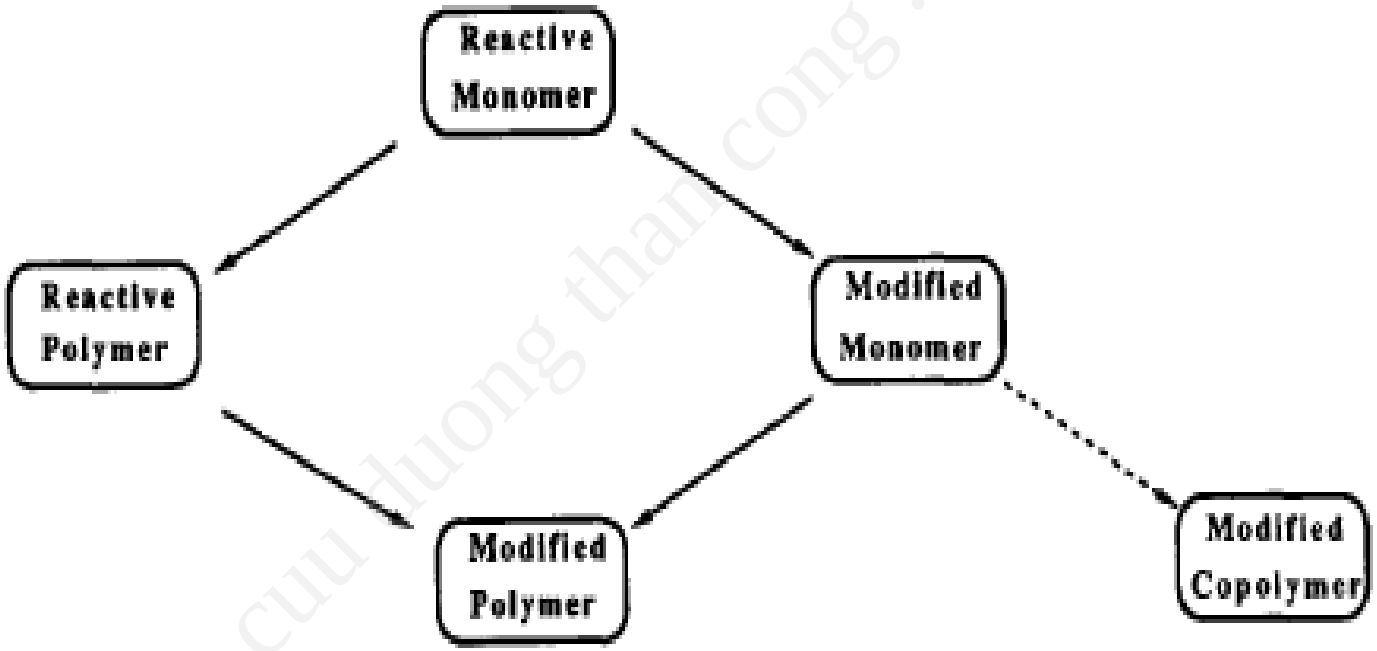
CHEMICAL MODIFICATION OF POLYMERS

APPLICATIONS AND SYNTHETIC STRATEGIES

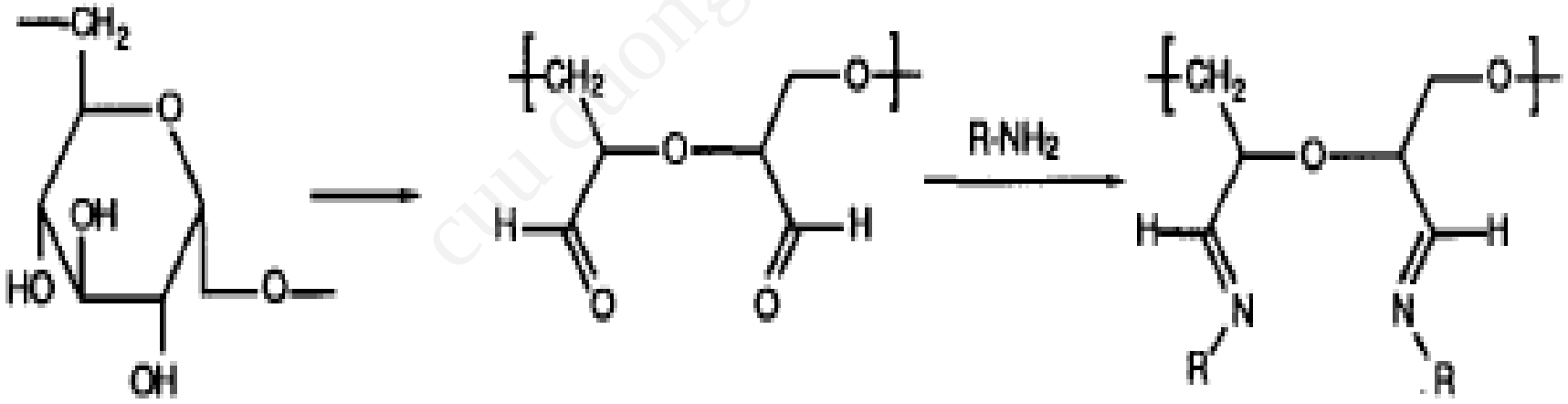


Two routes to modified polymer from a reactive monomer.

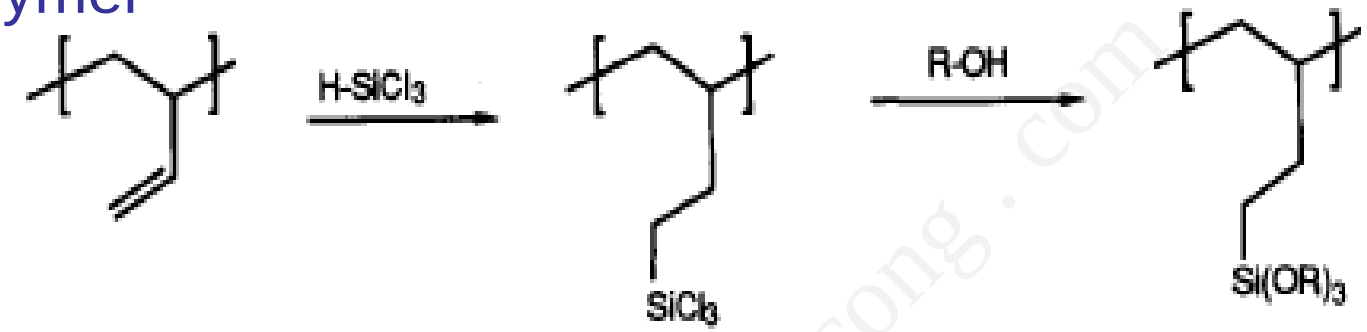
Synthesis of reactive polymers

I/ the attack on a conventional polymer by a convenient reagent

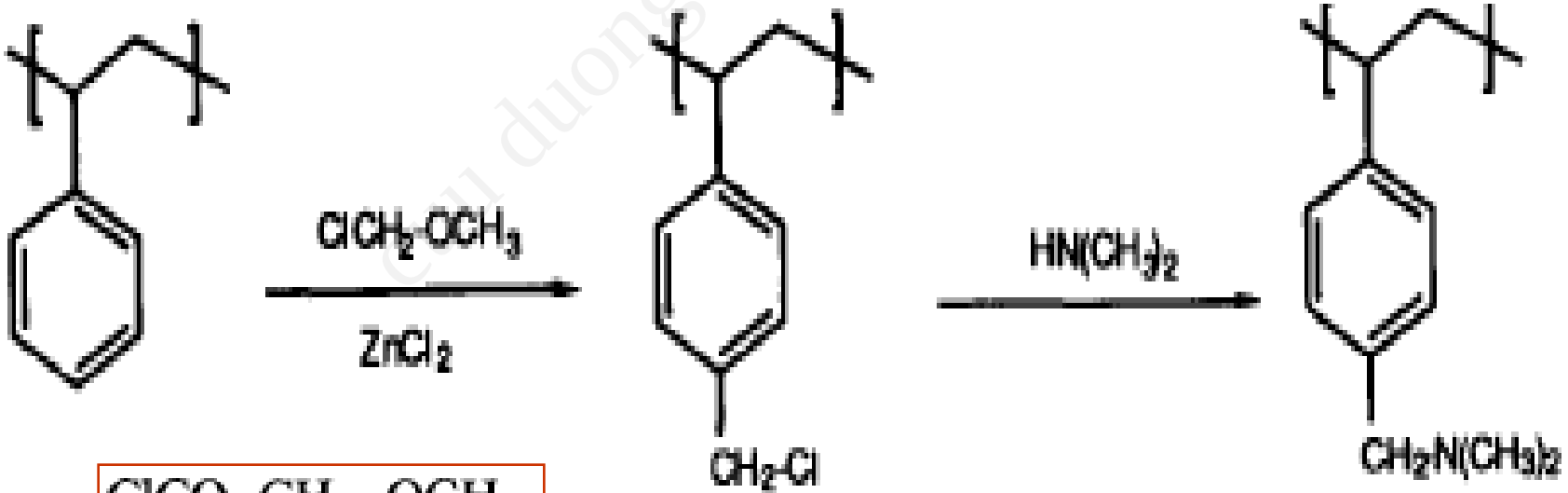
a/ the oxidation of dextrans by a periodate



