Waterborne polymers

Học phần biến tính polymer

Introduction

Water soluble polymers , Why ?

- Reduce flammability
- Reducing the amount of solvent vapour (VOC)
- Cost
- Political factor

Water-borne alkyds

- Water-reducible alkyds are basically conventional alkyd resins based upon saturated or unsaturated oils or fatty acids, polybasic acids and alcohols modified to confer water miscibility.

Vegetable oils or fatty acids :

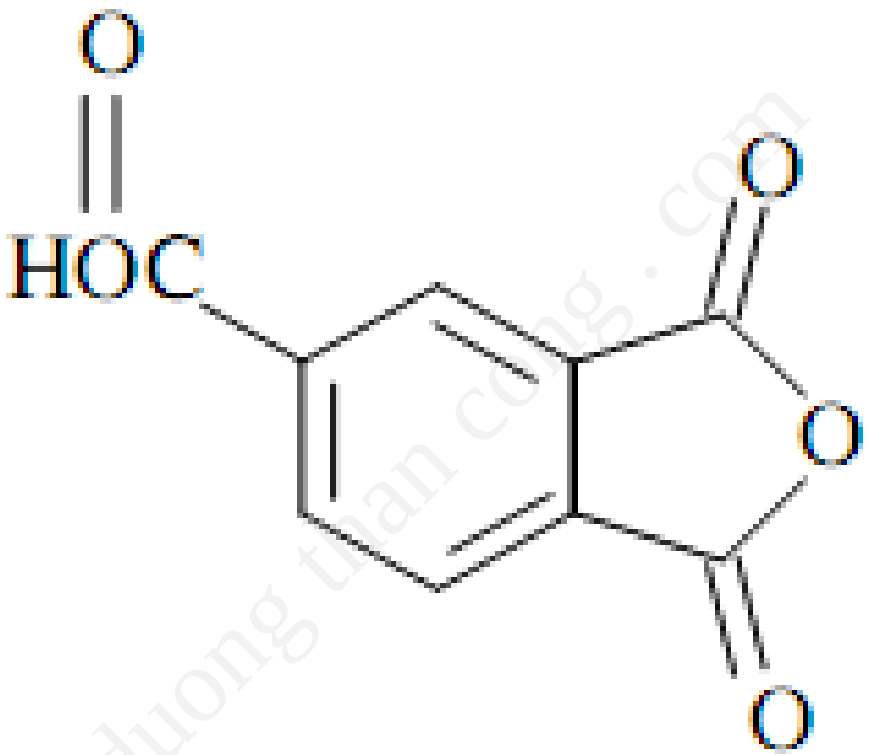
linseed, soyabean, castor, dehydrated castor, safflower, sunflower,tung, coconut and tall oil.

- **Acids :**

isophthalic, terephthalic, adipic, benzoic, succinic acids and phthalic, maleic and trimellitic anhydrides

- **. Polyols :**

glycerol, pentaerythritol, trimethylol propane, trimethylol ethane, ethylene glycol, propylene glycol, diethylene glycol, neopentyl glycol, 1:6 hexane diol, I :4 butanediol

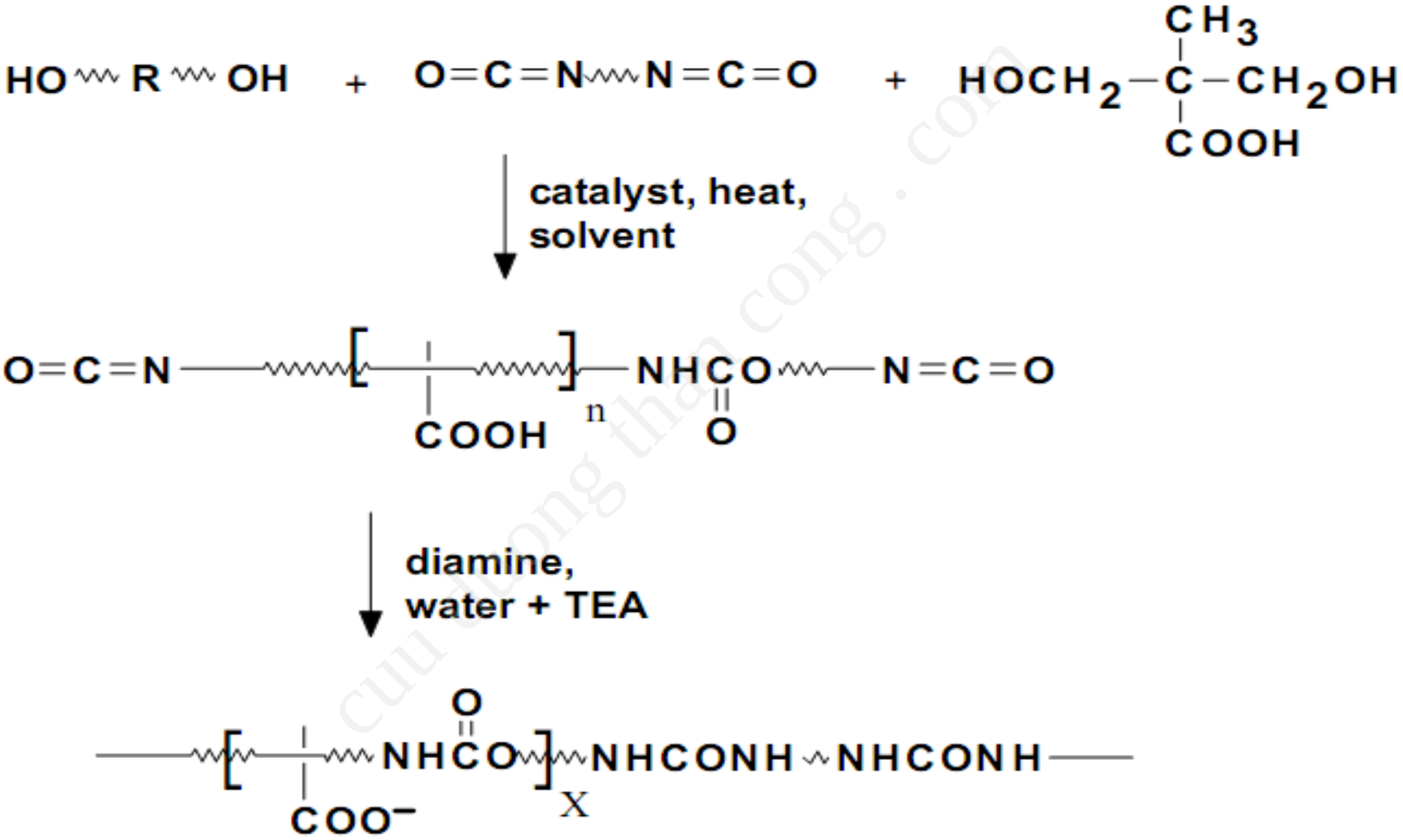


Trimellitic anhydride

Typical methods of introducing varying degrees of water miscibility are:-

- Initial maleinisation of the fatty acids followed by reaction with polybasic acids and polyols.
- Make the resin using hydroxyl containing prepolymers eg. polyethylene glycol
- Adding specific acid or hydroxyl containing substance towards the end of the reaction
- Styrenation or acrylation of the alkyd, with the monomer blend containing acidic groups.

