



SNS COLLEGE OF TECHNOLOGY

Vazhiampalayam, Coimbatore-35

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DEPARTMENT OF CHEMISTRY

**COURSE NAME : 19CHB102- ENGINEERING CHEMISTRY FOR
ELECTRICAL SCIENCES**

I YEAR / II SEMESTER

UNIT : 3. NANOCHEMISTRY

TOPIC : 2. SOL GEL METHOD



WHY SOL GEL METHOD?

- Bottom up method
- Extended composition range
- Better homogeneity
- Less energy consumption
- Economical method



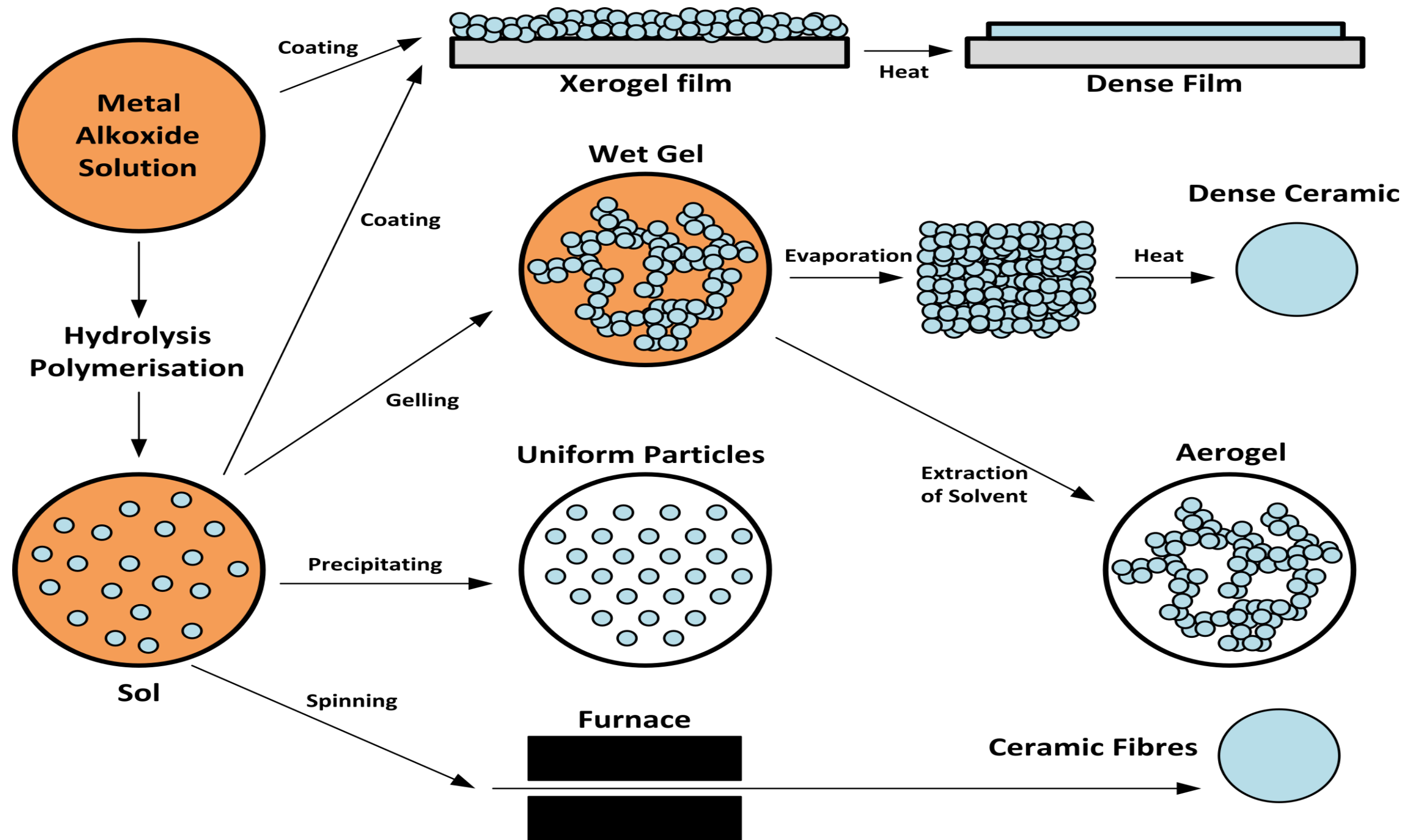
Sol



Gel



SCHEMATIC REPRESENTATION OF PROCESS