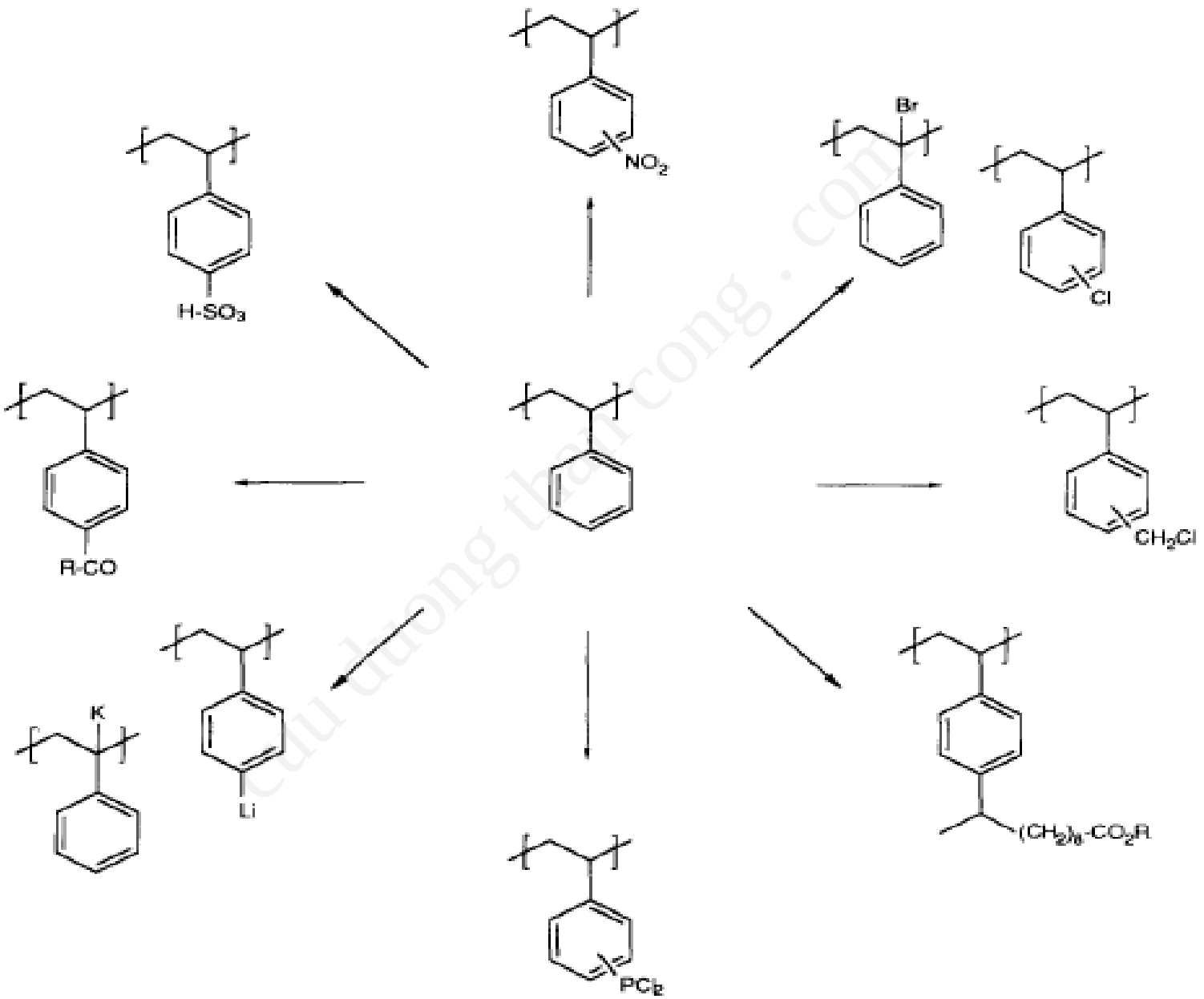
b/ addition of silanes to the double bonds of an unsaturated polymer

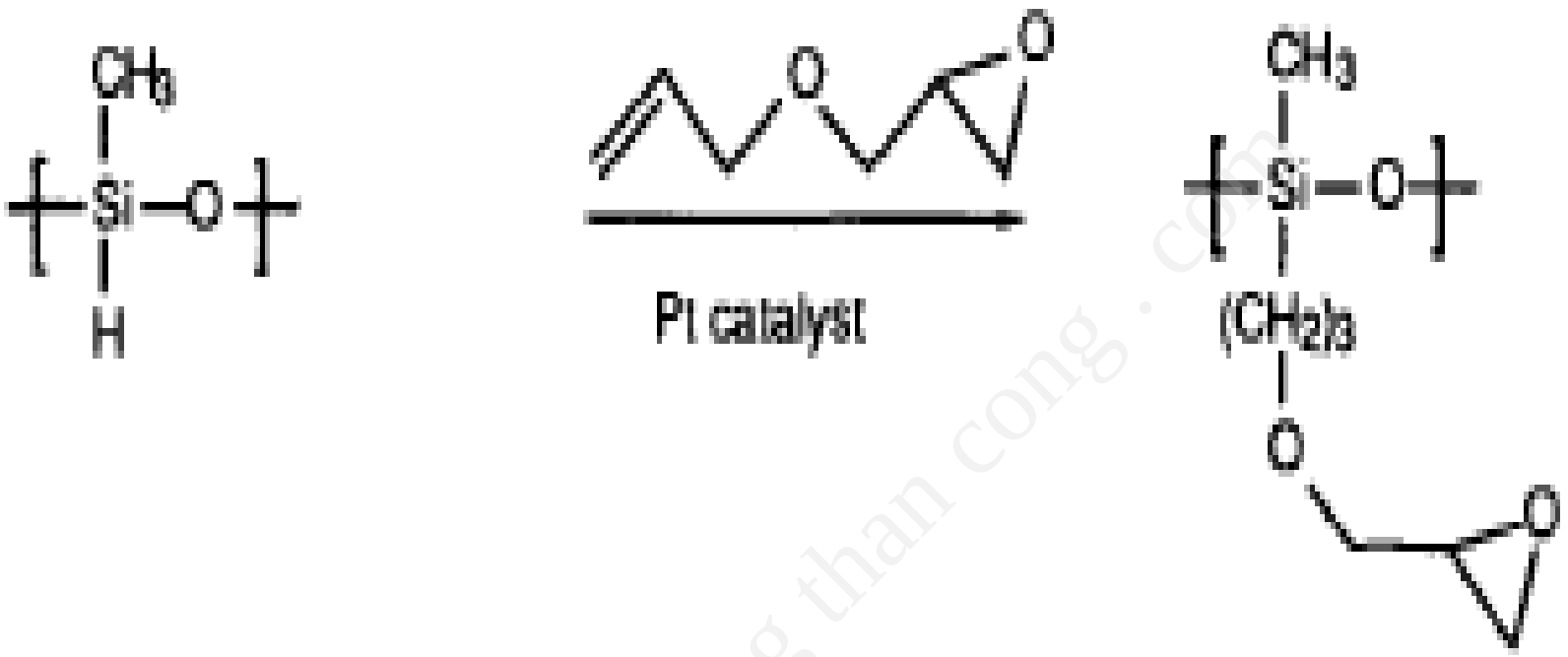


c/ introduction of -CH2Cl groups on polystyrene by chloromethyl ether catalyzed by a Lewis acid