Water-borne PU

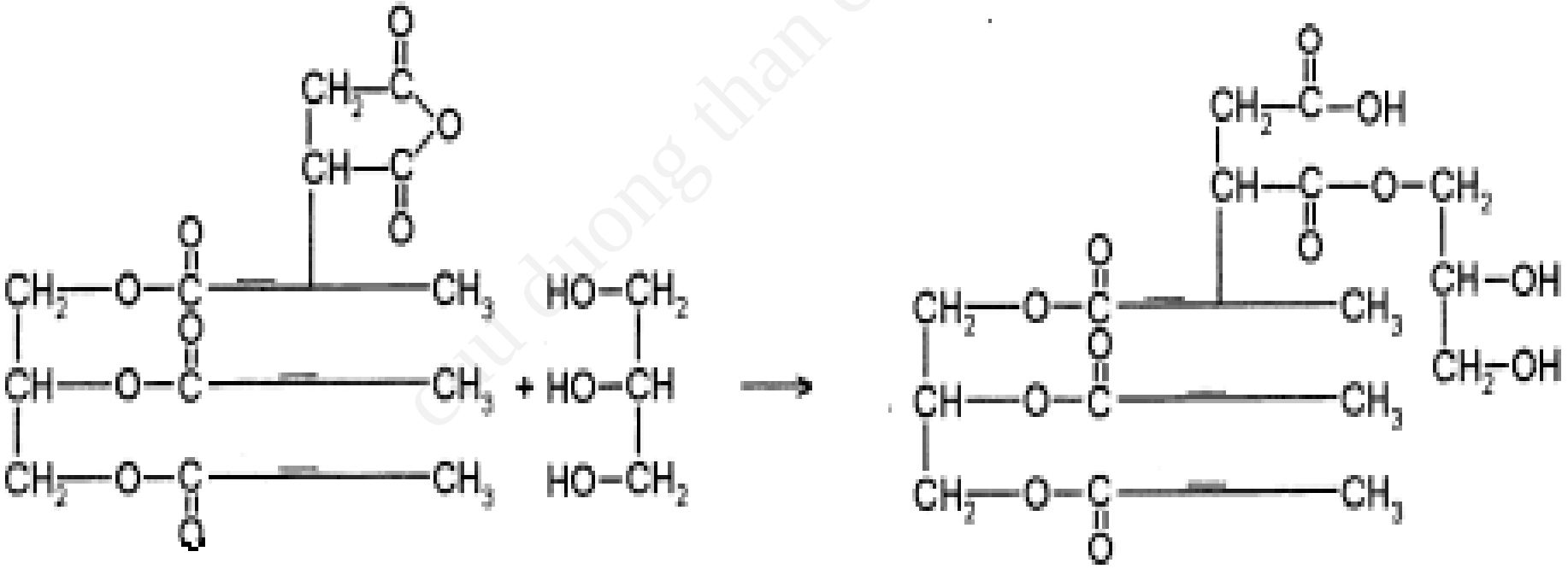


Synthesis of conventional waterborne polyurethane dispersion by the isocyanate prepolymer process.

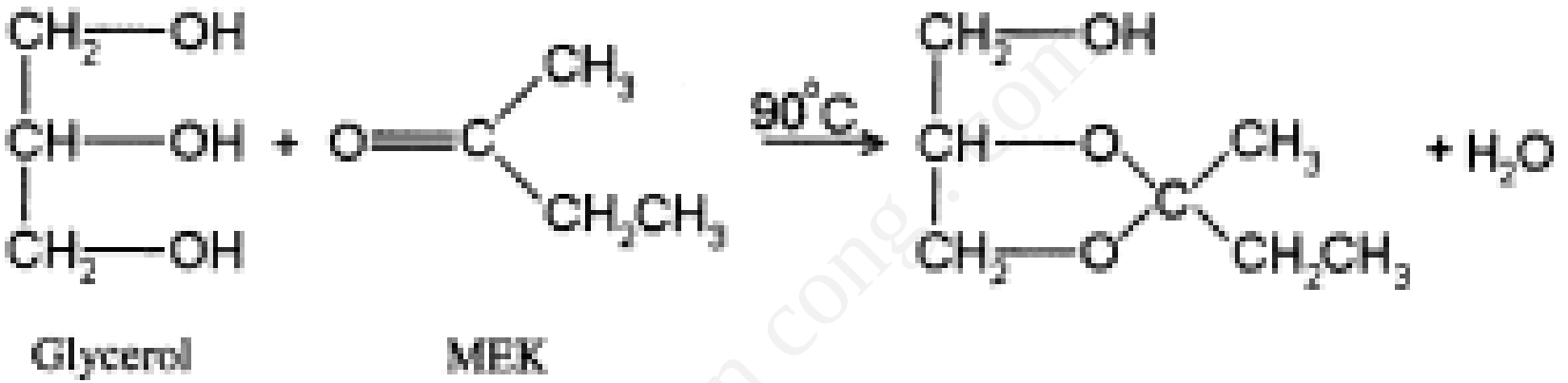
EX : Water-borne and air-drying oil-based resins

