Table S1. Thermal properties of wheat starch slurries (gelatinization) and gels (retrogradation) made with 10 to 50% sucrose solutions. Enthalpies were not adjusted to dry starch content. Capital letters indicate significant differences.

	Gelatinization											
	Onset (°C)				Peak (°C)				Enthalpy (J/g)			
	Avg.		SD	Stat.	Avg.		SD	Stat.	Avg.		SD	Stat.
Control	60.60	±	0.30	F	64.70	±	0.15	F	0.82	±	0.09	B
10% Sucrose	63.40	±	0.01	E	67.52	±	0.01	E	0.69	±	0.04	B
20% Sucrose	66.66	±	0.18	D	71.02	±	0.16	D	0.68	±	0.09	B
30% Sucrose	71.42	±	0.07	C	75.74	±	0.10	C	0.62	±	0.02	B
40% Sucrose	76.66	±	0.84	B	81.73	±	0.11	B	0.91	±	0.30	AB
50% Sucrose	82.75	±	1.35	A	89.57	±	0.25	A	1.26	±	0.22	A
	Retrogradation Day 7											
	Onset (°C)				Peak (°C)				Enthalpy (J/g)			
	Avg.		SD	Stat.	Avg.		SD	Stat.	Avg.		SD	Stat.
Control	48.85	±	2.56	A	55.07	±	0.75	C	0.04	±	0.02	D
10% Sucrose	49.49	±	2.46	A	55.59	±	0.37	BC	0.03	±	0.00	D
20% Sucrose	46.45	±	2.18	A	53.68	±	0.78	C	0.11	±	0.03	CD
30% Sucrose	46.15	±	2.03	A	55.69	±	2.01	BC	0.14	±	0.02	BC
40% Sucrose	47.58	±	1.15	A	58.49	±	1.03	AB	0.23	±	0.07	AB
50% Sucrose	47.92	±	0.62	A	60.32	±	1.18	AB	0.27	±	0.02	A
	Retrogradation Day 14											
	Onset (°C)				Peak (°C)				Enthalpy (J/g)			
	Avg.		SD	Stat.	Avg.		SD	Stat.	Avg.		SD	Stat.
Control	49.40	±	4.00	A	55.88	±	0.74	BC	0.03	±	0.02	E
10% Sucrose	44.07	±	0.49	AB	53.19	±	1.81	C	0.06	±	0.01	DE
20% Sucrose	42.88	±	0.54	B	52.65	±	1.13	C	0.11	±	0.02	CD
30% Sucrose	45.51	±	0.95	AB	56.51	±	1.00	B	0.14	±	0.01	BC
40% Sucrose	47.64	±	3.01	AB	58.70	±	0.77	AB	0.19	±	0.03	B
50% Sucrose	47.61	±	0.60	AB	60.96	±	0.38	A	0.27	±	0.03	A

Table S2. Anomeric and tautomeric forms of sweeteners in solution and the number of equatorial and exocyclic hydroxyl groups.

	Mutarotation Distribution						# of Equatorial OH Groups and Exocyclic OH Groups							
	Pyranose		Furanose				Pyranose		Furanose			Calculated equ. and exo-OH	Reported e-OH	Reference
Sweetener	α	β	α	β	Open	Reference	α	β	α	β	Open			
Ribose	21.5	58.5	6.5	13.5	0.05	[1]	2	3	1	1	4	2.4	2.1	[6]
Xylose	36.5	63	0.25	0.25	0.02	[1]	3	4	1	1	4	3.6	3.5	[6]
Xylitol	NA	NA	NA	NA	100		NA	NA	NA	NA	5	5.0		
Glucose	38	62	0.0	0.14	0.002	[1]	4	5	2	2	5	4.6	4.6	[6]
Galactose	30	64	2.5	3.5	0.02	[1]	3	4	2	2	5	3.6	3.6	[6]
Mannose	65.5	34.5	0.6	0.3	0.005	[1]	3	4	2	2	5	3.4	3.3	[6]
Fructose	2	70	5	23	0.7	[1]	2	3	2	2	5	2.7	3.0	[6]
Tagatose	79	16	1	4	0.6	[1]	3	4	2	2	5	3.1		
L-Sorbose	98	0	2	0	0.2	[2]	4	5	2	2	5	4.0	3.9	[7]
Sorbitol	NA	NA	NA	NA	100		NA	NA	NA	NA	6	6.0		
Mannitol	NA	NA	NA	NA	100		NA	NA	NA	NA	6	6.0		
Maltose	62	38	0	0	0	[3]	7	8	6	6	10	7.4	7.2	[6]
Trehalose	100	0	0	0	0		8	NA	NA	NA	NA	8.0	8.0	[8]
Sucrose	0	0	0	100	0		NA	NA	NA	6	NA	6.0	6.3	[6]
Isomaltulose	0	0	25	69	6	[4]	5	6	5	5	9	5.2		
Lactose	37.3	62.7	0	0	0	[5]	6	7	5	5	9	6.6	6.7	[9]
Isomalt	NA	NA	NA	NA	100		NA	NA	NA	NA	9	9.0		
Raffinose	0	0	0	100	0		NA	NA	NA	NA	NA	8.0	8.3	[6]

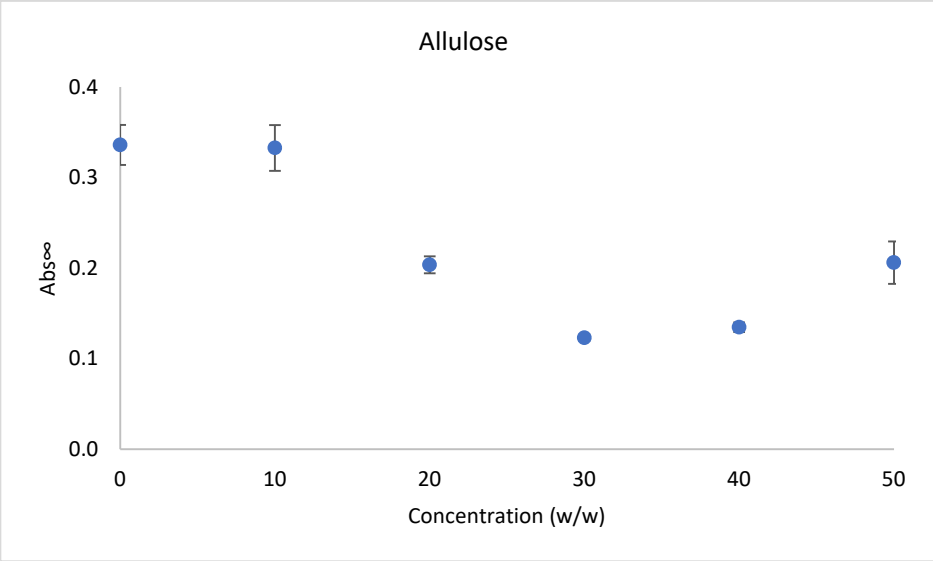
Table S3. Calculated sweetener solution $N_{OH,eff}$, and $\phi_{w,eff}$ values.

Sweetener	Concentration	$N_{OH,eff}$	$\phi_{w,eff}$
Control	0	2.000	1.000
Allulose	10	2.015	
Fructose	10	2.018	0.955
Galactose	10	2.021	0.956
Glucose	10	10.034	0.957
Isomalt	10	10.016	
Isomaltulose	10	10.017	0.946
Lactose	10	10.184	0.955
Maltitol	10	10.114	0.947
Maltose	10	10.117	0.949
Mannitol	10	10.182	0.950
Mannose	10	10.214	0.957
Raffinose	10	10.124	0.950
Ribose	10	10.199	0.954
Sorbitol	10	10.170	0.949
Sorbose	10	10.193	0.955
Sucrose	10	10.127	0.949
Tagatose	10	10.188	0.956
Trehalose	10	10.222	0.959
Xylitol	10	10.185	0.949
Xylose	10	10.223	0.956
Allulose	20	9.250	
Fructose	20	9.279	0.906
Galactose	20	9.318	0.908
Glucose	20	9.335	0.910

Isomalt	20	9.152	
Isomaltulose	20	9.157	0.889
Lactose	20	9.268	0.906
Maltitol	20	9.130	0.889
Maltose	20	9.136	0.893
Mannose	20	9.329	0.910
Raffinose	20	9.149	0.896
Ribose	20	9.298	0.904
Sorbitol	20	9.242	0.894
Sorbose	20	9.287	0.907
Sucrose	20	9.155	0.894
Tagatose	20	9.276	0.907
Trehalose	20	9.345	0.914
Xylitol	20	9.270	0.894
Xylose	20	9.348	0.909
Allulose	30	8.325	
Fructose	30	8.369	0.853
Galactose	30	8.428	0.857
Glucose	30	8.453	0.859
Isomalt	30	8.178	
Isomaltulose	30	8.353	0.853
Maltitol	30	8.146	0.827
Maltose	30	8.154	0.832
Mannose	30	8.443	0.859
Raffinose	30	8.174	0.837
Ribose	30	8.398	0.850
Sorbitol	30	8.313	0.834

Sorbose	30	8.381	0.854
Sucrose	30	8.183	0.834
Tagatose	30	8.365	0.855
Trehalose	30	8.467	0.866
Xylitol	30	8.356	0.835
Xylose	30	8.473	0.858
Allulose	40	7.400	
Fructose	40	7.459	0.795
Glucose	40	7.572	0.803
Isomalt	40	7.205	
Isomaltulose	40	7.215	0.856
Maltitol	40	7.161	0.759
Maltose	40	7.173	0.766
Mannose	40	7.558	0.803
Ribose	40	7.498	0.791
Sorbitol	40	7.385	0.771
Sorbose	40	7.475	0.796
Sucrose	40	7.211	0.768
Tagatose	40	7.454	0.798
Trehalose	40	7.590	0.812
Xylitol	40	7.442	0.771
Xylose	40	7.597	0.803
Allulose	50	6.476	
Fructose	50	6.549	0.732
Glucose	50	6.690	0.743
Maltitol	50	6.177	0.685
Maltose	50	6.192	0.693

