

# The effect of Kaolin-clays contents on characteristics and properties of chitosan-kaolin composite membranes

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## INTRODUCTION

In recent years, natural polymer/clay composites have attracted considerable interest because they combine the structure, physical and chemical properties of inorganic and organic materials. Chitosan/kaolin composite membranes were successfully prepared by solvent casting and evaporation process. The effect of kaolin content on the morphology and properties of the obtained membranes was studied. The interaction between chitosan and kaolin has been examined based on the specific and characteristic features of both components. Then, the obtained membranes were characterized in terms of surface chemistry, chemical stability and performance by using techniques as water contact angle, water resistance and pure water permeability.

## Materials and Methods

### MATERIALS



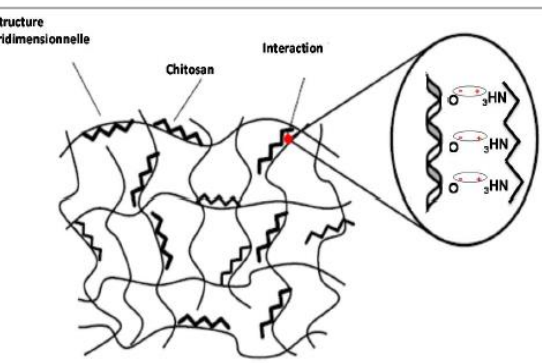
Chitosan Kaolin Sodium hydroxyde Distilled water Acetic acid

### COMPOSITE MEMBRANE PREPARATION

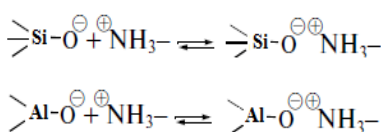
membrane	Chitosan (w/v)	Kaolin (w/v)
CK0	4	0
CK1	4	1
CK3	4	3
CK5	4	5

Composition of the prepared dope mixtures.

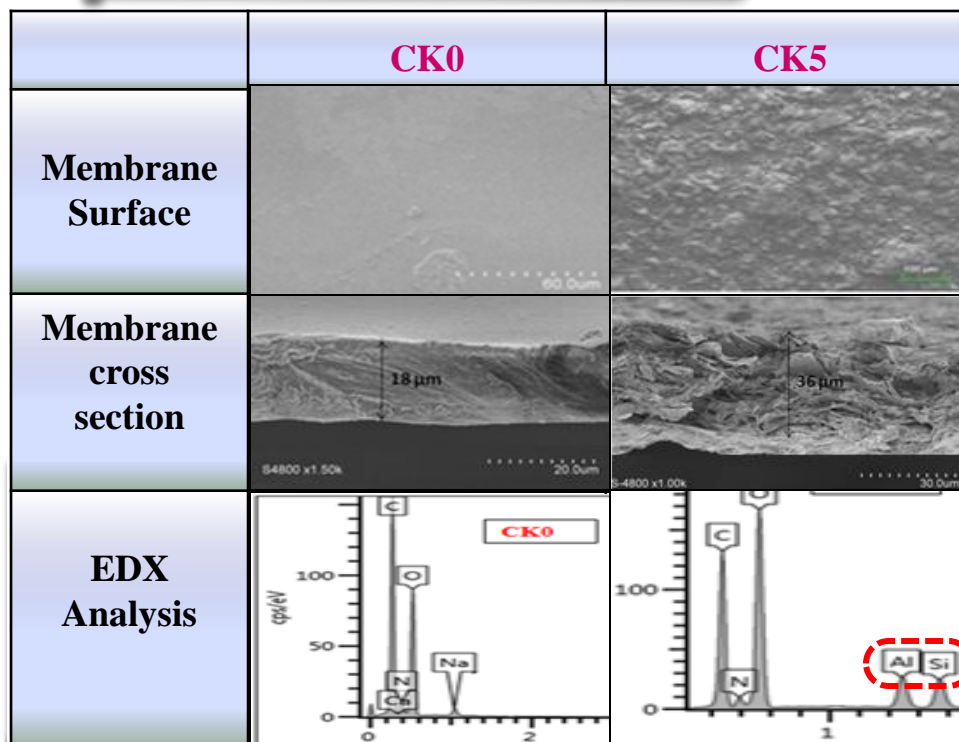
## Mechanisms of membrane preparation



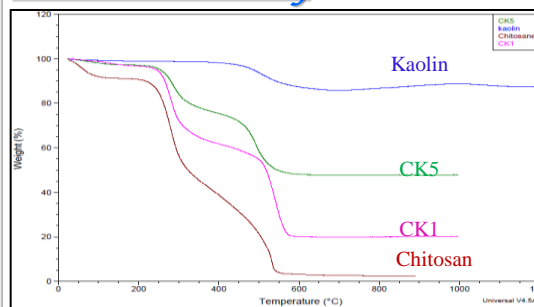
The positively charged amino groups interact with the negatively charged basal oxygen atoms:



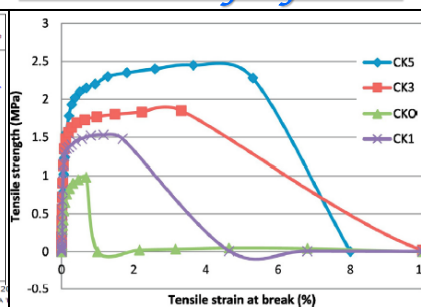
## Membrane characterization



### Thermal stability



### Mechanical properties



### Water contact angle & water permeability

membrane	WCA (°)	Lp (L/hm <sup>2</sup> bar)
CK0	57	2.7
CK1	62	8
CK3	71	18
CK5	83	32

The water permeability of the membranes was significantly enhanced by incorporation of clay in their composition.

### Water solubility (%)

	CK0	CK5
pH = 6	26	0
pH = 4	56	10
pH = 2	Soluble	soluble

• The chitosan film has poor chemical stability.  
• the resistance to water washout was improved by kaolin incorporation.

### Conclusion

- ❖ Successful preparation of chitosan/kaolin composite porous membranes.
- ❖ Composite membranes showed improved thermal stability and mechanical properties.
- ❖ Incorporation of kaolin decreased the water washout of chitosan in acidic medium.