

SECTION-I

Q.3 - a) - Introduction:

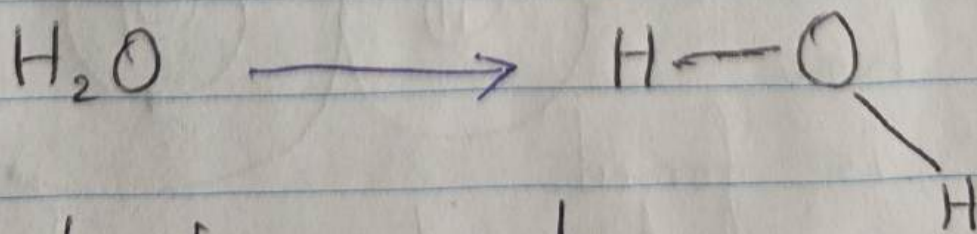
Atoms form chemical bonds to stabilize and achieve octet rule (or duplet in case of hydrogen).

Covalent Bond:

Covalent bond is formed by the sharing of ~~one~~ electrons between two atoms. Both the atoms used these electrons to stabilize and fill their outer shell.

Example in water:

Water is chemically composed of hydrogen and oxygen atoms.



These hydrogen atoms are sharing electrons with oxygen

and forming a covalent bond
on each side:

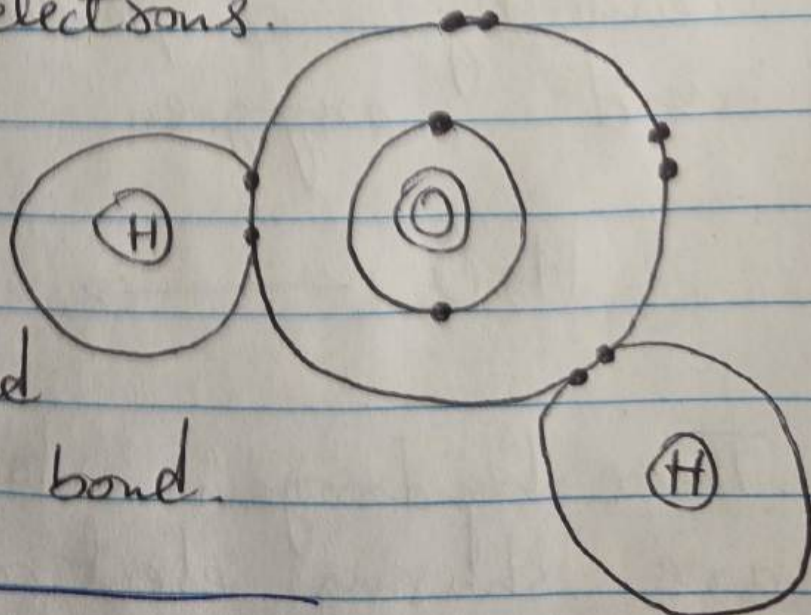
Process of formation:

⇒ Each hydrogen atom has a single electron, while Oxygen lacks two ~~atoms~~ electrons in its outer shell to complete its octet.



⇒ Hence, these will share their outer electron so that hydrogen has its duplet rule completed and oxygen has its octet completed with shared electrons.

⇒ And hence that's how water is formed with a covalent bond.



D) - Doping:

Doping is the process of introducing some impurities or material intentionally to a pure material to enhance its qualities.

Purpose:

It is used in material science to enhance properties of ceramics and in electronics to enhance the properties of semi-conductors.

Types of Ceramics:

Based on the structure/composition of ceramics, these are divided into following types:

• - Silicates:

These are coarse and dense or fine and porous based on their water absorption property.

e.g - Fine china, porcelain & traditional artisan ceramics

•- Oxides:

These have high melting points and various electrical properties.

e.g- These are used in high voltage power systems, metals processing and foundry.

•- Non-oxides:

These have high resistance to wear and corrosion, also known for their strength.

e.g- Metal forming tools, blast nozzles, seals and rotating parts in machinery.

•- Glass-ceramics:

Have both crystalline and amorphous phase with glass and ceramic properties.

e.g- Cookware, medical implants etc.

c) - Merits of Global Warming:

- - Melting of permafrost revealing new land for agricultural and commercial activities.
- - Making conditions livable in colder areas near pole.
- - New area becoming suitable for crops cultivation in previously colder areas.
- - Reduced cost and demand for heating purpose in Global North.

Demerits of Global Warming:

- - Fast meltdown of Glaciers leading to floods, followed by droughts.
- - Meltdown of polar ice, increasing sea level posing existential threat to coastal communities.

