

Evaluation of two food grade Proliposomes to encapsulate a commercial proteinase/peptidase preparation using microfluidization

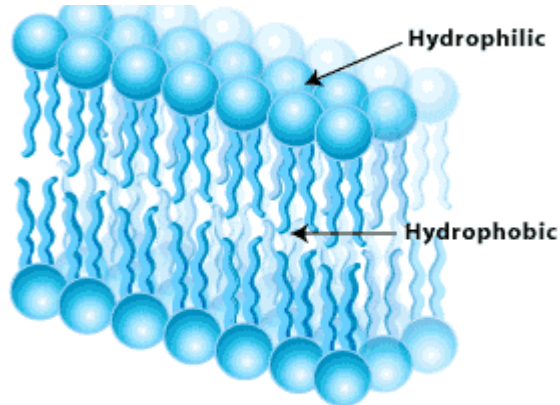
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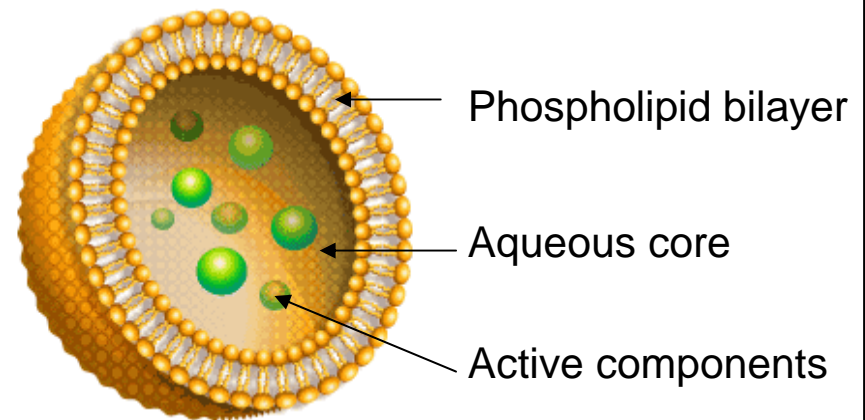
Definition of Liposomes

Proliposomes

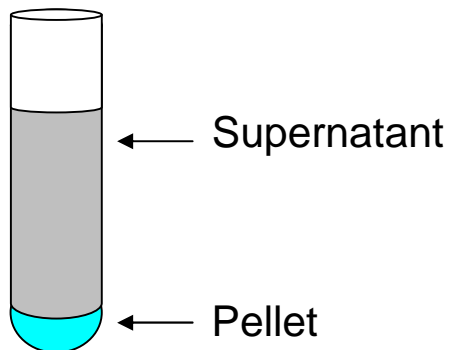
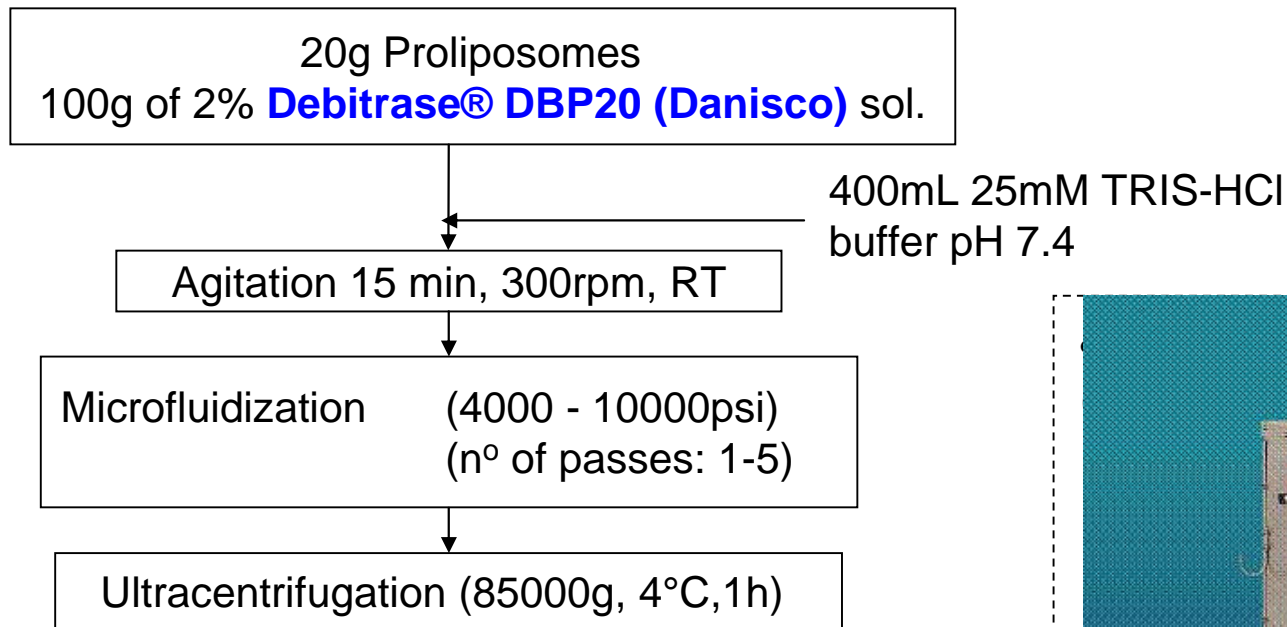


