NON-AQUEOUS SYNTHESIS OF METAL OXIDE NANOPARTICLES

The nano metal oxide particles are important because of their low surface energy and high surfce area, first one for the stability of the oxide and later on for high reaction area. There are several types of synthesis process for the metal oxide nano particles. The non aqueous synthesis for Sol-Gel process is most important.

The sol–gel process can be defined as the conversion of a precursor solution into an inorganic solid by chemical means. The precursor is either an inorganic metal salt or a metal organic species like a metal alkoxide or acetylacetonate. The oxygen for nanoparticle formation is provided by the solvent (ethers, alcohols, ketones, or aldehydes) or by the organic constituent of the precursor (alkoxides or acetylacetonates).

The route of process of nonaqueous Sol-Gel.

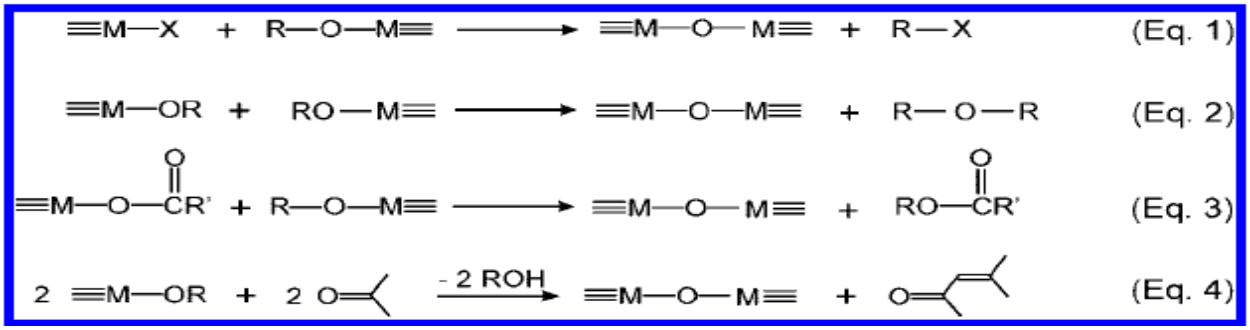

Fig : Condensation Steps Leading to M–O–M Bonds in Nonaqueous Sol–Gel Processes [alkyl halide elimination (eq 1), ether elimination (eq 2), ester elimination (eq 3), and aldol-like condensation (eq 4)

The two types of nonaqueous Sol-Gel process, one is *Surfactant-directed approach* which is converted precursor spices into the oxidic compound in the presence of stabilizing ligands and another one *Solvent-controlled approach* is used by the common organic solvent which act as a reactant and also control the growth of the particle size.

The role of the organic compounds in this process, not only supply the oxygen to the metal to form oxide but also help to size distribution and growth of the particles.

References:

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