THE SUBSTITUTION OF NON BIODEGRADABLE SURFACTANTS USED IN EMULSION POLYMERIZATIONS - A STUDY OF THE POLYMERIZATION PROCESS AND PERFORMANCE OF PRODUCTS OBTAINED FOR PAINT FORMULATIONS

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Those who are inspired by a model other than Nature, a mistress above all masters, are laboring in vain. - Leonardo Da Vinci

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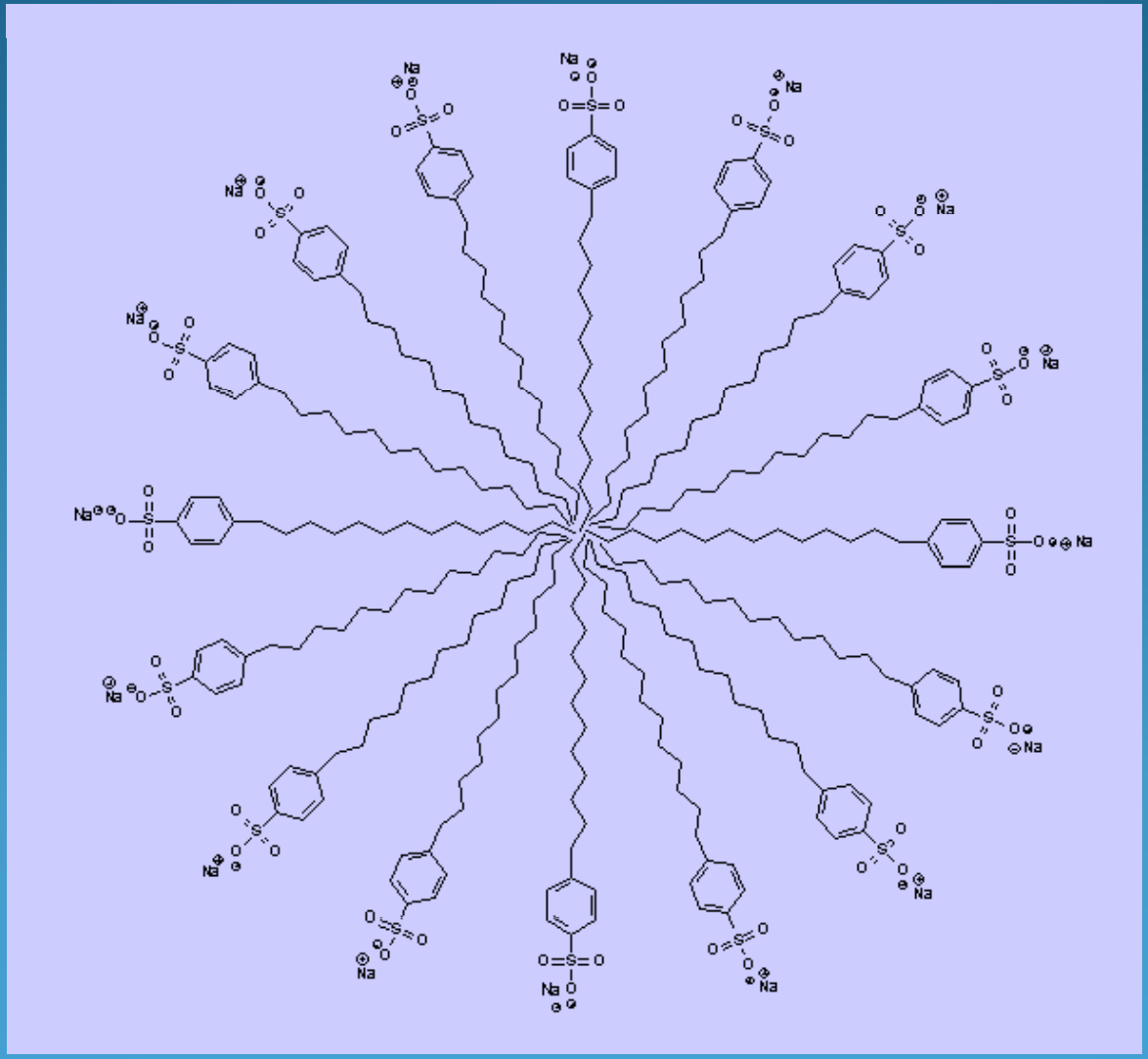
PROGRAMA DE PÓS GRADUAÇÃO