Most phospholipids don't spontaneously form liposomes in aqueous media

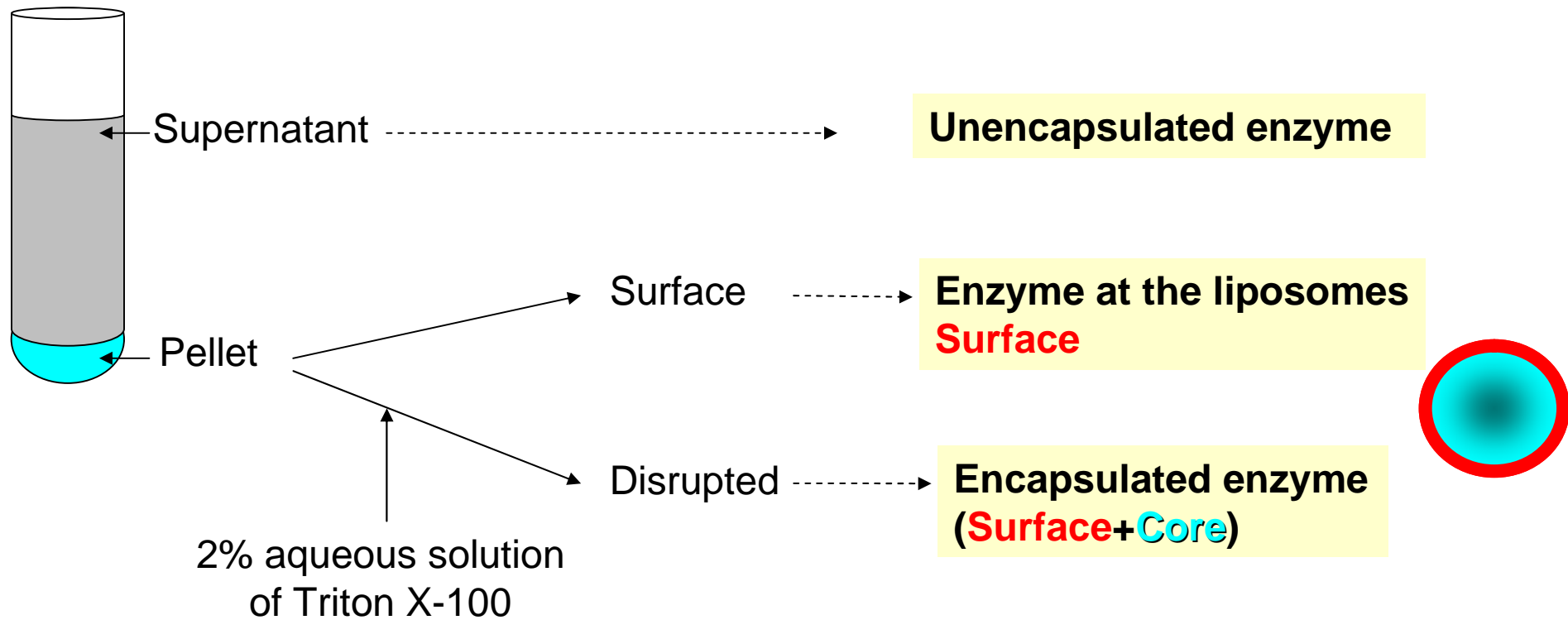
Liposome structure



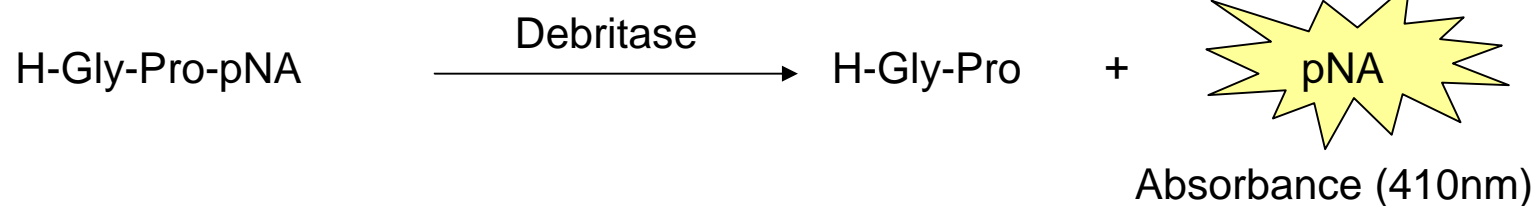
Preparation of the liposomes



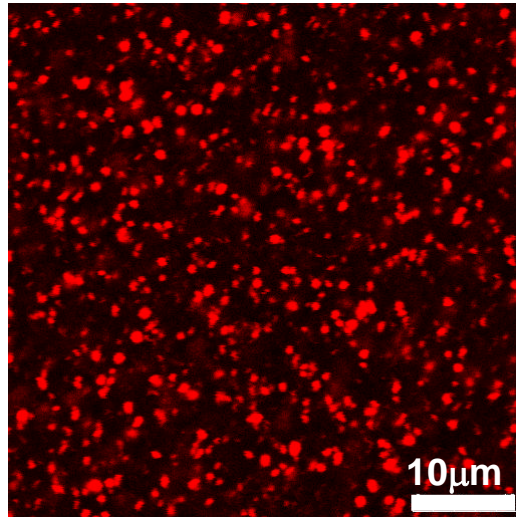
Determination of the encapsulation efficiency



