCO_{3(s)} + CO_{2(g)} + H_2O_{(g)}$ **ii: Clark's Method**: This method is used to remove the temporary hardness of water on a large scale. This is a chemical method. A calculated amount of slaked lime, (Ca(OH)2) is added to the temporary hard water. The soluble bicarbonate ions (HCO3-) of calcium and magnesium present in temporary hard water are converted into their carbonate ions(CO3-2). The carbonates of calcium and magnesium are soluble in water and settles down at the bottom. $Ca(HCO_3)_{(aq)} + Ca(OH)_2 \rightarrow 2CaCO_{3(s)} + 2H_2O_{(l)}$White ppt $Mg(HCO_3)_{2(aq)} + Ca(OH)_2 \rightarrow MgCO_{3(s)} + CaCO_{3(s)} + 2H_2O_{(l)}$White ppt**C): What methods could be adopted to remove the permanent hardness of water? A: Methods for removal of Permanent Hard:** Permanent hardness of water can only be removed by using chemicals, which convert soluble salts into insoluble salts on precipitation. **i: By using washing soda:** The washing soda ($NaCO_3$) removes the permanent hardness of water. The washing soda reacts with the soluble calcium and magnesium chloride and sulphate and converts them into insoluble calcium and magnesium carbonate respectively
$Na_2CO_{3(aq)} + CaCl_{2(aq)} \rightarrow CaCO_{3(s)} + 2NaCl_{(aq)}$ $Na_2CO_{3(aq)} + MgCl2(aq) \rightarrow MgCO_{3(a)} + 2NaCl_{(aq)}Na_2CO_{3(aq)} + CaSO4(aq) \rightarrow CaCO_{3(s)} + Na_2So_{4(aq)}$ $Na_2CO_{3(aq)}MgSO4(aq) \rightarrow MgCO_{3(s)} + Na_2SO_{4\,(aq)}$**ii: Ion exchange method**: Zeolite is an ion exchange resin which is integral part in the water treatment process in both consumer and industrial settings. Zeolite is naturally occurring sodium aluminum silicates. It can also be prepared artificially. This resin is commonly known as sodium zeolite. When hard water is passed through the resin, the sodium ions will go into the solution while the unwanted calcium and magnesium ions take their place in the resin.
$CaSO_{4(aq)}$+ Na2-Zeolite → Ca-Zeolite + + $Na_2SO_{4(aq)}$ Soluble Insoluble
$MgSO_{4(aq)}$ +Na_2-Zeolite → Mg-Zeolite + $Na_2SO_{4(aq)}$ Soluble InsolubleWhen the Na-zeolite is used up and becomes inactive then it can be regenerated by treating it with a strong solution of common salt(NaCl).
$Ca\text{-}Zeolite_{(S)} + 2NaCl_{(aq)} \rightarrow Na_2\text{-}Zeolite_{(S)} + CaCl_{2(aq)}$**4a): Why water is important for us?**
A: Water is an important requirement in our life. After air, the importance of water takes the second place for survival on earth. Water is important for us because;
Water is vital for maintaining life. The reactions, which take place in our body and keep us alive occur in the presence of water.
Water regulates the temperature of earth.
Water is a universal solvent, as many substances dissolve in it.
Water serves as a medium for transportation, as ships and boats move on water.
Water enables our body to excrete waste during perspiration and urination.

The kidneys and liver use it to help flush out these wastes from our body.
Water is used in cooking and washing.
Running water is used to generate electricity.
Water in lakes, rivers and oceans are used as a means of transportation.
Fish and other aquatic animals and many plants live in water.
Agriculture needs large amount of water, to cultivate fruits, vegetables, and other food.
It is required for irrigating crops, as seeds cannot germinate without water.
Many industries such as petroleum, fertilizers, dye and drugs industries require large quantities of water for various processes.

b): Write the disadvantages of hard water?

A: The following are the disadvantages of hard water;
Hard water consumes large amount of soap in washing process.
Hard water is unfit to use in steam engines and boilers. When hard water is used in the boiler, calcium and magnesium salts settles down at the bottom as hard insulating scale. As a result, more fuel is consumed in producing steam. If these are not removed, they block the tubes, which lead to the engines. These make a constant threat to the explosion of boiler. This deposition of scales inside the boiler causes overheating and reduces the life of boiler.
Use of hard water for drinking purposes for a long time causes dysentery, intestinal and stomach diseases. If magnesium sulphate is present in the hard water, it weakens the stomach function.

c): Enlist the advantages of wastewater treatment?