Mannose	50	6.673	0.742
Ribose	50	6.598	0.727
Sorbitol	50	6.456	0.701
Sucrose	50	6.238	0.696
Tagatose	50	6.543	0.735
Xylitol	50	6.528	0.703
Xylose	50	6.722	0.742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20
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40
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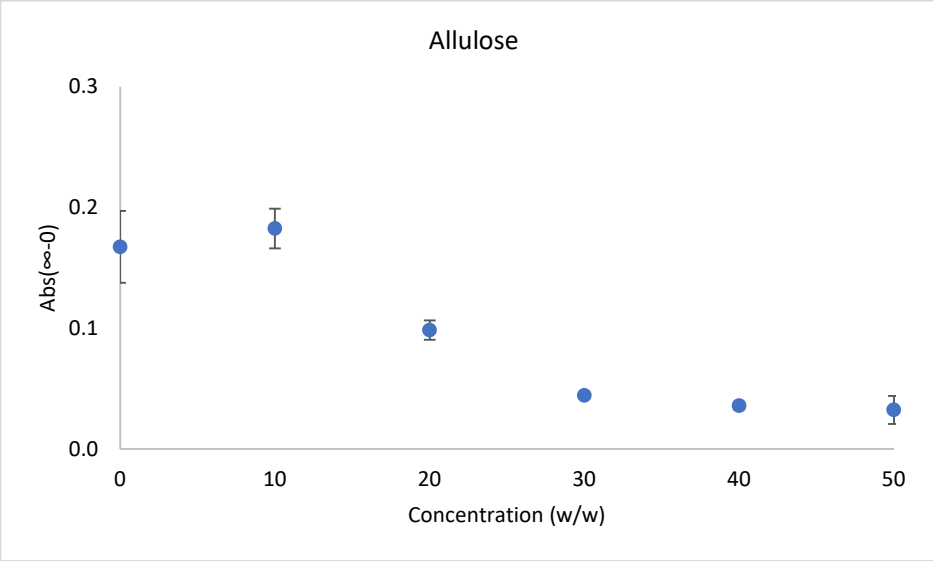
Concentration (w/w)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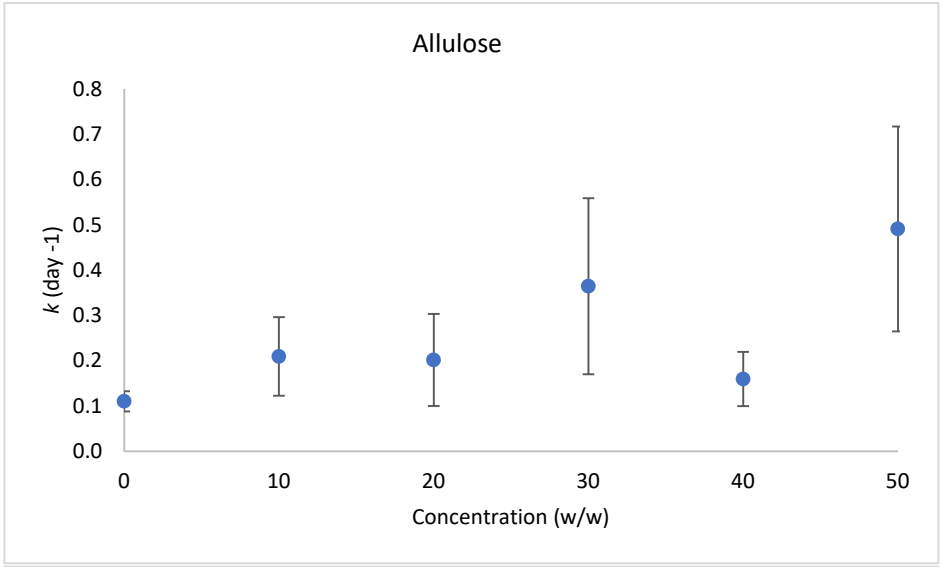
Concentration (w/w)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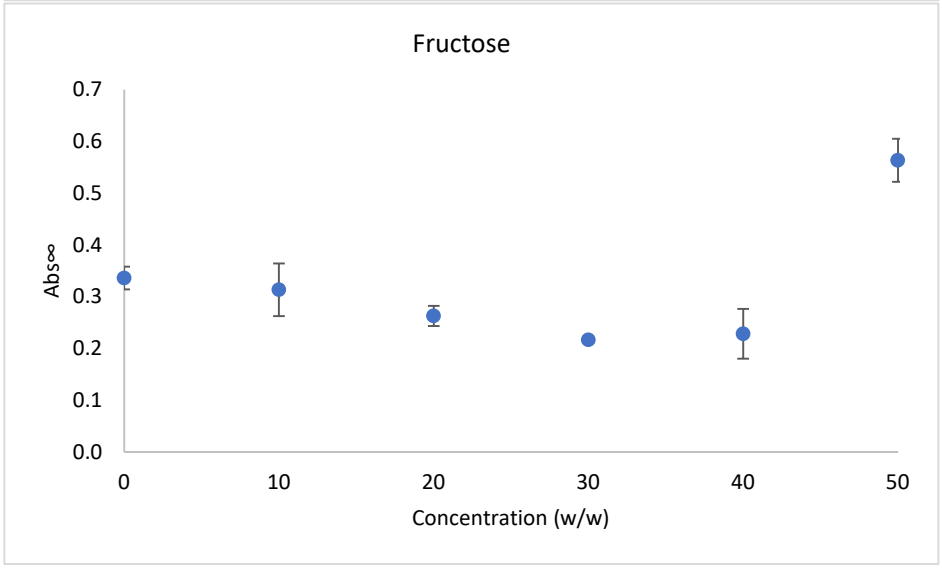
10
20
30
40
50
Concentration (w/w)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Abs∞
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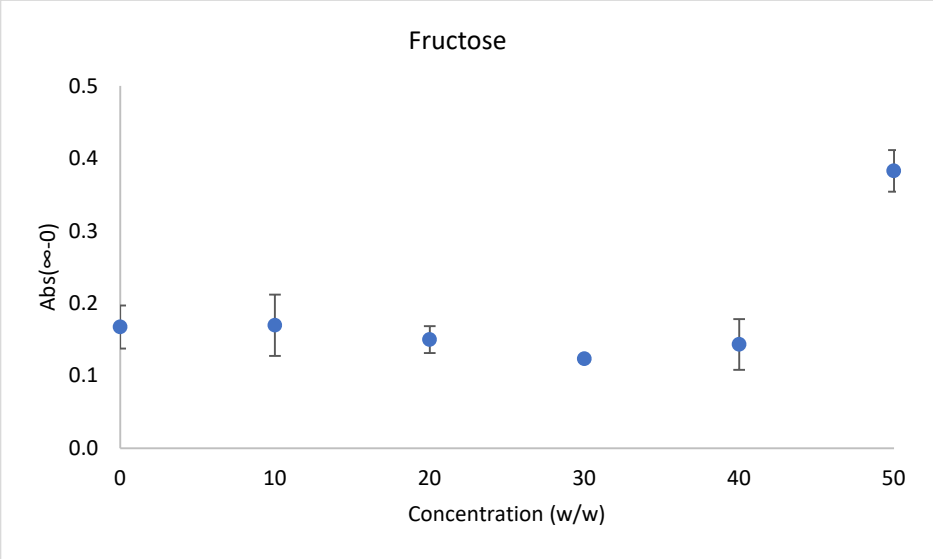
Concentration (w/w)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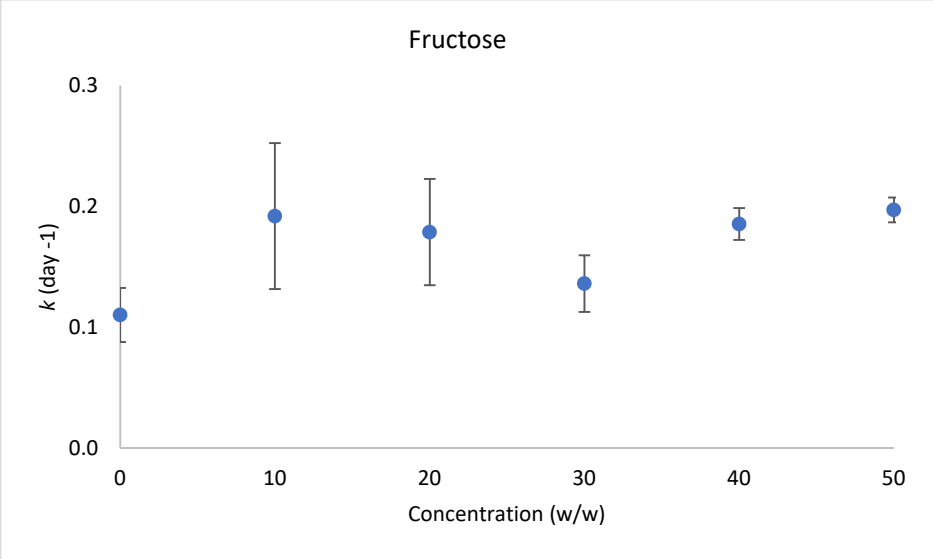
40
50
Concentration (w/w)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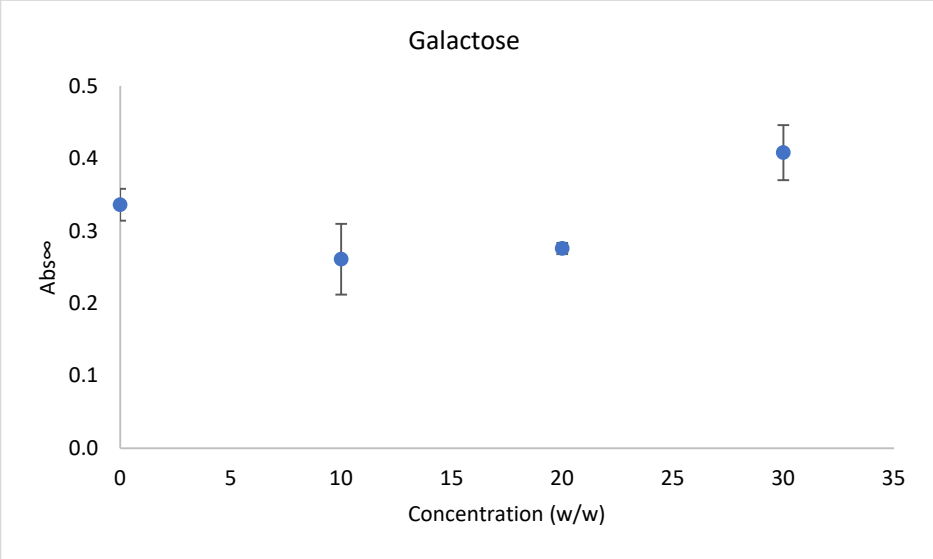
50
Concentration (w/w)


Galactose
Abs∞
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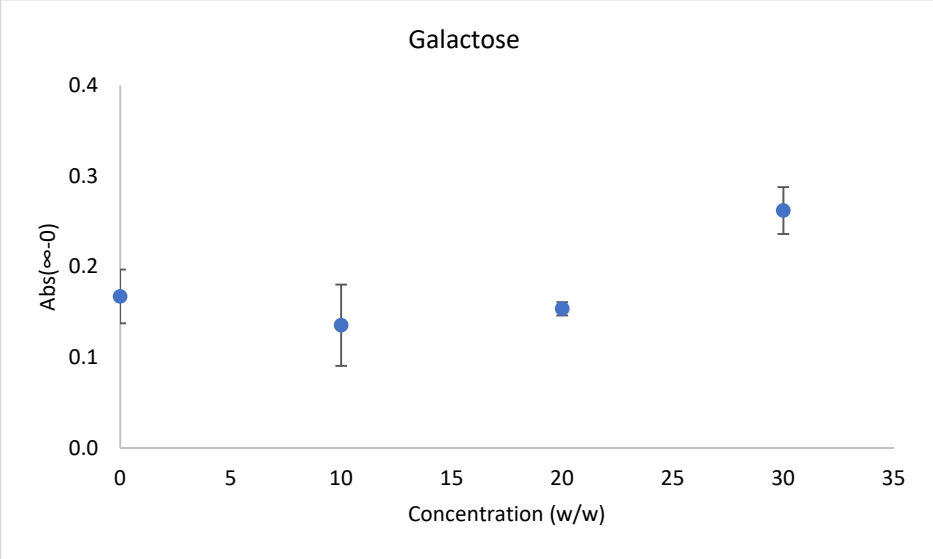
0.1
0.0
0
5
10
15
20
25
30
35
Concentration (w/w)


Galactose
Abs(∞-0)
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20
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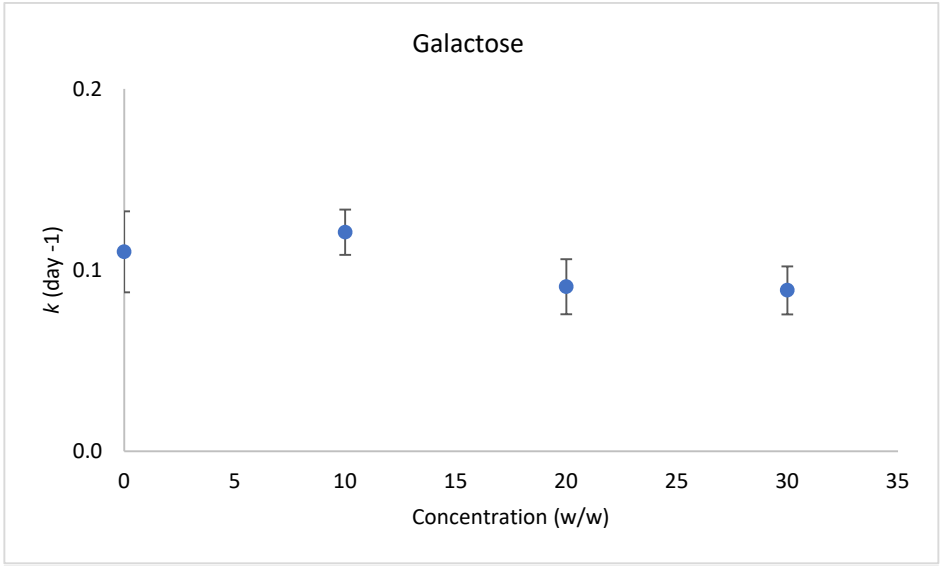
30
35
Concentration (w/w)


Galactose
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0.1
0.0
k (day -1)
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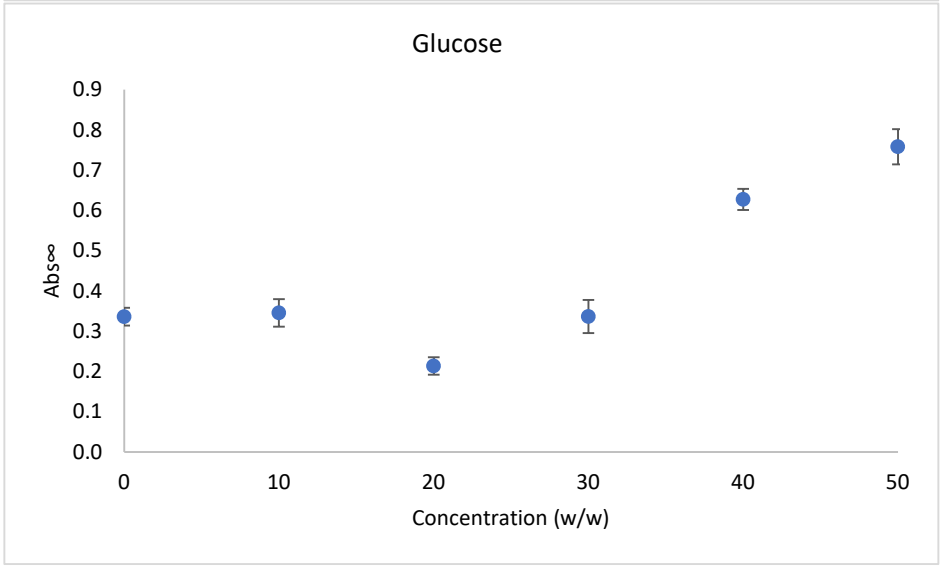
10
15
20
25
30
35
Concentration (w/w)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0.6
0.5
0.4
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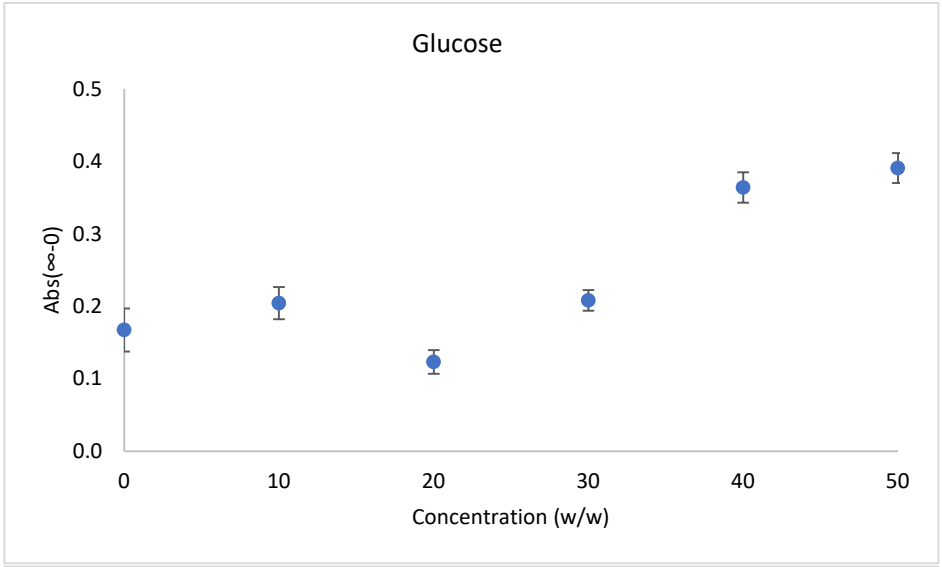
0.2
0.1
0.0
Abs∞
0
10
20
30
40
50
Concentration (w/w)


