

Alina Ayoub-063

Question No: 03

(a)
Chemical Bond:

Chemical bond refers to strong electrical force of attraction between the atoms or ions, in the structure.

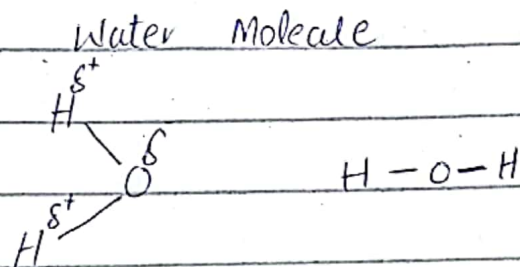
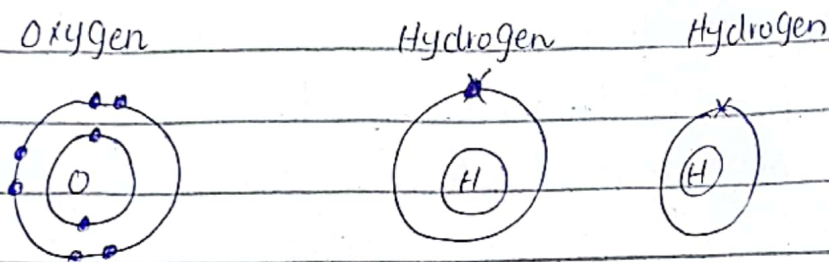
Why atoms form bonds?

Atoms form chemical bond in order to make their outer electron shells more stable. The type of chemical bond maximizes the stability of the atoms that form it. Atoms strive to have right electrons in their valence shells. This is achieved through bonding. Bonding reduces the potential energy of atoms, creating a more stable system. Bonds form due to electrostatic forces of attraction between positively

charged nuclei and negatively charged electrons.

Covalent Bond in a water Molecule:

A water molecule H_2O is an example of covalent bonding, where atoms share electrons to achieve stability.



The oxygen atom shares one electron with each of the hydrogen atoms. Each hydrogen atom contributes one electron to the bond, creating two single covalent bonds between oxygen atom and two hydrogen

atoms. Oxygen has six valence electrons needs two more to complete its octet. Oxygen is more electronegative than hydrogen it attracts the shared electrons more strongly. This sharing results in a polar molecule of water.

(b)

Doping:

Doping means intentional addition of impurities or foreign elements into a material to modify its physical, electrical or mechanical properties.

Doping is commonly used in fields such as electronics and materials science.

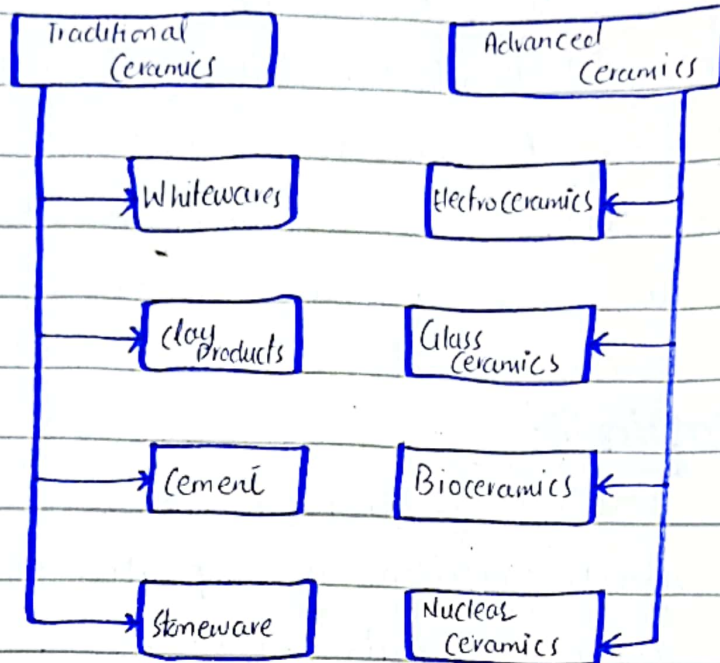
Doping is most commonly used in semiconductors and ceramics.