- - More demand and cost of cooling in Global South.
- - New areas for vectors and parasites becoming feasible for their growth and breeding. e.g. dengue and malaria.
- - Frequent heatwaves and wildfires making conditions unlivable in some areas.
- - Agricultural losses, as animals and plants can not adapt to rapidly changing climate.
- - Disruption of ecosystem due to loss of biodiversity and habitat as a result of changing climate.
- - Additional burden over economies to combat the disasters and calamities caused by Global warming.



d) - Polio:

Polio is a highly contagious viral disease caused by polio virus. It can cause paralysis, mainly in lower body and cause irreversible damage.


- - It mainly affects children under 5 years of age.
- - If paralysis expands to respiratory muscles, it can be fatal.

Challenges to Pakistan:

These are two types of Polio virus and both were eradicated from whole world until 2020 and 1999. But Pakistan and Afghanistan lags behind with only countries where polio virus still persist. because in Pakistan:

- - Some areas are so remote and lack proper infrastructure to

access and vaccinate.

- - Some areas in Pakistan lack sanitation and any administrative awareness that it provides the site for breeding of viruses like polio.
 - - Lack of funds is another major challenge for healthcare sector.
 - - Various factions in clergy usually misguide people about the aftermath of vaccines and that makes people avoid polio vaccine.
 - - A lot of people in Pakistan lack awareness and necessary education that makes it difficult to convince them to get their children polio vaccine.
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Q.5: a) - Climate Financing:

Climate Financing is the distribution of funds among developing countries to counter climate change while also ensuring low-carbon development to keep the condition of climate change from getting worse.

These funds are usually provided by developed countries, that were historically responsible for the situation.

Past pledges:

- - Copenhagen accord: In 2009, a \$ 100 billion fund was agreed to be given annually to developing countries to develop low carbon developments. But only \$ 83 billion was mobilized.

- - Loss & Damage Fund: In 2022, a loss and damage fund was made to help

vulnerable countries fight of the consequences of climate change.

little to none progress has been seen so far.

- - COP 29 : A \$ 300 billion annual fund is to be allocated by developed countries to use for climate financing by the developing countries.

Catering in COP 30 :

COP 30 will be held in Brazil and the past pledges that have not been met properly, needs to be fulfilled in order to mitigate climate change for the developing countries that lack resources to do so.

On ~~the~~ 21 January, 2025 U.S withdrew from Paris agreement creating

another challenge.

b) - Cyclones and Tornadoes:

One of the devastating cyclone of 2024 was Helene that caused catastrophic damage in North Carolina, Georgia and Florida.

Cyclone

- - Cyclones are large system of wind rotating around an eye in center.
- - The impact is usually wide spread upto several hundred and even thousands of kilometers.
- - Often formed over warmer water in oceans.

Tornado

- - Tornado is a violently rotating column of air stretching from sky to down to earth.
- - The impact is localized but intense and can extend to few kilometers.
- - This can form over land and water both.

Cyclones are large spanning over countries and continents.

Tornadoes mainly are small and walk upto few ~~§~~ kilometers before vanishing.

c) ~~Measures~~ Measures to deal with water scarcity:

⇒ Water Storage:

- At state level, dams must be built to store the water of running rivers.

- At local level, small check dams and contour ponds can be built to save down stream water for cattle and other local use.

- Rainwater harvesting structures must be built in public spaces to store the rain water and also recharging the ground water that is primary source in countries like Pakistan.

⇒ Conservation :

- - Existing water bodies should not be used exploitatively and instead governed to ensure sustainable use.
- - Water meters should be installed in order to keep a check and balance over the use of ground water.
- - Education and awareness over the use of water should be used to raise the sense of responsibility among masses.

⇒ Sustainability :

- - Polluting of public water bodies should be made, strict law against it.
- - Recycling of used water should

be obliged over industries and corporate sectors to ensure the recycling of used water.

- - Sewage water is rich in important nutrients. Domestic sewage water should be used for irrigation in agricultural and public places. But water should be monitored of pollutants that can be harmful.

d) 1) - Hypocenter:

The point in the earth where the strain energy is released and the earthquake starts. It is also called "focus".

2) - Epicenter:

The point on the Earth surface, directly above the hypocenter where the magnitude of earth quake is highest and most felt.

3) - Eyewall :

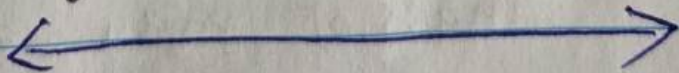
The formation right outside and around the eye in a hurricane is called the "eyewall". The pressure here is highest and speed of wind, as well.

