دانشگاه صنعتی اصفهان

صنایع لبنی تکمیلی

دکتر علی نصیرپور

1391

TABLE 1

Glass Transition Temperatures (T_g), Change of Specific Heat at T_g (Δc_p), Melting Temperature (T_f), and the Ratio of T_f/T_g for Anhydrous Pentoses, Hexoses, Disaccharides and Alditols (Roos, 1993*a*)

Compound	T_g (°C)[a]	Δc_p (J/g °C)	T_f (°C)[a]	T_f/T_g[a]
Pentoses				
Arabinose	−2	0·66	150 (160)	1·56 (1·60)
Ribose	−20	0·67	70 (86)	1·36 (1·42)
Xylose	6	0·66	143 (157)	1·49 (1·54)
Hexoses				
Fructose	5	0·75	108 (127)	1·37 (1·44)
Fucose	26	—	133 (145)	1·36 (1·40)
Galactose	30	0·50	163 (170)	1·44 (1·46)
Glucose	31	0·63	143 (158)	1·37 (1·42)
Mannose	25	0·72	120 (134)	1·32 (1·37)
Rhamnose	−7	0·69	— —	— —
Sorbose	19	0·69	153 (163)	1·46 (1·49)
Disaccharides				
Lactose	101	—	— (214)	— (1·30)
Maltose	87	0·61	— —	— —
Melibiose	85	0·58	— —	— —
Sucrose	62	0·60	173 (190)	1·33 (1·38)
Trehalose	100	0·55	— —	— —
Alditols				
Maltitol	39	0·56	139 (149)	1·32 (1·35)
Sorbitol	−9	0·96	85 (99)	1·36 (1·41)
Xylitol	−29	1·02	89 (95)	1·48 (1·51)

[a]Onset temperatures for the transitions; the values in parenthesis refer to the peak temperature values of the melting endotherms.

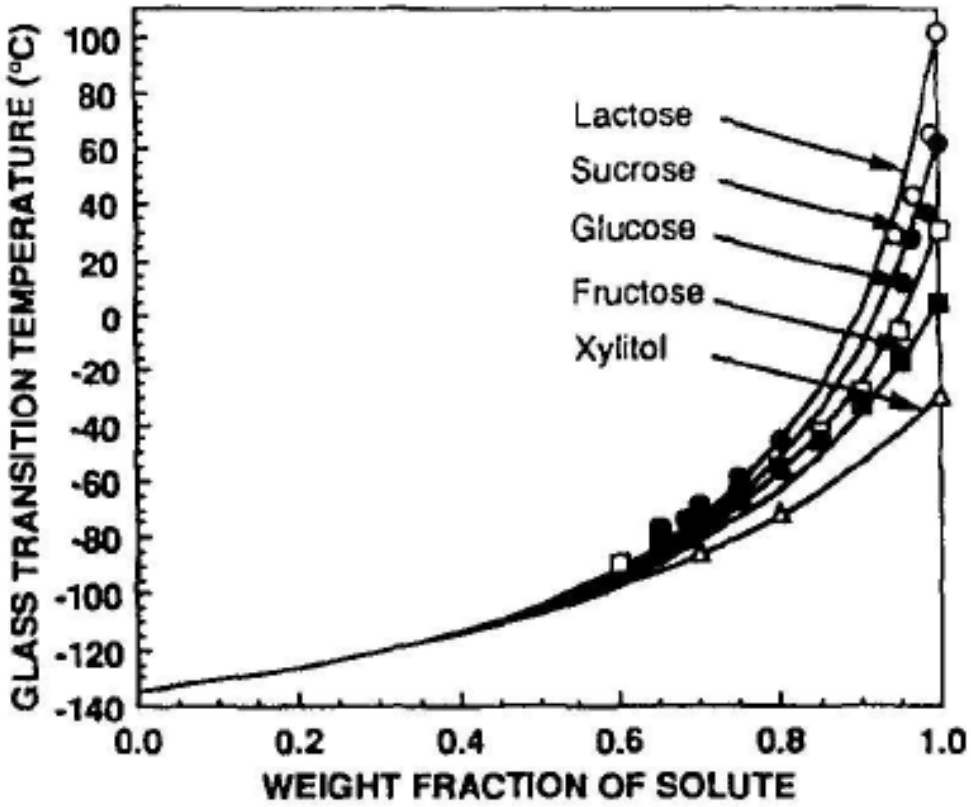


Fig. 2. Glass transition temperatures (T_g) of common mono- and disaccharides as a function of water content according to Roos (1993*a*). Experimental T_g values are indicated with symbols. The T_g curves are calculated with eqn (2) using $T_g = 135°C$ for water (Johari *et al.*, 1987).