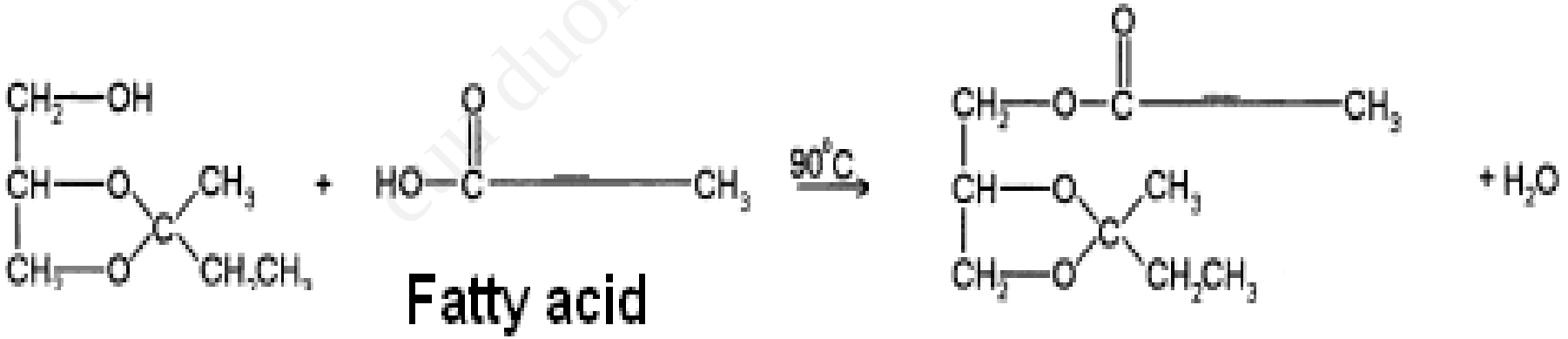
Progress in Organic Coatings 49 (2004) 259–269

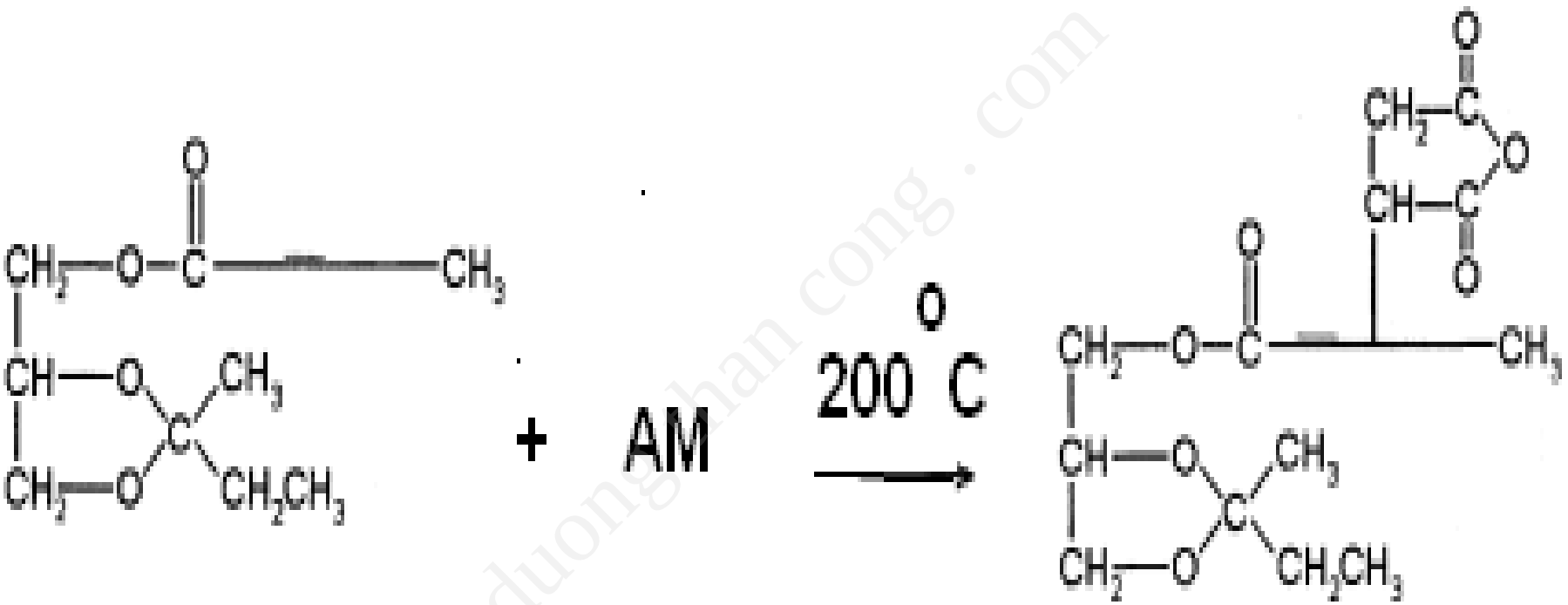
Method I :