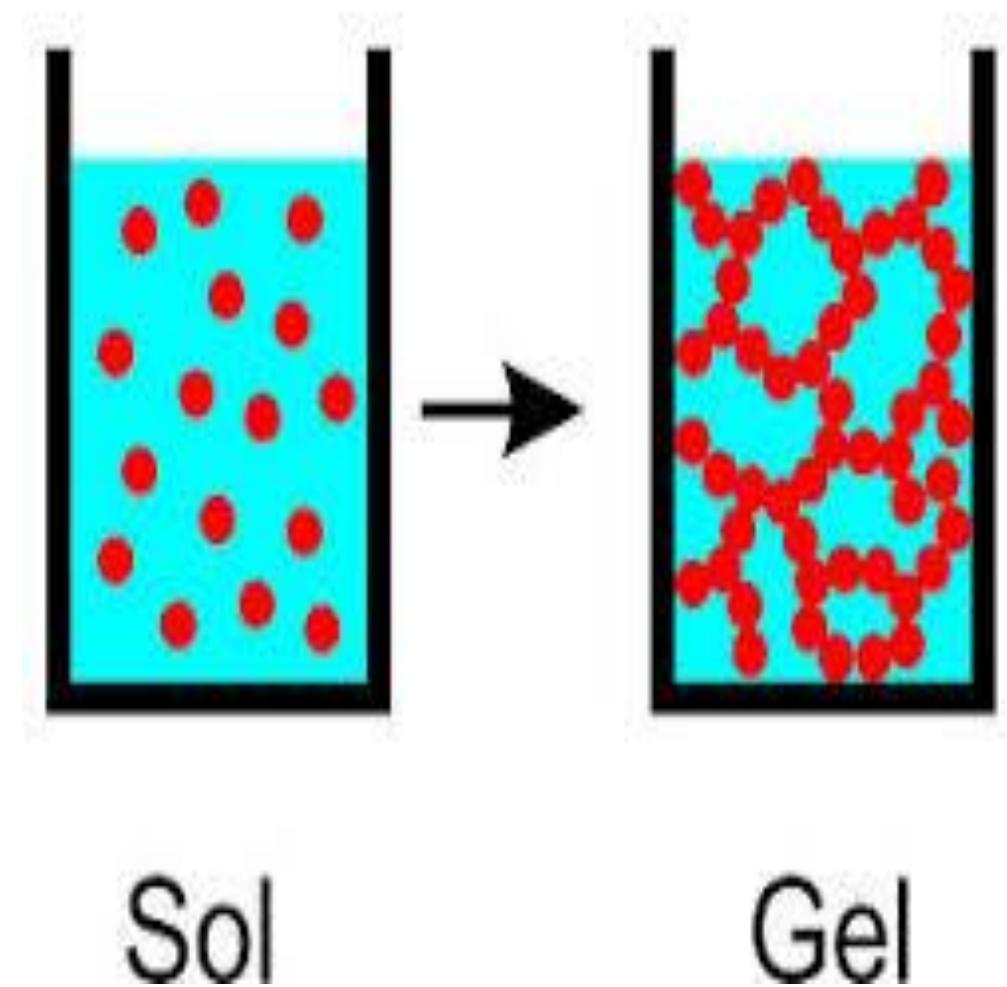




PROCESS



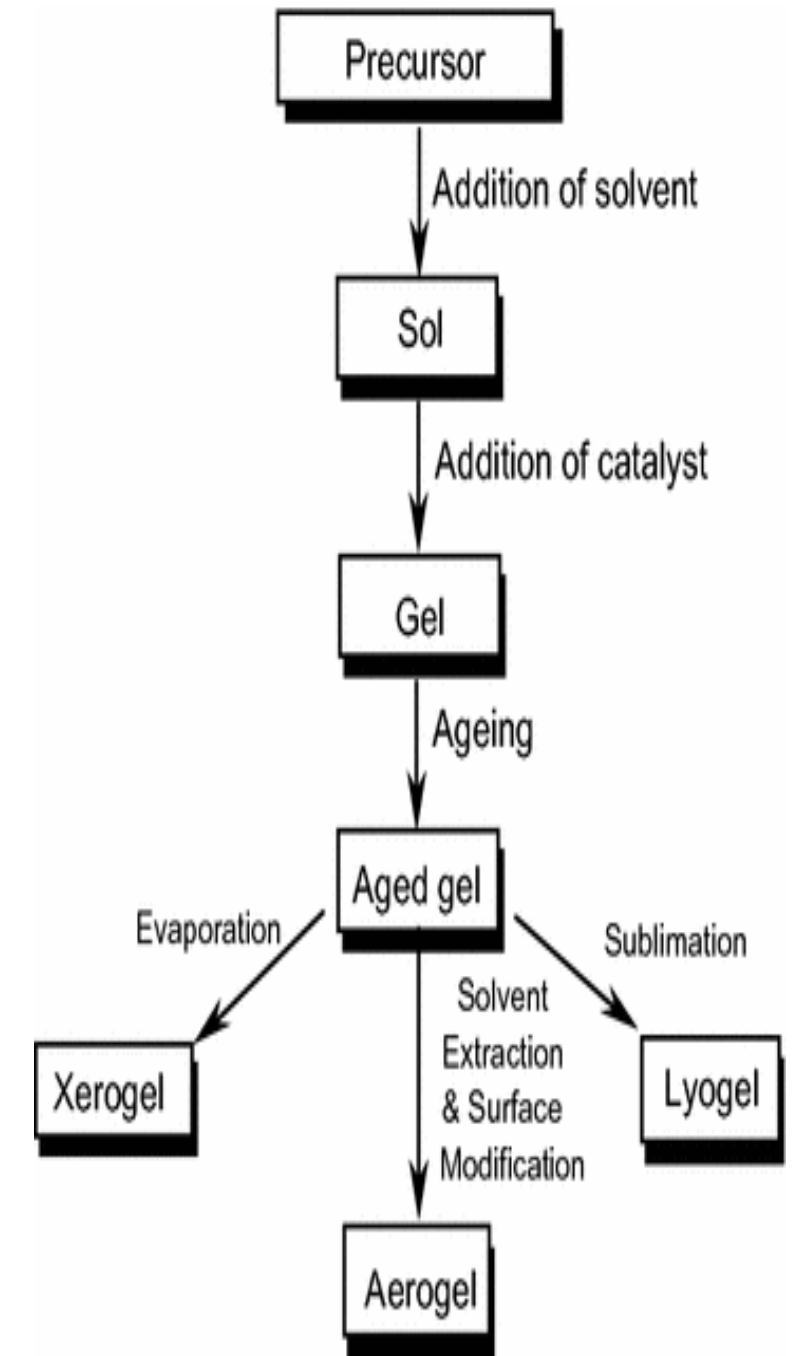
- Sol-gel is a chemical solution process used to make ceramic and glass materials in the form of thin films, fibers or powders .
- A sol is (a colloidal or molecular suspension) obtained from (starting materials) .
- A gel is a semi-rigid mass that forms when the solvent from the sol begins to evaporate and the particles or ions left behind begin to join together in a continuous network





PROCESS

- The sol-gel process is a wet-chemical technique that uses either a chemical solution (sol short for solution) or colloidal particles (sol for nanoscale particle) to produce an integrated network (gel).
- Metal alkoxides and metal chlorides are typical precursors. They undergo hydrolysis and polycondensation reactions to form a colloid, a system composed of nanoparticles dispersed in a solvent. The sol evolves then towards the formation of an inorganic continuous network containing a liquid phase (gel)