- Enzyme Activity - Pep X (*Post-proline dipeptidyl aminopeptidase*) Assay

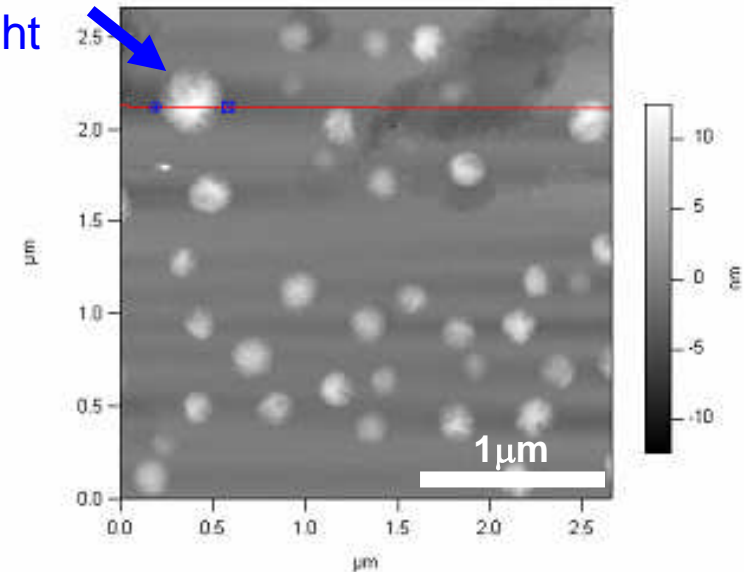


Size and shape of the liposomes



Confocal microscopy
Coloration with Nile red, Zoom $\times 5$