Glucose
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Abs(∞-0)
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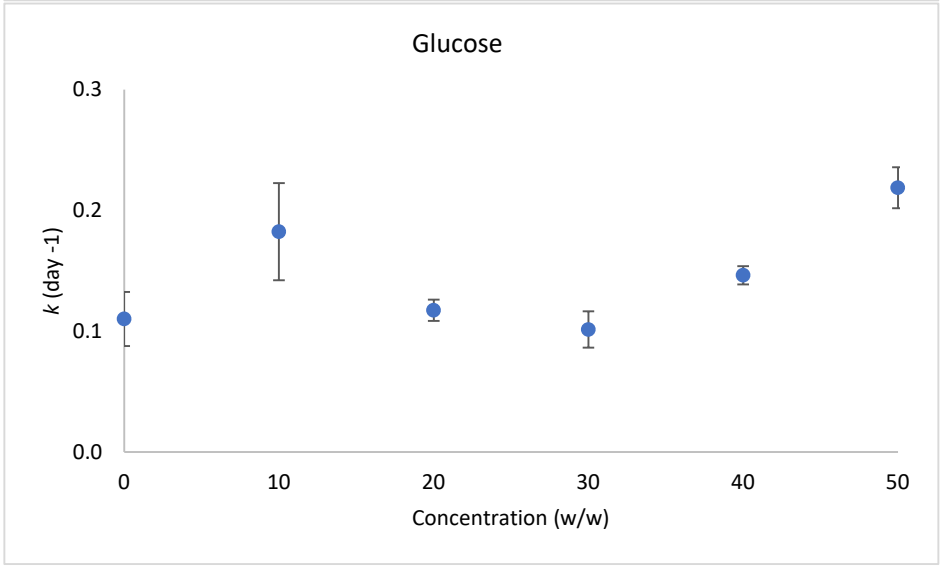
10
20
30
40
50
Concentration (w/w)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0.0
k (day -1)
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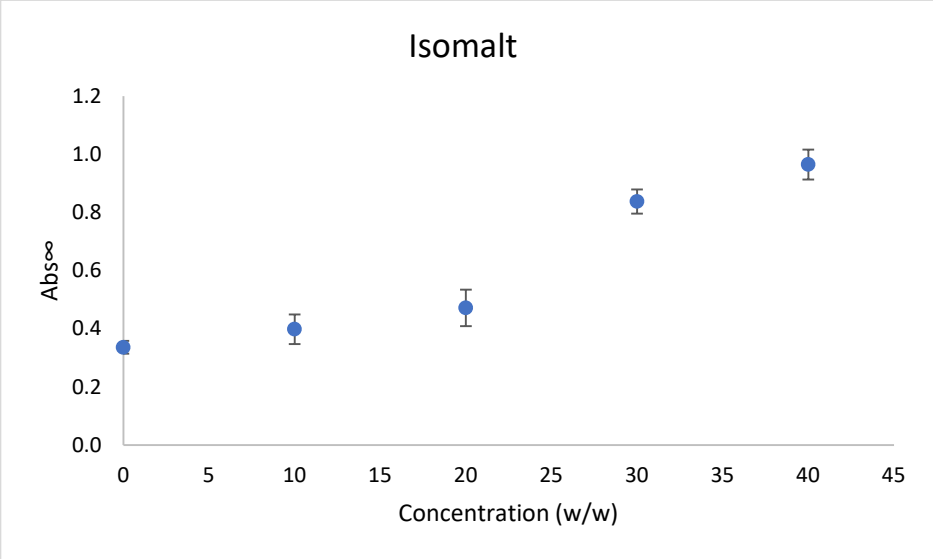
10
20
30
40
50
Concentration (w/w)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0.2
0.0
0
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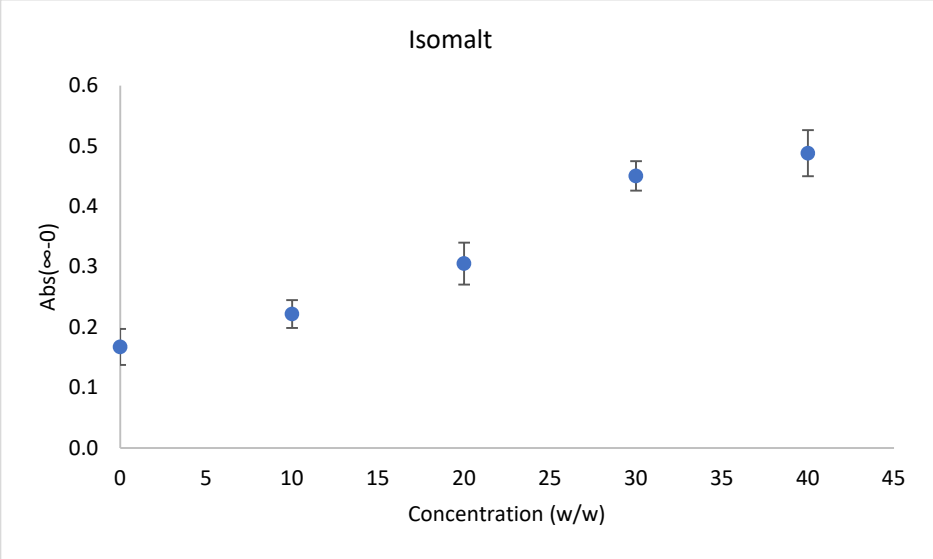
15
20
25
30
35
40
45
Concentration (w/w)


Isomalt
Abs(∞-0)
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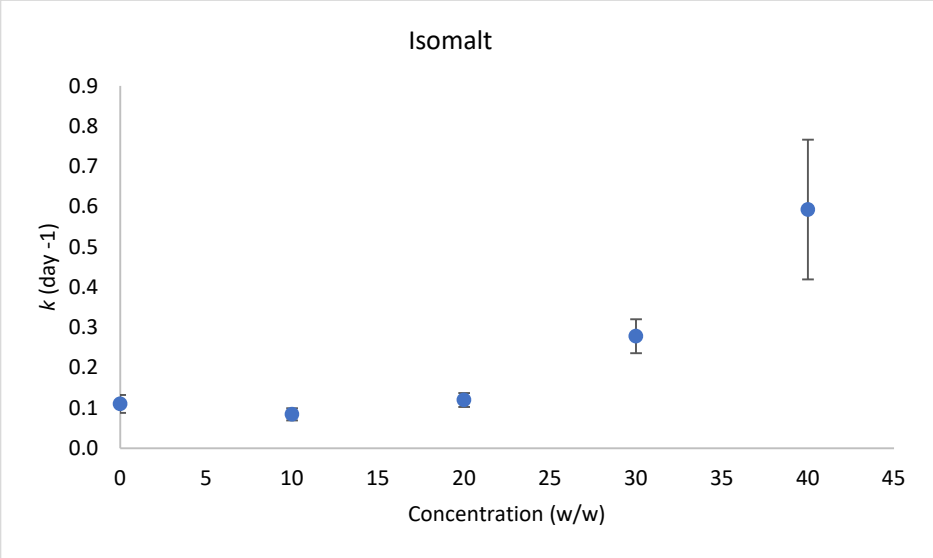
10
15
20
25
30
35
40
45
Concentration (w/w)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k (day -1)
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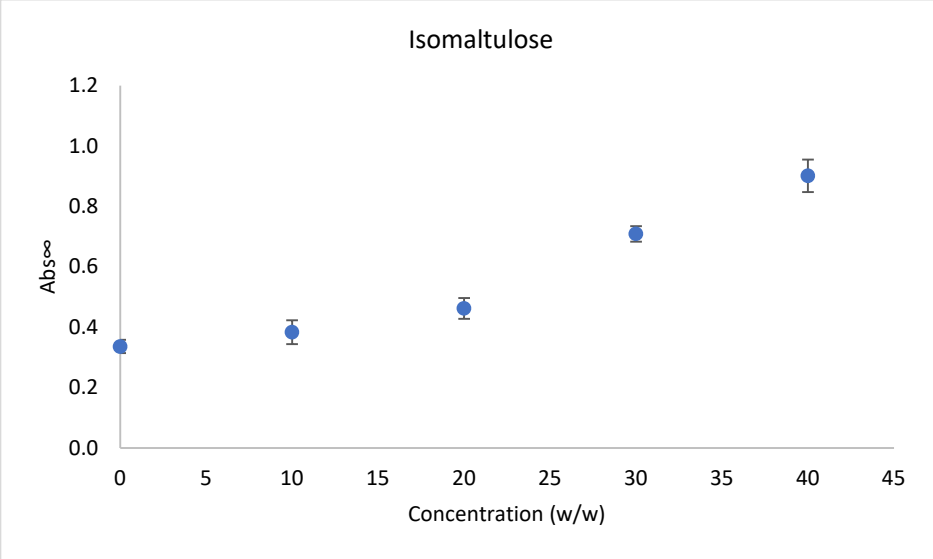
5
10
15
20
25
30
35
40
45
Concentration (w/w)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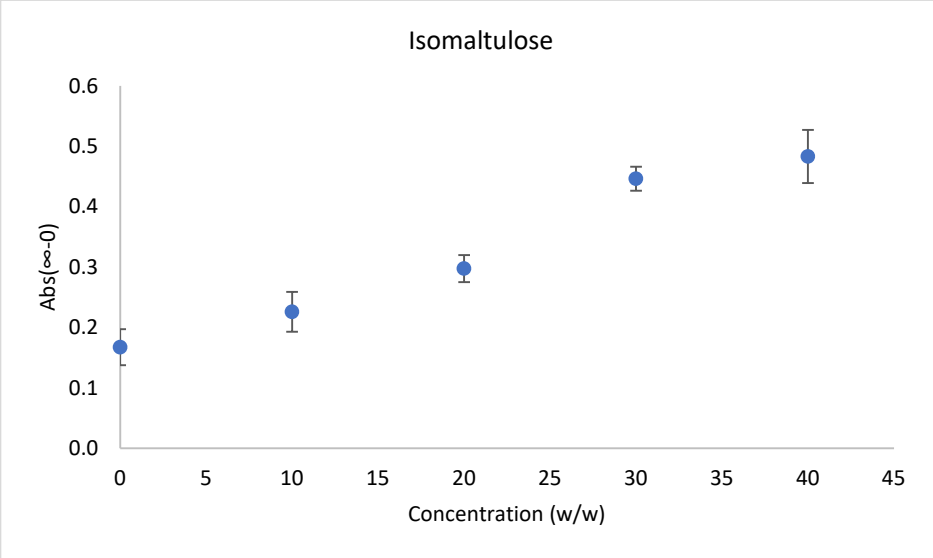
Concentration (w/w)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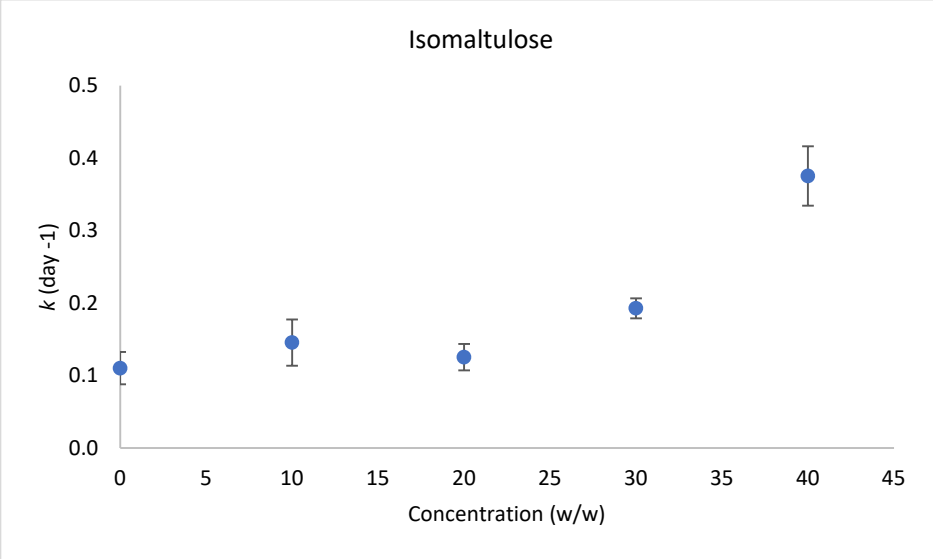
Concentration (w/w)