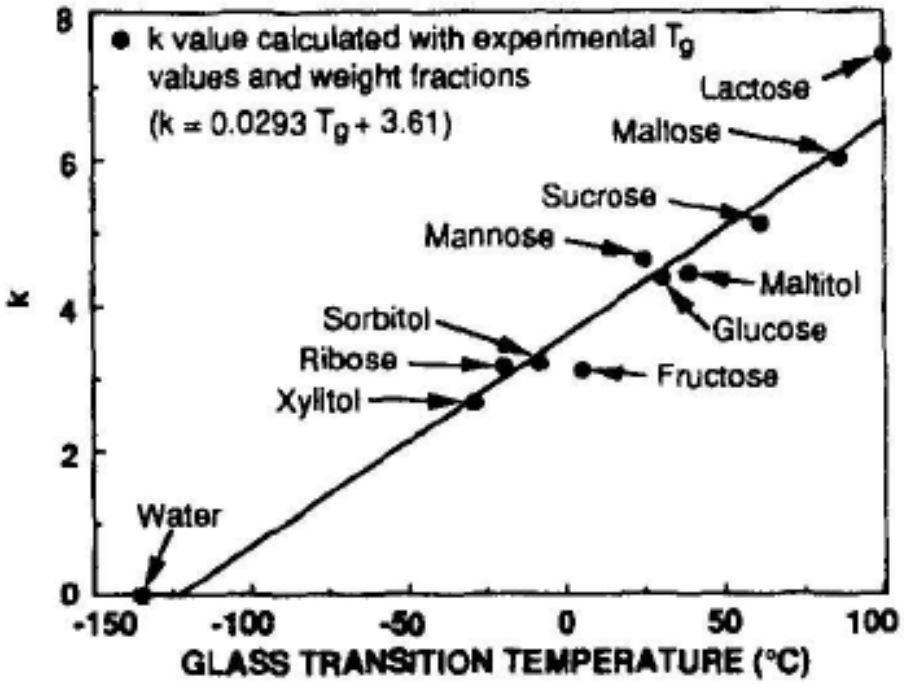
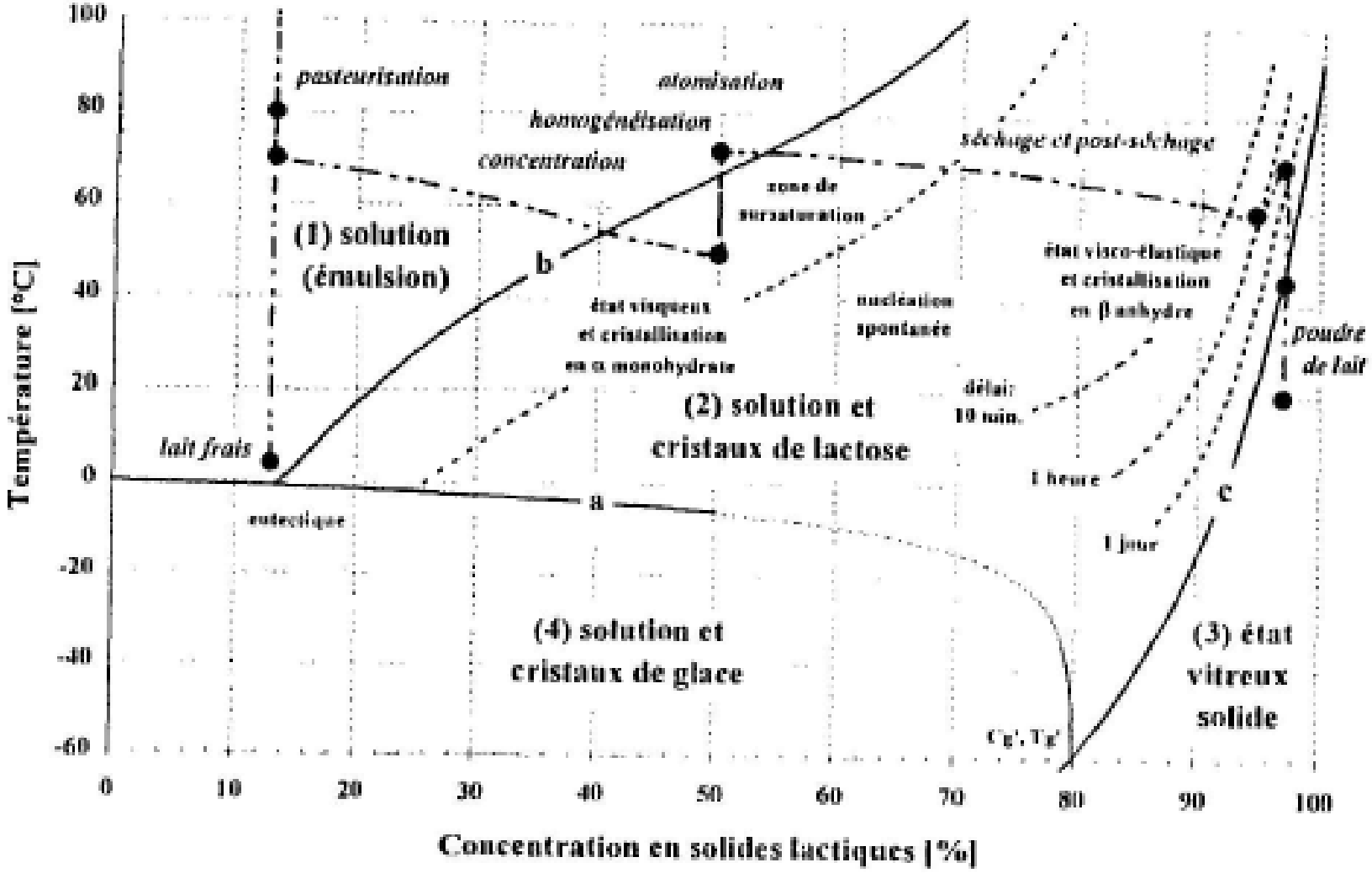