A: Wastewater treatment is defined as the process of removing any harmful contaminants from water no longer needed

Advantages of wastewater treatment:

1)It prevents disease:
It removes harmful bacteria and chemicals from water that cause disease. Thus makes the water safe for living organisms.
It provides clean water: It filtering out harmful contaminants, and leaving a water source clean and safe for everyone. This removes the fear of droughts, water shortages.

5a): How would you evaluate the effects of water pollution?

A: Effects of water pollution:
The effects of water pollutants are not only disturbing to people but also to plants, animals, fishes and birds. Polluted water is unsuitable for drinking, agriculture and industry.
The major effect of water pollutants are as under;
i: Infectious disease: Water pollution is the major cause of infectious diseases in human beings. These diseases include typhoid, cholera, dysentery, amoebiasis, ascariasis and hepatitis etc.
ii: Nutrient pollution: Nutrient pollution is a form pf water pollution. In this process, large amount of nutrients such as nitrogen, phosphorus, nitrates etc. become part of water as a runoff from agricultural fields or weathering of rocks. The enrichment of nutrients in water bodies is called eutrophication. These excessive amounts of nutrients create problems such as excessive growth of algae, decrease in dissolved oxygen in water etc. This in turn, can kill fish, carbs, oysters, and other aquatic animals.
iii: Chemical contamination: Some of the major effects of chemical contamination are as under;
Pesticides affect and damage the nervous system, liver, reproductive system, endocrine glands and DNA etc.
Oil and petrochemical can alter the ecology of aquatic habitats and the physiology of marine organisms. In human beings, it causes gastro-intestinal irritation, liver and kidney damage and nervous system effects. Mercury and its compounds are used in many industries. It finds its way into

the water bodies primarily through air pollution and industrial wastes. Mercury gets into the body through food especially seafood. In children, it causes brain damage, learning defects and incomplete mental development. In adults, mercury causes Parkinson's disease, Alzheimer's disease etc.

iv: Thermal water pollution: Hot water from industrial processes is directly allowed to become the part of the environment. This hot water effects the aquatic life in two ways;

a. The hot water decrease the solubility of oxygen as a result aquatic organisms will die due to the shortage of oxygen. Many aquatic animals especially young cannot survive in water above 30℃ and will die.

b.Explain how industrial wastes pollute environment?

A: Industrial wastes such as hot water, chemicals and solid materials pollute our environment in the following ways;

Most of the industries have been started without proper planning and waste treatment plants. They just dispose off untreated toxic wastes into nearby drains, canals or rivers. Industries produce lots of wastes. These wastes are highly toxic due to the presence of compounds like mercury, calcium, lead, chromium, arsenic, acids such as hydrochloric acid (HCl), sulphuric acid (H_2SO_4), nitric acid (HNO_3), oils, grease, dyes and may also contain gases in dissolved form.

Water used in industries as a coolant or for cleaning purposes dissolves all the chemicals and detergents and causes water pollution when discharge from industries. These industrial wastes also pollute ground water. The compounds which are discharged from industries gets into the body through edible substances and cause different diseases.

Radioactive wastes that may leak from nuclear power stations also create many problems to the living organisms.

c): Support the view that domestic wastes cause pollution?

A: Domestic Wastes: Domestic waste is also called solid waste or urban waste. It is either in solid or semisolid form. It contains food, newspaper, glass bottles, cans, metals etc. Today, many people dump their garbage into streams, lakes, rivers and seas. When rainwater or other forms of water come in contact with these materials, it removes or extracts chemicals from these solid wastes. This process is called leaching and the resulting mixture is called leachate. Leachate either seeps into the soil and pollutes underground water or finds its way to rivers and streams through rainwater.

d): How would you relate the agricultural wastes and water pollution?

