

Quality Characteristics of Microwave and Sundried Chitosan: A comparative study

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Chitosan is derived from chitin, which is one of the supreme abundant polysaccharides found in nature subsequent to cellulose. Generally, chitin is prepared from the exoskeleton of shrimp, crab, crayfish, and krill etc. Chitosan is chemically called a β (1,4) linked copolymer of D-glucosamine and N-acetyl-D-glucosamine. Chitosan has wide applications including food, pharmaceutical, textiles and effluent treatment etc. In general, the processing of chitin to chitosan from crustacean shells involves deproteinization, demineralization and deacetylation. Then it is dried under the sun and packed. The drying of chitosan under the sun is a time-consuming process. Hence, an improved drying process for chitosan is needed for the Industry to speed up the drying process without affecting its properties. The Present study is aimed to reduce the drying time of chitosan by microwave drying and to study its quality characteristics. The chitin prepared from shrimp shells was procured from the chitin Industry and it was subjected to 40% NaOH treatment under a cold process. Then it was subjected to microwave drying (Fig.1). The microwave power was used in the range from 400watts to 1600watts. The quality parameters of chitosan include moisture, ash (AOAC, 2019), degree of deacetylation

(DD) (Kim, 2010), viscosity (Brookfield viscometer), water and fat binding capacity (Wang and Kinsella, 1976) and color (Hunter color analyzer) were analyzed and it was compared with the chitosan dried under the sun.

The moisture of chitosan was 3.35% for the sundried one. The chitosan dried in a microwave, had a moisture content between 5.53 %- 7.58%. The Ash content of chitosan varied from 0.50% to 1.43%. The Lowest drying time (23min) was achieved for chitosan processed under 1600watts than sundried one (120min). The DD of chitosan was between 77.3% - 80.8%. The viscosity of chitosan was found to be higher (2117Cp) for chitosan dried at 1000watts than sun-dried one (828.50Cp) (Table 1). The highest L* value (74.70) was found in sun-dried chitosan than microwave-dried (L* : 71.22-72.73) chitosan. The highest WBC was observed for 1400w processed chitosan. Moreover, chitosan dried at 400watts showed a higher fat binding capacity (Table 1). There is no significant change in the thermal behavior and structural pattern of chitosan subjected to various drying conditions as indicated by DSC and FTIR analysis. Results suggested that the microwave drying process could reduce the drying time without affecting the structural pattern of chitosan.



Fig. 1. Microwave drying of chitosan

Table 1. Properties of microwave and sun-dried chitosan

Sample	Drying time (min)	Moisture (%)	Viscosity (Cp)	WBC (g of water/g chitosan)	FBC (g of oil/g chitosan)
Sun-dried	120	3.35	828.50	4.47	10.29
400w	70	6.77	1868.50	4.58	13.75
600w	43	5.53	2086.33	3.09	11.20
800w	40	6.83	1919.00	2.69	10.52
1000w	35	6.17	2117.00	3.80	10.51
1200w	33	6.85	1851.16	4.01	10.17
1400w	33	6.57	1977.83	4.99	11.81
1600 w	23	7.58	1483.33	4.65	12.30

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