Types of Ceramics

Ceramic types based on application base and composition

base.

Application Based Classification:



Composition based classification:

Ceramics can be classified into three distinct materials on the basis of composition.

Oxides: Alumina, Zirconia, Iron oxide etc.

Non-oxides: Carbides, Borides, nitrides and silicides.

Composites: Combinations of oxides and non-oxides.

Global Warming:

Global warming is the phenomenon of increasing air temperatures near the surface of the Earth over the past one to two centuries.

Global warming results from increasing concentration of carbon dioxide (CO₂) and other green house gases. Its demerits weighs than its merit.

Merits of Global Warming:

Longer growing season:

Warmer temperatures may extend the growing seasons in colder regions such as Canada and parts of Russia.

Easier Access to Resources:

Melting ice in the Arctic is opening new shipping routes (like the northern sea route) and access to untapped resources, such as oil, gas and minerals.

Increased Vegetation in Certain Areas:

Some ecosystems, like tundras, might experience more plant growth due to increased temperatures and CO_2 levels, which promote photosynthesis. Unsuitable areas, like northern regions, may become viable for farming due to milder climates.

Demerits of Global Warming:

Rising Sea levels:

Melting polar ice caps and glaciers contribute to sea level rise, leading to flooding of coastal areas and displacement of communities.

Loss of Biodiversity:

Change in the climate threaten in survival of many species leading to extinction, habitat loss and ecosystem imbalance.

Extreme Weather Events:

An increase in the frequency and intensity of hurricanes, heatwaves, droughts and heavy rainfall events disrupts human life and natural ecosystem.

Displacement and Economic Losses:

Extreme weather events force people to migrate and face straining resources in host areas. Infrastructure, Agriculture impose significant costs on governments, industries and communities worldwide.

Ocean Acidification:

Increased CO_2 level in oceans, making them more acidic. This threaten marine life, including coral reefs, shellfish and fish species.

Conclusion:

It is resulted that global warming has more cons than pros. Urgen actions to mitigate global warming are needed to prevent its consequences.

(d)

Polio:

Polio is a highly infectious viral disease caused by Poliovirus. It primarily affects children under five years of age. The virus spreads through contaminated water, food or close contact with an infected person. Polio attacks the nervous system and in severe cases, it leads to paralysis or death.

Challenges in eradication of Polio in Pakistan

Vaccine Misinformation and hesitancy

Many communities believe in conspiracy theories that vaccine is harmful, cause infertility or a cause of foreign Agenda. In 2019, rumours spread through social media claiming children were falling ill after receiving the vaccine, leading to mass refusal and even attacks on health workers.

Religious and cultural beliefs:

Some religious leaders oppose vaccination campaigns, labeling them as anti-Islamic. In rural areas, extremist groups have discouraged and outright banned polio vaccination campaigns.

Security concerns

Polio vaccination teams often operate in conflict prone areas, where they are vulnerable to attack by extremist groups.

In 2022, several health worker and their security personnel were killed during polio drives in Khyber Pakhtunkhwa.

Poor sanitation and Hygiene

Polio spread through contaminated water, and poor sanitation increases the risk of transmission. Karachi's slums often cases of wild poliovirus due to open sewers and unsafe drinking water.

Resistance from parents

In 2020, several cases of resistance in Punjab were reported, where families locked their doors to avoid vaccinations teams due to mistrust of government initiatives or fear of side effects.

Conclusion:

Polio eradication in Pakistan is a complex challenge due to misinformation, security threats and systematic issues. However, with sustainable efforts, it is possible to overcome these challenges and achieve a polio free Pakistan.

Question No. 04

Bile: A note on liver Juice.