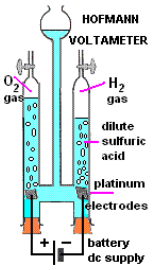
A: Agricultural Wastes: Agricultural wastes are wastes produced as a result of various agricultural activities. Agricultural wastes include both natural and synthetic wastes. Natural (organic) wastes include manure and other wastes from farming, harvesting, poultry and slaughter houses etc. whereas, synthetic wastes consists of fertilizers in run-off water from fields, pesticides, insecticides and herbicides that enter into water, air or soils and salt and slit drained from fields.

Topic wise:

Composition of water: water is a compound of hydrogen and oxygen. Henry Cavendish proved that water is a compound. Composition of water can be determined,

1) Volume 2) Mass .

Composition of water by volume: Water molecule composed of two Hydrogen atoms and one Oxygen atom. Its molecular formula is H_2O.Composition of water can be determined by using an apparatus called "Hofmann voltammeter". When an electric current is passed through water containing a little salt, water decomposes into hydrogen gas and oxygen gas.it shows that water composed of two volumes of hydrogen and one volume of oxygen.



Composition of water by mass: Water is composed of one part of hydrogen to eight parts of oxygen by mass. Joseph Proust determined the ratio of water by mass I.e. 1:8.

Explanation: One mole of H_2O is made up of 2 moles of Hydrogen atoms and 1 mole of Oxygen atom

Mass of 1 mole of Hydrogen atoms= 1 g /mol

Mass of 1mole of Oxygen atoms = 16 g/mol

Mass of two moles of Hydrogen atoms = 2x 1 g/mol = 2 g/mol.

Mass of one mole of Oxygen atoms = 1 x 16 g /mol

Mass of one mole of water = 2 g/mol + 16 g/mol = 18 g/mol.

% of hydrogen = molecular mass of hydrogen / molecular mass of H_2O ×100

%of hydrogen= 2/18 ×100=11.11

% of oxygen = Atomic mass of oxygen/molecular mass of H_2O ×100

% of oxygen = 16/18=88.88

Ratio = 1 : 8

Water pollution:

Definition: water pollution occurs when undesirable foreign substance are introduced into natural water**.** The substances that cause water pollution is called pollutants**.** Water pollution is one the main environmental issues that we are facing, as more than 70% of the Earth's surface is water-covered.

Sources of water pollution: The major sources of water pollution are following**;**

Industrial waste: waste from factories, refineries, waste treatment plants etc. that emit fluids of varying quality directly into urban water supplies cause water pollution sources include contaminants that enter the water supply from soils/groundwater systems and from the atmosphere via rain water. Soils and groundwater contain the residue of human agricultural practices (fertilizers, pesticides, etc.) and improperly disposed of industrial wastes. Atmospheric contaminants are also derived from human practices (such as gaseous emissions from automobiles, factories and even bakeries).

Waterborne diseases: The diseases that spread due to polluted water or eating those foods that are prepared from polluted water are called waterborne diseases. They bacterial, parasitic or viral diseases.

(1)Bacterial infections:

cholera: The symptoms are watery diarrhea and vomiting. It effects intestine and causes dehydration**.**

Dysentery: It is the large intestinal disease, causing abdominal cramp, anal pain and bloody stool.
Typhoid: it is bacterial disease and person is suffer from typhoid fever.
(2) Viral infections:
Hepatitis A and E: Hepatitis-A virus infection (HAV) and Hepatitis E virus infection (HEV) are due to contaminated water: it attack liver and cause jaundice.
Polio: Polio, also called poliomyelitis or infantile paralysis, is an infectious disease caused by the poliovirus.The polio virus usually enters the environment in the feces of someone who is infected. In areas with poor sanitation.
Protozoal infections: In this disease Amoeba enters through unsanitary food or contaminated water effect the gastrointestinal illness.
Parasitic infections: Guinea worm and pinworm infection are common parasitic infection. In contaminated water the egg of these worms are swallowed cause ulcers, fever, and vomiting.
Arsenicosis and fluorosis:
Fluorosis: It is an abnormal condition caused by excessive intake of water having fluorine.it effects the bones and teeth.
Arsenicosis: Drinking water rich in arsenic over a long period leads to arsenic poisoning or arsenicos is Most waters in the world have natural arsenic concentrations of less than 0.01 mg/dm^3.The symptoms of this disease are excess of saliva, vomiting, nausea and blood in urine.