4) - Shallow-focus :

The earthquakes with their hypocenters being at less than 70 km deep to the surface are called "shallow-focus" earthquake and these are extremely destructive due to closer proximity of surface to the focus.

5) - Parsec :

Parsec is an astronomical unit of distance in space, usually outside solar system that equals 3.26 light years.



SECTION - II

Q6 : A) - Mass of man = ? = M

Boat length = 3 m

Boat breadth = 2 m

Area of boat = $3 \times 2 = 6 \text{ m}^2$

Volume of water displaced = Depth \times Boat Area
 $= 1 \text{ cm} \times 6 \text{ m}^2$

$= 0.01 \text{ m} \times 6 \text{ m}^2$

Volume = 0.06 m^3

Mass of water displaced = m

$$\frac{m}{\rho} = V$$

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

$$m = \rho \times V$$

$$= 1000 \times 0.06$$

$$m = 60 \text{ kg water.}$$

As same amount of water is displaced as of man's mass, hence

mass of man = 60 kg

B) - Cost price of ball = ?

Balls = 17

Sale price = 720 Rs.

On ball sold for = $\frac{720}{17} \approx \text{Rs. } 42.35$

Total loss = 5 balls cost price

Loss per ball = $\frac{\text{Cost price of 5 balls}}{17}$

We put -

loss per ball = Cost price - Sale price

into -

Cost price - Sale price = $\frac{\text{Cost price of 5 balls}}{17}$

C.P = S.P + $\frac{\text{C.P of 5 balls}}{17}$

C.P = 42.35 + $\frac{\text{C.P} \times 5}{17}$

C.P = $\frac{42.35 \times 17 + \text{C.P} \times 5}{17}$

17 C.P = ₹ 720 + 5 C.P

17 C.P - 5 C.P = 720

$$12 \text{ C.P} = 720$$

$$\text{C.P} = 720 / 12$$

Cost price = Rs. 60
of one ball

C) Present age of son = ?

$$\text{Man's age} = X$$

$$\text{Son's age} = Y$$

$$X = Y + 24$$

In 2 years -

$$\cancel{2 + X} = \cancel{2}$$

$$\text{Man age} = Y + 24 + 2 = Y + 26$$

$$\text{Son's age} = Y + 2$$

Hence, as said -

$$Y + 26 = 2(Y + 2)$$

$$Y = 2Y + 4 - 26$$

$$2Y - Y = 22$$

$$Y = 22 \text{ years is son}$$

present age.

D) - Time to type 110 pages = ?

$$\text{Rashid speed} = \frac{32 \text{ pages}}{6 \text{ hours}} = 5.3 \text{ pages/hr}$$

$$\text{Kamran speed} = \frac{40 \text{ pages}}{5 \text{ hours}} = 8 \text{ pages/hr}$$

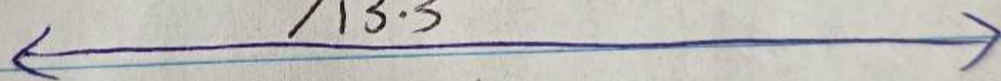
$$\text{Combined speed} = 5.3 + 8 = 13.3 \text{ pages/hr}$$

Assignment to be typed = 110 pages

Hence -

$$13.3 \text{ pages/hr} = \frac{110 \text{ pages}}{\text{time}}$$

$$\text{time} = \frac{110}{13.3} = 8.2 \text{ hours}$$



Q7- B) - Average visitors -

Total Sundays = 5, as month starts with a Sunday.

as first & last day is Sunday.

$$\text{Other days} = 30 - 5 = 25 \text{ days.}$$

$$\text{Visitors on Sunday (average)} = 510$$

$$\begin{aligned} \text{Total Visitors on all Sundays} &= 5 \times 510 \\ & \text{(\del{average})} \\ &= 2550 \text{ visitors} \end{aligned}$$

$$\text{Other days visitors (average)} = 240$$

$$\text{Whole month other than Sunday} = 240 \times 25$$

$$= 6000 \text{ visitors}$$

$$\begin{aligned} \text{Total visitors} &= 6000 + 2550 \\ &= 8550 \text{ visitors.} \end{aligned}$$

$$\begin{aligned} \text{Average} &= \frac{8550}{30} = 285 \text{ visitors} \\ & \text{per day on} \\ & \text{average.} \end{aligned}$$