Isomaltulose
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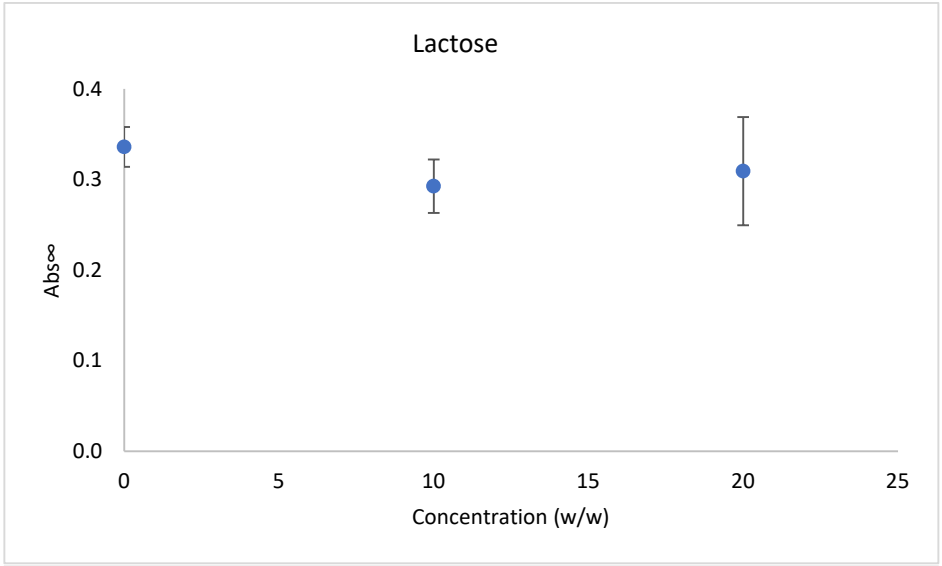
25
30
35
40
45
Concentration (w/w)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Abs∞
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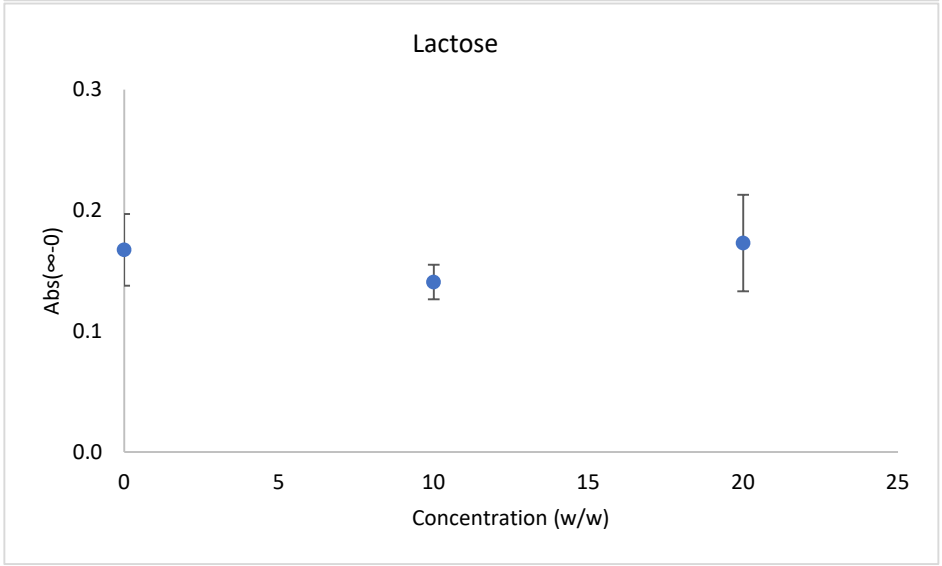
10
15
20
25
Concentration (w/w)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Abs(∞-0)
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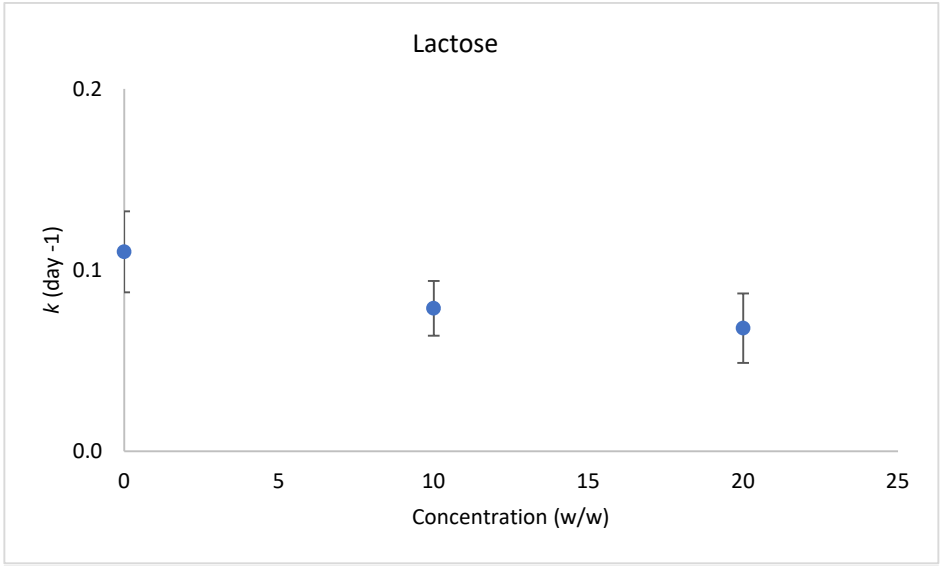
5
10
15
20
25
Concentration (w/w)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k (day -1)
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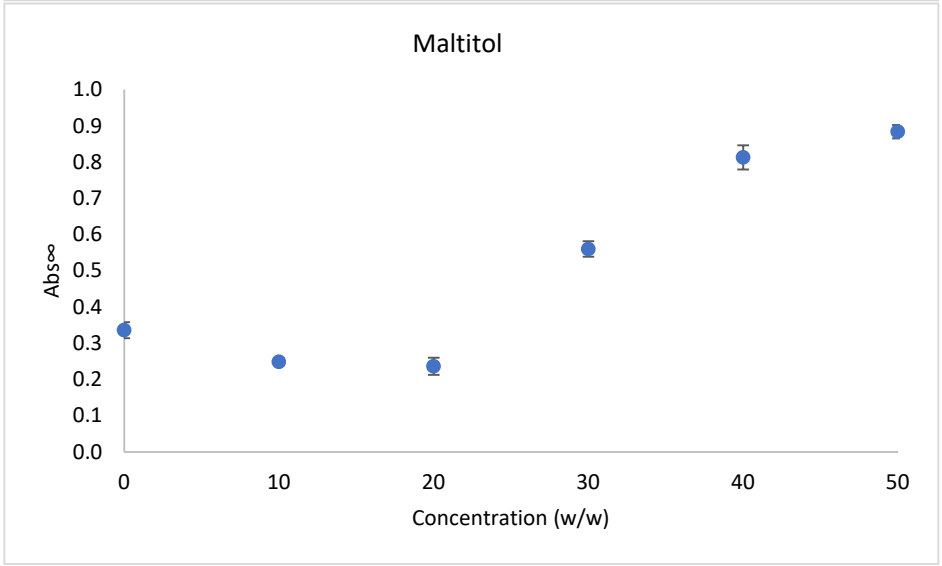
5
10
15
20
25
Concentration (w/w)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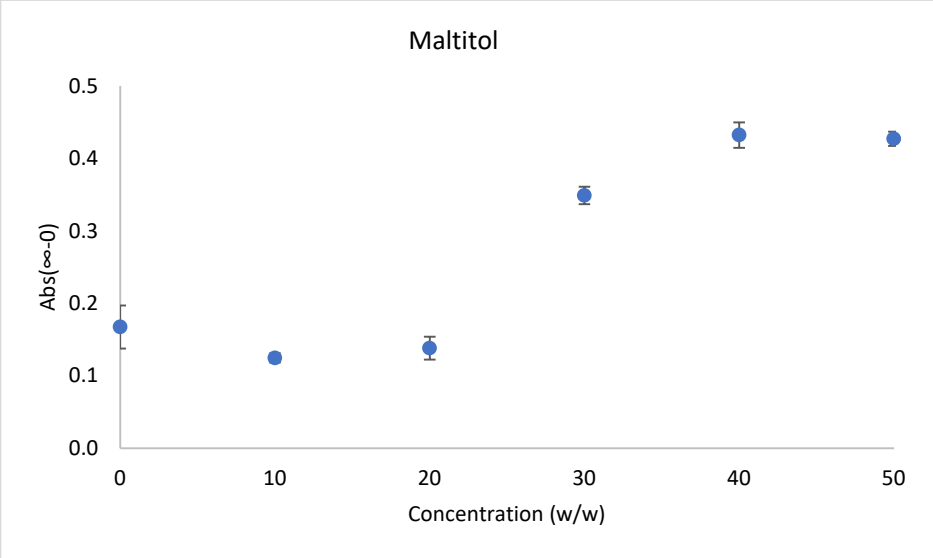
Abs∞
0
10
20
30
40
50
Concentration (w/w)


Maltitol
Abs(∞-0)
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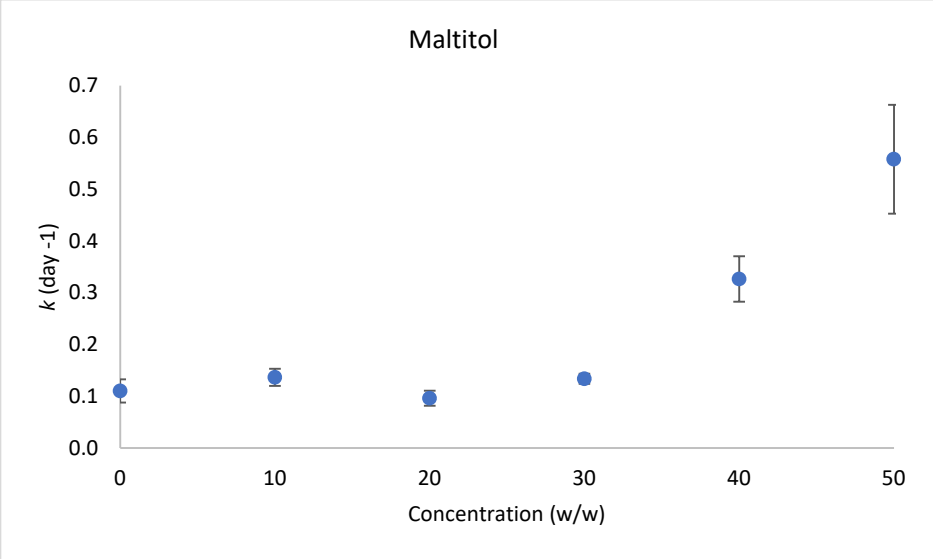
0.3
0.2
0.1
0.0
0
10
20
30
40
50
Concentration (w/w)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k (day -1)
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0.6
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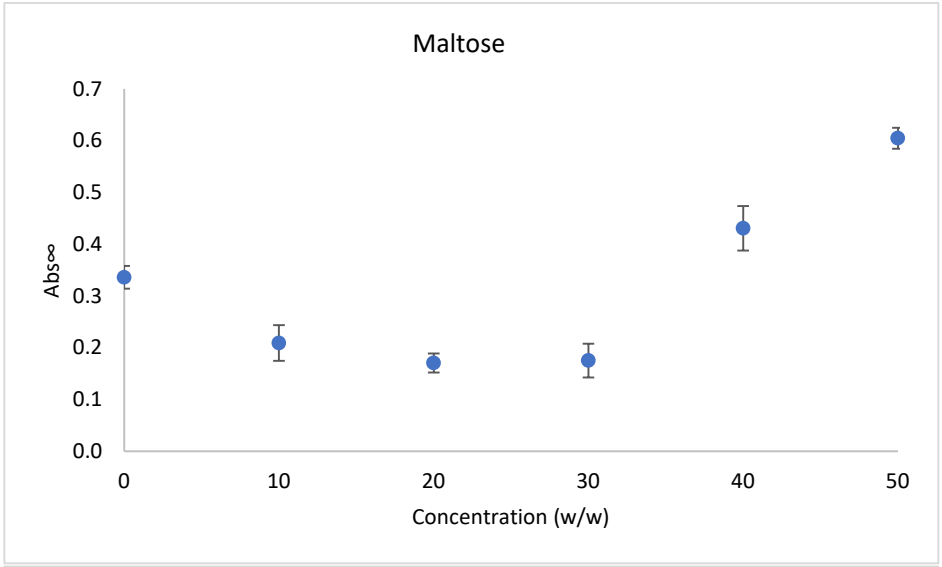
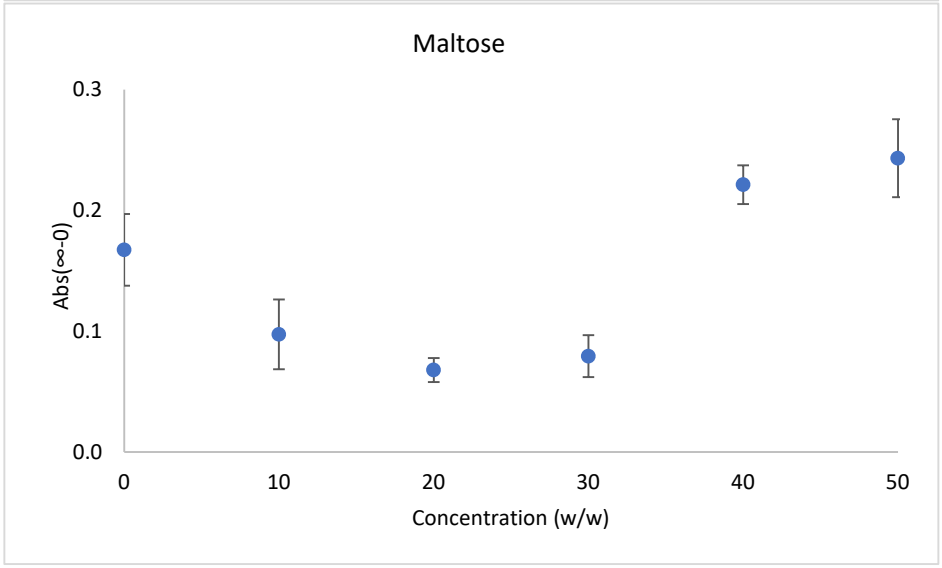
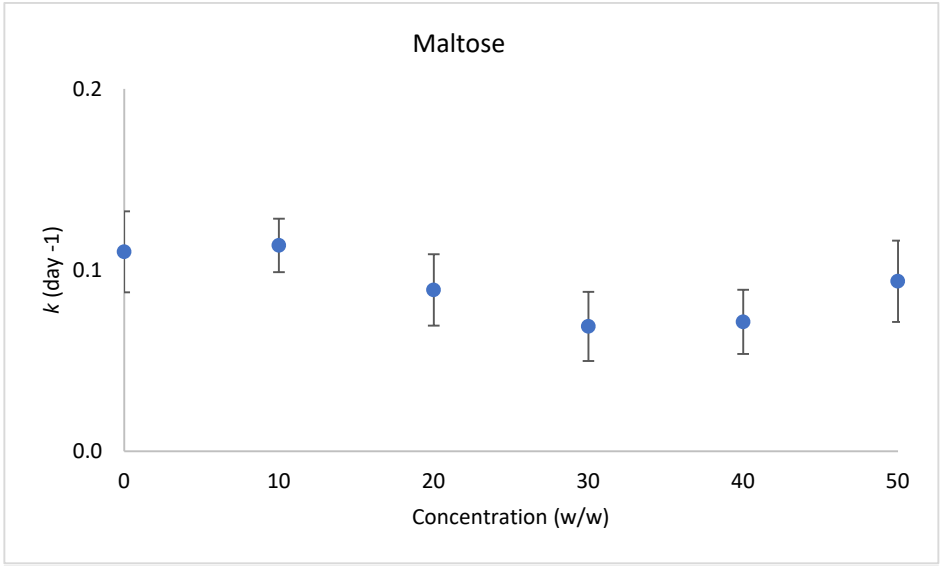
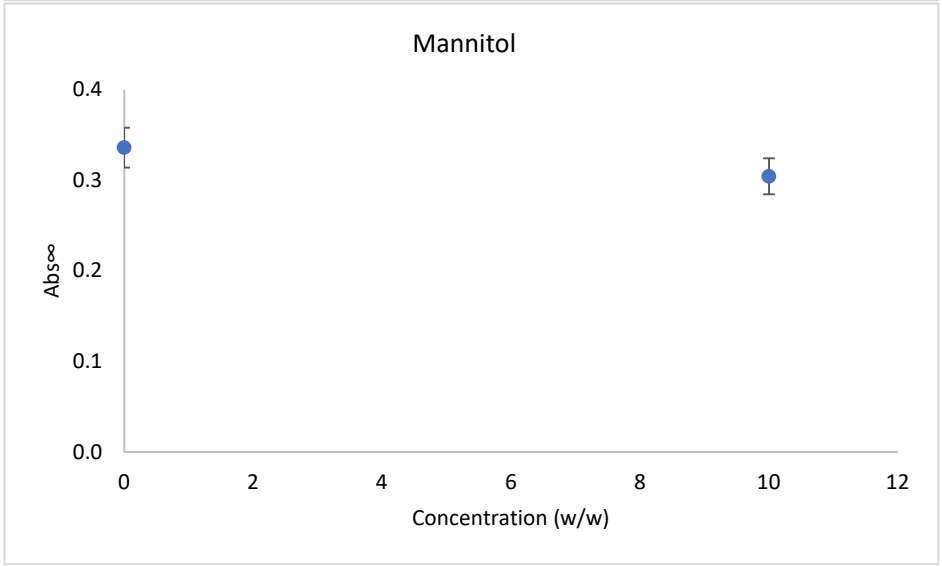
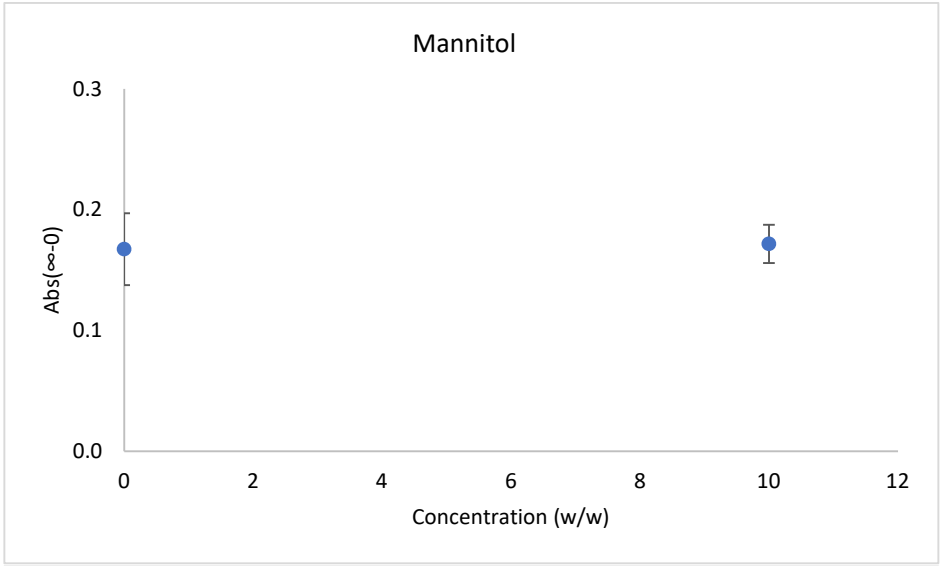
0.3
0.2
0.1
0.0
0
10
20
30
40
50
Concentration (w/w)