Bile is a digestive fluid produced by the liver and stored in the gallbladder. It plays a vital role in digestion and absorption of fats and

fat soluble vitamins in the small intestine.

Composition of Bile:

Bile

Consists of bile salts these are critical for emulsifying fats and aid their absorption, **bile pigments** such as bilirubin which is breakdown product of hemoglobin and gives bile its yellow-green color, **cholesterol** that is excessive is excreted ~~in~~ the bile, **water** is the primary component, making bile fluid for easy flow, and **electrolytes** help in maintaining the pH balance in the intestine.

Pathway of Bile:

Bile is produced by liver cells and it is stored in the gallbladder until needed. During digestion, especially after consuming fatty foods, bile is released into the

duodenum through bile duct.

Functions of Bile:

Bile breaks down large fat molecules into smaller droplets, increasing the surface area for lipase enzymes to act upon.

Absorption of fat soluble vitamins A, D, E and K rely on bile for efficient absorption.

Bile carries waste products like bilirubin and waste/excess cholesterol out of the body through feces.

Conclusion:

Bile is essential for maintaining digestive health and ensuring the efficient metabolism of fats.

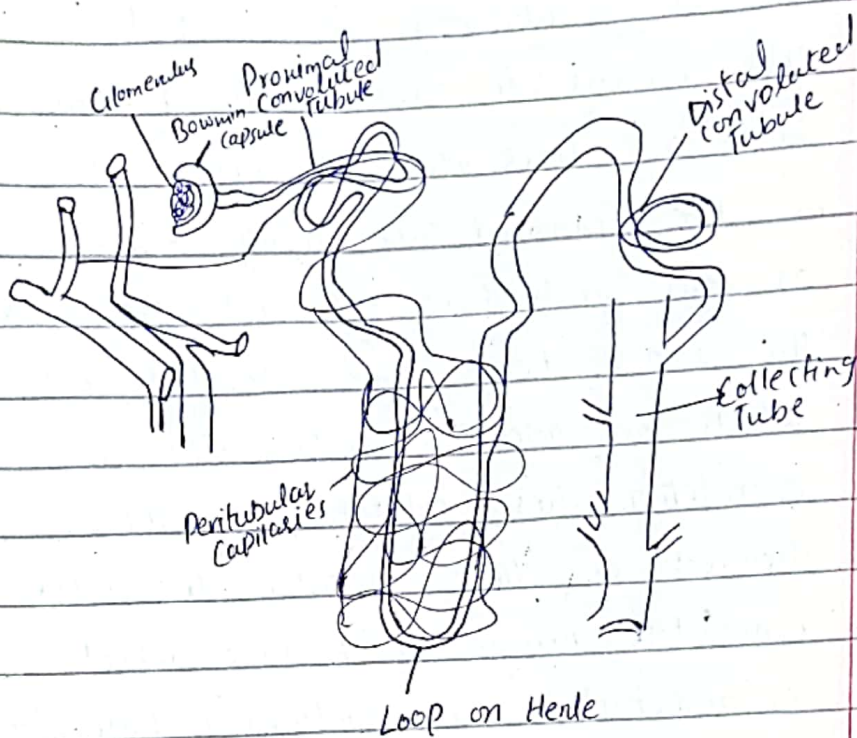
(b)

Role of Kidney in Excretion:

Kidneys are vital organ in human excretory system,

responsible for removing waste products, maintain fluid balance and regulating essential electrolytes in the body.

Key functions of kidney in excretion:



Kidney filters about 50 gallons of blood daily through tiny filtering units called nephrons. In nephron, blood enters in the glomerulus, where water, salts, urea and other small molecules are filtered out, forming a substance called glomerular

filtrate. As the filtrate moves through the renal tubules, essential substances like glucose, amino acids, water and some salts are reabsorbed into the blood stream. This process ensures that only waste products and excess substances are excreted.