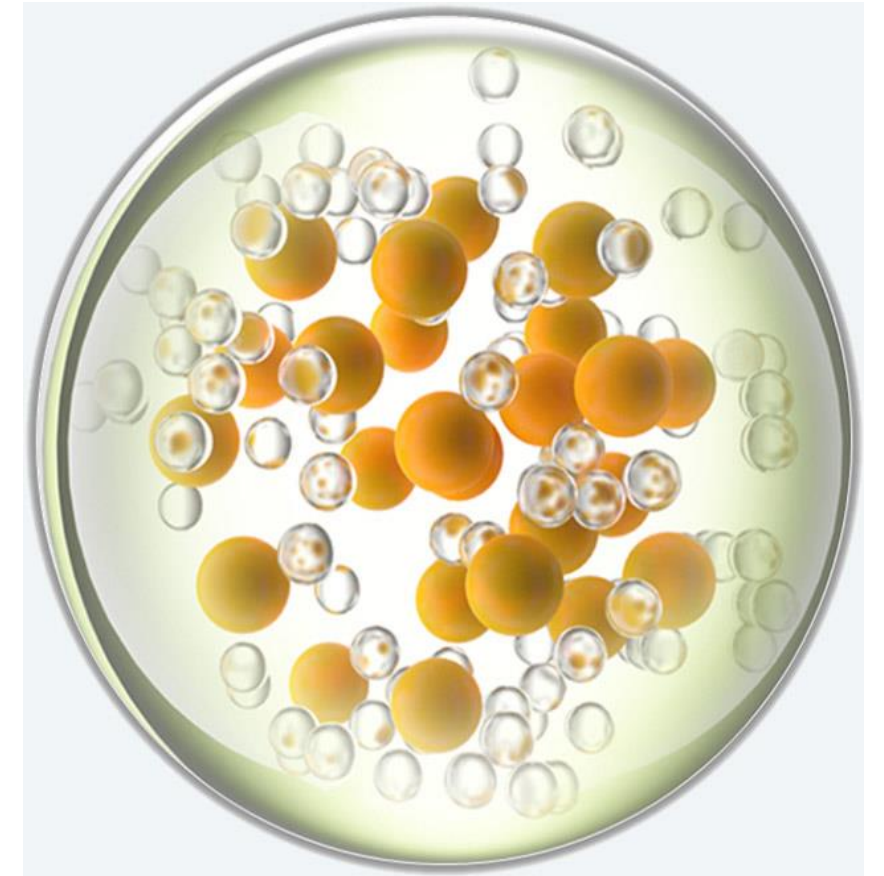




PROCESS



- Formation of a metal oxide involves connecting the metal centers with oxo (M-O-M) or hydroxo (M-OH-M) bridges, therefore generating **metal-oxo or metal-hydroxo polymers** in solution.
- After a drying process, the liquid phase is removed from the gel. Then, a thermal treatment (**calcination**) may be performed in order to favor further poly condensation and enhance mechanical properties