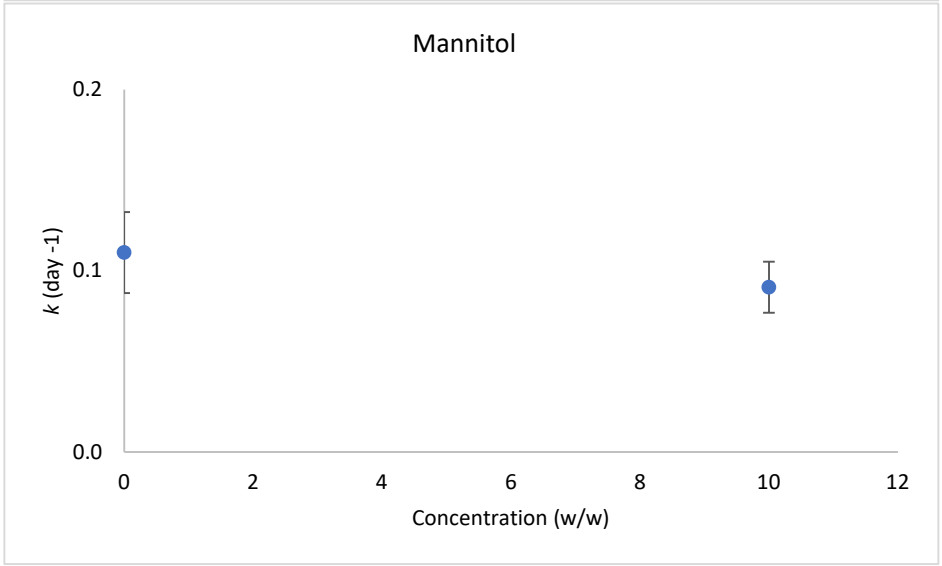

Maltose
Abs∞
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
10
20
30
40
50
Concentration (w/w)

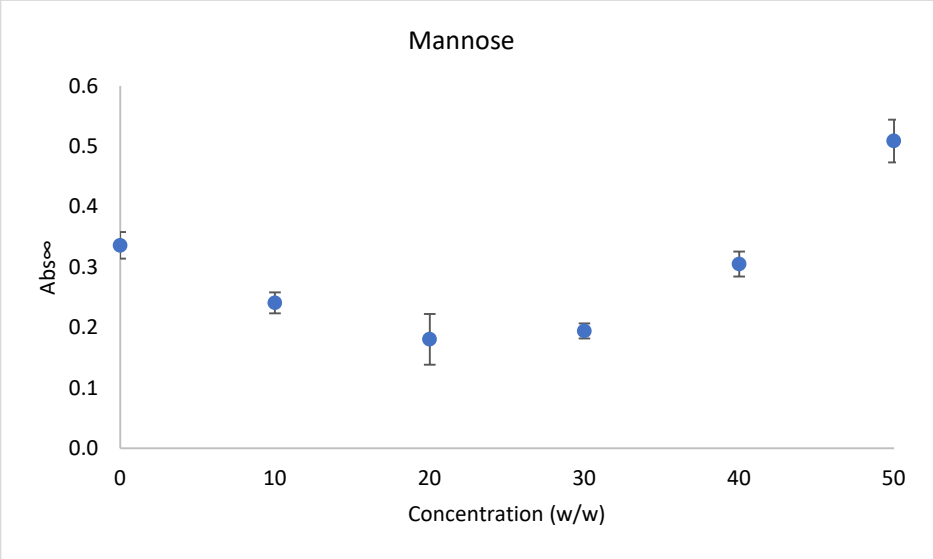

Maltose
Abs(∞-0)
0.3
0.2
0.1
0.0
0
10
20
30
40
50
Concentration (w/w)

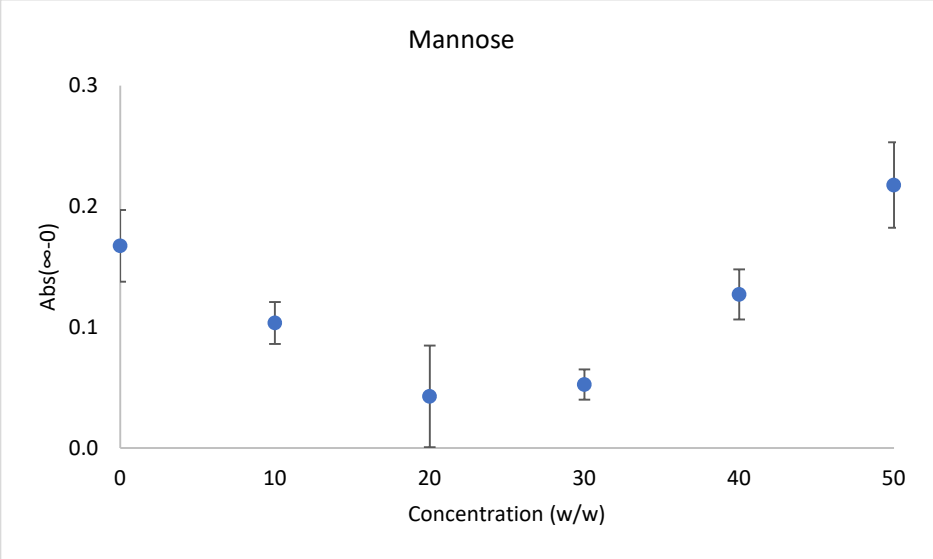

Maltose
0.2
0.1
0.0
k (day -1)
0
10
20
30
40
50
Concentration (w/w)

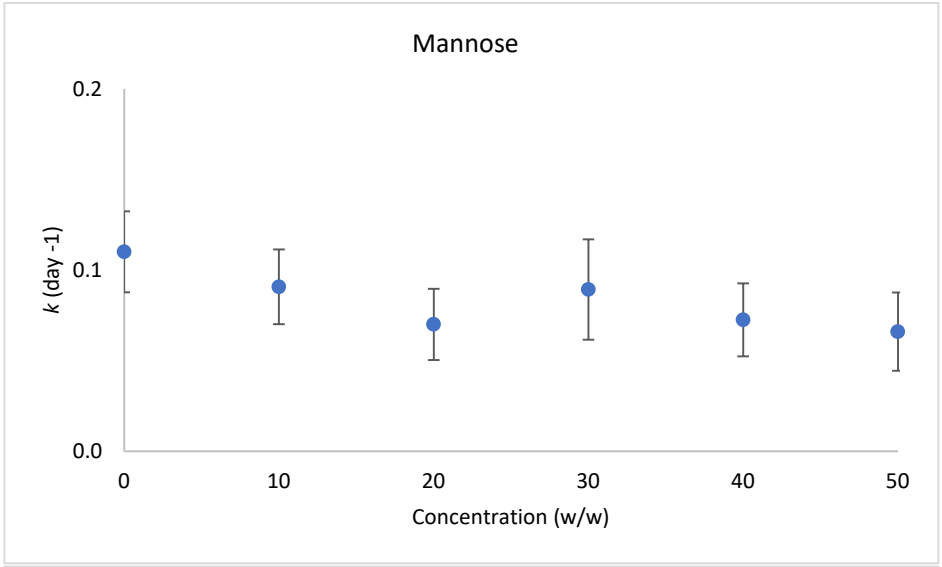

Mannitol
0.4
0.3
0.2
0.1
0.0
Abs∞
0
2
4
6
8
10
12
Concentration (w/w)

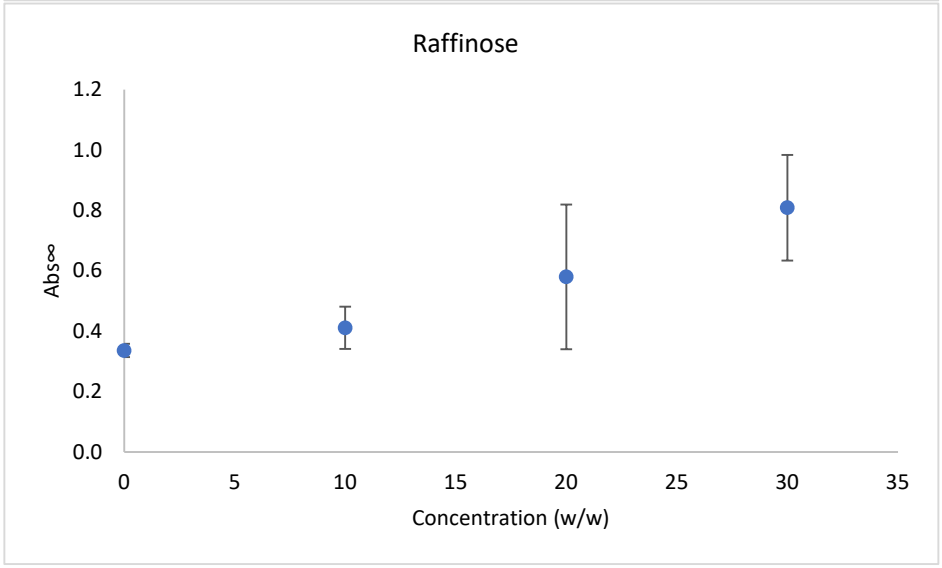

Mannitol
0.3
0.2
0.1
0.0
Abs(∞-0)
0
2
4
6
8
10
12
Concentration (w/w)

