M.SC Semester III

Core Course XII

Environmental Chemistry

TOPIC:-Unit IV, GREEN SOLVENTS FOR ACADEMIC CHEMISTRY

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GREEN SOLVENTS FOR ACADEMIC CHEMISTRY

- Teaching both environmental issue and basic chemistry to non-science students requires:-

  Mainly environmental topics with chemical facts &

  Basic chemistry with environmental points.

- Education for green chemistry must show chemical processes that carry environmental negatives can be replace with less polluting alternatives.

- Academics must provides goals for green research.

- Must provides green technologies that can replace target technology

CONTI.....

- School & colleges must creates awareness about various hazardous chemicals.

- Academics also must provides information to their employees through ‘material safety data sheet’(MSDS).

PHYSICAL PROPERTIES OF SOLVENT'S:-

- The physical properties of solvents greatly influence the choice of solvent for a particular application.
- The solvent should be liquid under the temperature and pressure conditions at which it is employed.
- thermodynamic properties:- density & vapor pressure, temperature & pressure coefficients, as well as the heat capacity surface tension.
- transport properties:- such as viscosity, diffusion coefficient, & thermal conductivity, also need to be considered

- Electrical, optical, and magnetic properties, such as the dipole moment, dielectric constant, refractive index, magnetic susceptibility, and electrical conductance are relevant, too.
- Molecular characteristics, such as the size, surface area, and volume, as well as orientational relaxational times, have appreciable bearing on the applicability of a solvent or on the interpretation of solvent effects.

CHEMICAL PROPERTIES OF SOLVENT'S:-

- The chemical properties of solvents have obviously a strong bearing on their applicability for various purposes.

- Structuredness of Solvents:-The volatility, viscosity, diffusion coefficient and relaxation rates of solvents are described quantitatively by their structuredness.

- Stiffness:-expressed by the cohesive energy density

- Openness:-the difference between its molar and intrinsic volumes

- Ordering:- This is the deficit of entropy of the liquid solvent relative to the solvent vapor or the dipole orientation correlation.

- Polarity in Molecules:-*Dispersion Forces*- Molecules that have no permanent dipole still have their electrons in movement.
- *Polarization and Polarizability:*-If the molecules have a dipole but there is no applied electric field, the dipoles are randomly orientated.
- Dipole–dipole interactions between rotating dipolar molecules are small.

  Only for molecules with large dipoles, and where hydrogen bonding is absent, such as DMSO (dimethyl sulfoxide) and acetonitrile, do dipole–dipole attractions contribute significantly to molecular association.

- **Dipole moments of some solvents:-**

- Benzene 0
- DMSO 3.9
- Acetone 2.69
- Hydrogen fluoride 1.83
- Water 1.83
- THF 1.75

APPLICATION OF GREEN SOLVENTS:-

- New syntheses of Ibuprofen and Zoloft.
- Integrated circuit production.
- Removing Arsenic and Chromate from pressure treated wood.
- Many new pesticides.
- New oxidants for bleaching paper and disinfecting water.
- Getting the lead out of automobile paints.
- Recyclable carpeting.
- Replacing VOCs and chlorinated solvents.
- Biodegradable polymers from renewable resources