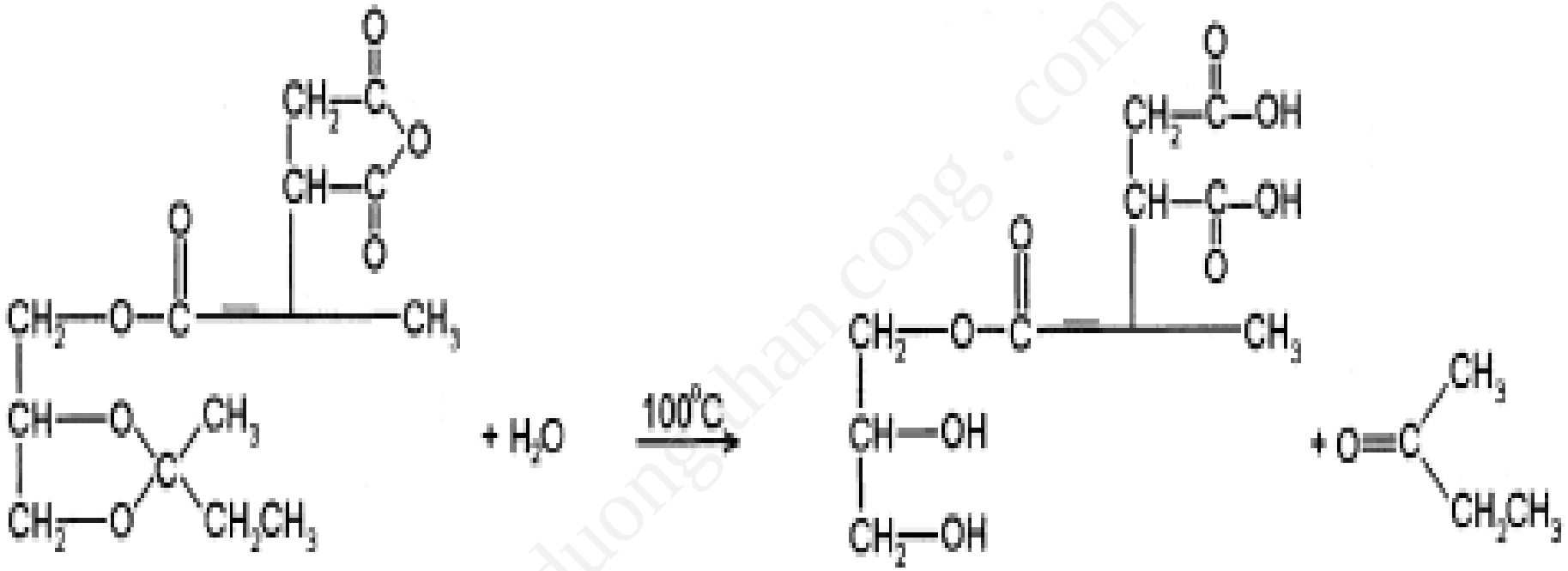


Method II









Water-dispersed polyurethane varnish production

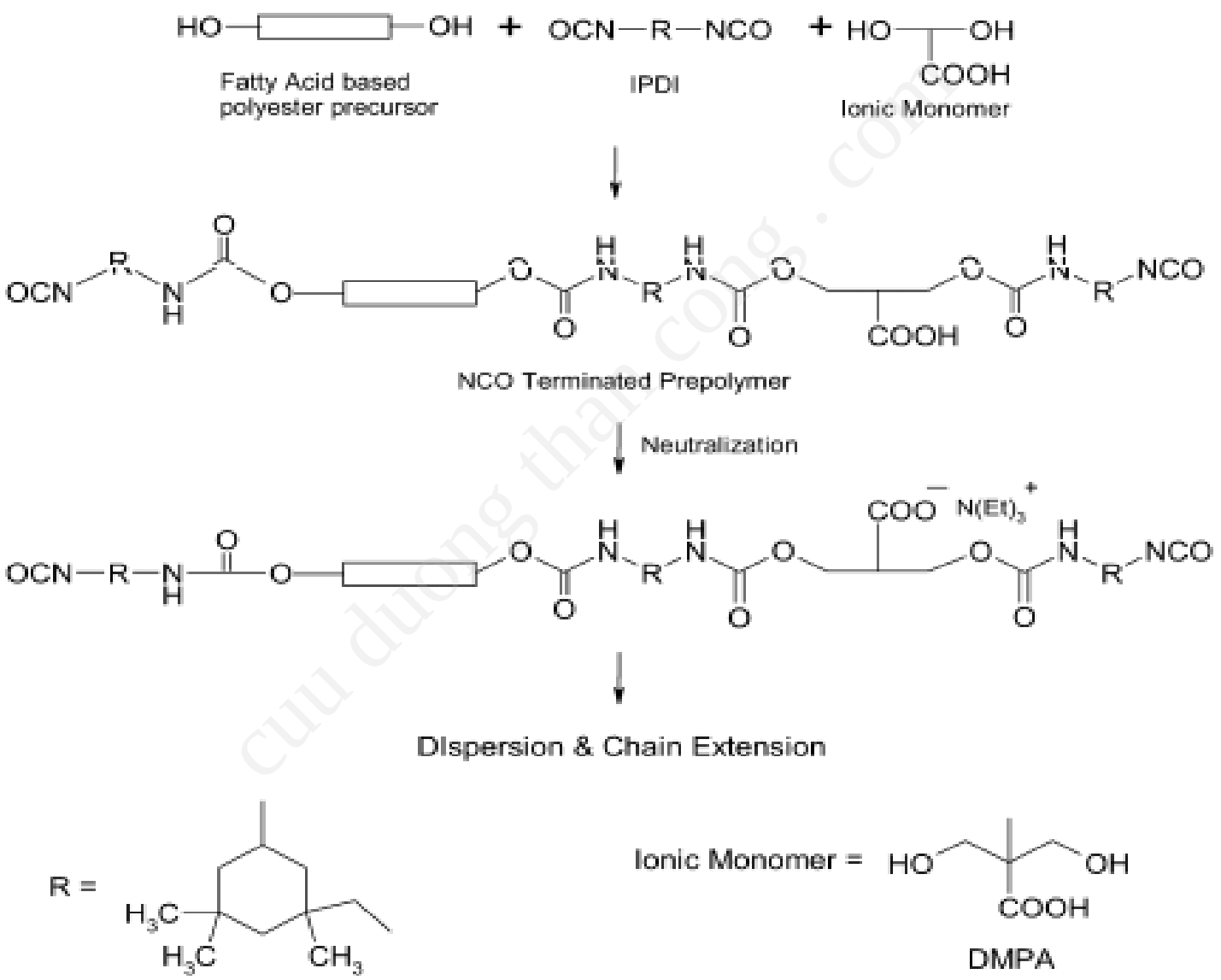
[NCO]/[OH] ~ 1,5 => NCO termination

HTPB and MMG + TDI → PU (*NCO terminated*)

Free NCO groups of the prepolymer were blocked with MEKO (methylethyl ketoxime)

TEA was added to the solution to neutralize the carboxylic group

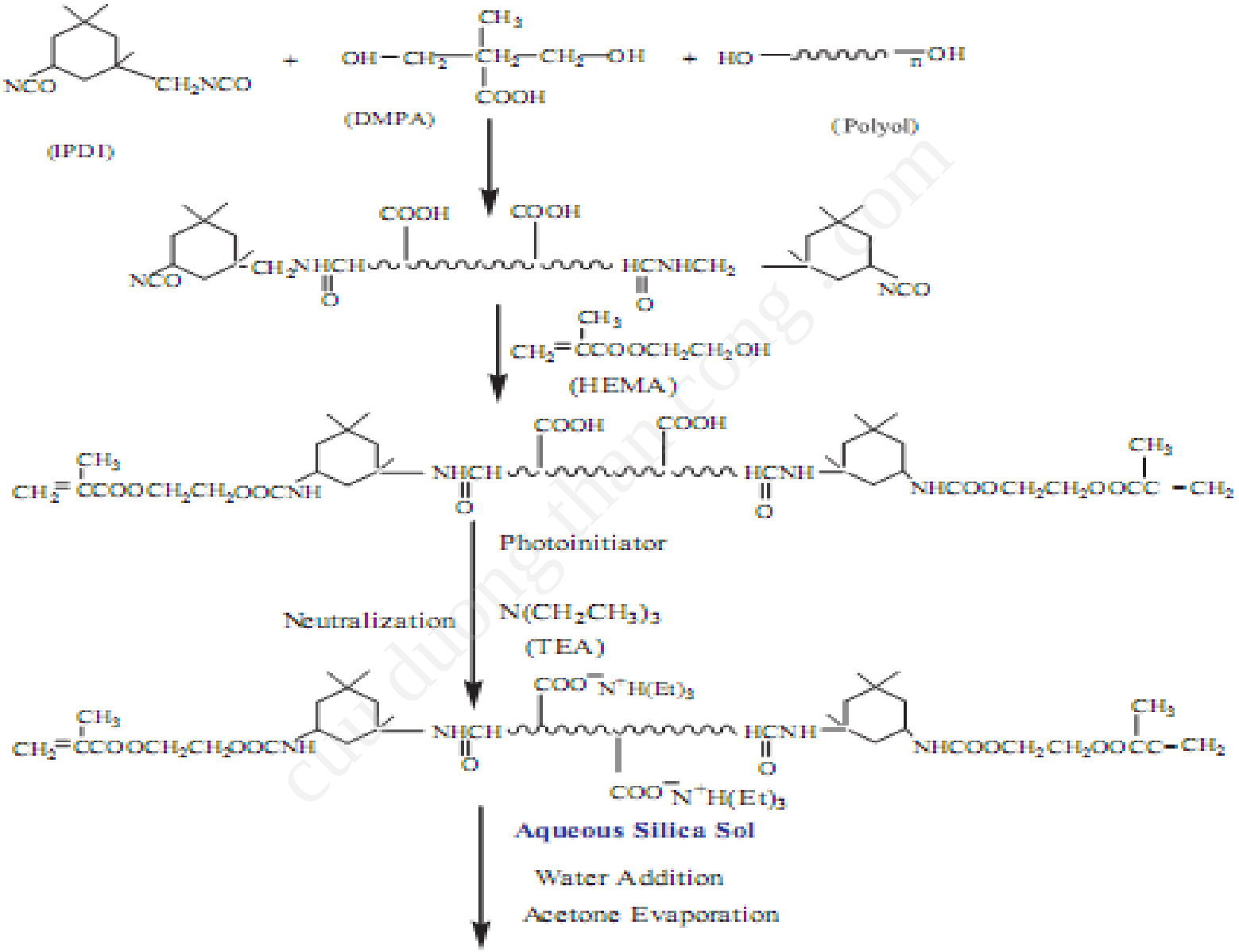
Progress in Organic Coatings 67 (2010) 255–263