This means a great deal of water must go back into the blood while in the proximal tube using osmosis as this will balance electrolyte level. The loop of henle concentrates the salts which are added to the urine for excretion. This substance is then drained so that it enters the distal convoluted tubule, a feature which is responsible for maintaining balanced pH level of both blood and urine. After that the fluid continues on its way to the collecting duct for another process of ultrafiltration before going to the ureters followed by the bladder.

(C) Waste Management:

Waste management is a process of collecting, transporting, treating and disposing of waste materials in a manner that minimizes harm to the environment, human health and ecosystems.

Methods of Solid Waste Management:

1. Landfilling:

Waste is buried in designated areas called landfills. Wastes are compacted and covered with soil to reduce odor, pests and leachate generation. Modern landfills use liners and leachate collection systems to prevent groundwater contamination.

2. Incineration:

Combustion of solid waste at high temperatures to reduce its volume and generate

energy. In this process, waste is burned in especially designed incinerators. Heat generated is used to produce electricity or steam. It reduces waste volume and generates renewable energy.

3. Recycling:

The process of converting waste materials into new reusable products. Waste is segregated into recyclable materials such as paper, glass, plastics and metals. These materials are processed into raw form to reuse.

4. Composting:

Biodegradable waste is decomposed by microorganisms to produce nutrient rich compost. Organic waste like, agricultural residues, garden waste and food scraps are piled and allowed to decompose. Aerobic conditions are maintained for faster decomposition.

5- Waste Minimization:

Waste minimization means to reduce the amount of waste generated at the surface by encouraging reuse of material and designing products with minimal packaging.

It reduces overall management costs and conserve resources and reduces pollution.

Conclusion:

The choice of solid waste management method depends on factors like the type of waste, available resources and environmental regulations. A combination of these methods, integrated into a comprehensive waste management strategy, is often the most effective way to manage solid waste sustainably.

(d)

(i) Anaemia:

Anaemia is a disease caused by deficiency of red blood cells and hemoglobin in the blood, leading to reduce oxygen carrying capacity. Symptoms may include fatigue, weakness, shortness of breath and pale skin.

(ii) Appendicitis:

Appendicitis is the inflammation of the appendix, a small tube like structure attached to the large intestine. It often cause sharp pain in the lower right abdomen, nausea, vomiting and fever and it typically requires surgical removal of the appendix.

(iii) Spleen:

The spleen is the organ located in the upper left abdomen, beneath the ribcage. It is the part of lymphatic

system and helps filter blood, recycle old blood cells and platelets, and fight infections.

(iv) **Myopia:**

Myopia or nearsightedness is a common vision condition where distant objects appear blurry while close objects are seen clearly. It occurs when the eyeball is too long or the cornea is too curved, causing light to focus in front of the retina.

(v) **Isotopes:**

Isotopes are atoms or nuclei of different elements that have the same number of neutrons but a different number of protons. For example, carbon 12 and nitrogen 13 are isotopes because both have 7 neutrons.

Question No: 6

(A)

$$\text{Length of boat} = 3$$

$$\text{Breadth of boat} = 2$$

$$\text{The boat sinks by } h = 1 \text{ cm} = 0.01 \text{ m}$$

$$\text{Density of water } (\rho) = 1000 \text{ kg/m}^3$$

$$\text{Volume of water} = L \times B \times h$$

$$= 3 \times 2 \times 0.01$$

$$= 0.06 \text{ m}^3$$

$$\text{Mass of water} = \rho \cdot V$$

$$= 1000 \text{ kg/m}^3 \times 0.06 \text{ m}^3$$

$$\text{Mass of man} = 60 \text{ kg}$$

(B)

$$\text{Let cost of one ball} = x$$

$$\text{Cost of 17 balls} = 17x$$

$$\text{Loss} = 5x$$

$$\text{Selling price} = 720$$

$$\text{selling price} = \text{cost price} - \text{Loss}$$

$$720 = 17x - 5x$$

$$720 = 12x$$

$$\frac{720}{12} = x$$

$$60 = x$$

$$\text{Cost price of one ball} = 60$$

(C)

	Present	Future
Man	$x+24$	$(x+24)+2$
Sam	x	$x+2$

Equation formed

$$x+26 = 2(x+2)$$

$$x+26 = 2x+4$$

$$2x-x = 26-4$$

$$x = 22$$

Present age of Sam is 22.

