Water fluxes and encapsulation efficiency in double emulsions: impact of emulsification and osmotic pressure unbalance.

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SUPPORTING INFORMATION

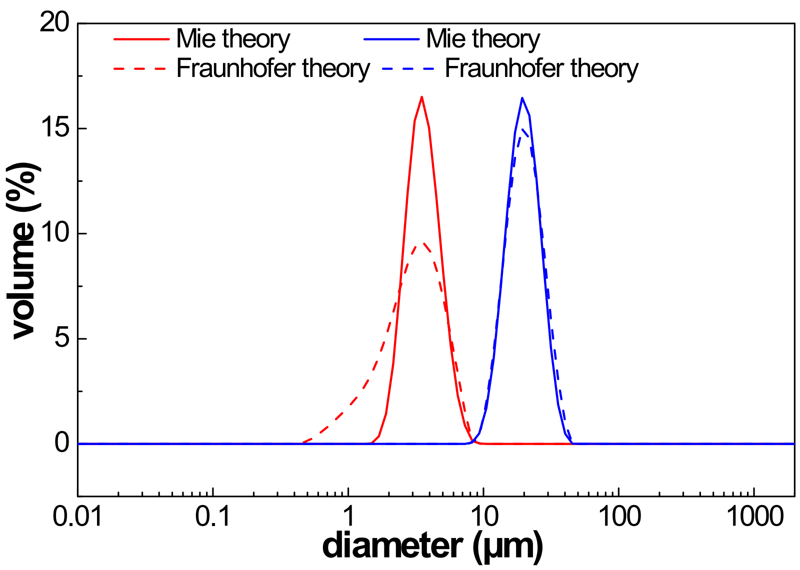


Figure S1: Drops size distributions of two sunflower-in-water emulsions determined using either Mie theory (continuous line) or Fraunhofer approximation (dotted line). Note the excellent agreement for the 20µm-centered emulsion between Mie and Fraunhofer analyses and the good agreement for the mean size (not the size distribution width) for the 5µm-centered emulsion.

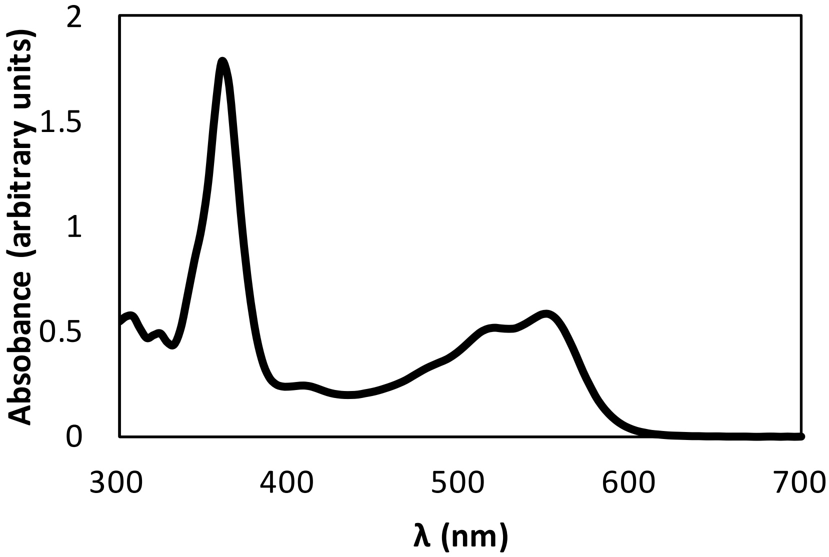
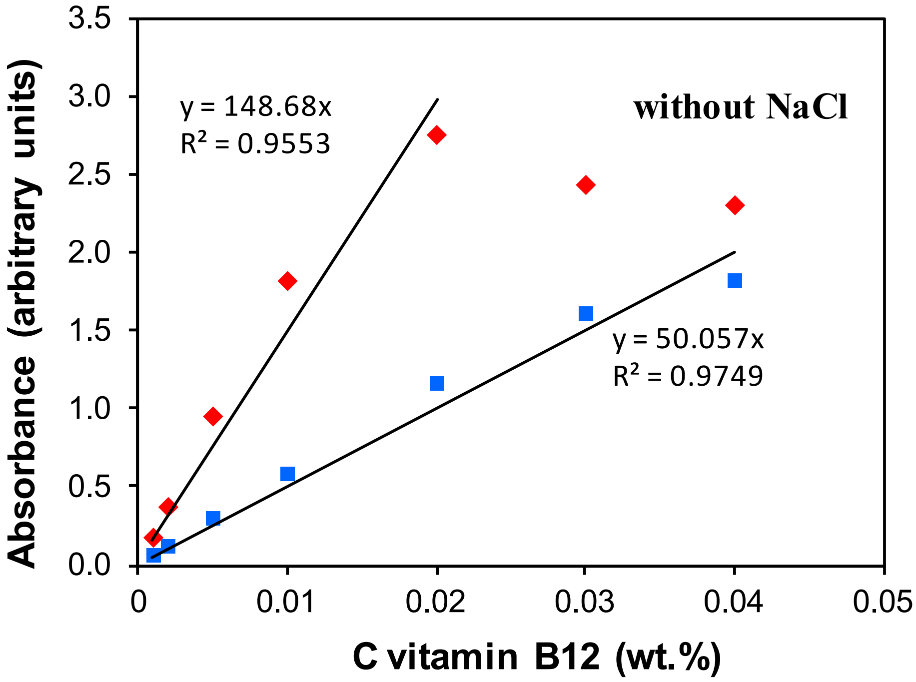