Schematic diagram of preparation of fatty acid modified PUD.

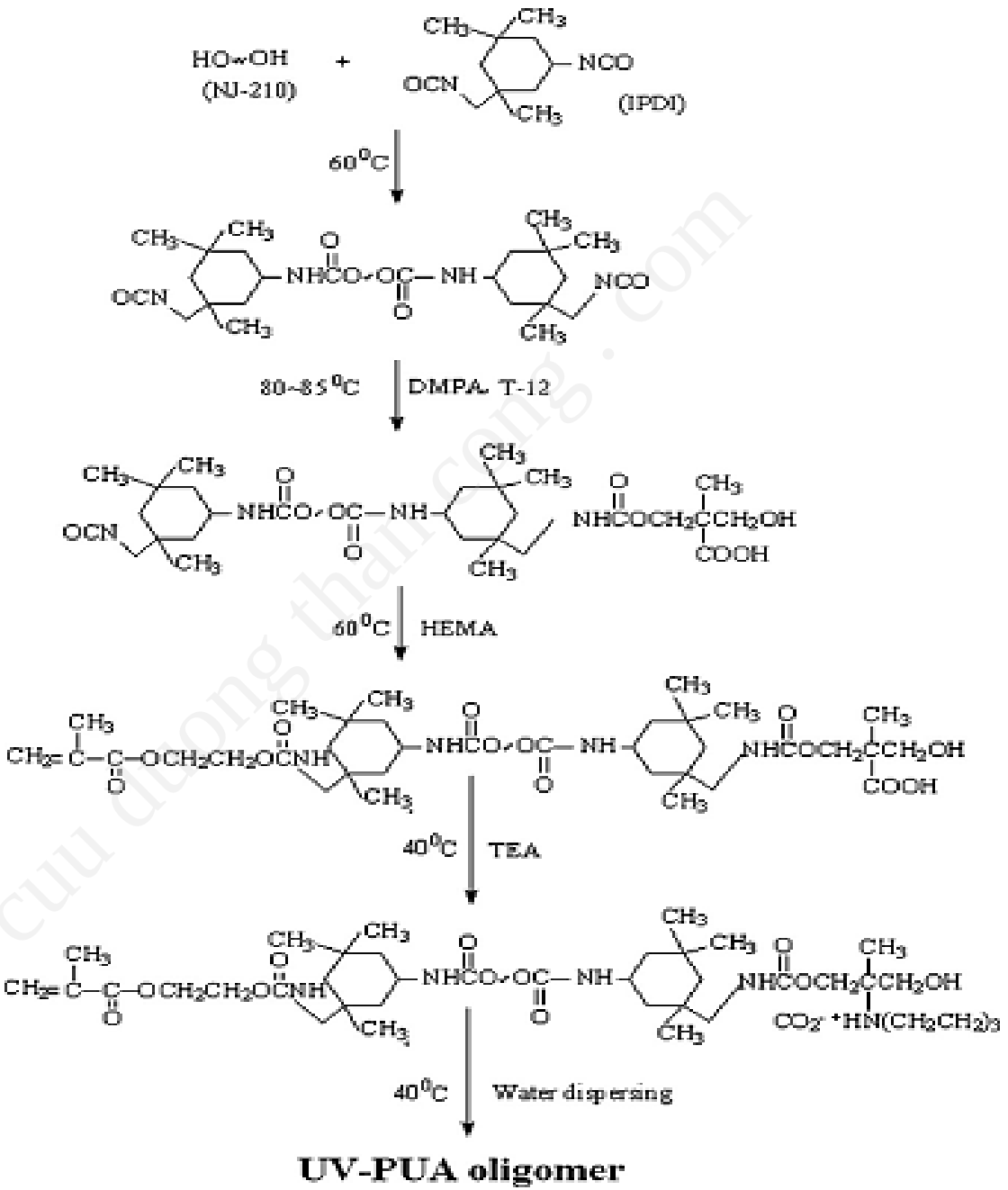
waterborne UV-curable polyurethane/silica nanocomposites

Progress in Organic Coatings 70 (2011) 1–8



Elementary steps for the synthesis of the WUPU/silica nanocomposites.