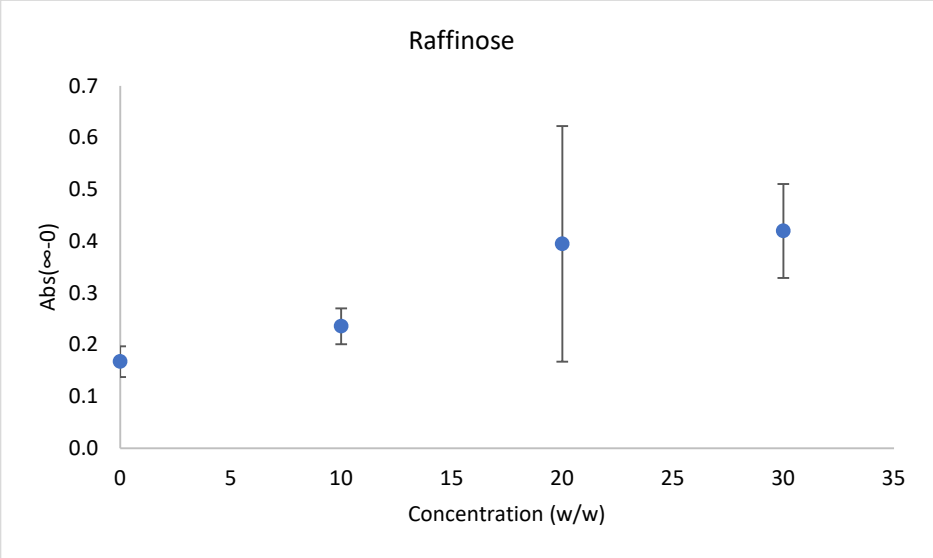

Mannitol
0.2
0.1
0.0
k (day -1)
0
2
4
6
8
10
12
Concentration (w/w)

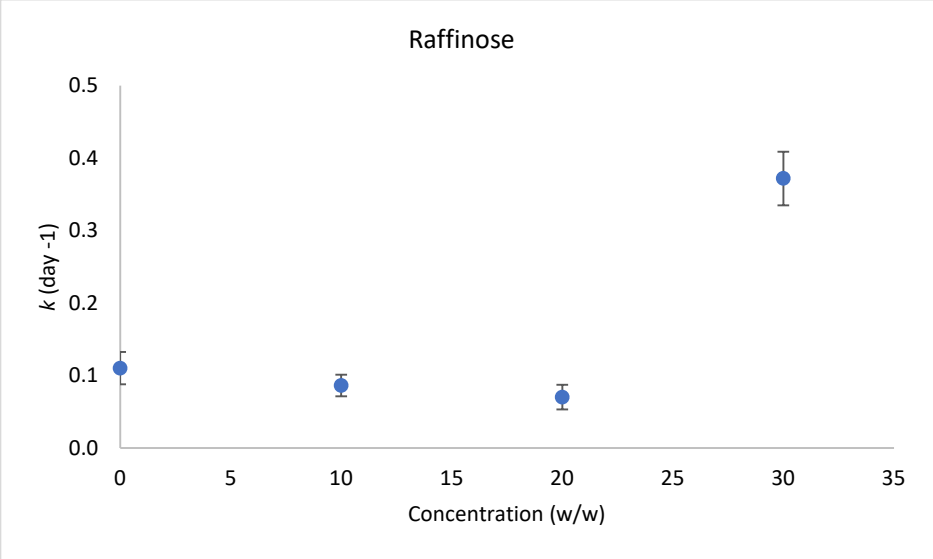

Mannose
Abs∞
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
10
20
30
40
50
Concentration (w/w)

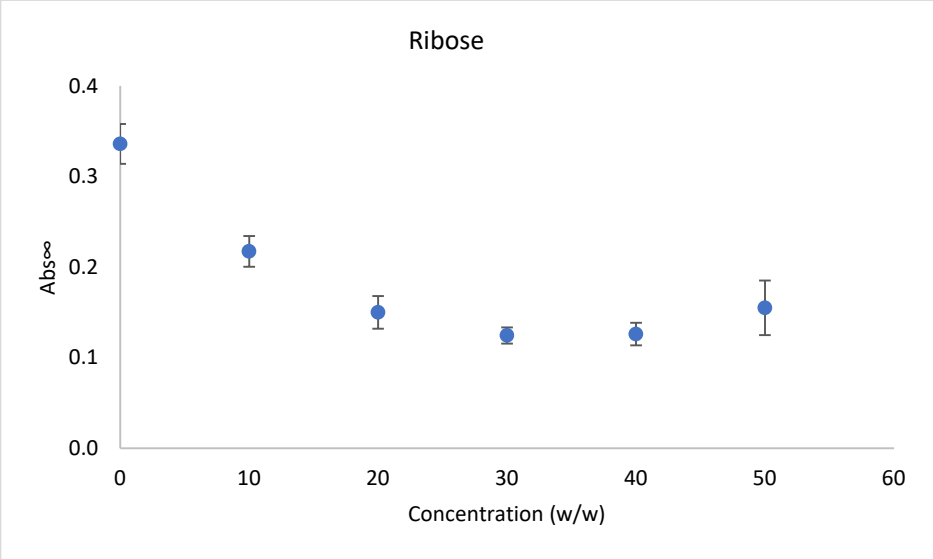

Mannose
Abs(∞-0)
0.3
0.2
0.1
0.0
0
10
20
30
40
50
Concentration (w/w)

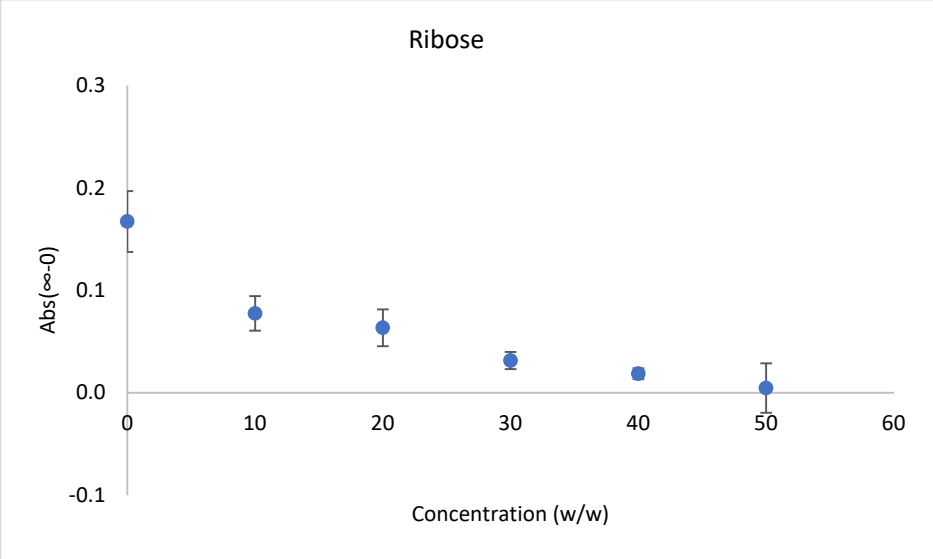

Mannose
0.2
0.1
0.0
k (day -1)
0
10
20
30
40
50
Concentration (w/w)

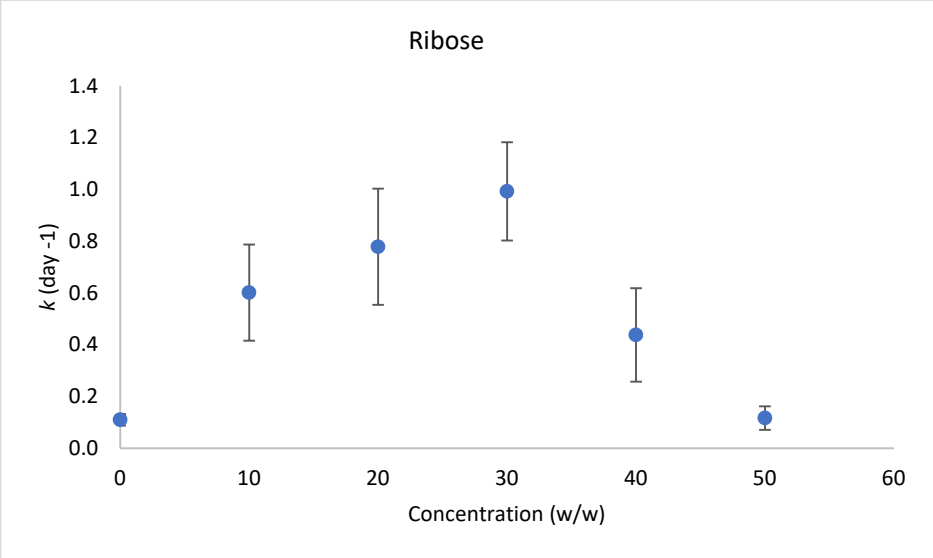

Raffinose
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Abs∞
0
5
10
15
20
25
30
35
Concentration (w/w)

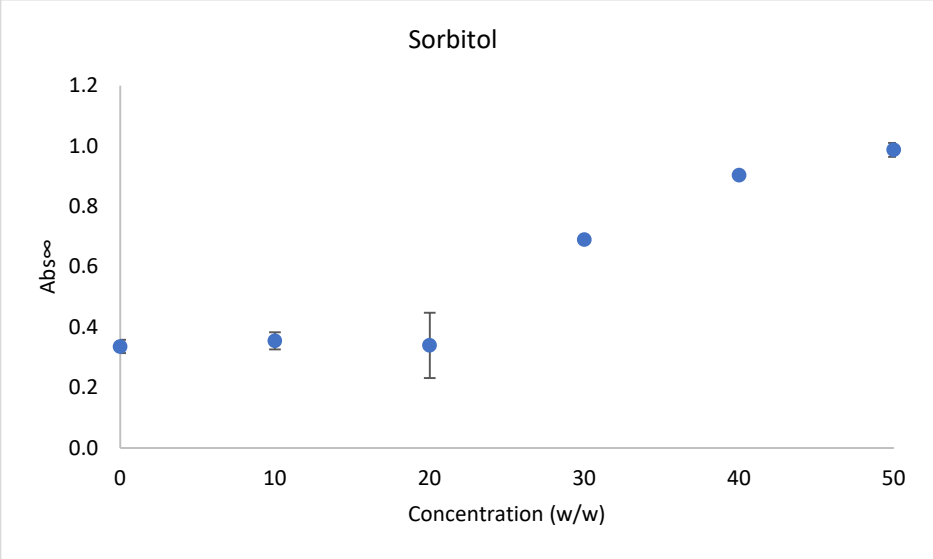

Raffinose
Abs(∞-0)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
5
10
15
20
25
30
35
Concentration (w/w)

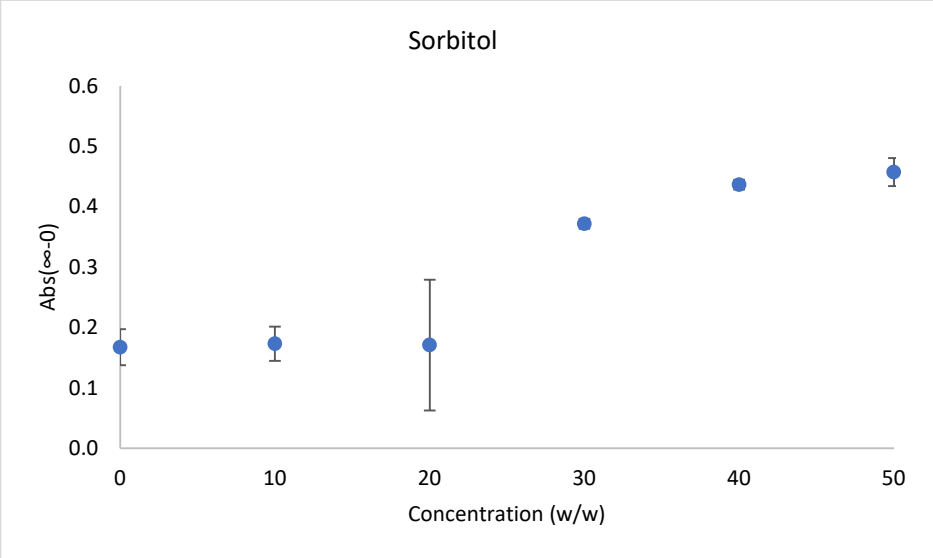

Raffinose
k (day -1)
0.5
0.4
0.3
0.2
0.1
0.0
0
5
10
15
20
25
30
35
Concentration (w/w)