ÁREA DE CONCENTRAÇÃO DE PESQUISA

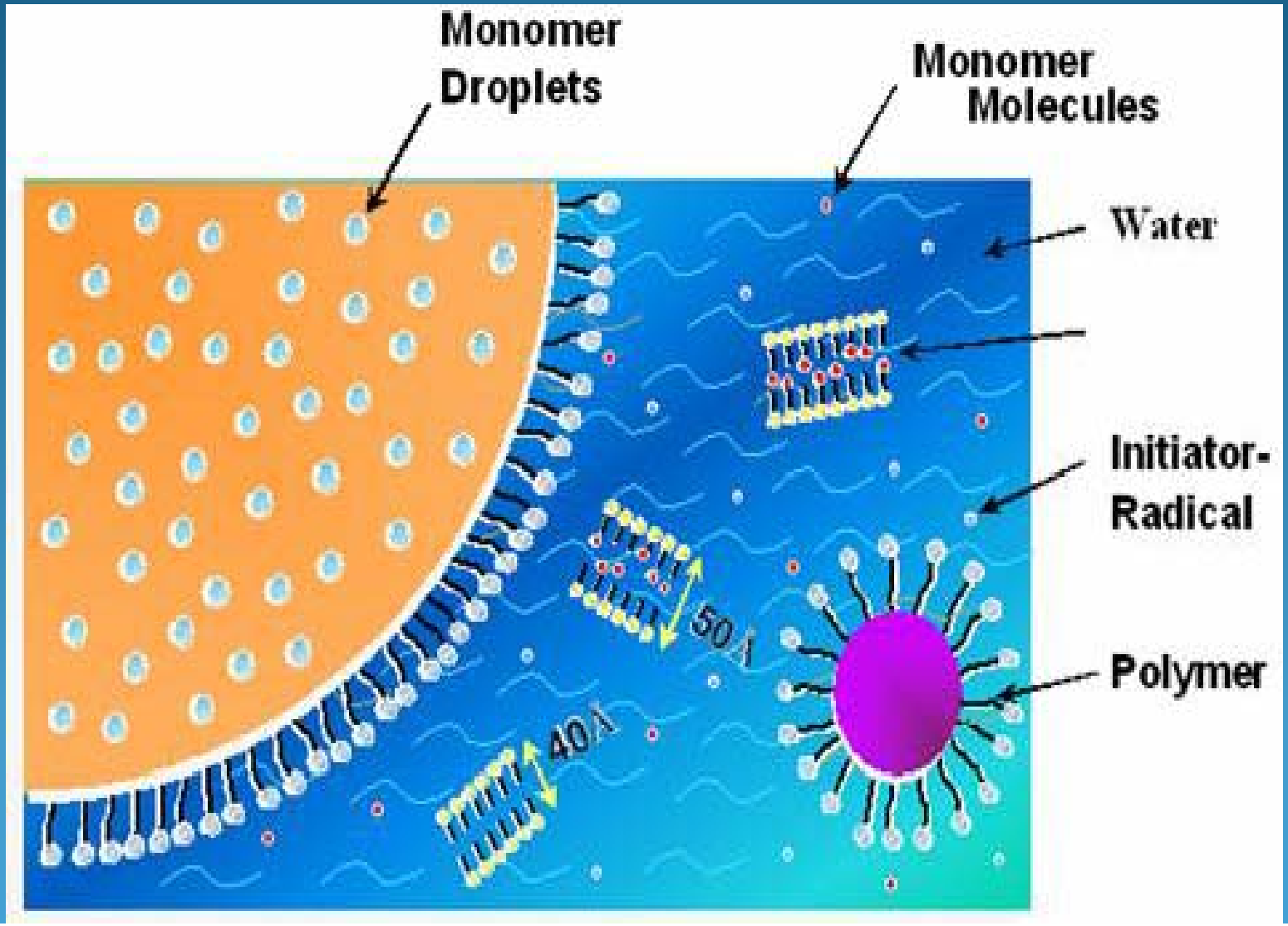
CÊNCIA E TECNOLOGIA DE MATERIAIS

THE MICELLES AS THE LOCI OF POLYMERIZATION.

NANOREACTORS?



THE MICELLES AS THE LOCI OF POLYMERIZATION. NANOREACTORS? -II



EMULSION POLYMERIZATION IS CONSIDERED A SAFE, ECONOMIC, VERSATILE, AND CONSEQUENTLY OF INTEREST AS AN ENVIRONMENTALLY FRIENDLY PROCESS. HOWEVER , SURFACTANTS UTILIZED NEED TO BE BIODEGRADABLE , AND STILL GUARANTEE A GOOD FILM QUALITY , WITH AN ADEQUATE PERFORMANCE ACCORDING TO ITS END USE.

- *APE's (Alkylphenol ethoxylates) ARE UTILIZED IN A DIVERSITY OF APPLICATIONS, INCLUDING IN EMULSION POLYMERIZATION.*

- *ALTHOUGH APE's ARE THEMSELVES OF LITTLE TOXICITY, THE PRODUCTS OF ITS DECOMPOSITION ARE HIGHLY TOXIC - ASSOCIATED WITH LOW MALE SPERM COUNTS AND CARCINOGENIC ACTIVITY*

SURFACTANTS

(PHM: Per Hundred Monomer)

Surfactant – 1.7 PHM

AEROSOL NPES 930 –

nonylphenol ethoxylated 9 moles

AEROSOL EF-800 –

biodegradable sulfosuccinate

AEROSOL 501 – APE-based sulfosuccinate

AEROSOL A-102 –

biodegradable sulfosuccinate

Initiator – APS: 0.52 PHM

