World’s Hardest-to-Recycle Plastics into High-performance Lubricating Oil

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Why in News?

Virginia Tech researchers led by Guoliang "Greg" Liu have developed a chemical process that converts discarded polyvinyl chloride (PVC) into polyalphaolefin (PAO), a key base oil used in high-performance synthetic lubricants like engine oil, in three hours.

Why PVC Is Hard to Recycle?

- **High chlorine content–** More than half of PVC's weight is chlorine, and heating it can release corrosive hydrochloric acid.
- **Chemical additives–** Manufacturers add plasticizers, stabilizers, and other compounds for flexibility or heat resistance, which complicate conventional recycling.
- **Low recycling rates–** Most discarded PVC ends up in landfills rather than being recycled into new PVC products.

How the Process Works?

- **Ingredients–** Researchers place PVC into a solvent with aluminum trichloride and alpha-olefins (such as 1-decene).
- **Reaction–** Heating the mixture to about 70°C (158°F) for three hours strips chlorine, attaches olefin chains, breaks down polymer chains, and produces an oily material that is then stabilized and extracted.
- **Upcycling value–** Instead of making more PVC, the plastic acts as a feedstock for a higher-value synthetic lubricant base used in engine oils and industrial lubricants.

Reference

Science Daily| World’s hardest-to-recycle plastics into high-performance lubricating oil