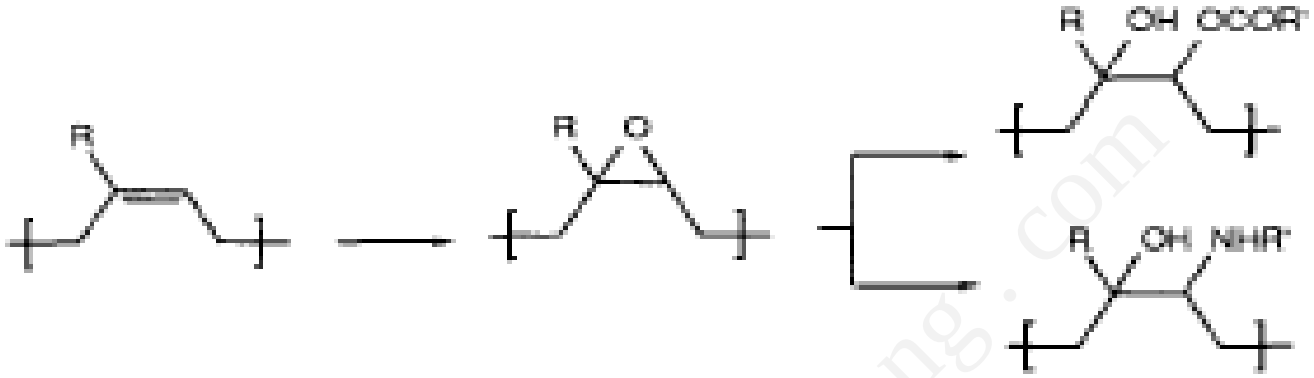


$ClCO–CH_2–OCH_3$

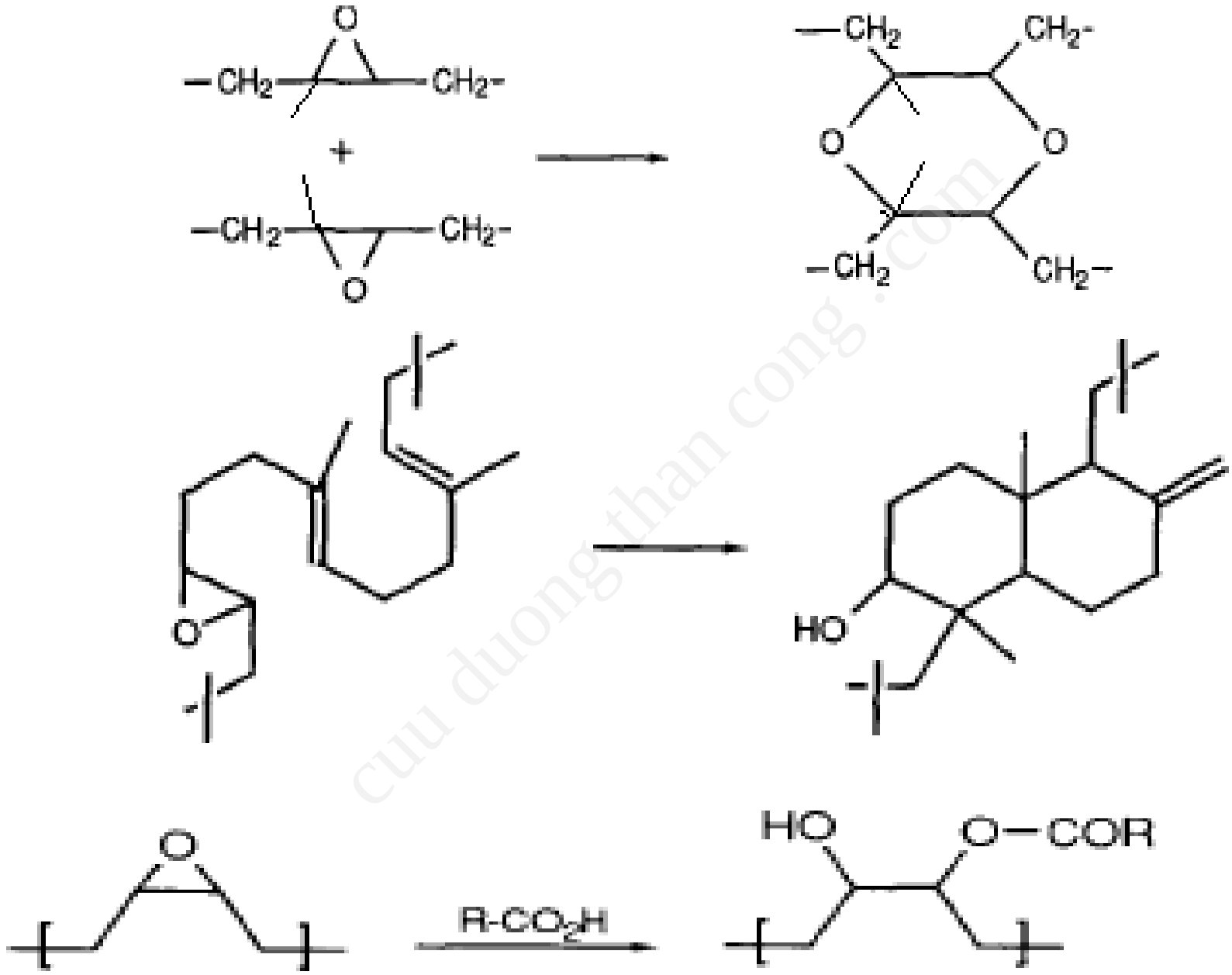




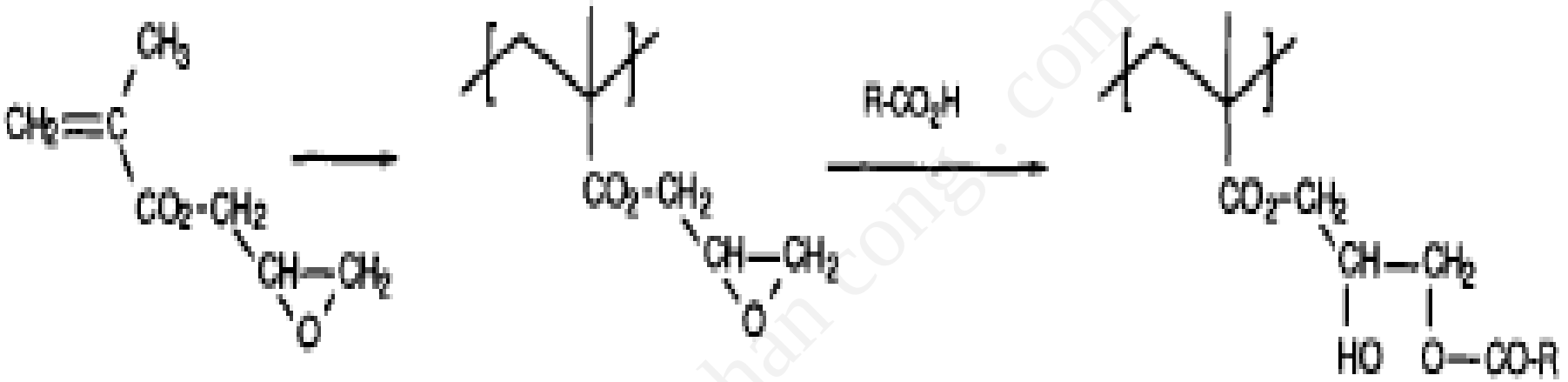
d/ the epoxidation of unsaturated polymers or copolymers

