**P-003** **The microencapsulation fish (*Engraulis encrasicolus* L) oil by various wall materials**

**Kahyaoglu T., [1# *] Dervisoglu M.[1], Tatar F[1].,Tunc M.T[1] ., and Cekmecelioglu D[2].**
[1]Food Eng, Univ Ondokuz Mayıs - Samsun Turkey [2]Food Eng, METU - Ankara, Turkey
* Supervisor # tkahyaoglu@omu.edu.tr

## INTRODUCTION AND OBJECTIVES

In this study, the hemicellulose was used as coating material for microencapsulation of anchovy fish *(Engraulis encrasicolus* L) oil. The selection of suitable wall material one of main challenges for food encapsulation process. Due to high cost production and the lack of food-grade available materials, limitations in many of the encapsulation techniques have occured (Gibbs, 1999) Despite the wide range of encapsulated products that have been developed, manufactured, and successfully marketed in the pharmaceutical and cosmetic industries, microencapsulation has found a comparatively much smaller market in the food industry (Desai, 2005).

Hemicellulose extensively found in nature, and it could be produced from various plant sources. The main objective of our study is to test the use of hemicellulose as wall material in the microencapsulation of food components. The primer results have been presented in this contribution.

## MATERIALS AND METHODS

### *Materials*

Hemicelluloses (HC) were isolated from corn stalks and stems by alkaline exctraction method. Anchovy oil was obtained from local company. Maltodextrin and gum arabic (GA) were also used as coating material.

### *Methods*

Three emulsions were prepared using ultratrax. The solid contents of them were adjusted as 30% (w/w) (Table 1). Then, emulsions were converted into powder form by a spray drier (Buchi, B-290). Rheological properties of the samples were measured at 25°C with use of rheometer MARS III (Thermo Scientific, Germany) equipped with a system of cone and plate (diameter 35mm and gap 0.104 mm cone angle 2°). Color values were evaluated using Minolta Colorimeter which provided the Hunter *L*, *a* and *b*. Color parameters range from L = 0 (black) to L= 100 (white), -a (greenness) to +a (redness), -b (blueness) to +a (yellowness).

**Table 1. Composition of emulsions**

| Sample | Maltodextrin | Gum | Hemicellulose | Oil |
|---|---|---|---|---|
| Control | 18% | 6% | - | 6% |
| HC/GA | 18% | 3% | 3% | 6% |
| HC | 18% | - | 6% | 6% |

## RESULTS AND DISCUSSIONS

### *Emulsion properties*

The color values of emulsions were given in Table 2. Hemicellulose containing samples were less whiter than control samples. The addition of hemicellulose also increased the yellowness of samples.

**Table 2. Color values of emulsions**

| Sample | L | b |
|---|---|---|
| Control | 64.38±3.48 | 7.55±0.91 |
| HC/GA | 61.77±2.77 | 9.78±2.12 |
| HC | 54.47±3.04 | 9.33±0.17 |

The viscosity of emulsion is significant parameter for spray drying operation. The apperant viscosities were determined as 0.01840, 0.02158 and 0.03510 (Pa.s) for control, HC/GA and HC samples respectively. The addition of hemicellulose increased the apperant viscosities of samples at 20 1/s shear rate.

### *Spray drying*

Emulsions were spray dried under the following parameters ; inlet temperature : 170 °C, outlet temperature : 100-110 °C, air flow rate : 45-50 ml/min and feed flow rate was between 6 ml/min. The color values of dried samples were presented in Table 3. Similar results were obtained with the emulsions, hemicellulose containing samples were less whiter and more yellower that control.

**Table 3. Color values of powders**

| Sample | L | b |
|---|---|---|
| Control | 82.69±0.15 | 8.00±0.05 |
| HC/GA | 74.79±0.68 | 9.09±0.21 |
| HC | 76.71±0.51 | 11.21±0.111 |

The efficiencies of microencapsulation process were determined measuring the total oil and free oil contents of powders. The microencapsulation efficiency HC samples (around 80 %) were found lower than that of control sample (around 90 %). Further study is needed for improving the microencapsulation efficiency of hemicellulose containing samples.

## CONCLUSIONS

Anchovy oil was microencapsulated using maltodextrin, gum arabic and hemicellulose as coating material. Primary results were showed that hemicellulose could have potential as wall material for the microencapsulation of food components. On the other hand, further studies must be conducted to prove

## ACKNOWLEDGMENTS

This research was supported by TUBİTAK with the project number 109O603 (Ankara, Turkey).

## REFERENCES


- Gibbs et al. (1999) *Encapsulation in the food industry: a review*. Int J Food Sci Nutr 50:213–224
- Desai et al. (2005) *Recent developments in microencapsulation of food ingredients*. Drying Technol 23:1361–1394