

What are Volatile organic compounds/molecules (VOC)?

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In news- A new study has found that India can reduce 76 percent of its VOC by swapping all two- and three-wheelers with electric vehicles and all diesel-fuelled ones with CNG.

Key findings of the study-

- The team of researchers have **looked at the number of vehicles expected to ply on Indian roads, projected per capita income and population growth in 2030.**
- Their analysis showed that **non-methane volatile organic compounds' emissions could fall by 91 per cent.**
- Non-methane volatile organic compounds (NMVOC) are VOCs minus methane, a greenhouse gas.
- Emissions of other pollutants carbon monoxide, PM2.5, toxic volatile organic compounds, BTEX (Benzene, toluene, ethylbenzene and xylene) might drop by 80 per cent, 44 per cent, 76 per cent and 93 per cent, respectively.
- This intervention could lower the emissions of black carbon, a sooty black material coming from gas and diesel-powered vehicles by 50 per cent.

Note- Benzene, a chemical that induces cancer, is the only VOC included in the ambient air-quality standards(AAQs). The other pollutants considered for AAQS are Particulate Matter 10 (PM10), Particulate Matter 2.5 (PM2.5), nitrogen dioxide, sulphur dioxide, carbon monoxide, ozone, ammonia, lead, nickel and benzo(a)pyrene.

What are Volatile organic compounds/molecules (VOC)?

- VOC are **compounds that have a high vapor pressure and low water solubility.**

- **Many VOCs are human-made chemicals** that are used and produced in the manufacture of paints, pharmaceuticals, and refrigerants.
- VOCs **typically are industrial solvents**, such as trichloroethylene; fuel oxygenates, such as methyl tert-butyl ether (MTBE); or by-products produced by chlorination in water treatment, such as chloroform.
- **They are often components of petroleum fuels, hydraulic fluids, paint thinners**, and dry cleaning agents. VOCs are common ground-water contaminants.
- **They are emitted as gases from certain solids or liquids.**
- **Concentrations of many VOCs are consistently higher indoors** (up to ten times higher) than outdoors.
- They are emitted by a wide array of products like paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials and furnishings, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions.
- They can drive the formation of other dangerous pollutants. For instance, **they react with sunlight and nitrogen dioxide to form ground-level ozone.**
- **They can irritate the eyes, nose and throat, damage body organs** and long-term exposure to VOCs is not good because the majority of the VOCs are carcinogenic (cancer-causing).
- **VOCs also trigger the formation of PM2.5**, a pollutant that reaches deep into the lungs, affecting their normal functioning.
- They react in the air to produce secondary organic aerosols, minute particles suspended in the air, that in turn, form a large chunk of PM 2.5.
- **VOCs can have a natural origin, too.** Plants emit these

chemicals to attract pollinators, defend themselves from pests and predators and adapt to environmental stress.