

Zeolite cargo service

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In news- Air India flights began transporting 'zeolite', from Rome, that is an essential component imported by the DRDO **for oxygen generation.**

About Zeolite-

- Zeolite, also called **molecular sieve**, are **microporous crystalline solid of aluminium silicate** that have small openings of fixed size to trap large molecules, while allowing small molecules to pass through.
- Atmospheric air contains 78 % nitrogen and about 20 % oxygen and zeolite adsorbs or traps nitrogen onto its surface.
- Zeolite is used in the Medical Oxygen Plant (MOP) technology, developed by DRDO for on-board oxygen generation on aircraft like Tejas.
- The MOP utilizes **Pressure Swing Adsorption (PSA) technique and Molecular Sieve (Zeolite) technology** to generate oxygen directly from atmospheric air.
- This technology will be useful to provide oxygen supply during the pandemic in hospitals in urban and rural areas.

Zeolites occur naturally as well as man made. They are very **stable solid with a high melting point** of 1000 degree Celcius. They do not undergo oxidation in the presence of air. They are **insoluble in water or other inorganic solvents.** They **do not have any harmful environmental effects** though skin contact or inhalation might have a carcinogenic effect.

Application of Zeolites-

- Zeolites are widely used as ion-exchange beds in domestic and commercial water purification, softening.
- They have the potential of providing precise and

specific separation of gases, including the removal of H₂O, CO₂, and SO₂ from low-grade natural gas streams.

- Zeolites help silver naturally emit light, which may compete with fluorescent lights or LEDs.
- Zeolites have used advanced nuclear-waste reprocessing methods, where their micro-porous ability is used to remove fission products from the waste.
- Used to thermochemically store solar heat harvested from solar thermal collectors.
- In agriculture, clinoptilolite (a naturally occurring zeolite) is used as a soil treatment. It provides a source of slowly released potassium.
- Clinoptilolite has also been added to chicken food- the absorption of water and ammonia by the zeolite made the birds' droppings drier and less odoriferous, hence easier to handle.
- Pet stores market zeolites for use as filter additives in aquaria.