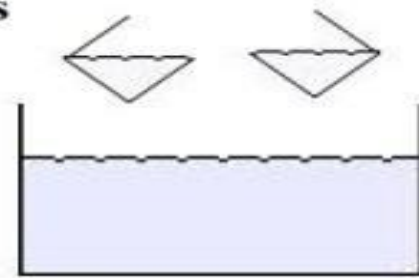


Quiz time



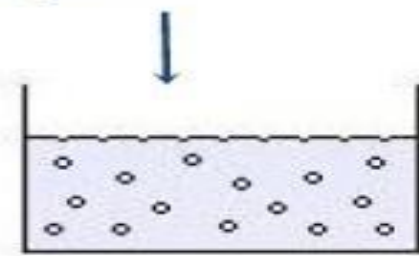
REACTIONS

Mix reactives

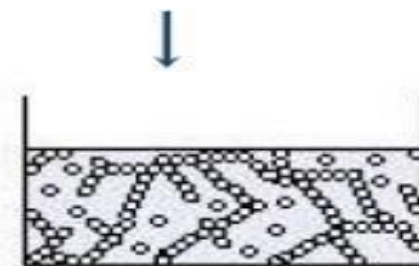


Hydrolysis and Condensation reactions take place

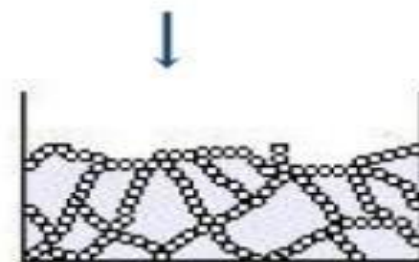
Sol



Gelification



Gel



Hydrolysis



Condensation





PICTORIAL REPRESENTATION OF PROCESS



Sol



Gel



Dried gels



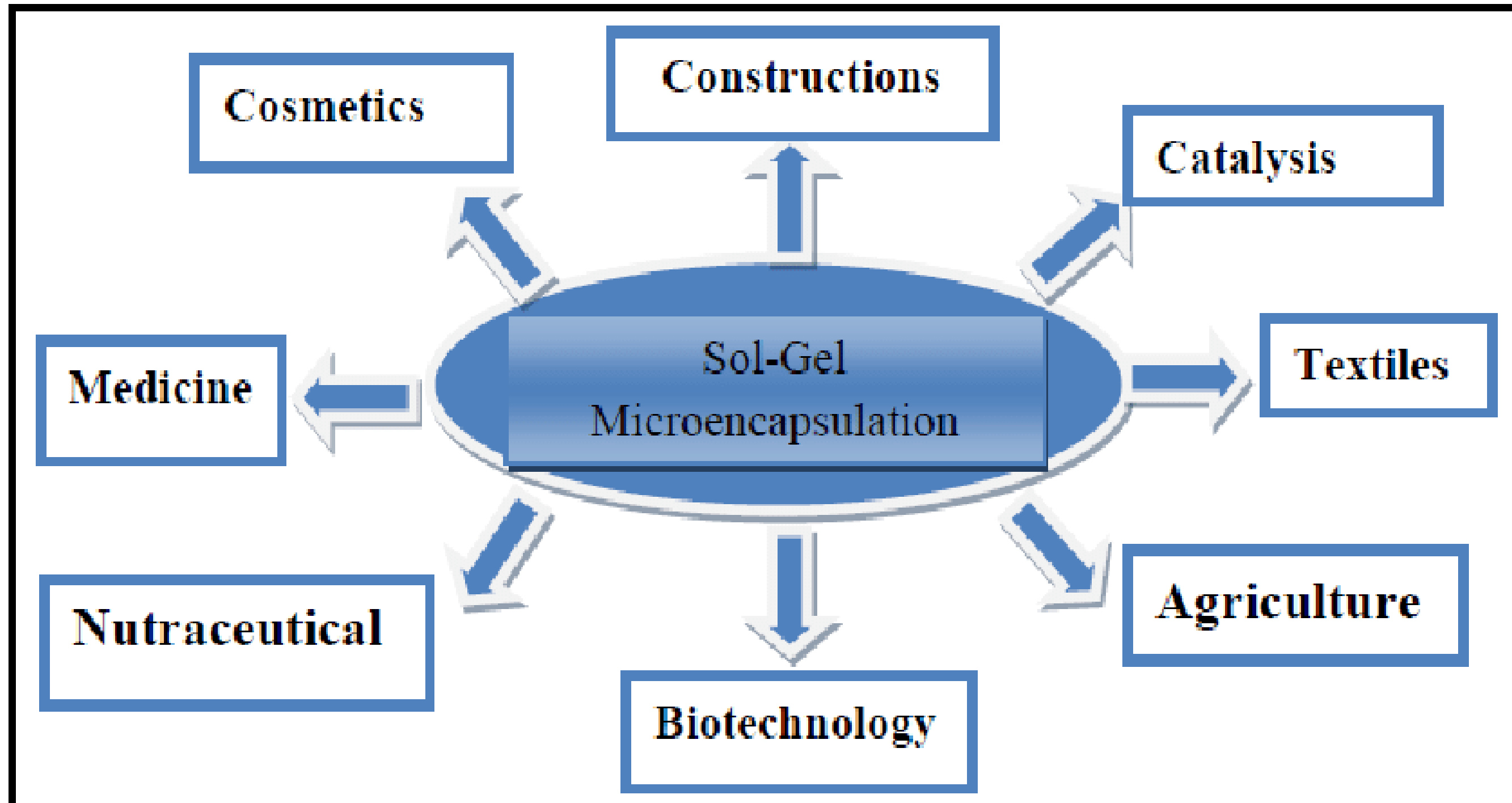
Grinding



Sifting



APPLICATIONS OF SOL GEL METHOD





SUMMARY



REFERENCES



1. Dr.V.Veeraiyan, “Engineering Chemistry-II ”VRB Pub. Co. Ltd, Chennai.2016..
2. Wiley, “Engineering Chemistry”, John Wiley & Sons. InC, USA.
3. P.C.Jain & Monicka Jain, “Engineering Chemistry” , Dhanapat Rai Publising Company Pvt. Ltd. 2017.

THANK YOU