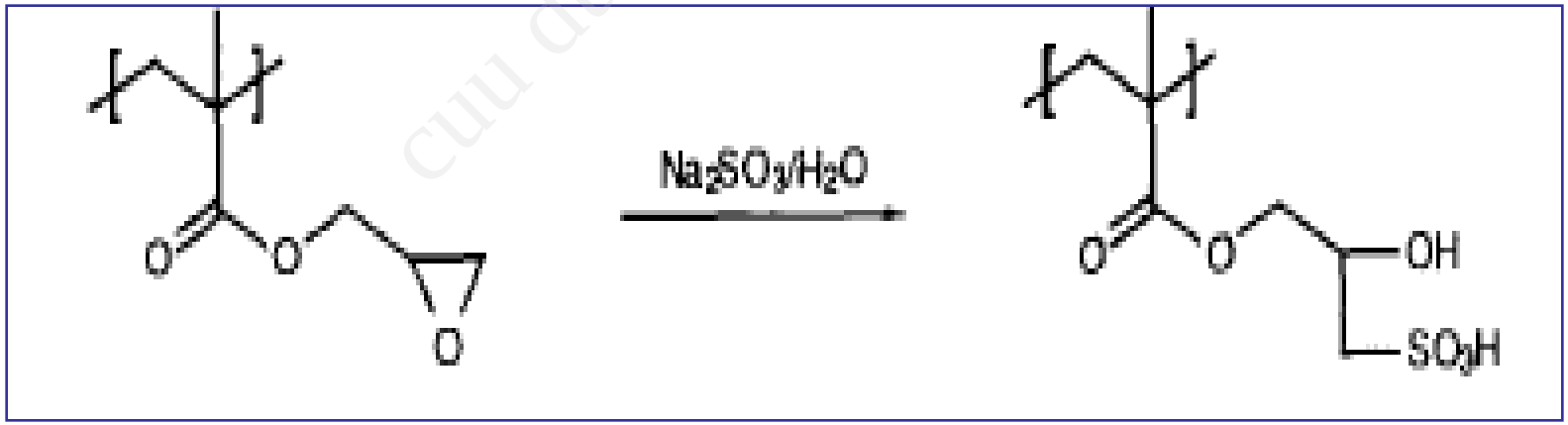


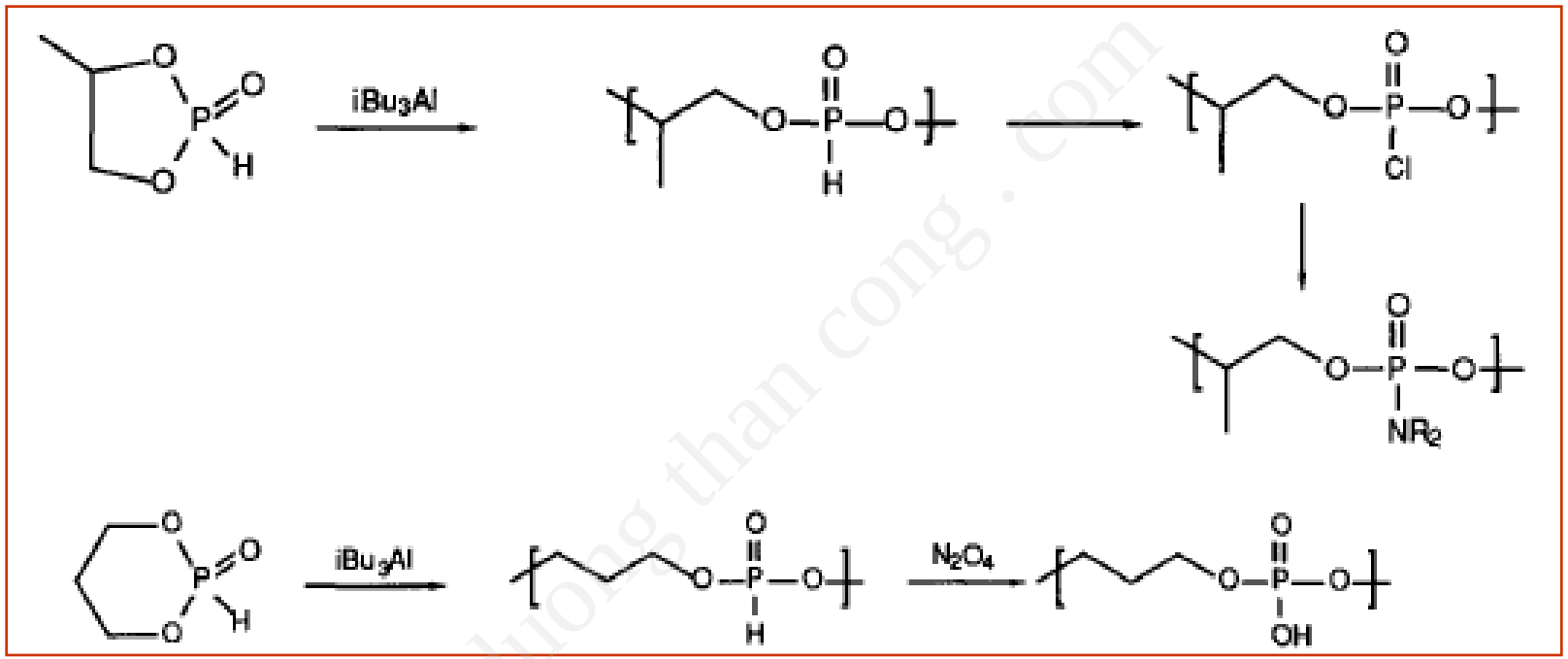
Secondary reactions



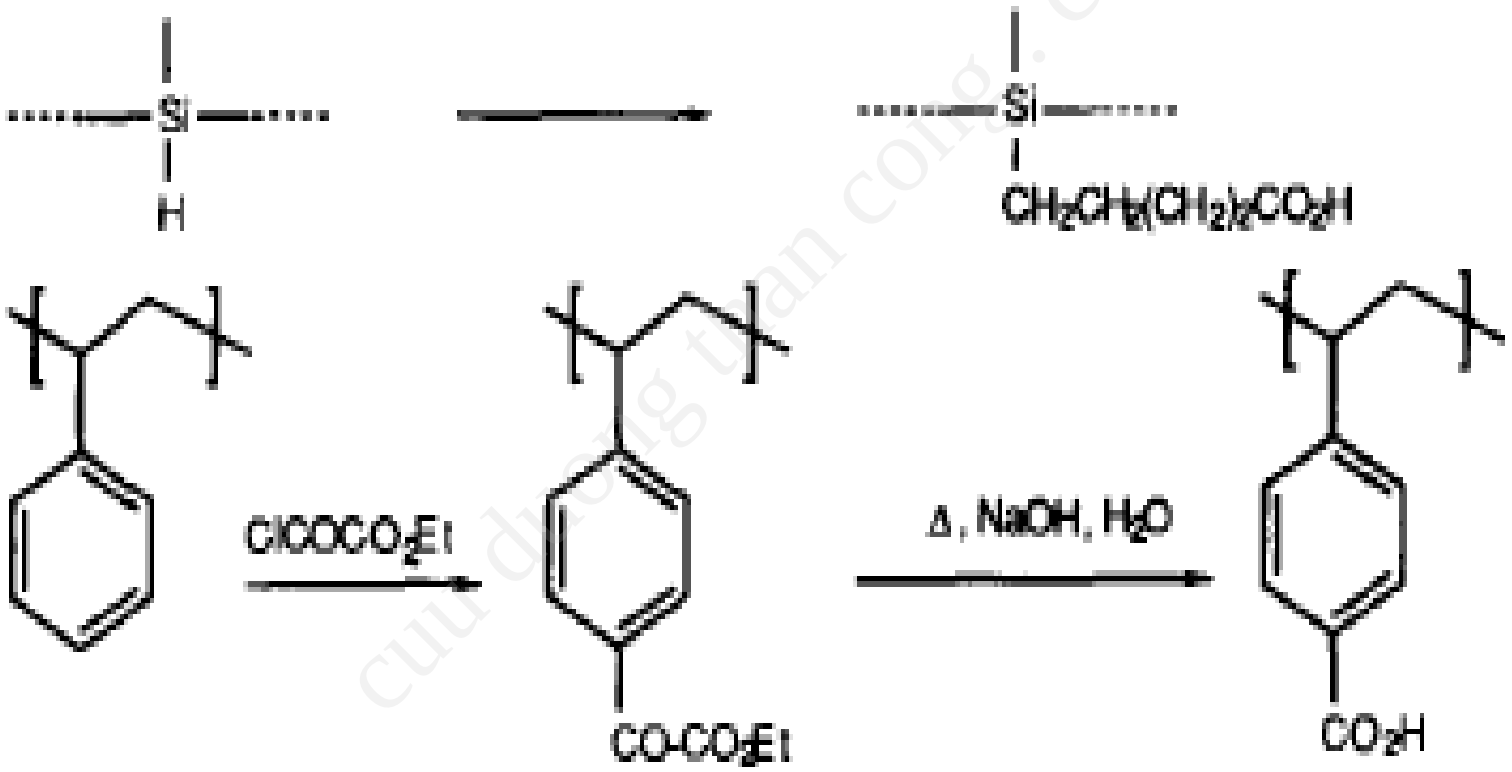
2/ polymerization of a precursor monomer