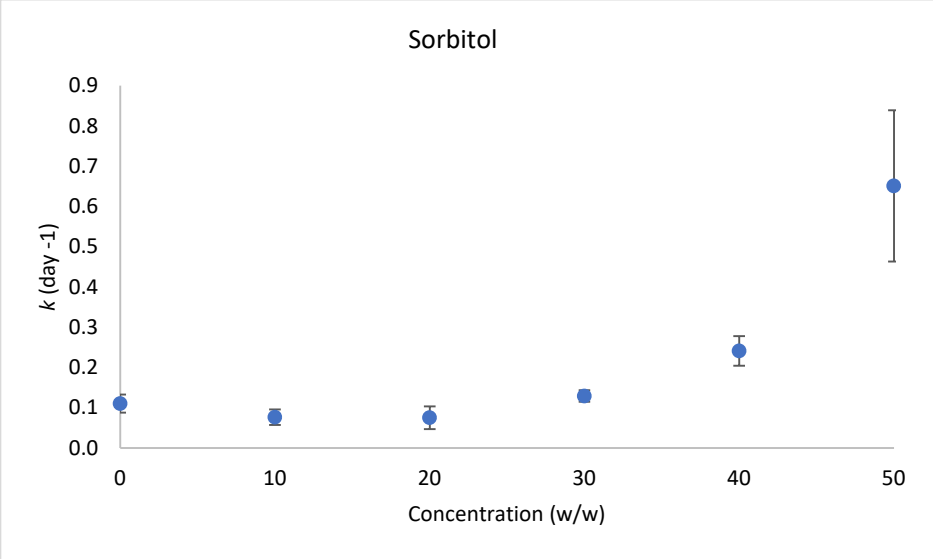

Ribose
0.4
0.3
0.2
0.1
0.0
Abs∞
0
10
20
30
40
50
60
Concentration (w/w)


Ribose
0.3
0.2
0.1
0.0
-0.1
Abs(∞-0)
0
10
20
30
40
50
60
Concentration (w/w)


Ribose
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
k (day -1)
0
10
20
30
40
50
60
Concentration (w/w)

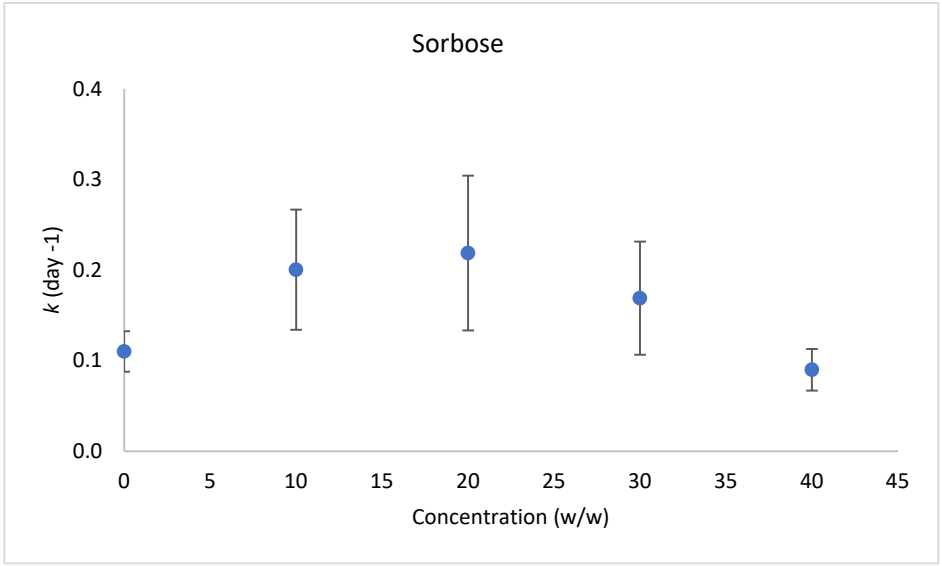

Sorbitol
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Abs∞
0
10
20
30
40
50
Concentration (w/w)

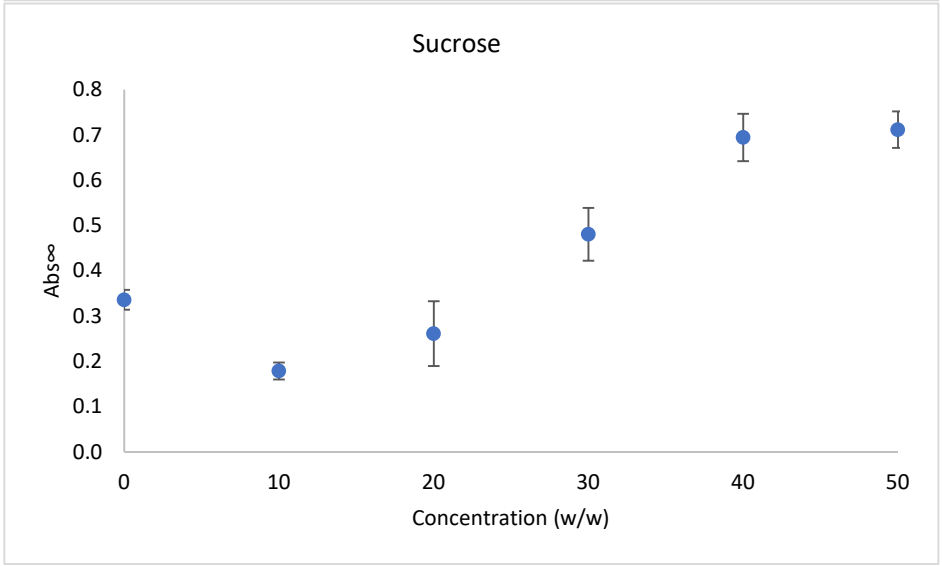

Sorbitol
Abs(∞-0)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
10
20
30
40
50
Concentration (w/w)

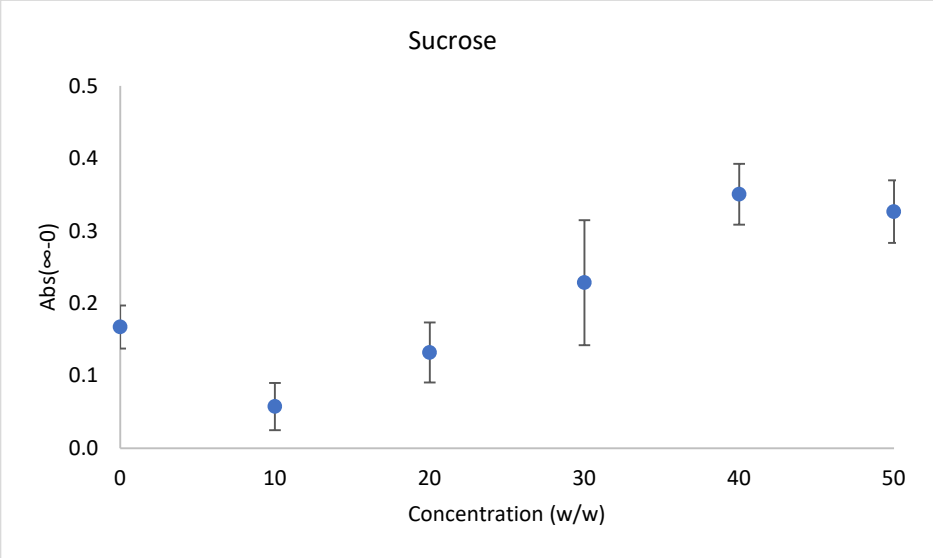

Sorbitol
k (day -1)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
10
20
30
40
50
Concentration (w/w)

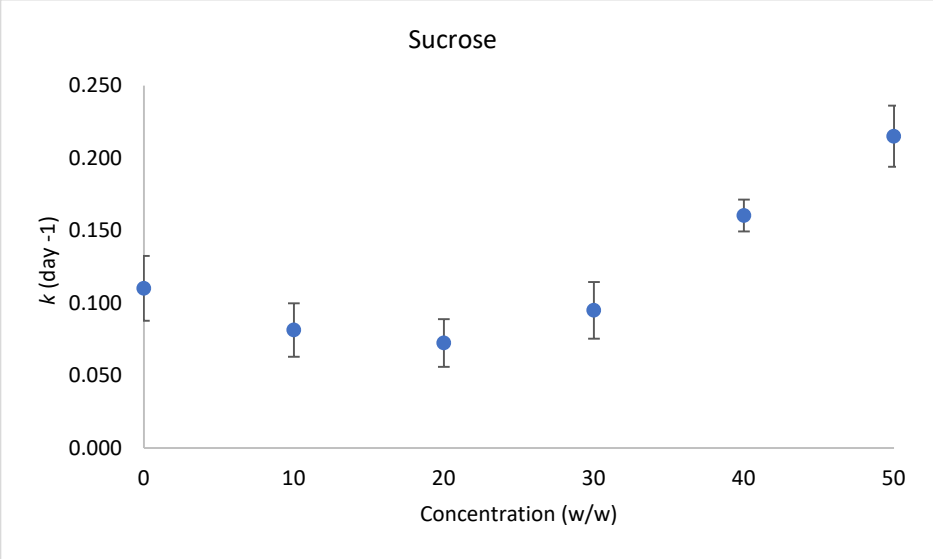

Sorbose
Abs∞
0.4
0.3
0.2
0.1
0.0
0
5
10
15
20
25
30
35
40
45
Concentration (w/w)

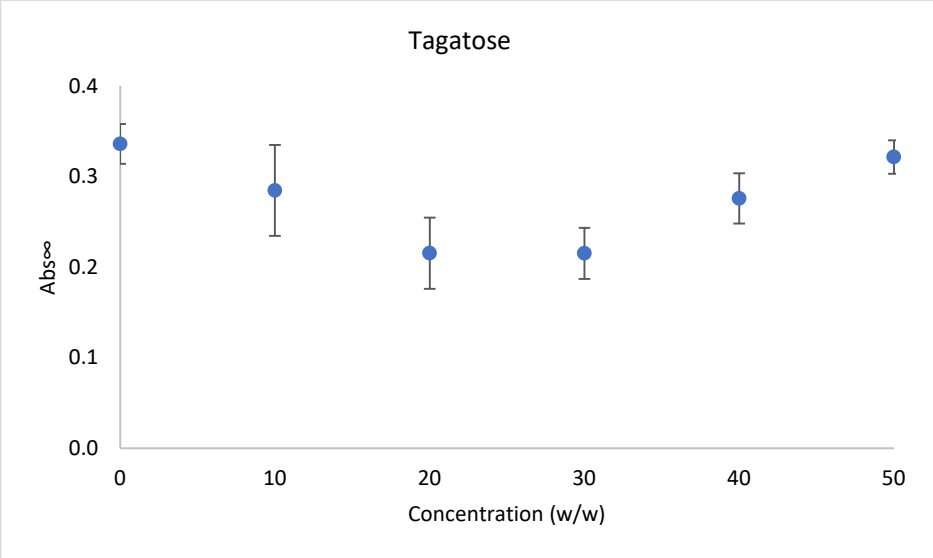

Sorbose
Abs(∞-0)
0.3
0.2
0.1
0.0
0
5
10
15
20
25
30
35
40
45
Concentration (w/w)

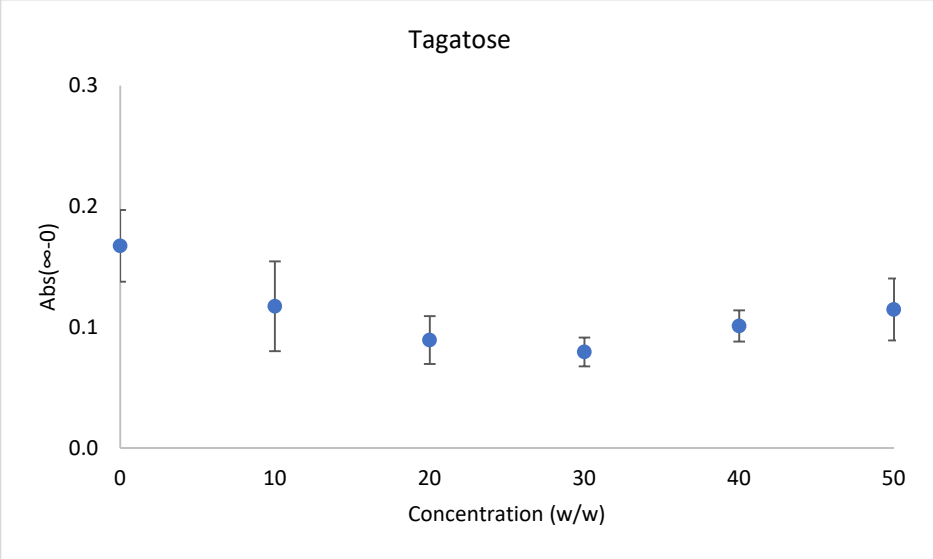

Sorbose
0.4
0.3
0.2
0.1
0.0
k (day -1)
0
5
10
15
20
25
30
35
40
45
Concentration (w/w)

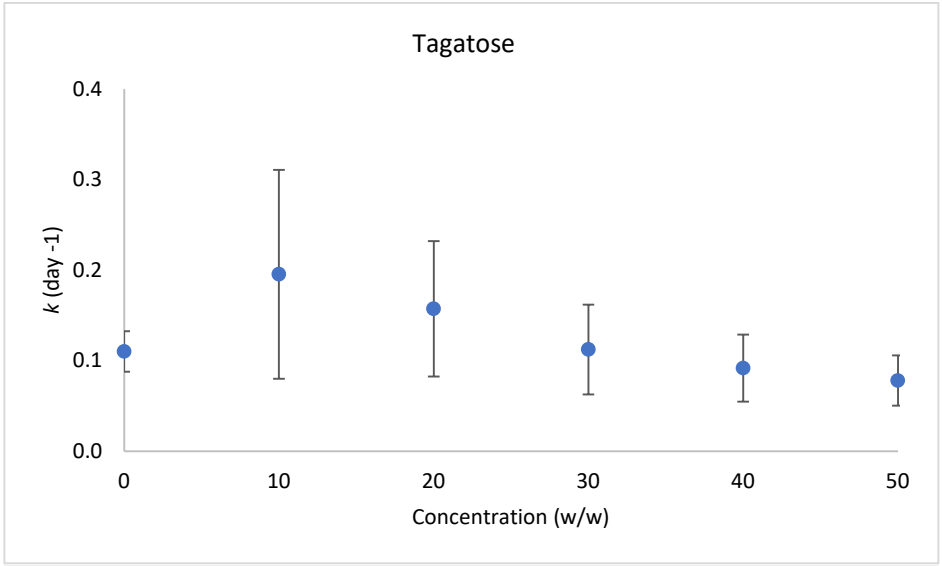

Sucrose
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Abs∞
0
10
20
30
40
50
Concentration (w/w)

