

1. Record Nr.	UNINA9910828739803321
Autore	De Sirshendu
Titolo	Electric field enhanced membrane separation system [[electronic resource]] : principles and typical applications / / Sirshendu De, Biswajit Sarkar and Sunando DasGupta
Pubbl/distr/stampa	New York, : Nova Science Publishers, c2009
ISBN	1-61728-389-4
Edizione	[1st ed.]
Descrizione fisica	1 online resource (214 p.)
Altri autori (Persone)	SarkarBiswajit DasGuptaSunando
Disciplina	660/.28424
Soggetti	Membrane separation Electric fields
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Intro -- ELECTRIC FIELD ENHANCED MEMBRANE SEPARATION SYSTEM: PRINCIPLES AND TYPICAL APPLICATIONS -- ELECTRIC FIELD ENHANCED MEMBRANE SEPARATION SYSTEM: PRINCIPLES AND TYPICAL APPLICATIONS -- CONTENTS -- PREFACE -- Chapter 1 INTRODUCTION -- 1.1. APPLICATION OF MEMBRANE SEPARATION PROCESSES -- 1.1.1. Electro-painting -- 1.1.2. Water Purification -- 1.1.3. Textile Industry -- 1.1.4. Dairy Industry -- 1.1.5. Soy Protein Extraction -- 1.1.6. Fruit Juice Clarification -- 1.1.7. Biotechnological Application -- 1.1.8. Pulp and Paper Industry -- 1.1.9. Sugar Processing Industry -- 1.1.10. Tanning and Leather Industry -- 1.2. ADVANTAGE OF MEMBRANE SEPARATION PROCESSES -- 1.3. LIMITATIONS OF MEMBRANE SEPARATION PROCESSES -- 1.3.1. Concentration Polarization -- 1.3.2. Irreversible Membrane Fouling -- 1.4. APPROACHES TO IMPROVE MEMBRANE PERFORMANCE -- 1.4.1. Surface Modification -- 1.4.1.1. Chemical Treatment and Physical Coating -- 1.4.1.2. Plasma Treatment -- 1.4.1.3. Ion Beam Irradiation -- 1.4.1.4. Grafting Polymers -- 1.4.2. Change of Hydrodynamic Conditions -- 1.4.2.1. Turbulent Flow -- 1.4.2.2. Unsteady Flows and Induction of Instabilities -- 1.4.2.2.1. Turbulence Promoter -- 1.4.2.2.2. Gas Sparging -- 1.4.2.3. Secondary Flow -- 1.4.2.4. Pulsatile Flow -- 1.4.3. Change of Physico-chemical Environment of the Solution

-- 1.4.4. External Field -- REFERENCES -- Chapter 2 CLARIFICATION OF CITRUS FRUIT JUICE -- ABSTRACT -- NOMENCLATURE -- Greek Letters -- 2.1. IMPORTANCE AND TECHNIQUES OF CLARIFICATION OF FRUIT JUICE -- 2.2. APPLICATION OF EXTERNAL FIELD -- 2.2.1. Application of Electric Field during Fruit Juice Clarification -- 2.3. MEMBRANE EXPERIMENT -- 2.3.1. Cross-flow Electro-ultrafiltration Cell -- 2.3.2. Procedure for Conducting Experiments -- 2.3.2.1. Materials -- 2.3.2.2. Operating Conditions -- 2.3.2.3. Preparation of Feed. 2.3.2.4. Conduction of Experiments -- 2.3.2.5. Analysis of the Feed and Permeate -- Variation of Zeta Potential of Synthetic Juice (A Mixture of Pectin and Sucrose) with pH -- 2.3.2.6. Optical Studies -- 2.4. PREDICTION OF THE PERMEATE FLUX AND DEPOSITION THICKNESS -- 2.4.1. Analysis of Transient Flux -- 2.4.1.1. Theoretical Aspects -- 2.4.1.2. Analysis of Transient Flux Decline of Synthetic Juice -- Effect of Constant Electric Field -- Optical Quantification of Gel Layer Thickness -- Effect of Pulsed Electric Field -- 2.4.1.3. Mosambi (Citrus Sinensis (L.) Osbeck) Juice -- Effect of Constant Electric Field -- Effect of Pulsed Electric Field -- 2.4.2. Analysis of Steady State Flux -- 2.4.2.1. Theoretical Aspect -- 2.4.2.2 Analysis of Steady State Flux of Synthetic Juice -- Effect of Constant Electric Field -- Effect of Transmembrane Pressure -- Effect of Cross Flow Velocity -- Variation of Permeate Flux with Axial Position -- Effect of Pulsed Electric Field -- Effect of Pulse Ratio -- Effect of Cross Flow Velocity -- Estimation of Electric Power Consumption per Unit Volume of Permeate -- 2.4.2.3. Analysis of Steady State Flux of Mosambi (Citrus Sinensis (L.) Osbeck) Juice -- Theoretical Aspect -- Effect of Constant Electric Field on Permeate Flux -- Effect of Cross Flow Velocity on Permeate Flux -- Effect of Pulsed Electric Field -- Effect of Pulse Ratio -- Effect of Cross Flow Velocity -- Characterization of Clarified Mosambi Juice -- Power Consumption and pH Variation -- 2.5. CONCLUSION -- REFERENCES -- Chapter 3 SEPARATION AND FRACTIONATION OF PROTEIN SOLUTION -- ABSTRACT -- NOMENCLATURE -- Greek Letters -- Subscript -- Superscript -- 3.1. ELECTRIC FIELD ASSISTED ULTRAFILTRATION OF PROTEIN FROM AQUEOUS SOLUTION -- 3.1.1. Mass Transfer Analysis during Electric Field Assisted Ultrafiltration -- Estimation of Mass Transfer Coefficient. Prediction of cm₁ and vw -- Algorithm Used for Estimation of cm and vw -- 3.1.2. Importance of Membrane Surface Charge -- Electro-kinetic Theory -- Calculation of Zeta Potential and Surface Charge Density of Membrane -- 3.1.3. Detailed Experiment -- 3.1.3.1. Ultrafiltration of BSA from Aqueous Solution -- Membrane and Materials -- Electro-ultrafiltration Cell and Operating Conditions -- Steps Used during Experiment -- Preparation of Feed Solution -- Conduction of Experiments -- Analysis of the Feed and Permeate -- 3.1.3.2. Evaluation of Membrane Surface Charge -- Membrane -- Preparation of Feed Solution -- Streaming Potential Measurement -- Zeta Potential and Surface Charge Density of Membrane -- 3.1.4. Osmotic Pressure of Protein Solution -- 3.1.4.1. Effect of pH and Solute Concentration on Osmotic Pressure of BSA -- 3.1.4.2. Effect of pH and Solute Concentration on Osmotic Pressure of Lysozyme -- 3.1.5. Quantification of Permeate Flux and Membrane Surface Concentration -- 3.1.5.1. Effect of Electric Field on Concentration Boundary Layer Thickness -- 3.1.5.2. Effect of Electric Field on the Variation of Membrane Surface Concentration and Permeate Flux along the Length of the Channel -- 3.1.5.3. Effect of Electric Field on the Membrane Surface Concentration and Permeate Flux -- 3.1.5.4. Effect of Pressure on the Permeate Flux -- 3.1.5.5. Effect of Cross Flow Velocity on Permeate Flux -- 3.1.5.6. Variation of Mass Transfer Coefficient --