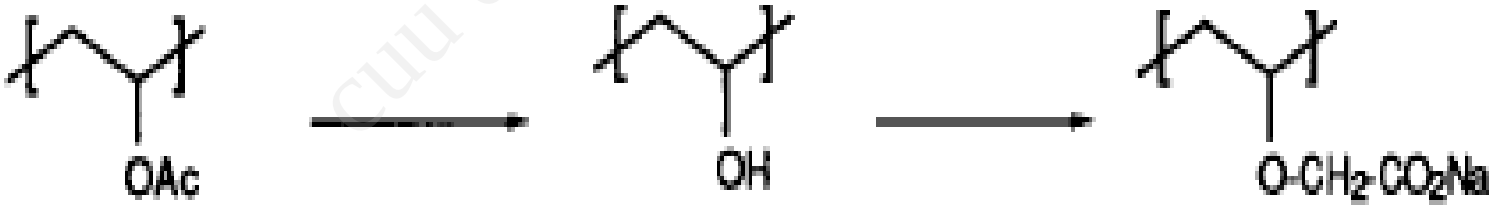


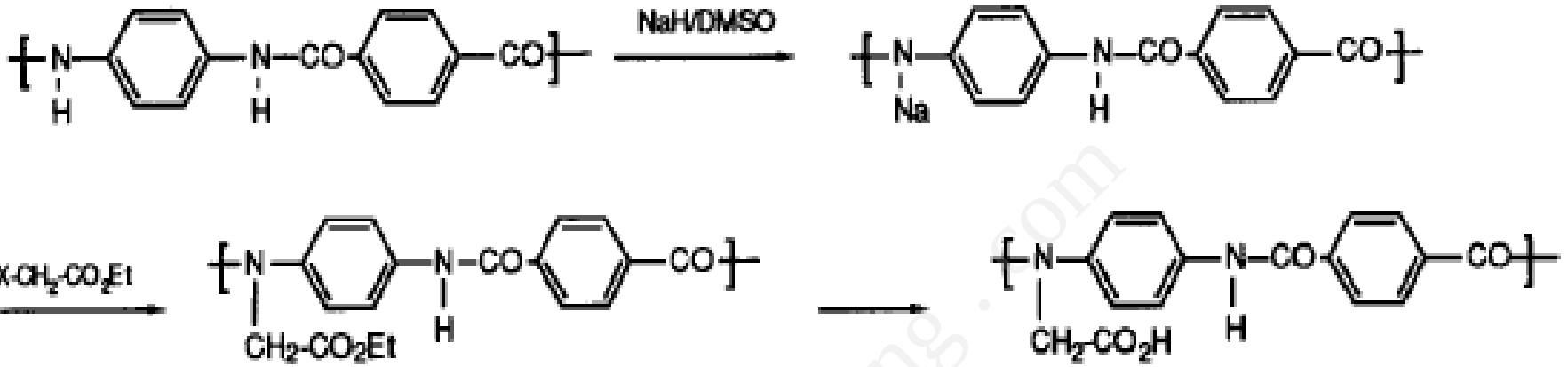


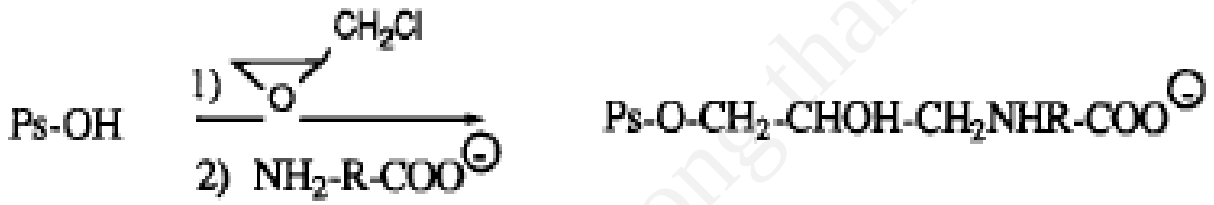


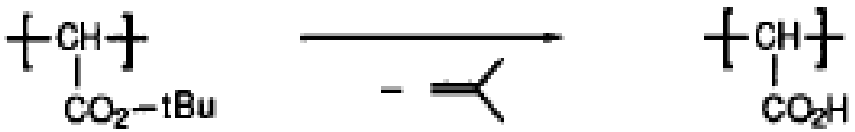
Synthesis of polymers bearing acid groups



