

(Q: 2)

(a)

What is tuberculosis & hepatitis? Explain briefly. (5)

Tuberculosis

Definition = Bacterial infection caused by Mycobacterium tuberculosis, primarily affecting lungs, but can affect other organs.

Causes =

- Inhaling affected droplets from coughing/sneezing.
- Close contact with infected person.
- Weakened immune system.
- Poor ventilation and hygiene.

Symptoms =

- Persistent cough for almost 2 weeks or more.
- Chest pain.
- Coughing up blood or phlegm.
- Fatigue
- Weight loss
- Fever
- Night sweats.

Treatment =

- Antibiotic (6-12 months)
- Combination therapy (Rifampicin, Isoniazid, etc.)
- Directly observed treatment, short-course (DOTS)

Hepatitis

Definition = Inflammation of liver caused by viral infection, toxins, or autoimmune disorders.

Causes =

- Viral transmission (blood, bodily fluids, contaminated food/water)
- Liver damage from toxins (alcohol, drugs)
- Autoimmune disorder

Symptoms

- Yellowing of skin/eyes (Jaundice)
- Fatigue
- Loss of appetite
- Abdominal pain
- Nausea
- Vomiting
- Dark urine

Types & Treatments:

- 1- Hepatitis A: Supportive care, rest, hydration
- 2- Hepatitis B: Antiviral medications (interferon/Entecavir)
- 3- Hepatitis C: Antiviral medications (interferon)
- 4- Hepatitis D: Antiviral medications (sofosbuvir, Ledipasvir)
- 5- Hepatitis E: Supportive care, hydration, rest.

Prevention:

- Vaccination (HAV, HBV)
- Safe blood transfusions
- Proper hygiene
- Avoid sharing needles
- Balanced diet & Exercise.

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(Q2)

(b)

Explain the mechanism of Fiber Optic Cable for signal.

Explain its construction.

Fiber Optic Cable

A fiber optic cable is a network cable that contains strands of glass fibers inside an insulated casing.

They provide higher bandwidth and transmit data over long distances. They support much of the world's internet, cable television and telephone system.

→ Mechanism :

Fiber optic cables transmit signals as light waves through thin glass or plastic fibers. The process :

1 → Conversion = Electrical signal → Light signal (using laser or LED).

2 → Transmission : Light signal travels through fiber optic cable.

3 → Reception = Light signal → Electrical signal (using photodetector).

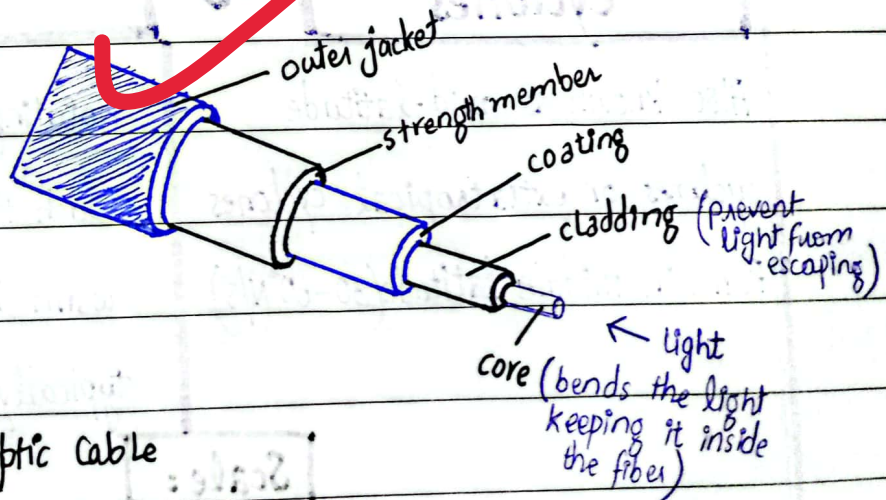


Figure :
Fiber optic cable

→ Construction :

Fiber optic cable consists of :

Core : Thin glass or plastic centre (diameter: 8-10 microns).

Cladding : Surrounding layer around core (diameter: 125 microns).

Coating : Protective layer surrounding cladding (diameter: 250 microns)

Strength Member : Kevlar or fiberglass fiber for mechanical strength.

Outer jacket : Outer protective covering.

(Q2)

(C)

Explain the difference between Middle Latitude Cyclones and Tornadoes.