LATEXES FORMULATIONS AND PROCEDURE

1. Styrene + n-butyl acrylate (50/50)
2. Styrene + n-butyl acrylate + acrylamide (48.75/48.75/2.5)
3. Styrene + n-butyl acrylate + acrylic acid (48.75/48.75/2.5)
4. Styrene + n-butyl acrylate + methacrylic acid (48.75/48.75/2.5)
5. Styrene + n-butyl acrylate + acrylamide + acrylic acid (48.75/48.75/1.25/1.25)
6. Styrene + n-butyl acrylate + acrylamide + methacrylic acid (48.75/48.75.25/1.25)

PROCEDURE

Seed 8% monomers

Semi Continuous Process

Pre emulsion Feed for 3.5 hours

Latex solids averaged 49 to 50%

PROPERTIES MEASURED

- DISTRIBUTION OF PARTICLE SIZES
- PAINT VISCOSITY
- LATEX VISCOSITY VERSUS TIME
- WASHABILITY
- GLOSS

CONCLUSIONS

- MONO ESTHER SODIUM SULFOSUCCINATE BIODEGRADABLE SURFACTANTS SHOWED IN THESE EXPERIMENTS GREAT POSSIBILITIES FOR THE FUTURE OF EMULSION POLYMERIZATION WHERE BIODEGRADABILITY IS A TARGET

- IMPORTANT PROPERTIES ARE IMPROVED, LIKE VISCOSITY CONTROL OVER TIME
- IMPROVED GLOSS DUE TO THE NARROW PARTICLE SIZE DISTRIBUTION AND BETTER CONTROL OF SURFACE PARTICLE , WHEN WATER SOLUBLE MONOMERS WERE USED.

- IMPROVED WASHABILITY

- IMPROVED GLOSS