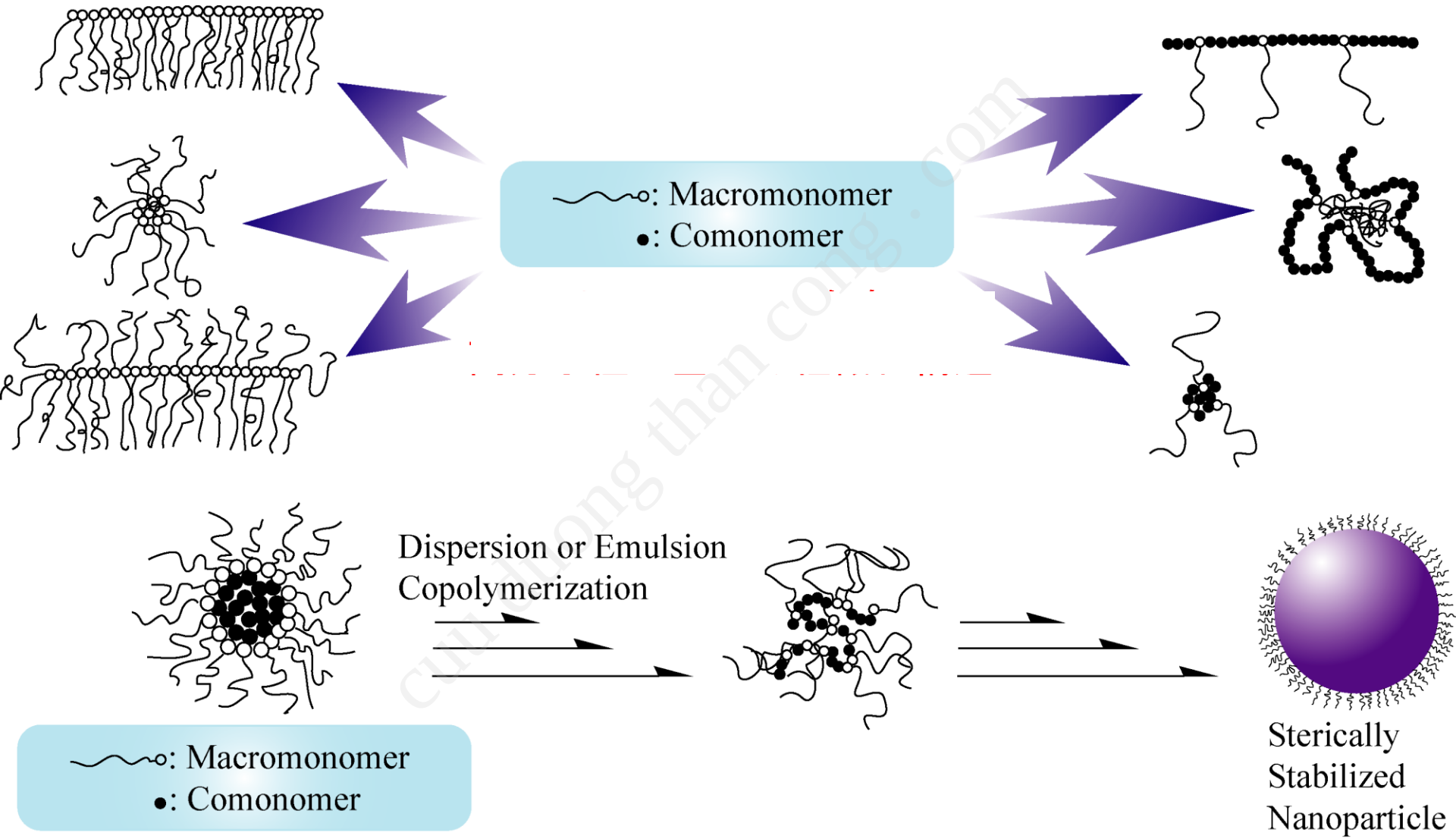








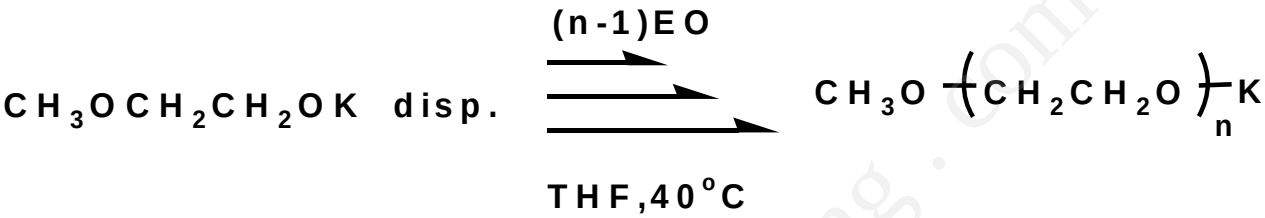
Mcromonomer Method

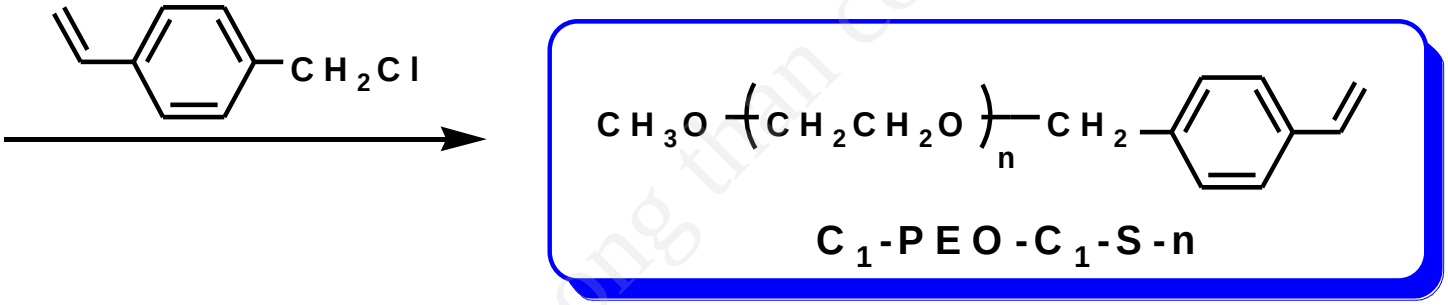


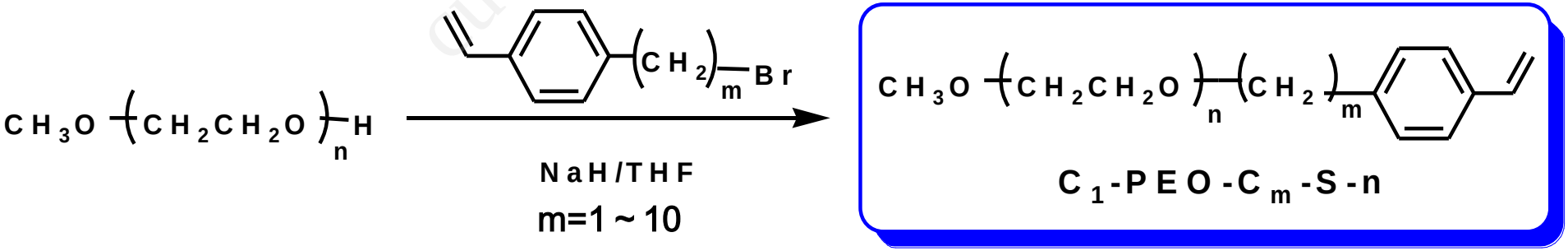
K. Ito, S. Kawaguchi, "Poly(macromonomers), Homo- and Copolymerization", *Advance in Polymer Science*, **142**, 129-178(1999).

S. Kawaguchi, K. Ito "Dispersion Polymerization", *Advance in Polymer Science*, **175**, 317-346(2005).

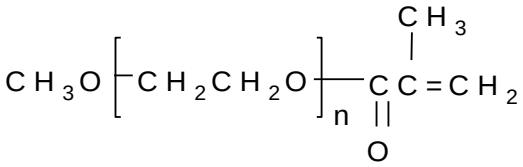
Synthesis of Macromonomers

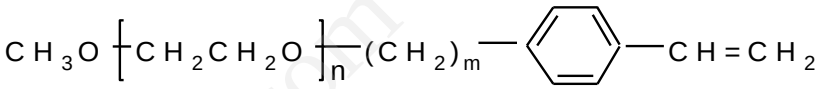




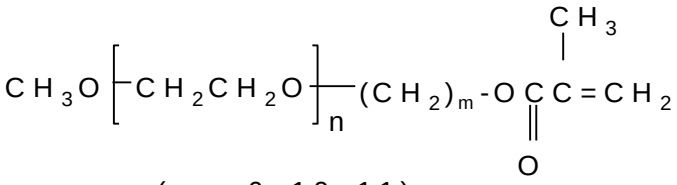


PEO

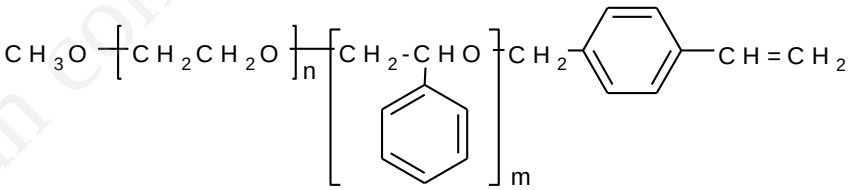




(m = 1, 4, 7)

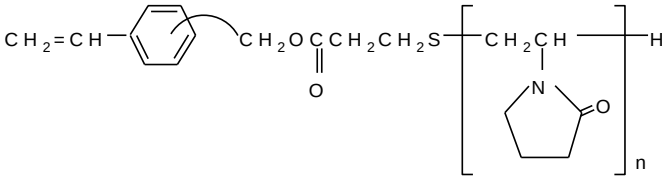


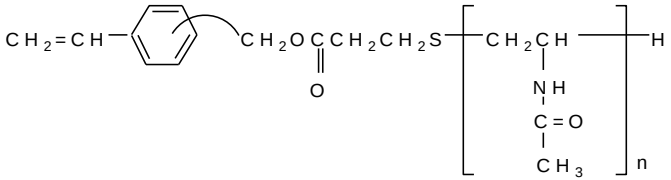
(m = 6, 10, 11)

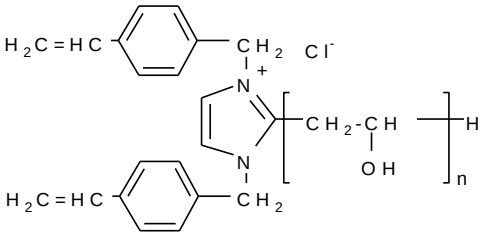


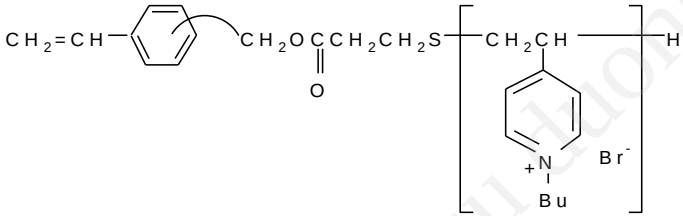
(m = 2.6, 4.1, and 6.8)