Middle Latitude Cyclones

VS

Tornadoes

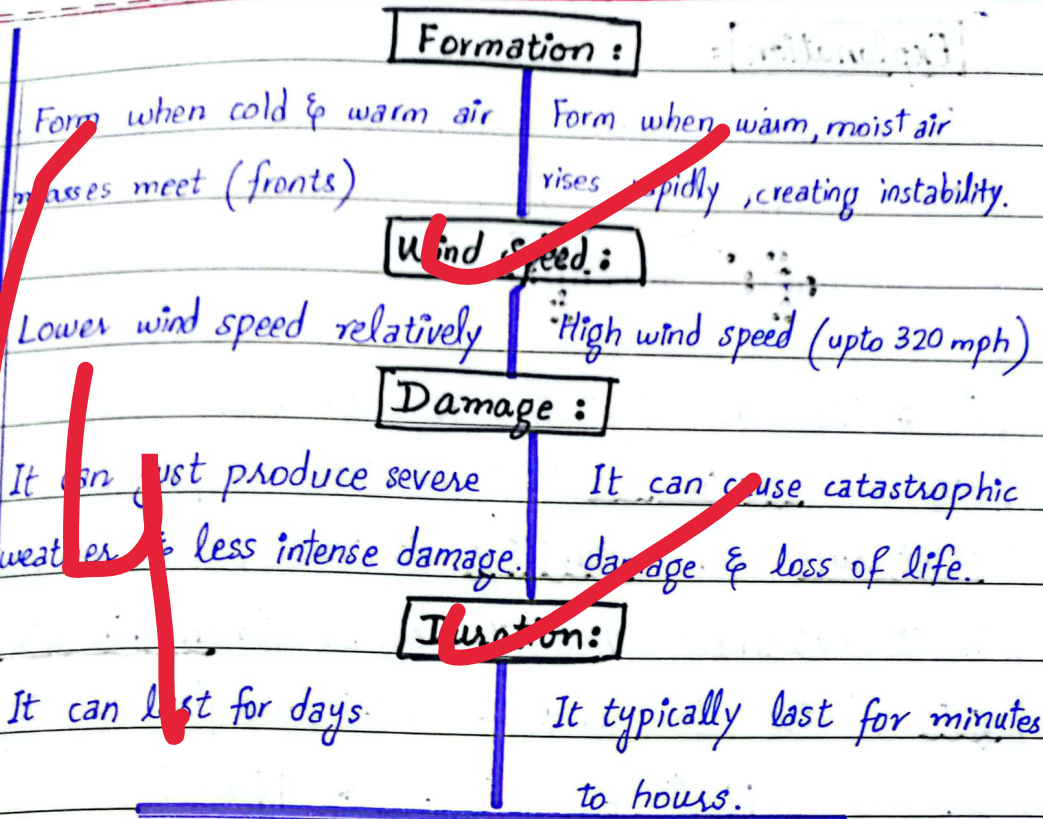
Also known as mid-latitude cyclones or extratropical cyclones
Form in middle latitude (30-60°N/S)

Rotating columns of air that touch the ground, form in warm, humid environment (typically in tropical & sub-tropical regions)

Scale:

Large-scales low-pressure systems
(100-1000 km diameter)

Small scale, localized phenomenon
(100-1000 m) diameter.



(Q 2)

(d)

What is the difference between ionic and covalent bonding? Give examples.

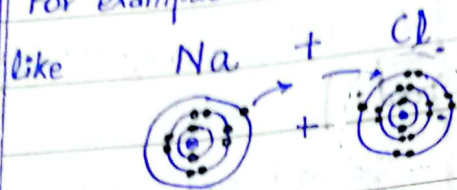
The key difference between ionic and covalent bonding is that, in ionic bonding, there is complete transfer of electrons, while in covalent bonding, there is mutual sharing of electrons. Here is the explanation of both types of chemical bonding with their examples:

Ionic Bonding

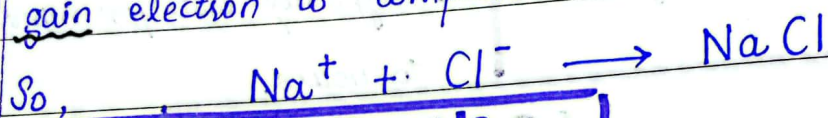
Definition: A chemical bond which is formed by the complete transfer of electrons from one atom to another atom.

Explanation:

For example: when sodium and chlorine come together,



As Na has $1 e^-$ in its outermost shell, it's easy for Na to lose that electron to fulfill the octet rule for stability. Similarly, Cl has $7 e^-$ in its outermost shell, it's easier for chlorine to gain electron to complete octet rule for stability.