Figure S2: UV-Vis spectrum of the vitamin B12.



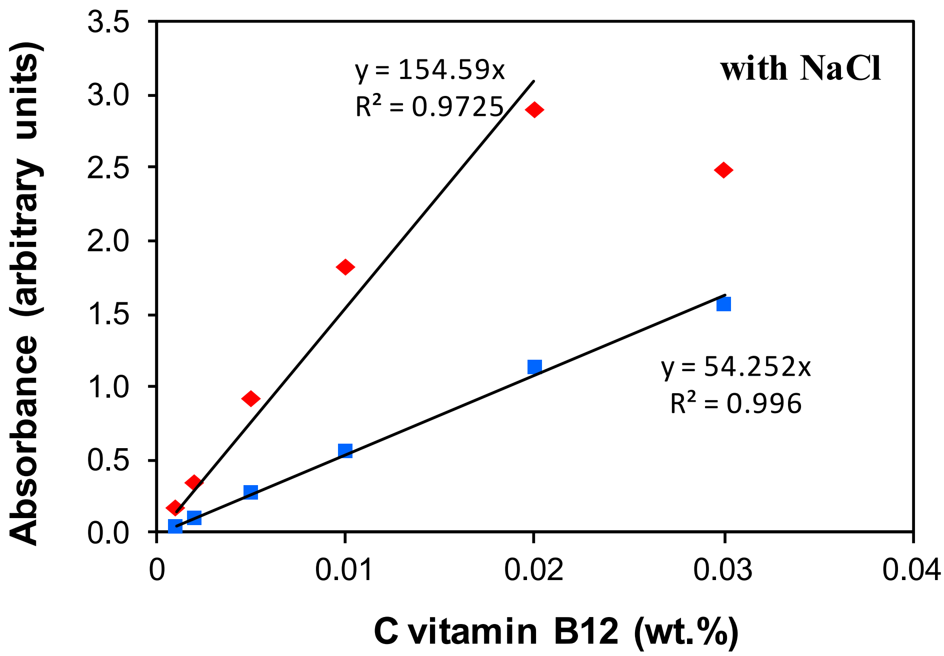


Figure S3: UV-Vis calibration curve of vitamin B12 with and without NaCl: values taken at wavelengths equal to 360 nm (diamonds) and 550 nm (squares).