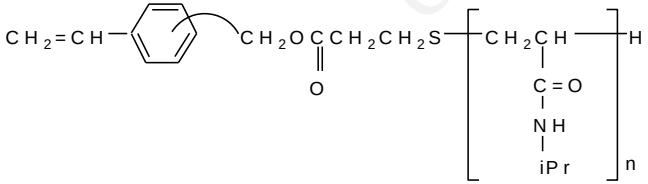
Other Water-soluble Macromonomers

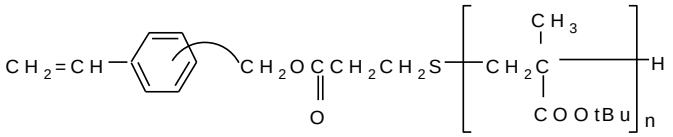


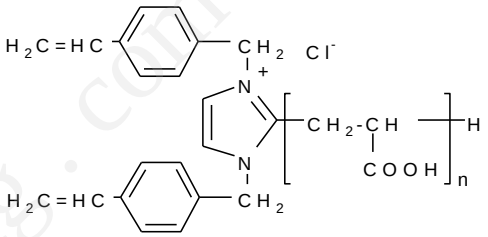


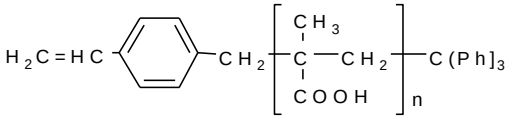


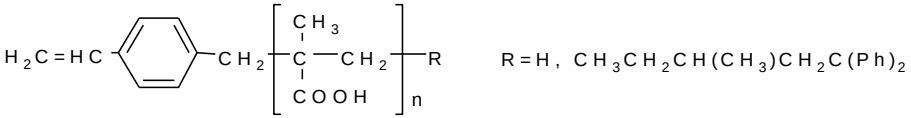


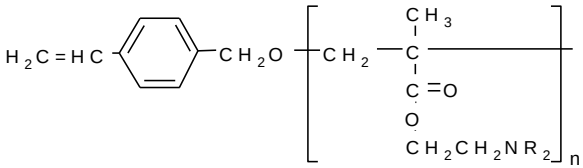


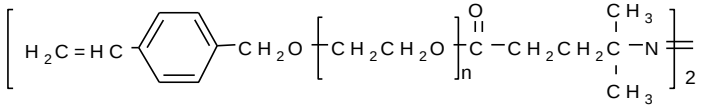


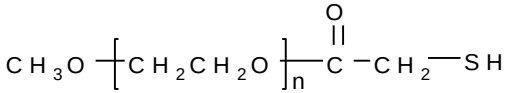




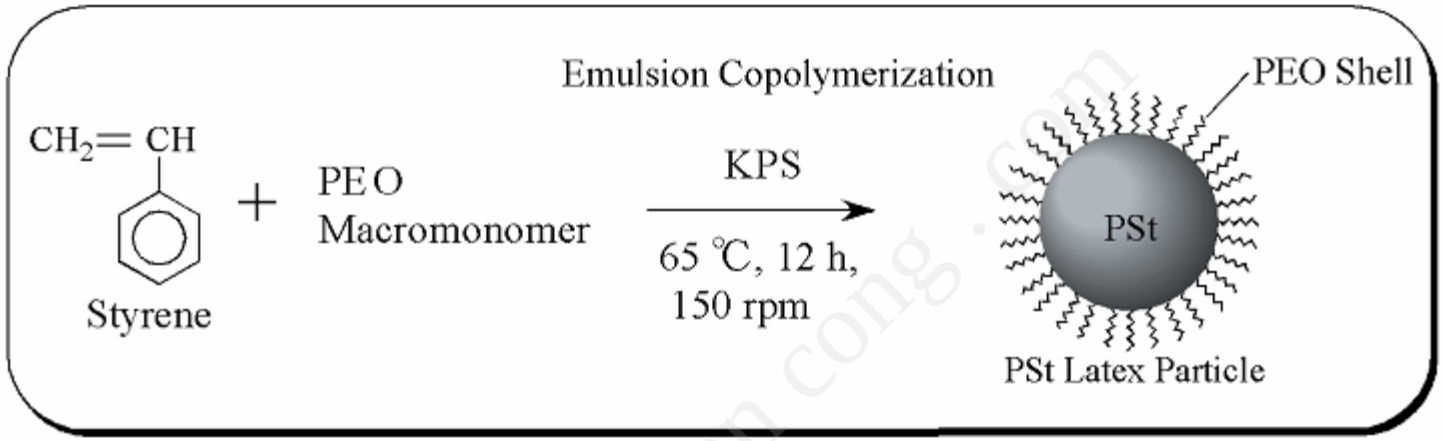




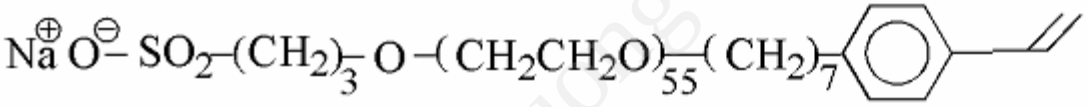




Emulsion Polymerization

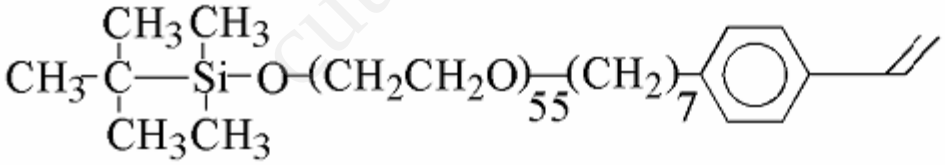


PEO Macromonomers



Macromonomer 1

S-C_7-PEO_{55}-Sulfonic acid Na salt

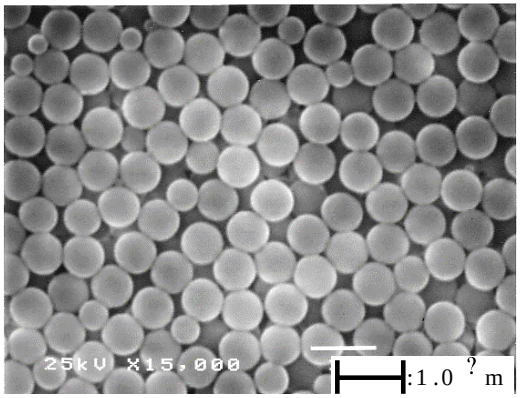


Macromonomer 2

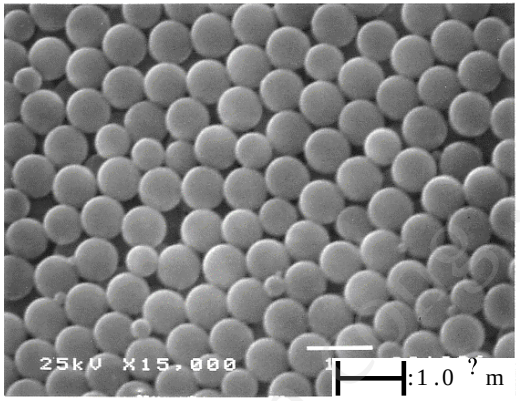
S-C_7-PEO_{55}-tBDMSi

SEM photographs

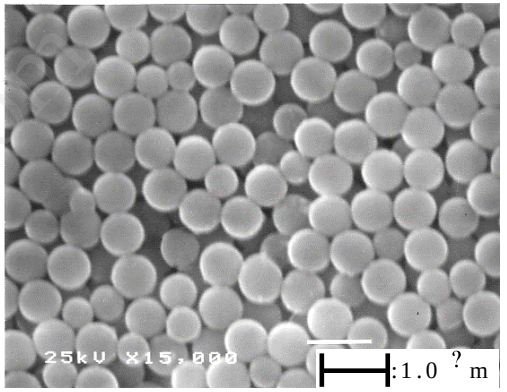
2-1 645 nm



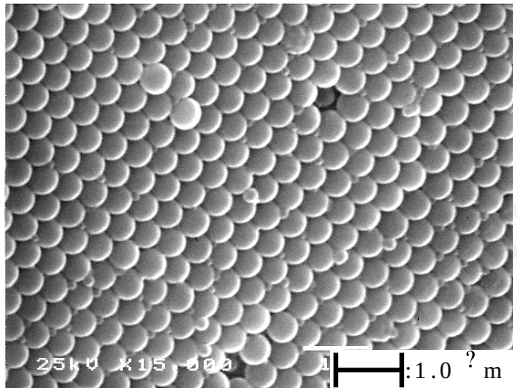
2-2 710 nm



2-3 699 nm



2-4 515 nm



2-5 409 nm

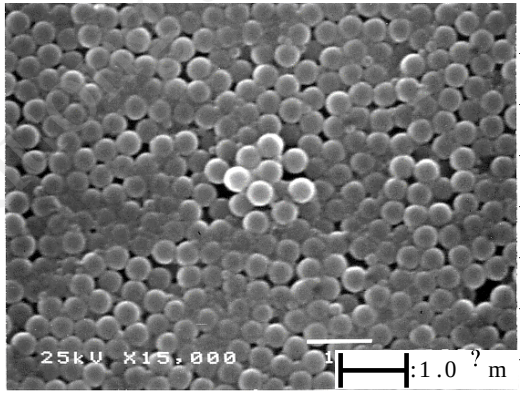


Figure. SEM photographs of polymer particles synthesized by emulsion copolymerization of ST with PEO Macromonomer 2.