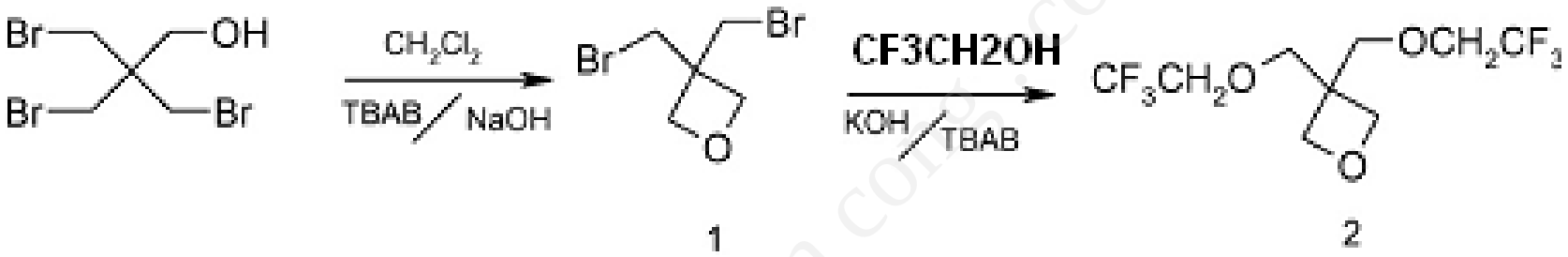
UV-curable waterborne polyurethane-acrylate

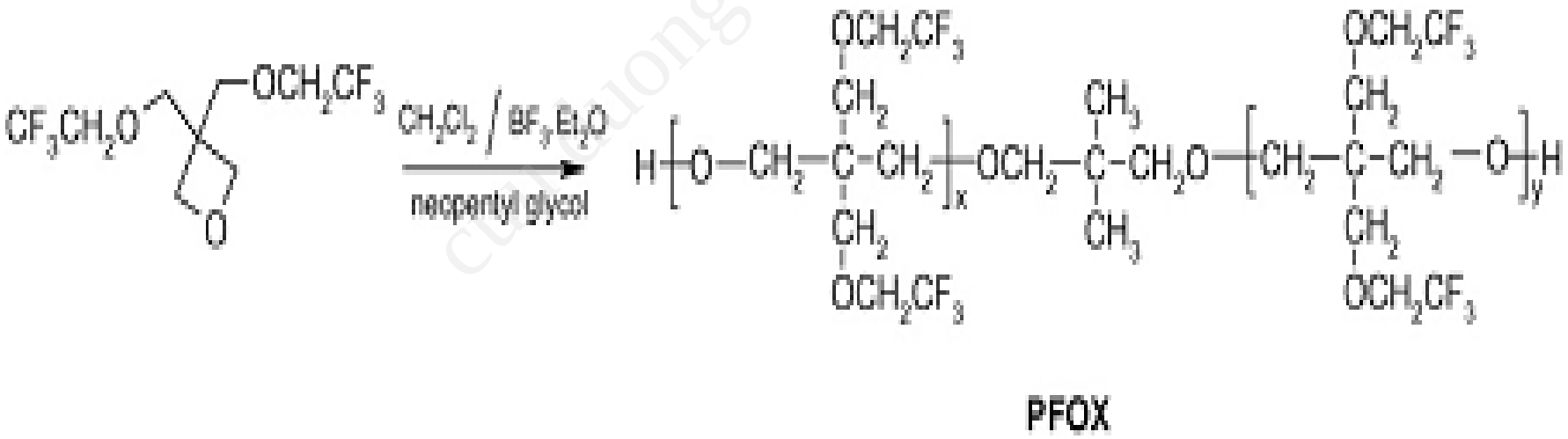


UV-PUA oligomer

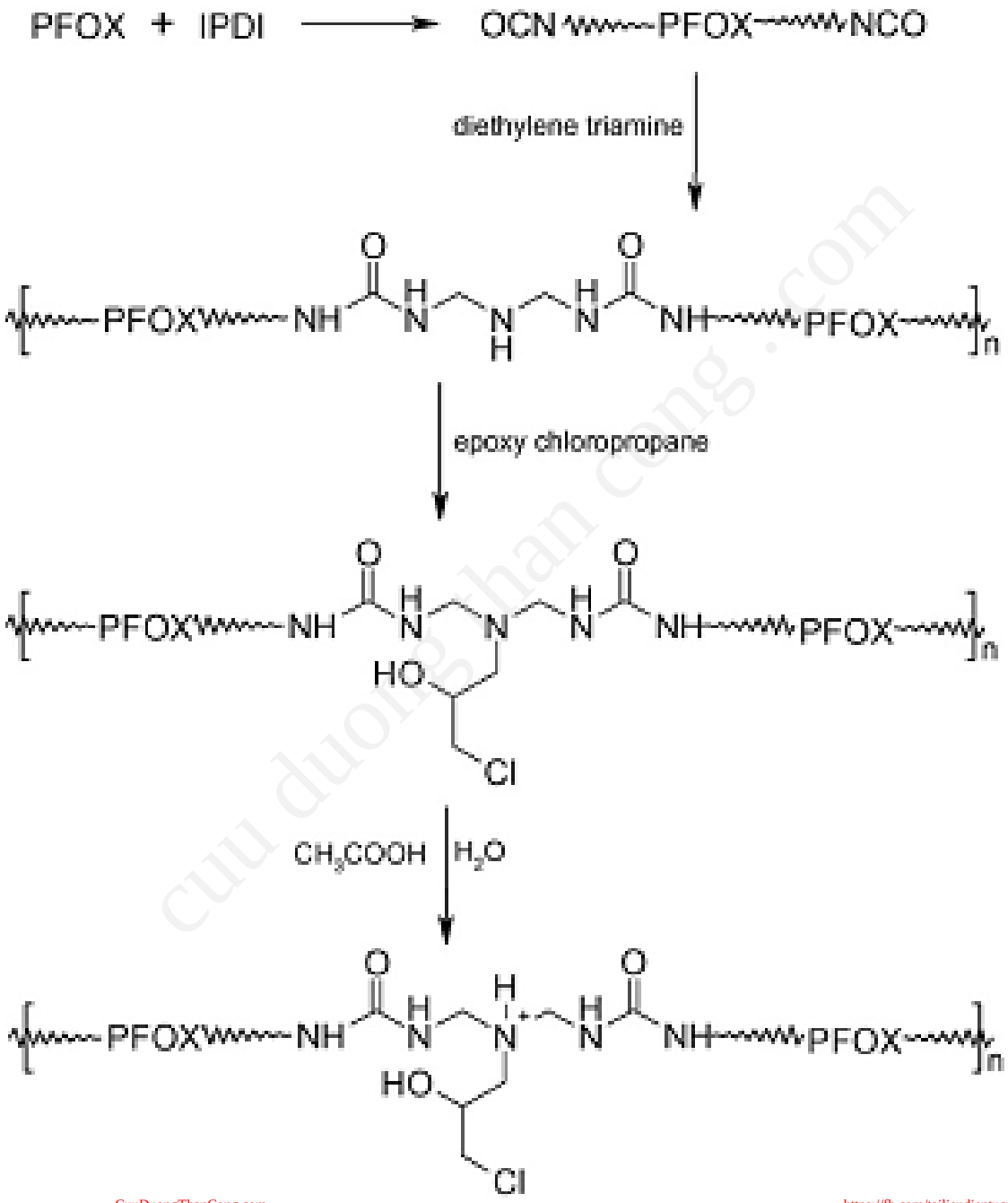
A novel waterborne polyurethane containing short fluoroalkyl chains