390nm diameter
17nm height

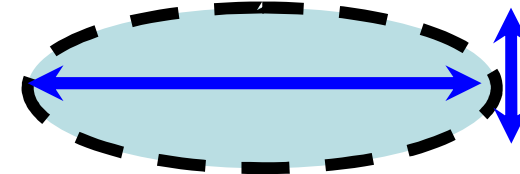


Atomic Force Microscopy
of liposomes S

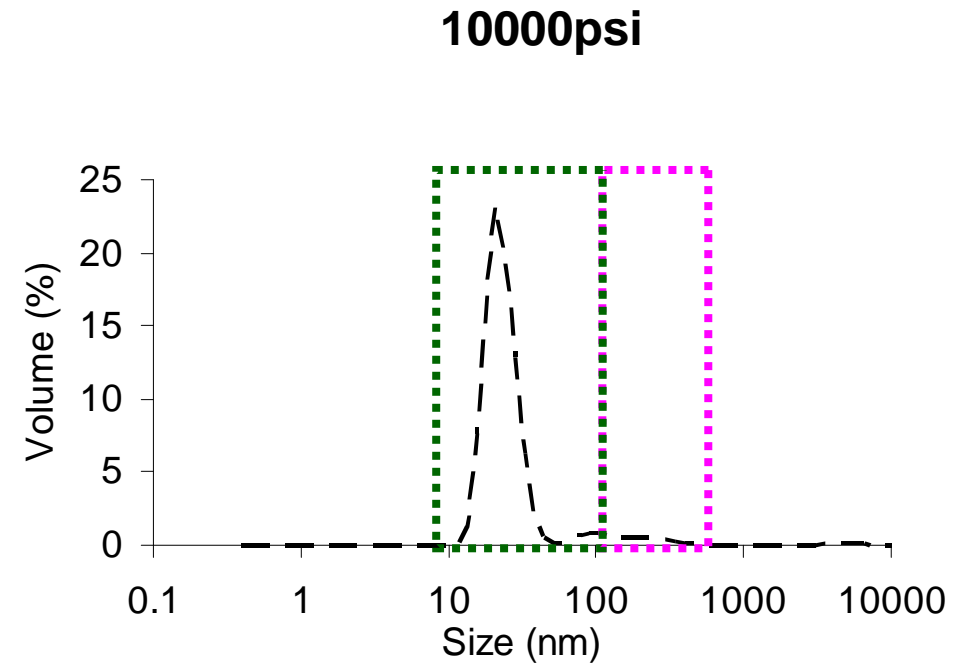
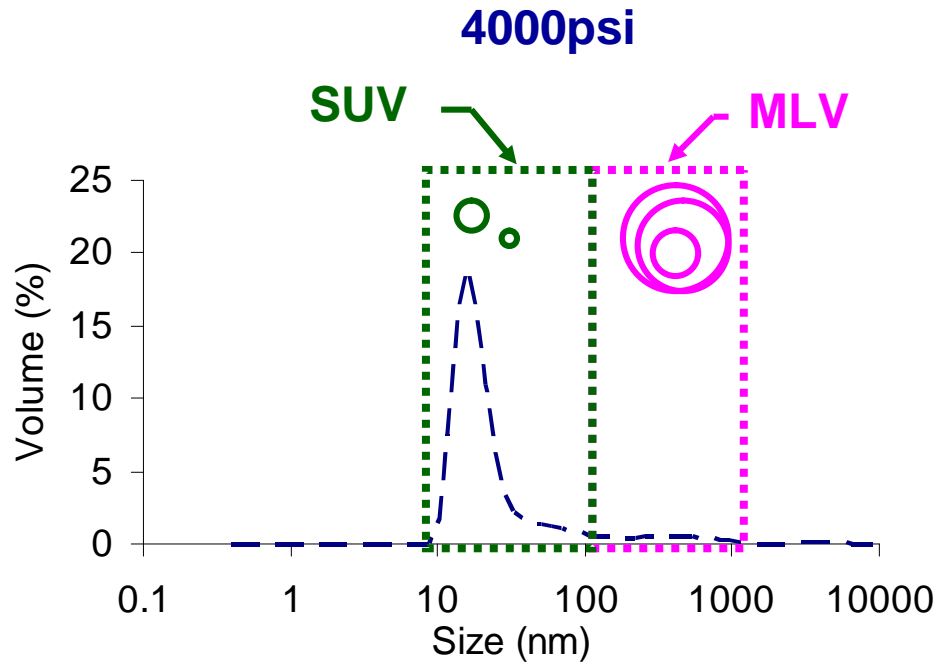
Several hundred nm