(3) Characterization of particle surface

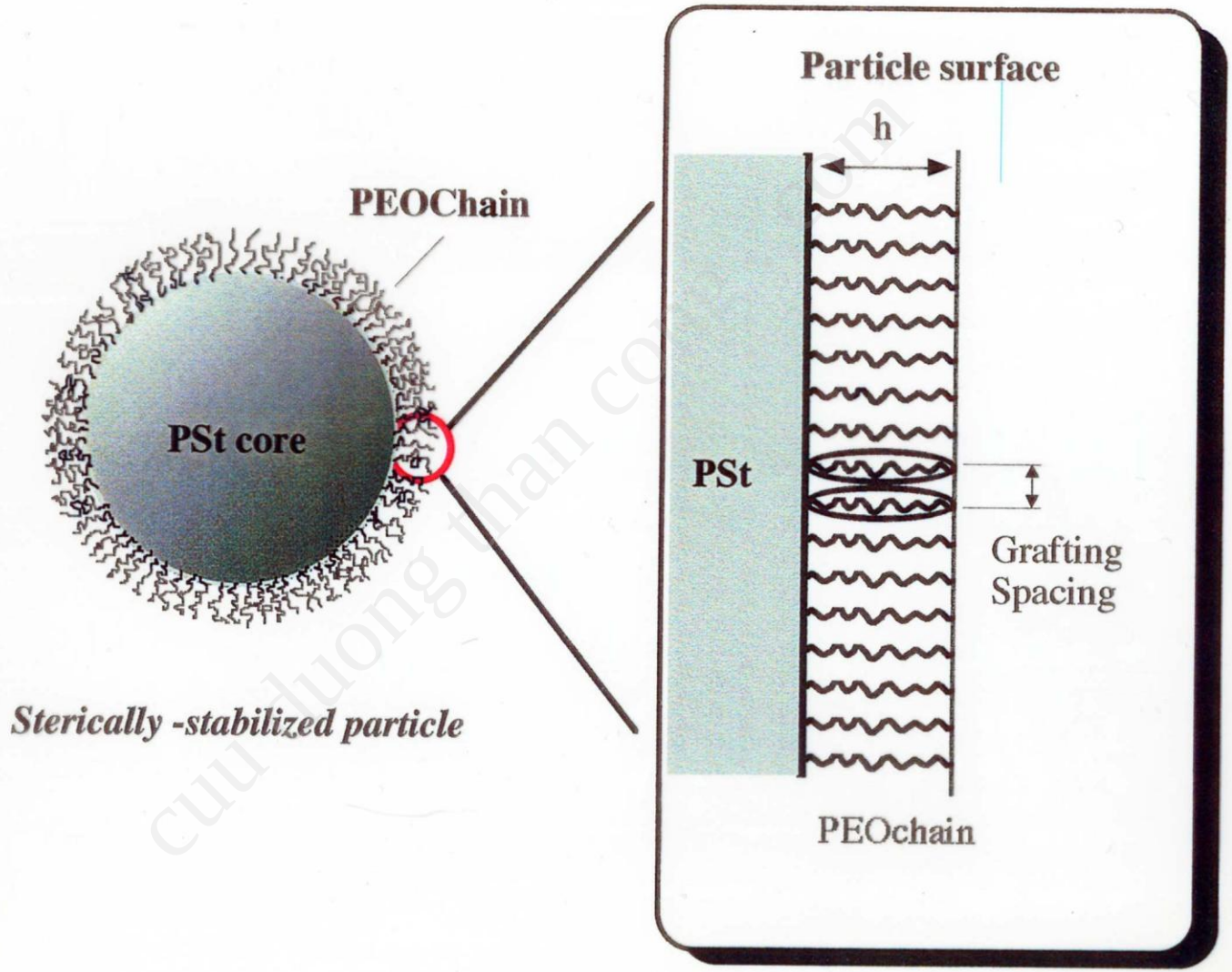


Fig. Schematic representation of Sterically-stabilized particle.

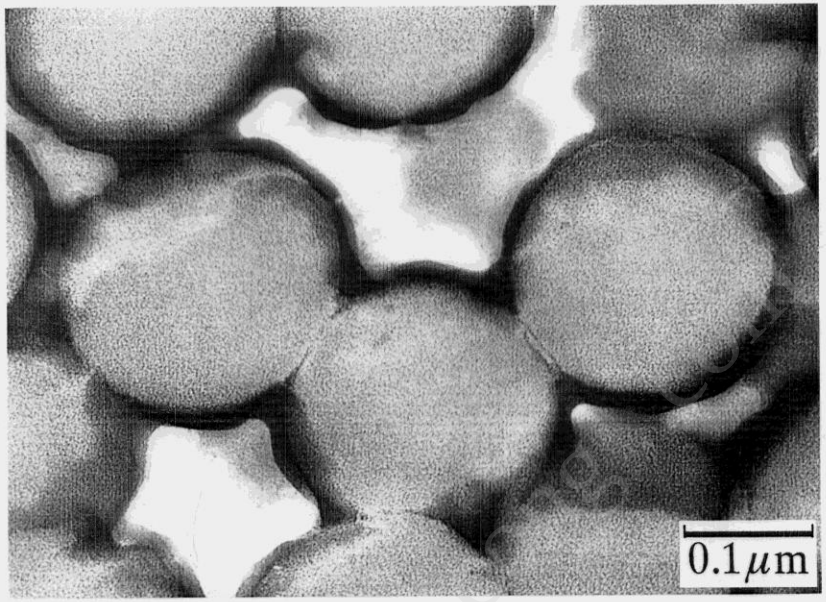


図1-7 SPECIMEN ポリスチレン粒子 MAGNIFICATION x 250.000
FILM No. 69315

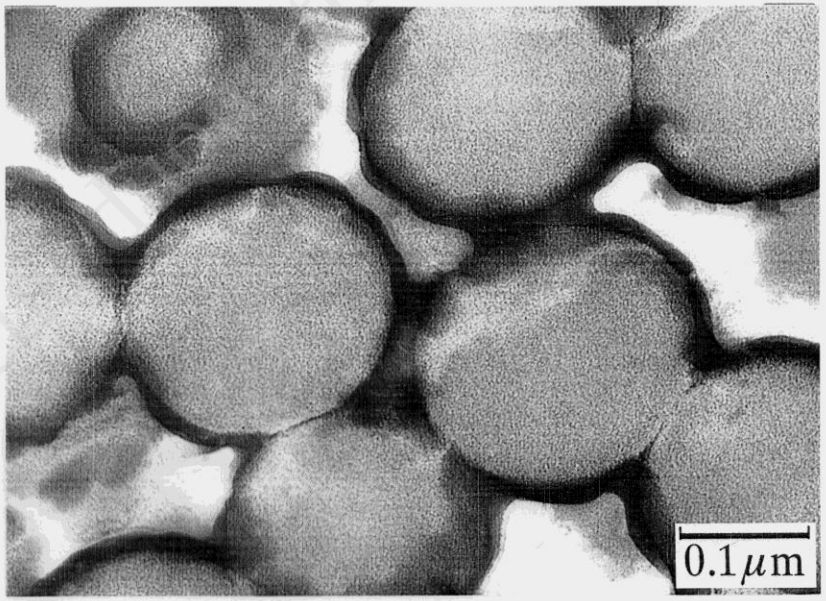


図1-8 SPECIMEN ポリスチレン粒子 MAGNIFICATION x 250.000
FILM No. 69315