Fig. 5. k values (eqn (2)) of sugars as a function of the anhydrous glass transition temperature (T_g). The regression equation obtained allows prediction of the constant k in eqn (2) based on the anhydrous T_g value. After Roos (1993*a*).



Le diagramme de phase se prête particulièrement bien à la description des différentes étapes du procédé illustrées à la Fig 1, soit entre autres: pasteurisation, concentration, homogénéisation, atomisation, séchage, post-séchage, post refroidissement.

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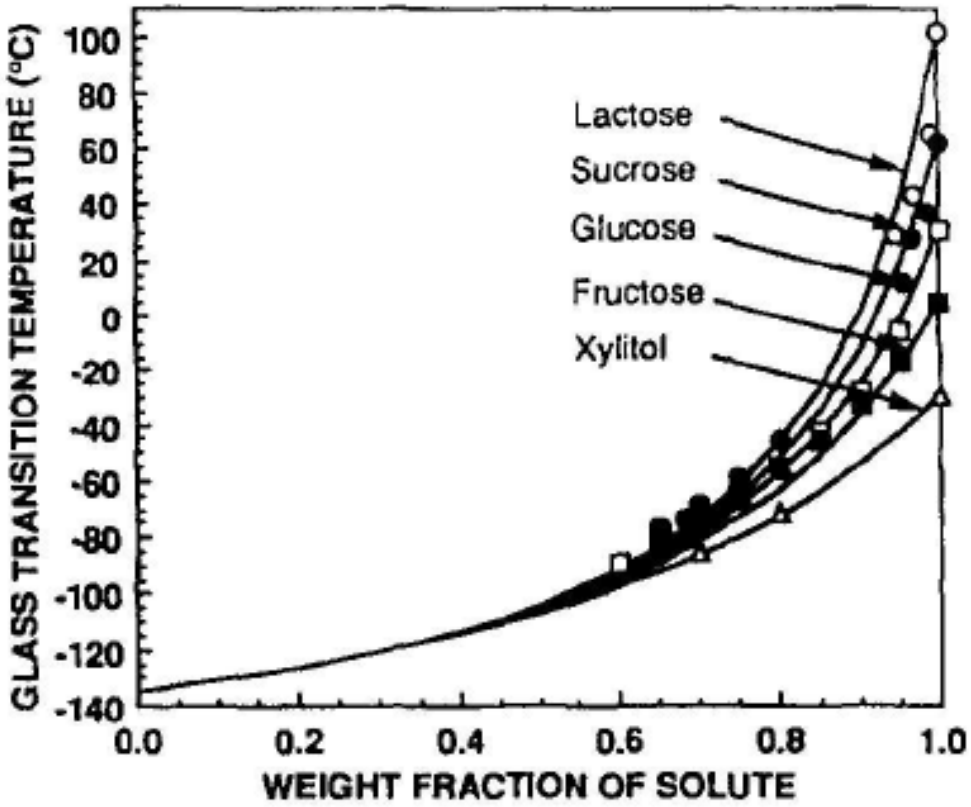

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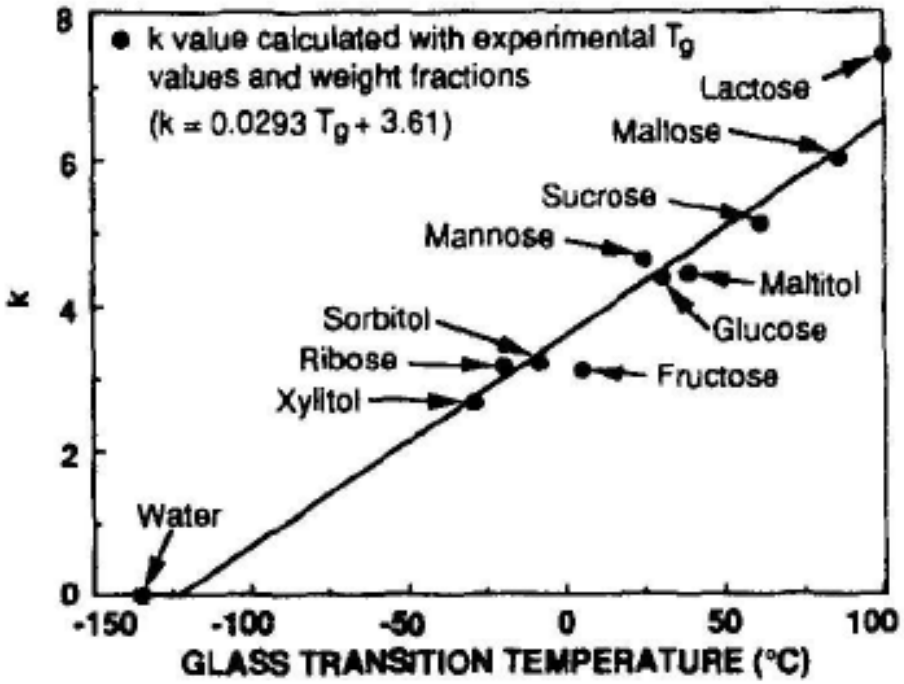