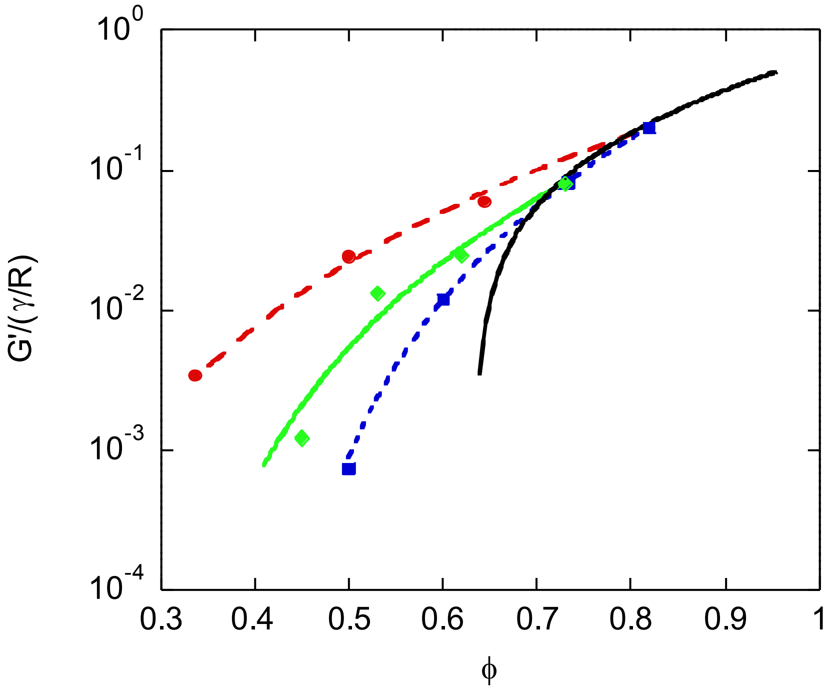


Figure S4: Normalized elastic modulus of a reverse monodisperse 150 nm-sized brine-in dodecane emulsion stabilized by Span 80® as a function of the dispersed phase volume fraction. The continuous phase contains various concentration of surfactant inducing depletion between drops by micelles: the micelle volume fraction is equal to 0.06 (squares), 0.09 (diamonds) and 0.132 (circles). The experimental data can be accounted for using equation 6 of the manuscript. Comparison with the non adhesive emulsion (black continuous line). Adapted from [Arditty pH-D thesis university Bordeaux 1 2004 "Fabrication, stability and rheological properties of emulsions stabilized by colloidal particles"].

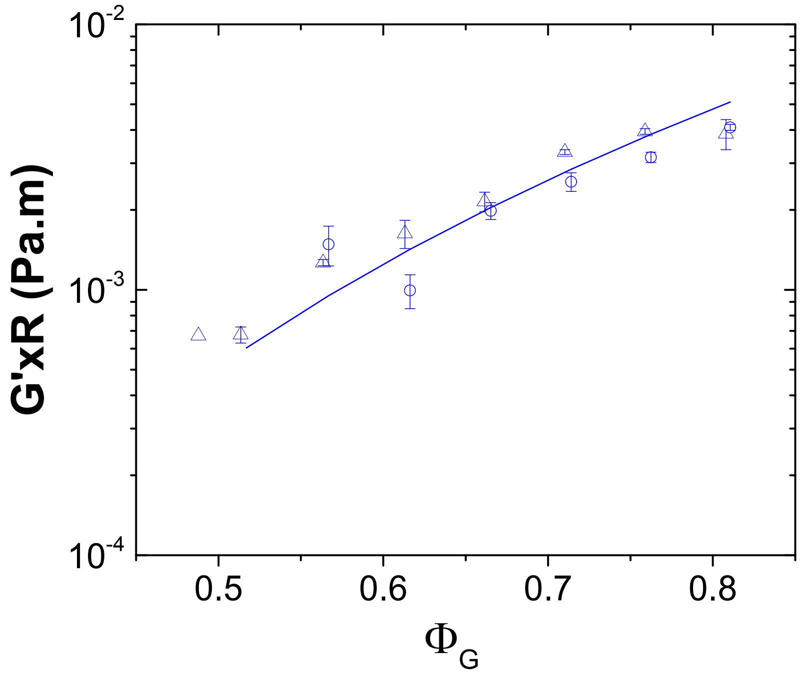


Figure S5: Normalized elastic modulus of the double emulsions stabilized by sodium caseinate, as a function of the globule volume fraction and for various inner droplet volume fractions: squares ϕ_d=0%, circles ϕ_d=20% and triangles ϕ_d=40%. The experiments are performed by dilution of a mother emulsion keeping the outer aqueous phase composition constant that is to say keeping the depletion interaction constant. Even when the droplet volume fraction is equal to zero, the oil contains PGPR to keep the interfacial tension constant throughout the experiment. The solid lines are fits to $G' = \frac{A_0}{R}(\phi - \phi_0)^{\beta}$ with β=4, A_0= 0.02 and ϕ_0= 0.1.