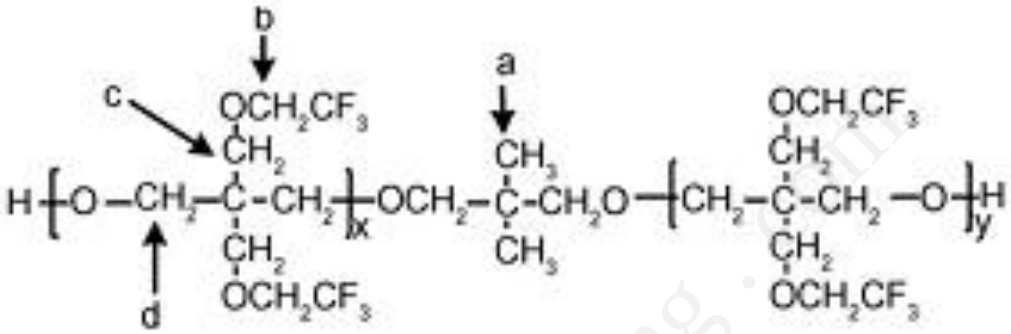
W.-C. Jiang et al. / Applied Surface Science 253 (2006) 2304–2309

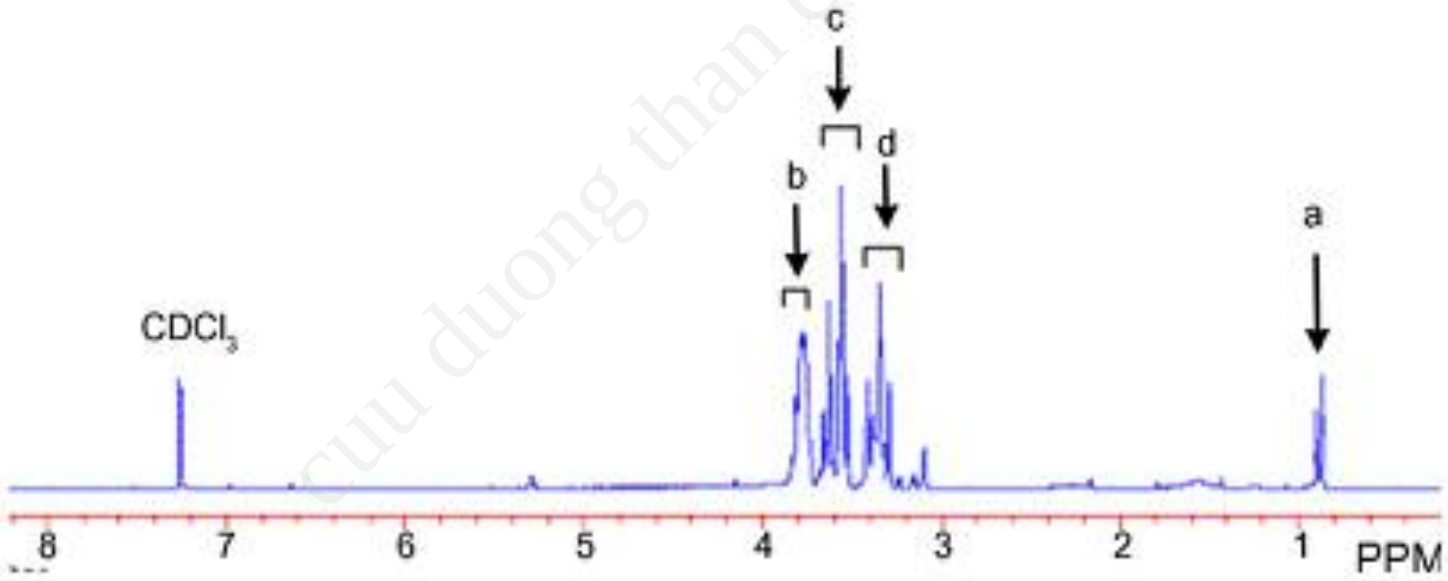




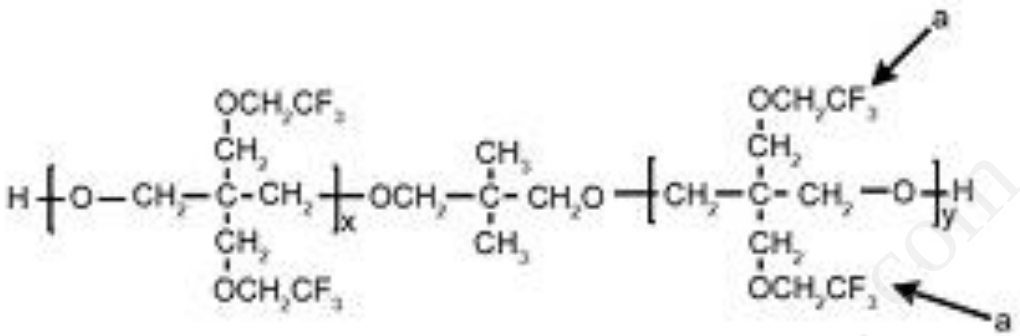
PFOX

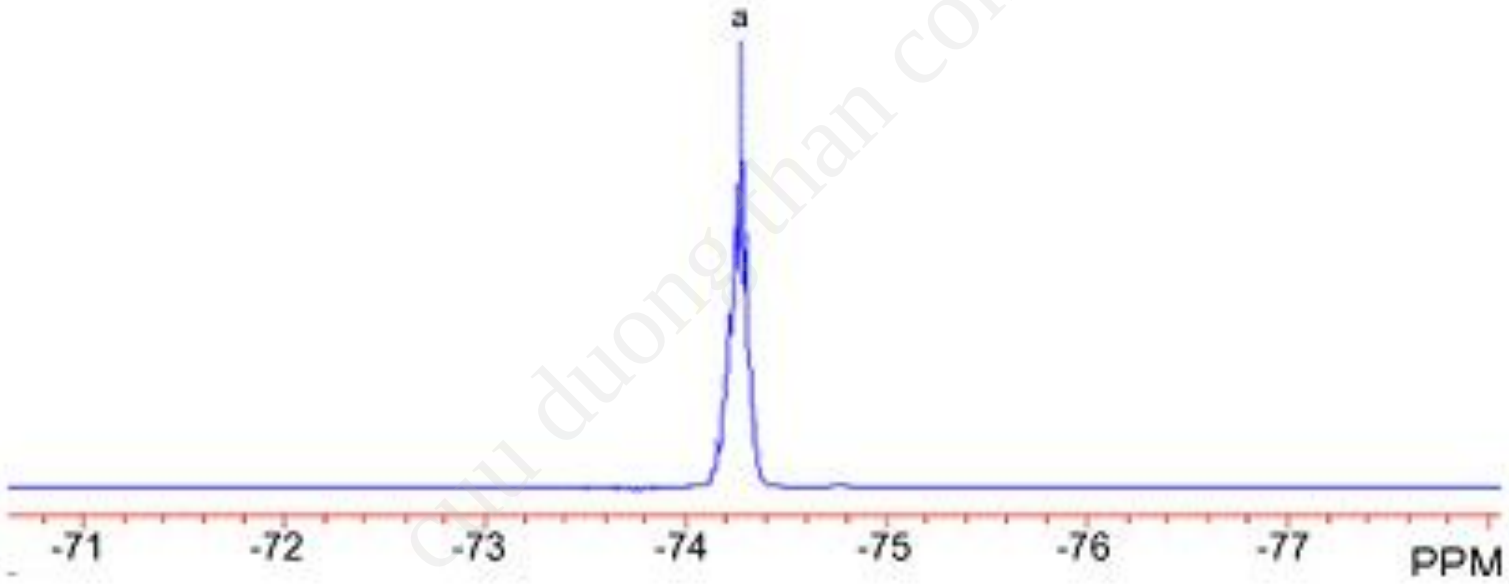




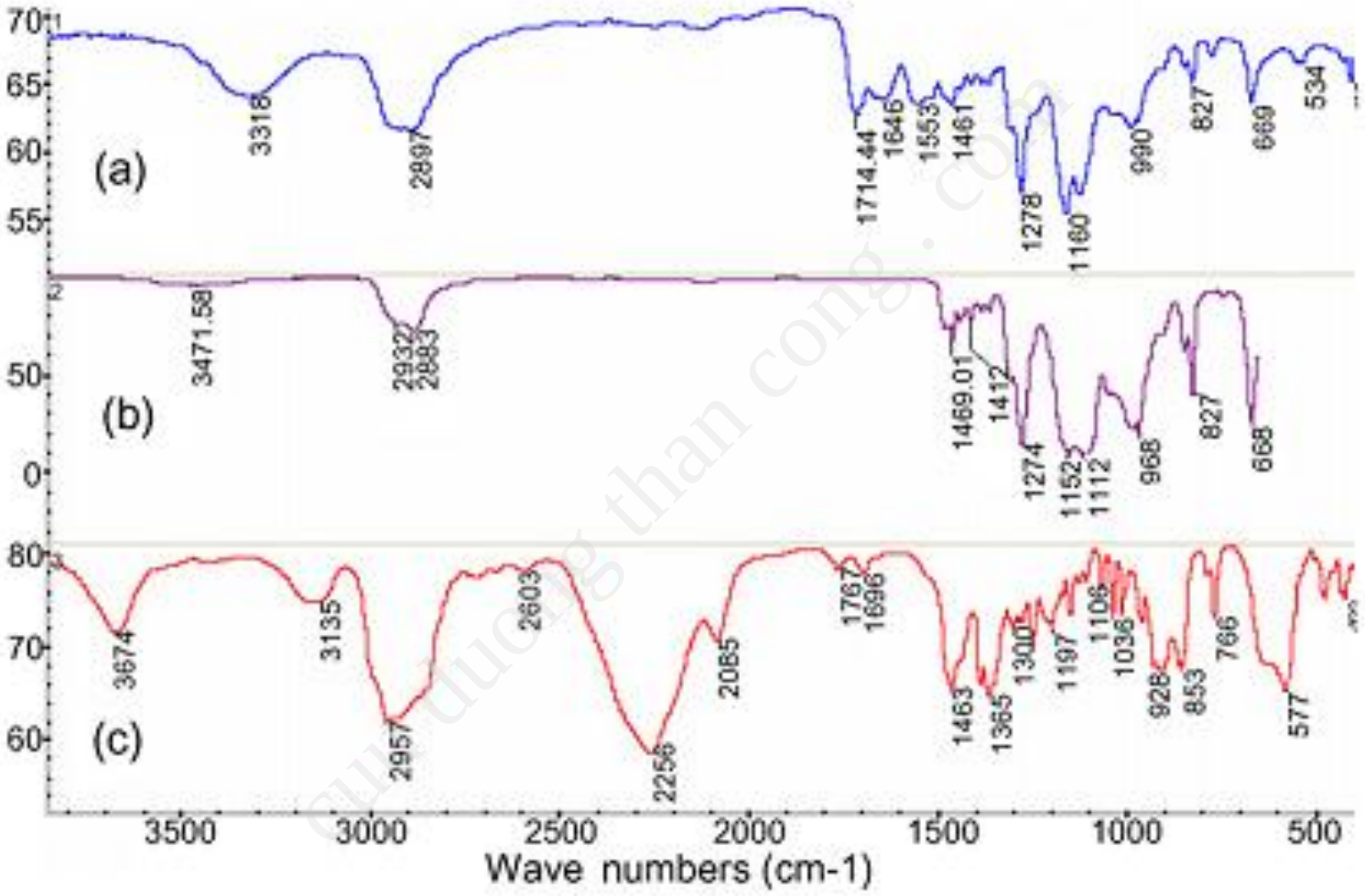


^{1}H NMR of PFOX.



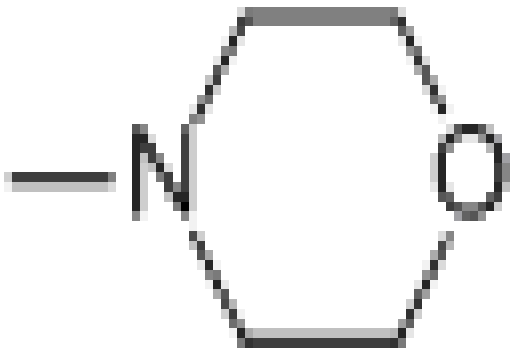


^{19}F NMR of PFOX, $CDCl_3$ as solvent.



FT-IR spectra of samples (a) FPU, (b) PFOX and (c) IPDI.

Photograph of a water droplet placed on the treated cotton fabrics.



N-methylmorpholine (NMM)