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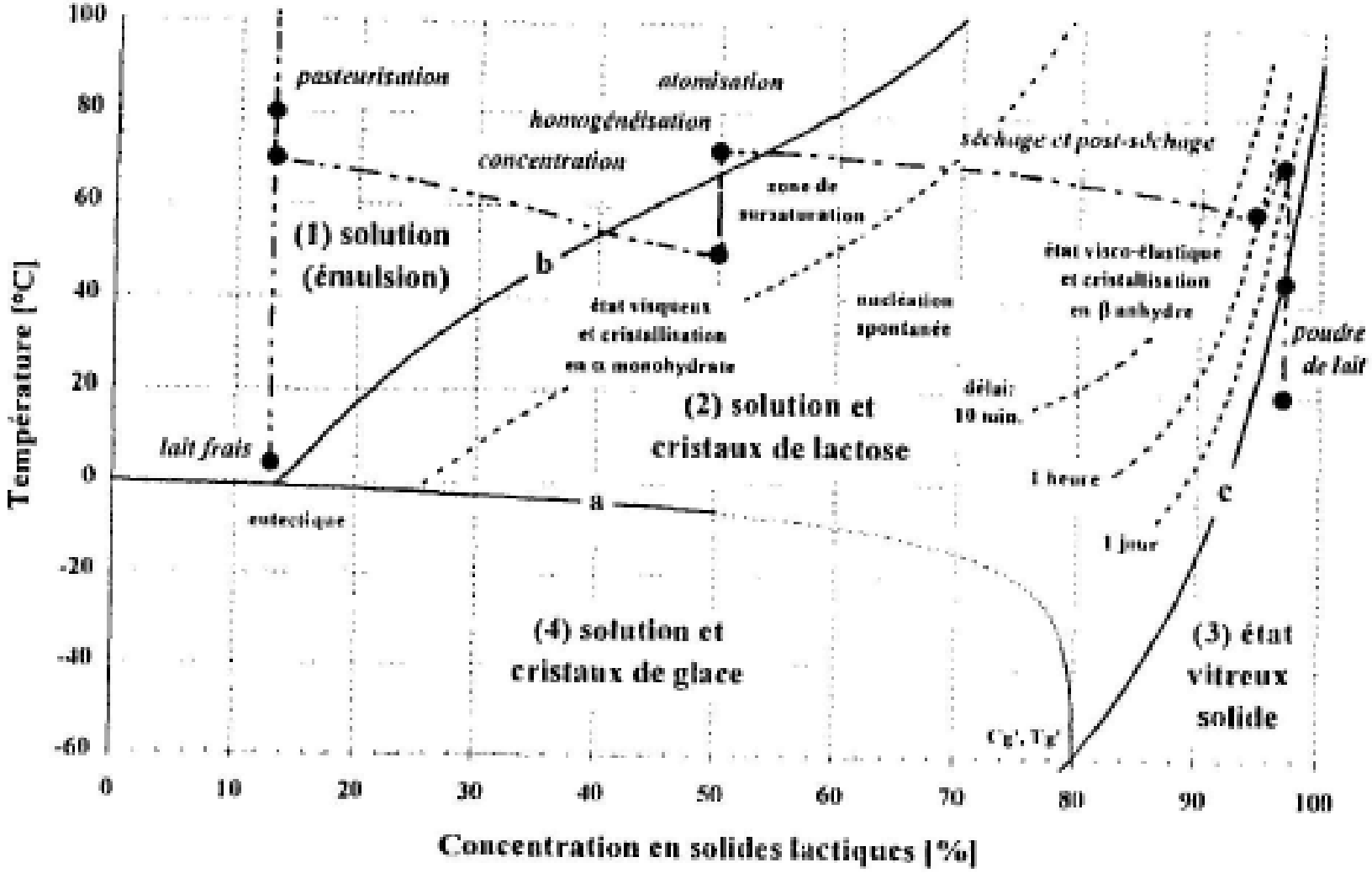