→ Same order of value as those found
in the literature (Thompson *et al.*,
2006; Dufour *et al.*, 1996)

Spherical rod-like shape (Thompson
and Singh, 2006)



Influence of the microfluidization pressure on the Size distribution of liposomes and encapsulation efficiency



Encapsulation efficiency

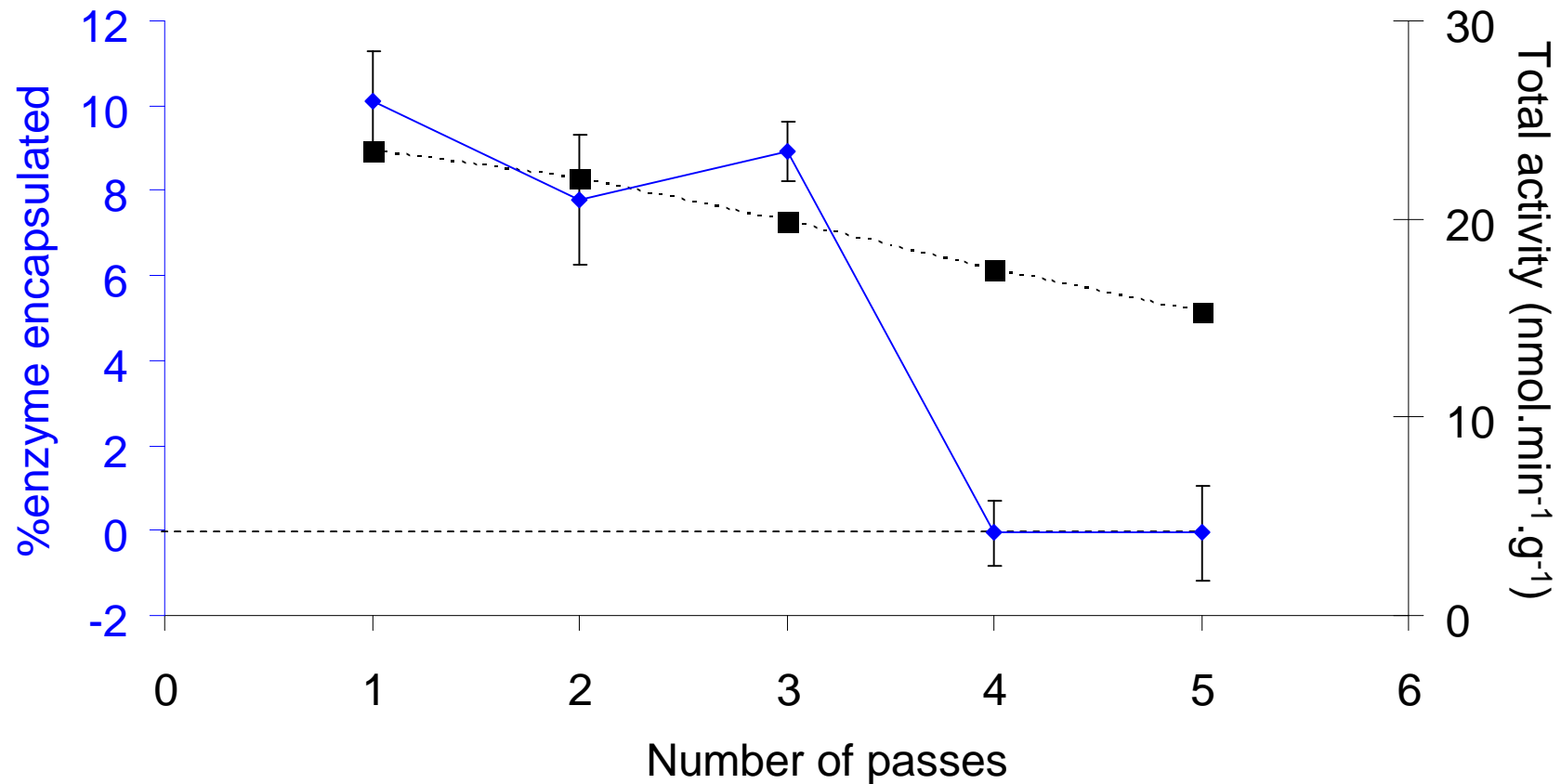
31.2%

22.8%

Effect of the number of passes on the encapsulation efficiency

Prolipo C

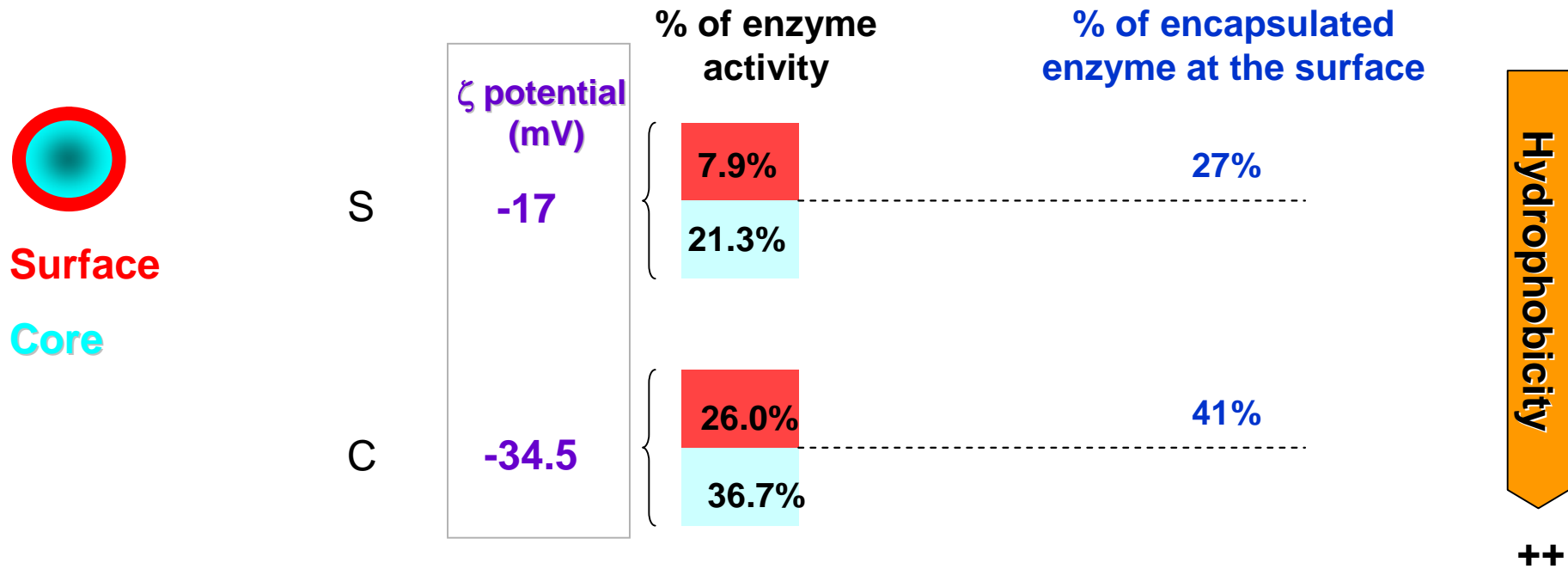
- ◆— Encapsulated
- Encapsulated+Unencapsulated