3.1.5.7. Effect of Solution pH during Ultrafiltration of BSA from Aqueous Solution -- 3.2. ELECTRIC FIELD ENHANCED FRACTIONATION OF BSA AND LYSOZYME -- 3.2.1. Theoretical Aspects -- Algorithm for Numerical Calculation -- 3.2.2. Detailed Experiment -- 3.2.2.1. Membrane and Materials -- 3.2.2.2. Electro-ultrafiltration Cell -- 3.2.2.3. Experimental Design -- 3.2.2.4. Procedure -- Conduction of Experiments.

Analysis of the Feed and Permeate -- 3.2.3. Quantification of Permeate Flux and Solute Retention -- 3.2.3.1. Effect of Pressure on Permeate Flux and Observed Retention during Ultrafiltration of Single Protein Solution -- 3.2.3.2. Effect of Solution pH -- 3.2.3.3. Effect of Electric Field on Observed Retention and Permeate Flux -- 3.2.3.4. Effect of Cross Flow Velocity on Permeate Flux and Observed Retention -- 3.2.3.5. Effect of Pressure on Permeate Flux and Observed Retention -- 3.2.3.6. Effect of Electric Field on Membrane Surface Concentration -- 3.3. CONCLUSIONS -- APPENDIX 1 -- Calculation of Osmotic Pressure -- Electrostatic Interaction -- London-van der Waals Interaction -- Entropic Pressure -- REFERENCES -- Chapter 4 ELECTRIC FIELD ASSISTED MICELLAR ENHANCED ULTRAFILTRATION -- ABSTRACT -- NOMENCLATURE -- Greek Letters -- 4.1. INTRODUCTION -- Dye Removal: A Case Study -- 4.2. PRINCIPLE OF ELECTRIC FIELD ASSISTED MEUF -- 4.3. LIMITING FLUX PHENOMENA -- 4.3.1. Calculation of Limiting Pressure and Limiting Flux -- 4.4. MEMBRANE EXPERIMENTS -- 4.4.1. Chemicals -- 4.4.2. Membrane -- 4.4.3. Cross Flow Cell and Operating Conditions -- 4.4.4. The Steps Used in Experiment -- 4.4.5. Analysis of Feed and Permeate -- 4.4.5.1. Concentration of SDS and Methylene Blue -- 4.4.5.2. Measurement of Viscosity, Conductivity and pH -- 4.4.6. Determination of Particle Size -- 4.4.7. Determination of Gel Porosity -- 4.5. ANALYSIS OF PERMEATE FLUX, GEL-LAYER THICKNESS AND SOLUTE RETENTION -- 4.5.1. Electric Field Assisted MEUF of Pure Surfactant Solution -- 4.5.1.1. Variation of Gel Layer Thickness with Pressure -- 4.5.1.2. Effect of Pressure on Permeate Flux -- In Absence of Electric Field -- In Presence of Electric Field -- 4.5.1.3. Effect of Pressure on Gel Layer Thickness -- 4.5.1.4. Effect of Electric Field on Permeate Flux.

4.5.1.5. Effect of Electric Field on Gel Layer Thickness -- 4.5.2. Electric Field Assisted MEUF of SDS Solution Containing of Methylene Blue Dye -- 4.5.2.1. Effect of Surfactant to Dye Concentration Ratio -- 4.5.2.2. Effect of Electric Field -- 4.5.2.3. Effect of Cross Flow Velocity -- 4.5.2.4. Effect of Pressure -- 4.6. CONCLUSION -- REFERENCES -- INDEX -- Blank Page.