(B)

Rashid 6 h to type 32 pages

$$\text{Rashid's rate} = \frac{\text{Pages}}{\text{hours}} = \frac{32}{6} = \frac{16}{3} \text{ pages per hour}$$

$$\text{Kamran's rate} = \frac{40}{5} = 8 \text{ pages per hour}$$

$$\text{Combined rate} = \frac{16}{3} + 8 = \frac{16+24}{3} = \frac{40}{3}$$

$$\text{Combined rate} = \frac{\text{Pages}}{\text{hours}}$$

$$\text{Time} = \frac{\text{Page}}{\text{combined rate}} = \frac{110}{\frac{40}{3}}$$

$$\text{Time} = 110 \times \frac{3}{40} = \frac{33}{4}$$

$$\text{Time} = 8.25 \text{ hours}$$

Question No: 0

Kamran will take 8 hours and 15 minutes.

Question No: 08 (A)

$$\begin{aligned}\text{Distance} &= \text{Speed} \times \text{time} \\ &= 12 \times \frac{8}{60} \\ &= 1.6 \text{ km}\end{aligned}$$

$$\begin{aligned}\text{Distance} &= 2(\text{length} + \text{Breadth}) \\ &= 2(3a + 2a) \\ &= 6a + 4a\end{aligned}$$

$$1.6 \times 1000 \text{ m} = 1600$$

$$1600 \text{ m} = 10a$$

$$a = 160 \text{ m}$$

$$\text{length} = 3(160) = 480 \text{ m}$$

$$\text{Breadth} = 2(160) = 320 \text{ m}$$

$$\begin{aligned}\text{Area of rectangle} &= \text{length} \times \text{Breadth} \\ &= 480 \times 320 \\ &= 153600 \text{ m}\end{aligned}$$

$$\text{Area of the park} = 153.6 \text{ km}$$

(B)

The father of boy's uncle = Grandfather

Daughter of grandfather = Mother

Mother of son so the son
of the girl's mother is
girl's brother.

(C)

let the 10's digit be x ∴

unit digit = $x+2$

$$\text{Numbers} = 10x + (x+2)$$

$$= 11x+2$$

$$\text{Sum of digits} = x + (x+2) = 2x+2$$

$$\therefore (11x+2)(2x+2) = 144$$

$$22x^2 + 22x + 4x + 4 = 144$$

$$22x^2 + 26x - 140 = 0$$

$$11x^2 + 13x - 70 = 0$$

$$\left[\begin{array}{l} x^2 + 10x - 7x - 70 = 0 \\ x(x+10) - 7(x+10) = 0 \\ (x+10)(x-7) = 0 \end{array} \right]^x$$

$$11x^2 + 35x - 22x - 70 = 0$$

$$11x^2 - 22x + 35x - 70 = 0$$

$$11x(x-2) + 35(x-2) = 0$$

$$(x-2)(11x+35) = 0$$

$$x = 2$$

$$11x+2 = 24$$

Hence the required number is 24

(D)

Number are in ratio = 2:3

L.C.M of $2x$ and $3x$ is given 48

L.C.M = $\frac{\text{Product of numbers}}{\text{Greatest common Divisor}}$

$$48 = \frac{(2x)(3x)}{x}$$

$$48 = 6x$$

$$8 = \frac{48}{6} = x$$

$$2(x) = 2(8) = 16$$

$$3(x) = 3(8) = 24$$

$$\text{Sum of number} = 16 + 24 = 40$$

The sum of number = 40