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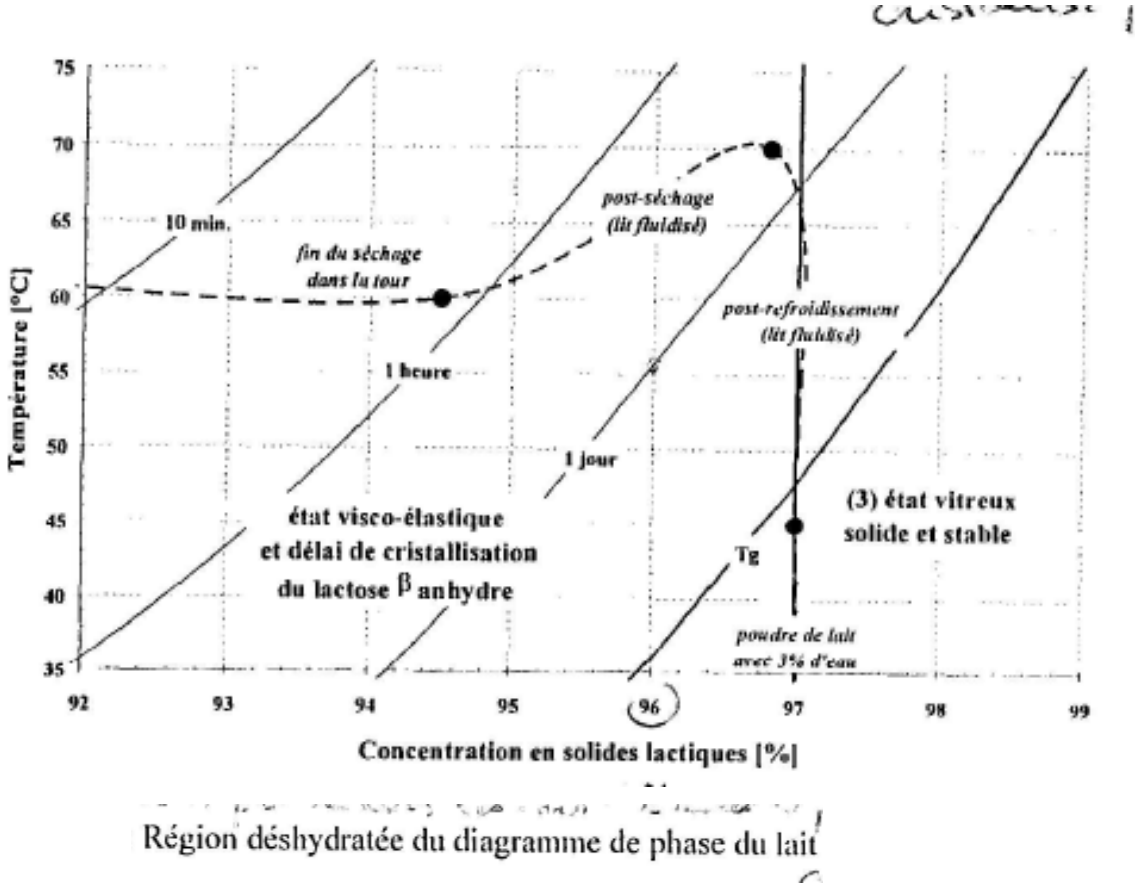
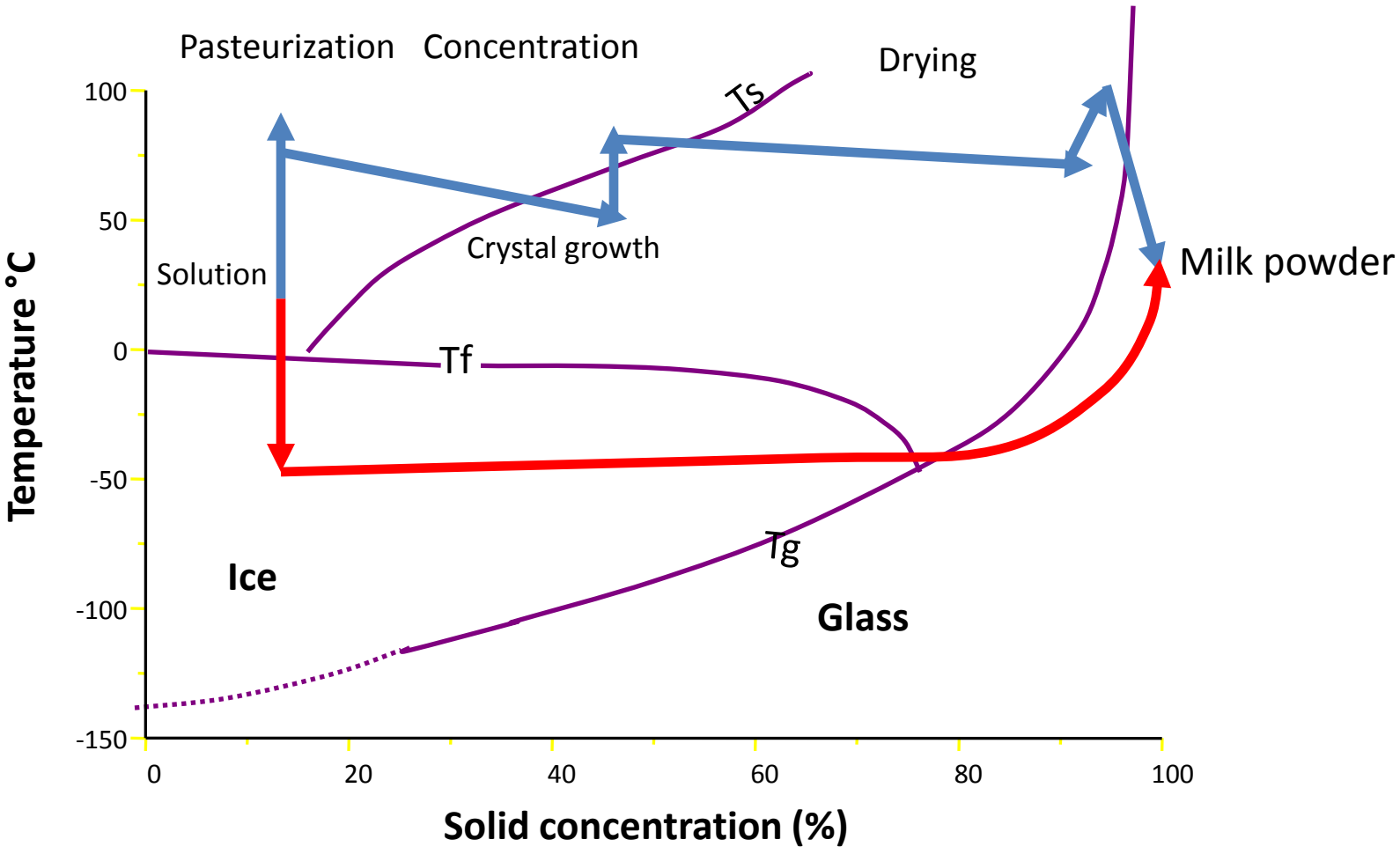