Possible denaturation of the enzyme due to processing conditions

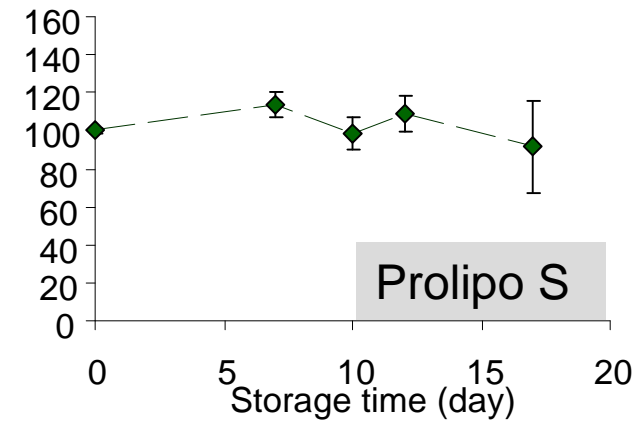
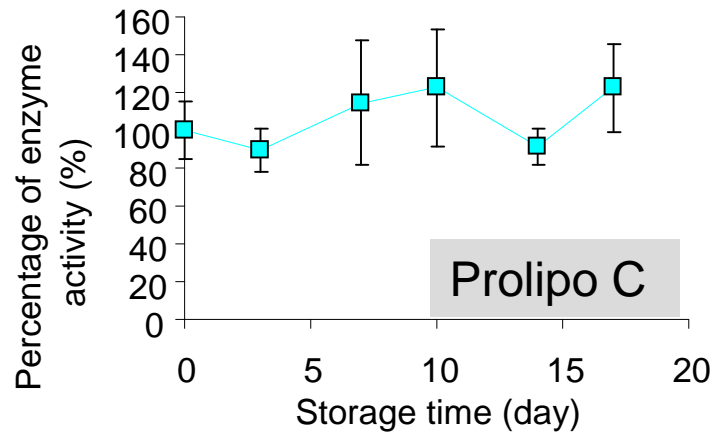
Partition of the enzyme extract between the surface and the liposome core

4000psi
1 passage

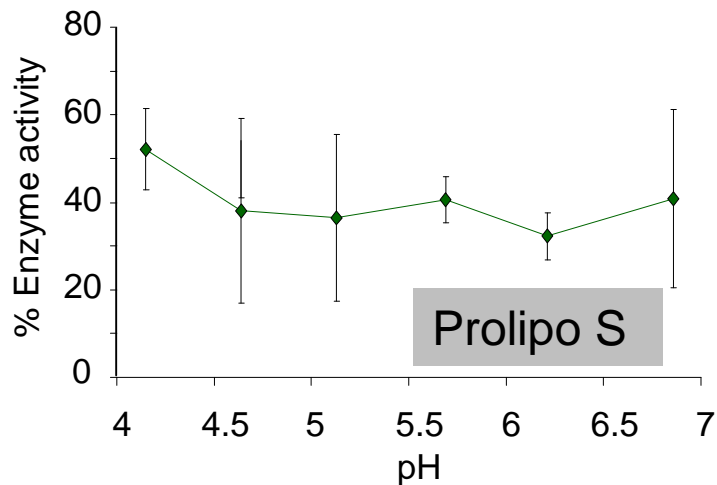


Stability of the enzyme activity in the liposomes effect of storage time and outer pH value

□ Storage as a pellet 4°C, 18 days



□ Effect of outer pH on the encapsulation efficiency



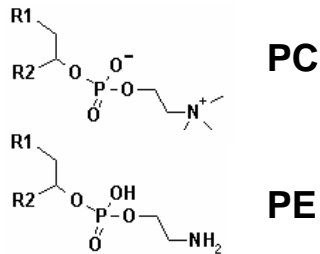
Conclusion

Microfluidization



Pressure
#Passes

Proliposome (Phospholipid)

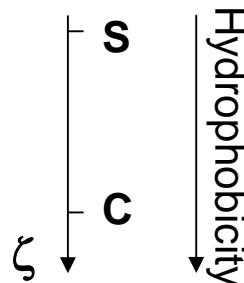


Size

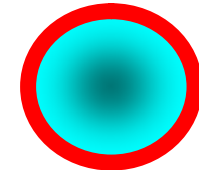
SUV ○_o



Charge & hydrophobicity



Encapsulation
efficiency



Surface/Core
partitioning

Bibliography

1. Dufour, P.; Vuilleumard, J. C.; Laloy, E.; Simard, R. E. Characterization of enzyme immobilization in liposomes prepared from proliposomes. *J. Microencapsul.* **1996**, *13*, 185-194.
2. Thompson, A. K.; Hindmarsh, J. P.; Haisman, D.; Rades, T.; Singh, H. Comparison of the structures and properties of liposomes prepared from milk fat globule membrane and soy phospholipids *J.A.F.C.* **2006**, *54*, 3704-3711.
3. Thompson, A. K.; Singh, H. Preparation of liposomes from milk fat globule membrane phospholipids using microfluidizer. *J. Dairy Sci.* **2006**, *89*, 410-419.