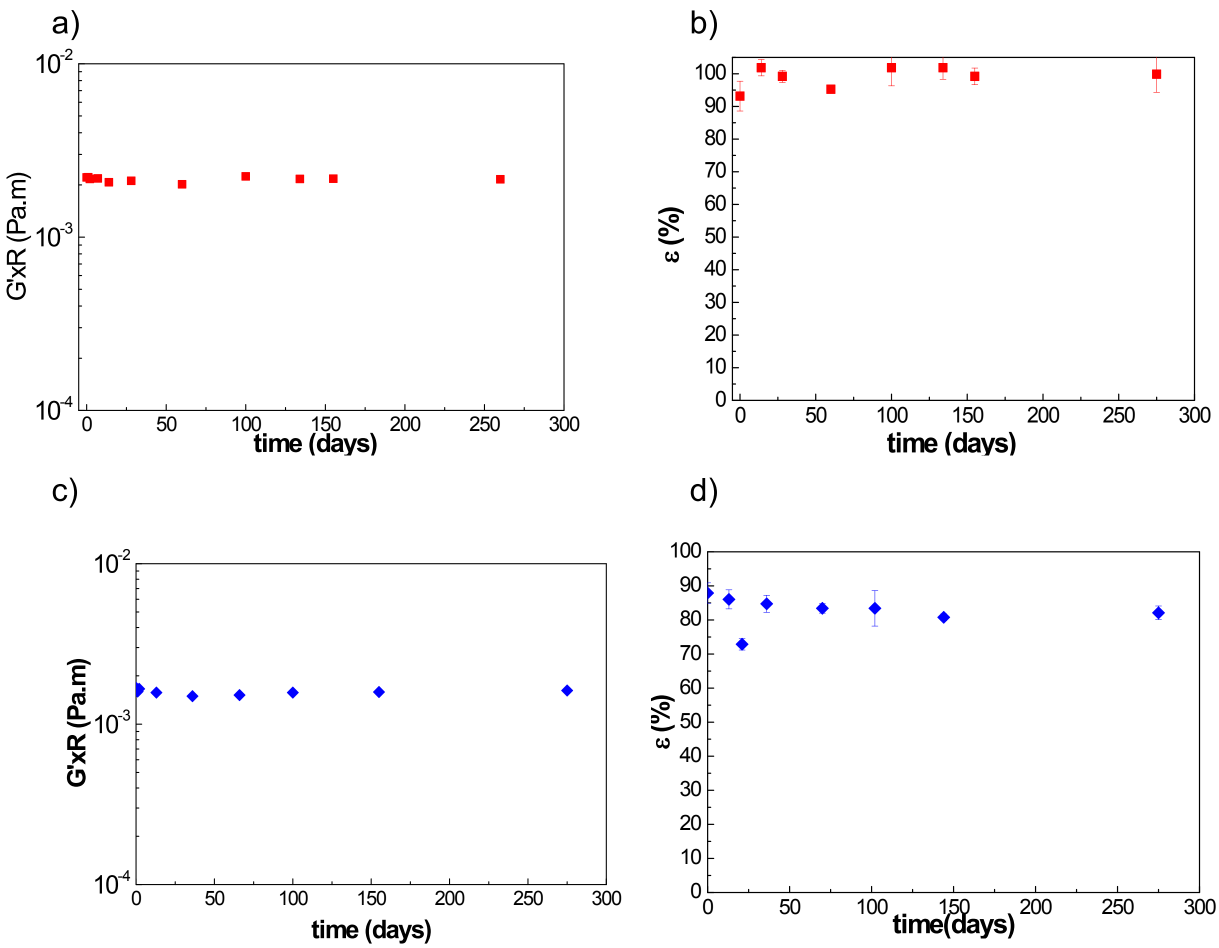


Figure S6: Evolution of the G'R and e as a function of time for the Arabic gum (a and b) and for the sodium caseinate (c and d) stabilized emulsions. In both cases, the values are stable over 10 months.

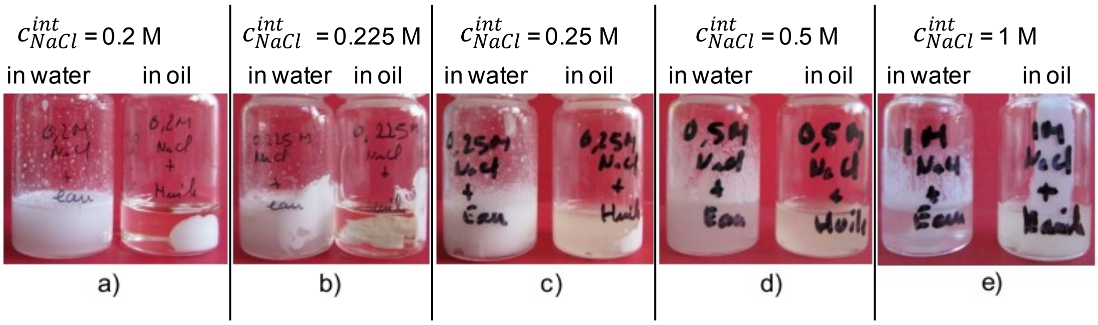


Figure S7: Photographic pictures of dilution in water (on the left of each photograph) and in oil (on the right) tests of sodium caseinate-stabilized double emulsions containing increasing NaCl concentrations in the inner droplets: a) 0.2 mol/L, b) 0.225 mol/L, c) 0.25 mol/L, d) 0.5 mol/L and e) 1 mol/L. For a to c the double emulsion can be dispersed in water but not in oil while for d and e it can be dispersed in either liquid.