Région déshydratée du diagramme de phase du lait

Table 2: $a_w(T)$ maximales des poudres de lait

T[°C]	a_w max
40	0.31
45	0.26
50	0.22
55	0.17
60	0.13
65	0.08

Phase changes during drying

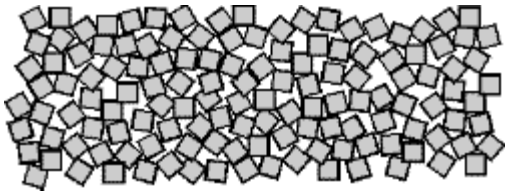


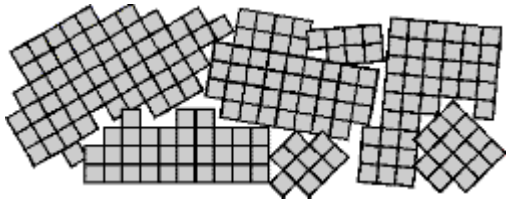
Cristallisation du lactose: effet de l'humidité

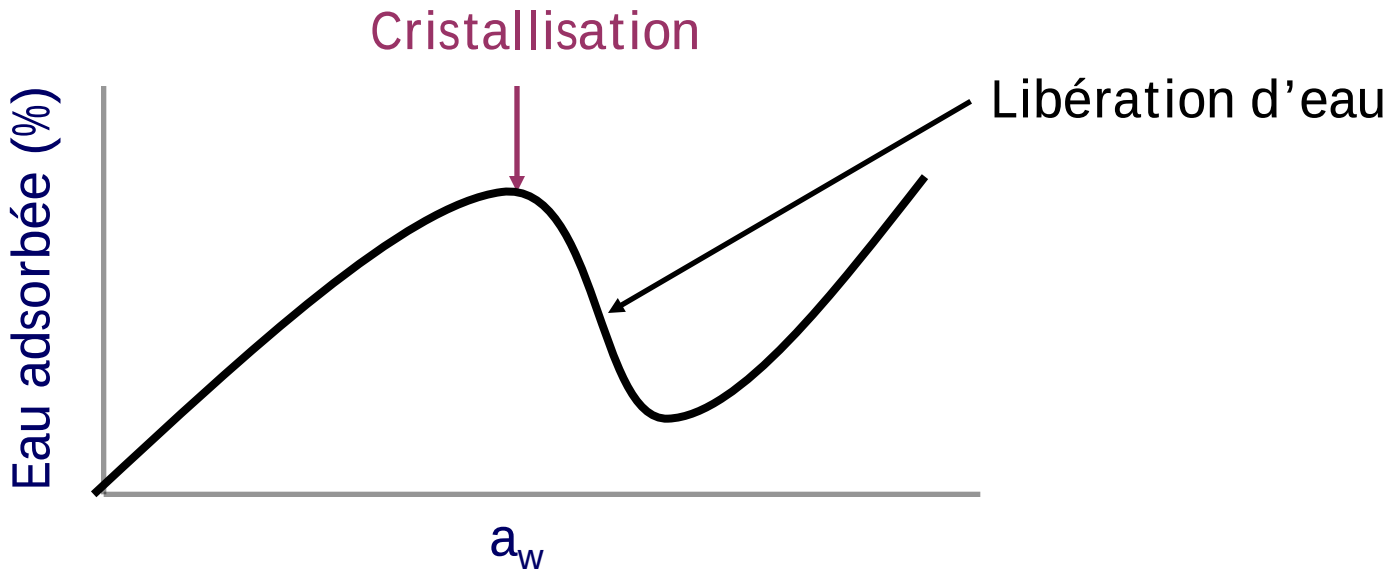
Lactose amorphe (hygroscopique)