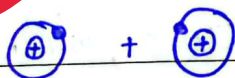


Covalent Bonding

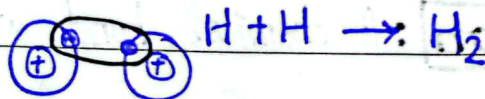
Definition: A bond which is formed by the mutual sharing of electrons between the atoms.

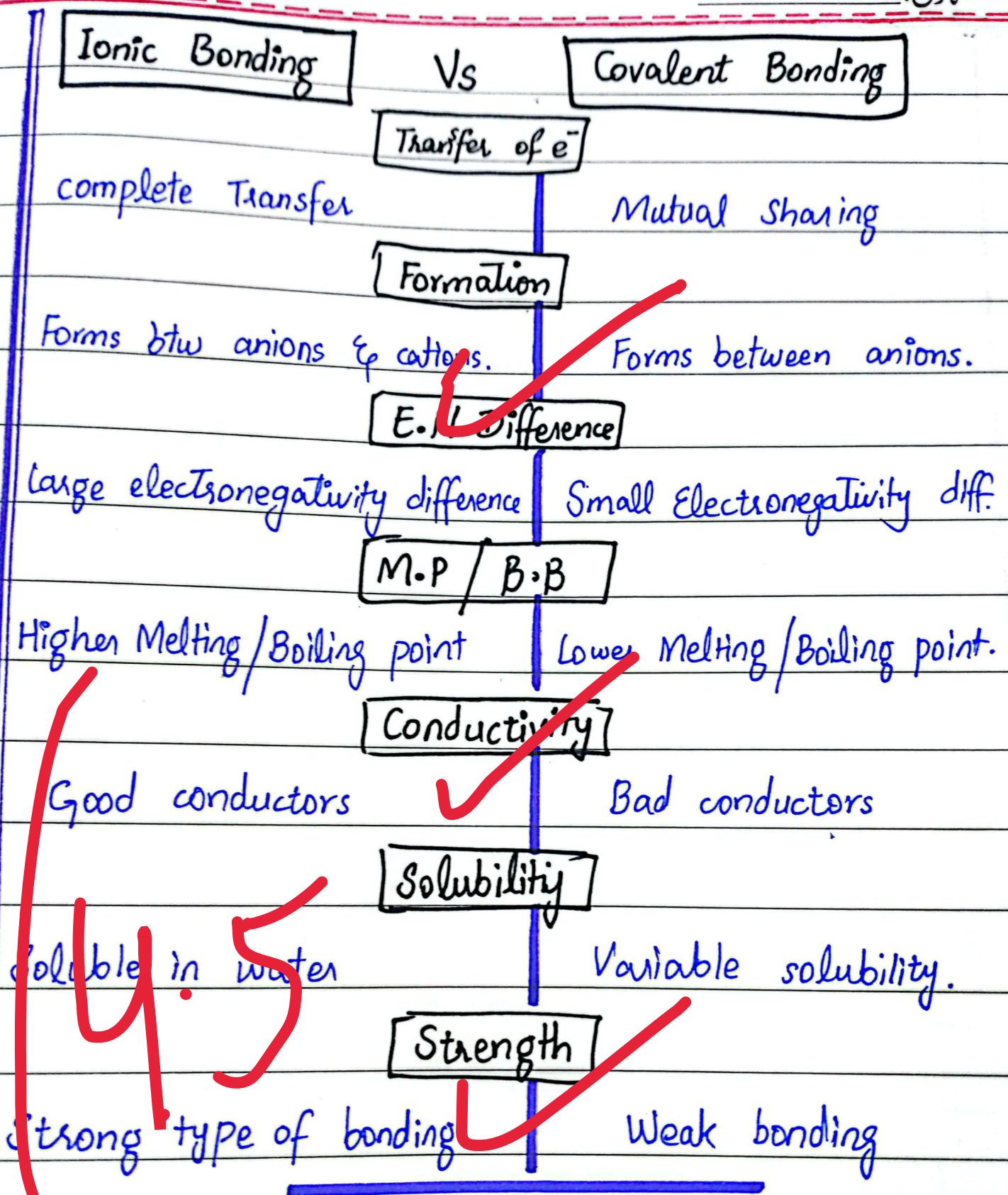
Explanation:

For example; in hydrogen gas, when two H atoms come together. like $\text{H} + \text{H}$



Unlike ionic bonding, there will be mutual sharing. Because if H completely loses its only electron, there will be no any stability for it. So, they both share electrons and follow duplet rule and become stable





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Very good answers!!!

Presentation, structure and arguments are up to the mark