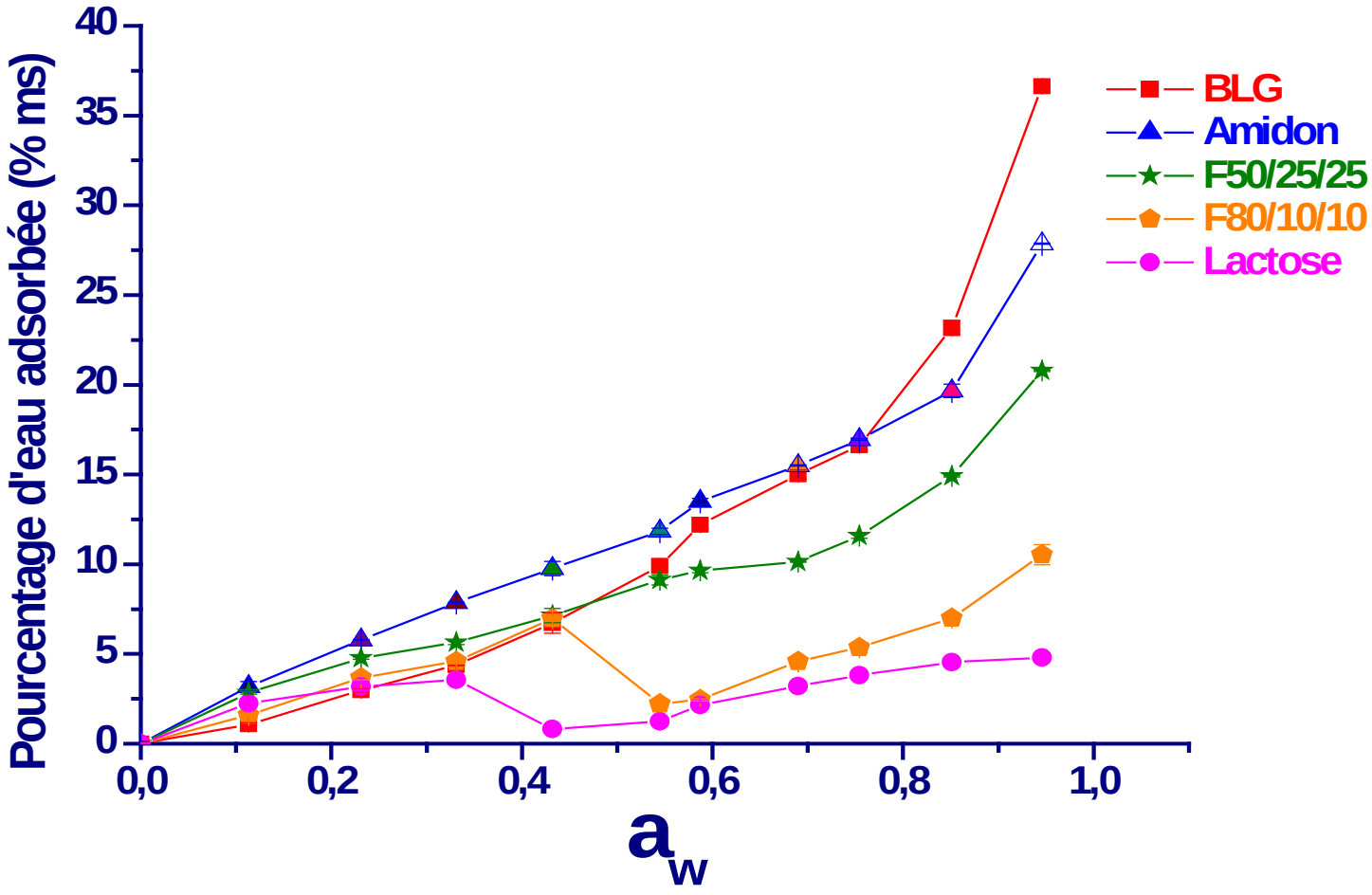
Cristallisation

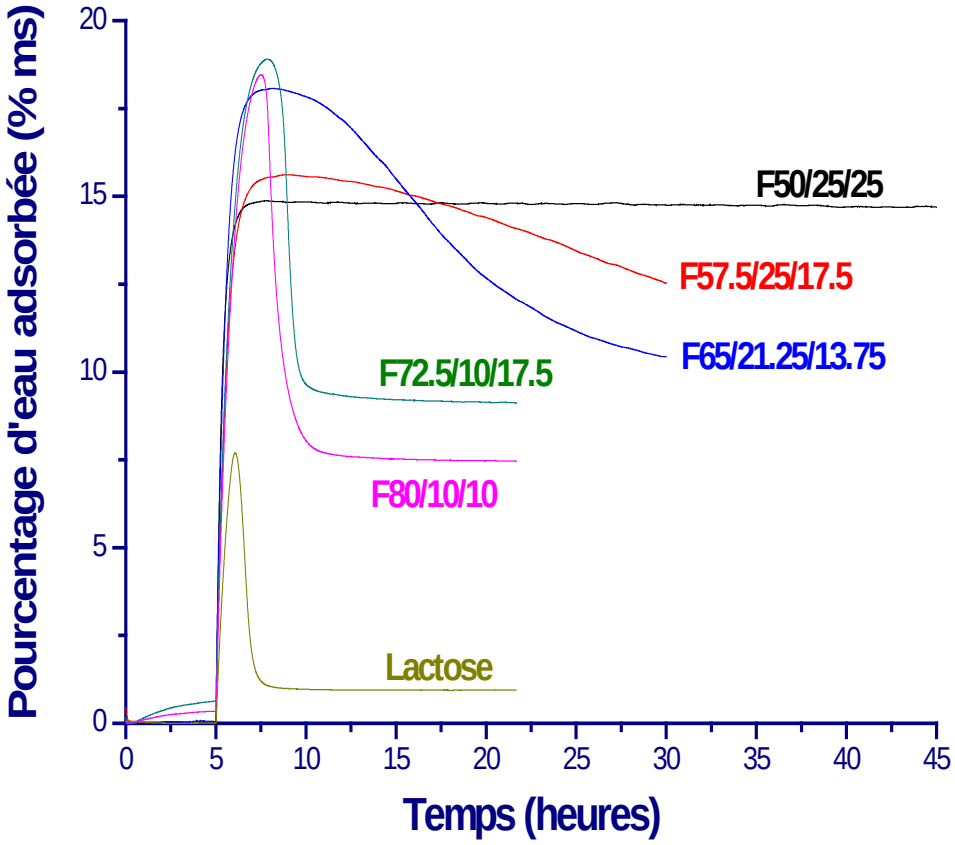
Lactose cristallisé (non hygroscopique)

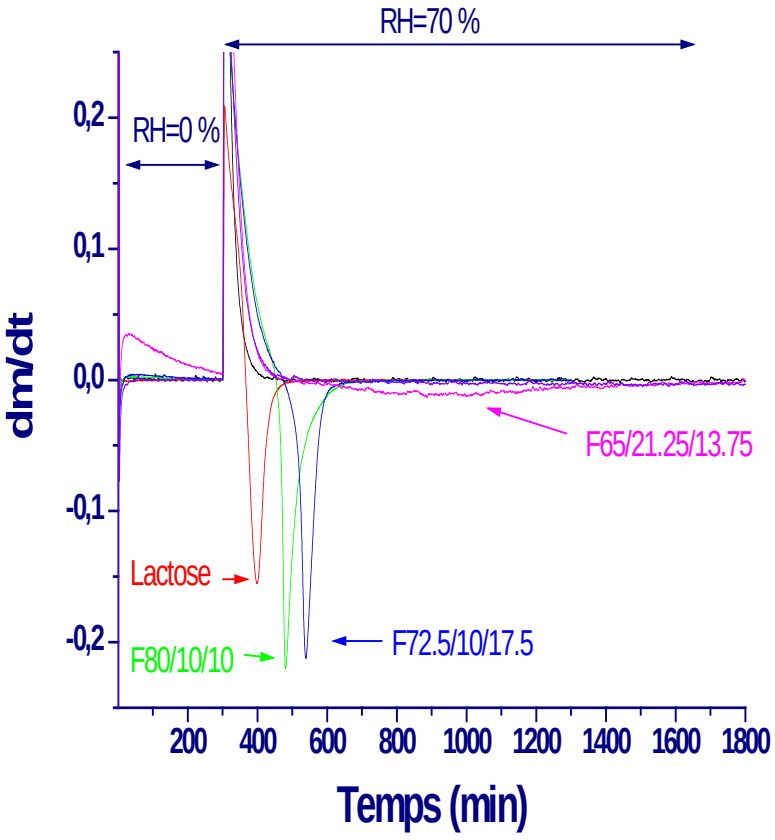







Pourcentage d'eau adsorbée (% ms)
40
35
30
25
20
15
10
5
0
0,0
0,2
0,4
0,6
0,8
1,0
a
w
BLG
Amidon
F50/25/25
F80/10/10
Lactose


Pourcentage d'eau adsorbée (% ms)
Temps (heures)
F50/25/25
F57.5/25/17.5
F65/21.25/13.75
F72.5/10/17.5
F80/10/10
Lactose


RH=70 %
RH=0 %
dm/dt
Temps (min)
F65/21.25/13.75
Lactose
F80/10/10
F72.5/10/17.5