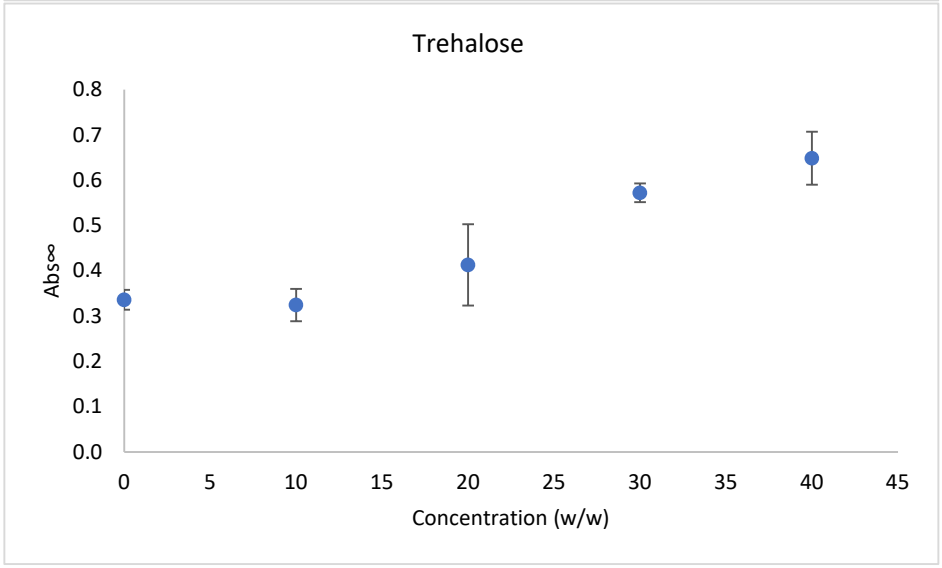

Sucrose
Abs(∞-0)
0.5
0.4
0.3
0.2
0.1
0.0
0
10
20
30
40
50
Concentration (w/w)

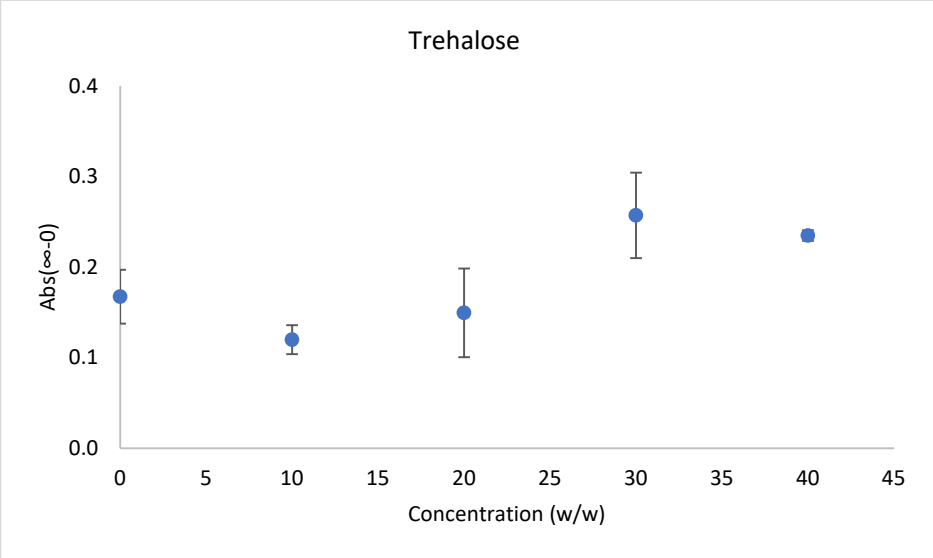

Sucrose
k (day -1)
0.250
0.200
0.150
0.100
0.050
0.000
0
10
20
30
40
50
Concentration (w/w)

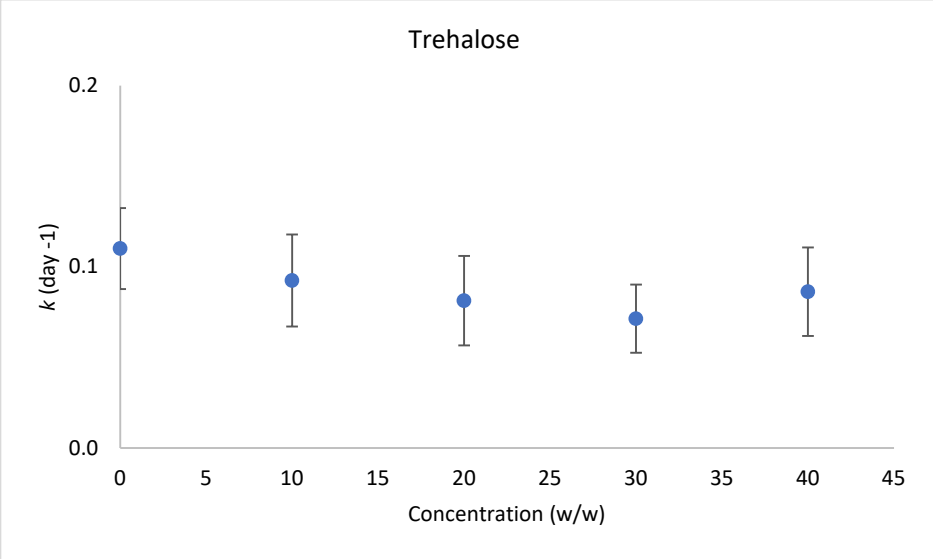

Tagatose
0.4
0.3
0.2
0.1
0.0
Abs∞
0
10
20
30
40
50
Concentration (w/w)

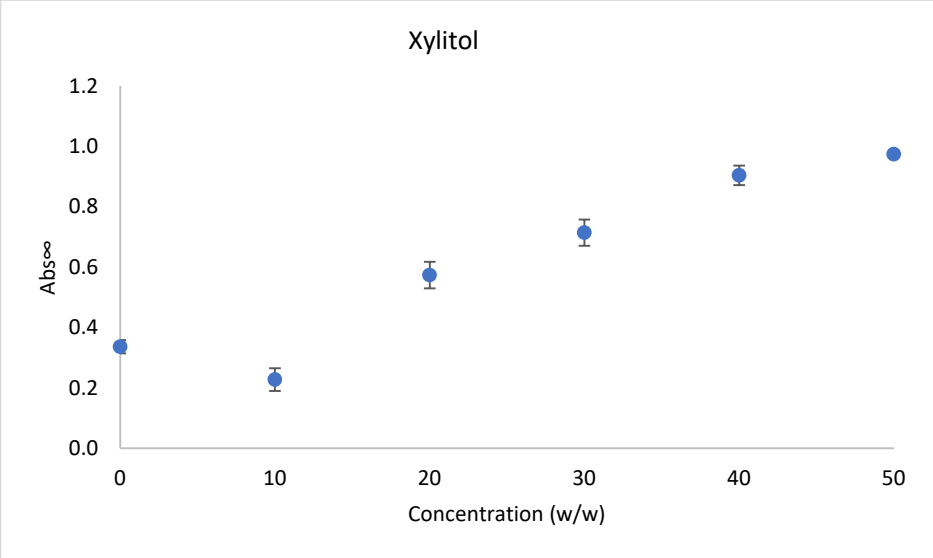

Tagatose
0.3
0.2
0.1
0.0
Abs(∞-0)
0
10
20
30
40
50
Concentration (w/w)

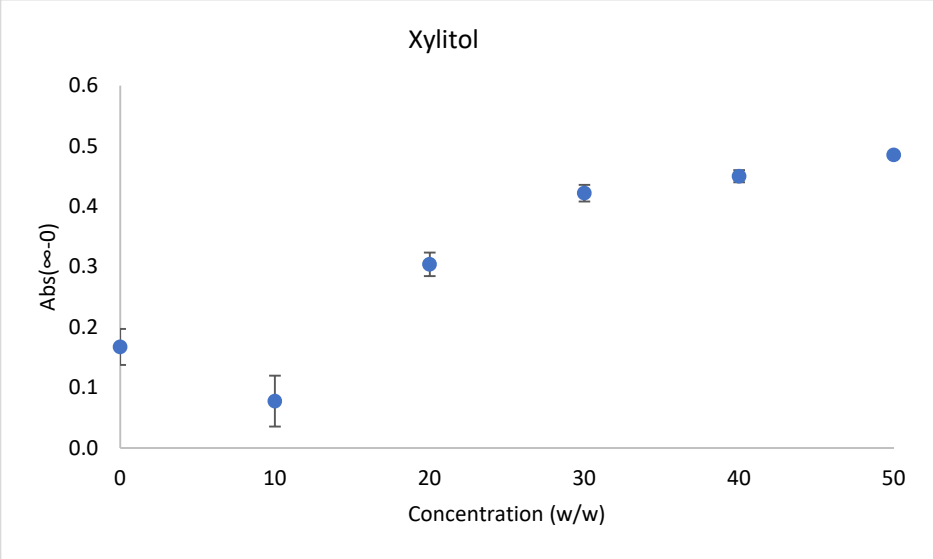

Tagatose
0.4
0.3
0.2
0.1
0.0
k (day -1)
0
10
20
30
40
50
Concentration (w/w)

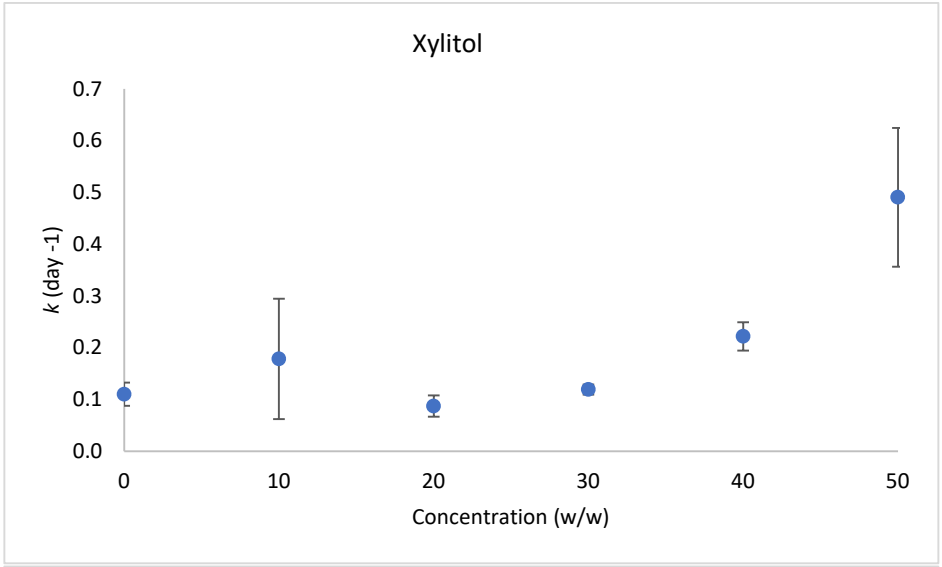

Trehalose
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Abs∞
0
5
10
15
20
25
30
35
40
45
Concentration (w/w)

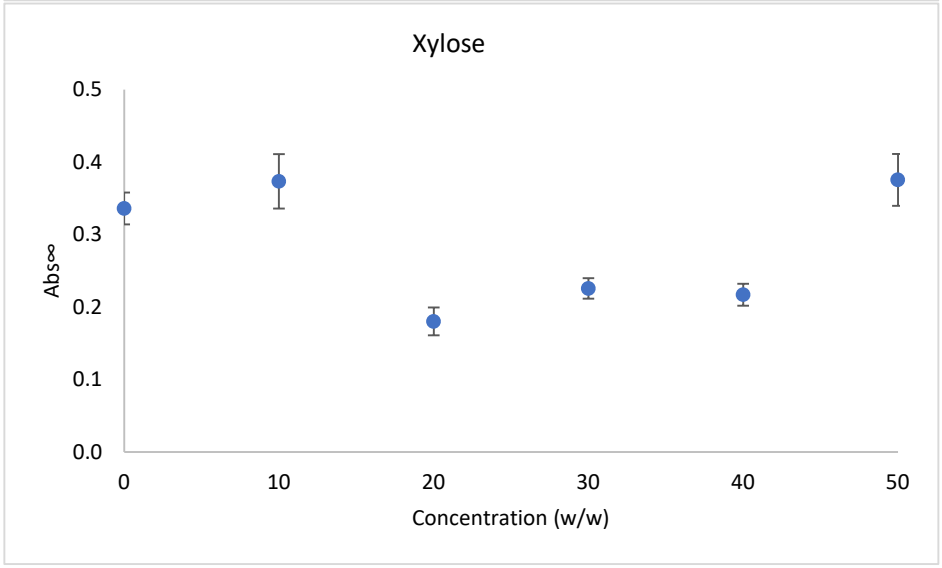

Trehalose
0.4
0.3
0.2
0.1
0.0
Abs(∞-0)
0
5
10
15
20
25
30
35
40
45
Concentration (w/w)


Trehalose
0.2
0.1
0.0
k (day -1)
0
5
10
15
20
25
30
35
40
45
Concentration (w/w)


Xylitol
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Abs∞
0
10
20
30
40
50
Concentration (w/w)


Xylitol
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Abs(∞-0)
0
10
20
30
40
50
Concentration (w/w)


Xylitol
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
k (day -1)
0
10
20
30
40
50
Concentration (w/w)


Xylose
0.5
0.4
0.3
0.2
0.1
0.0
Abs∞
0
10
20
30
40
50
Concentration (w/w)

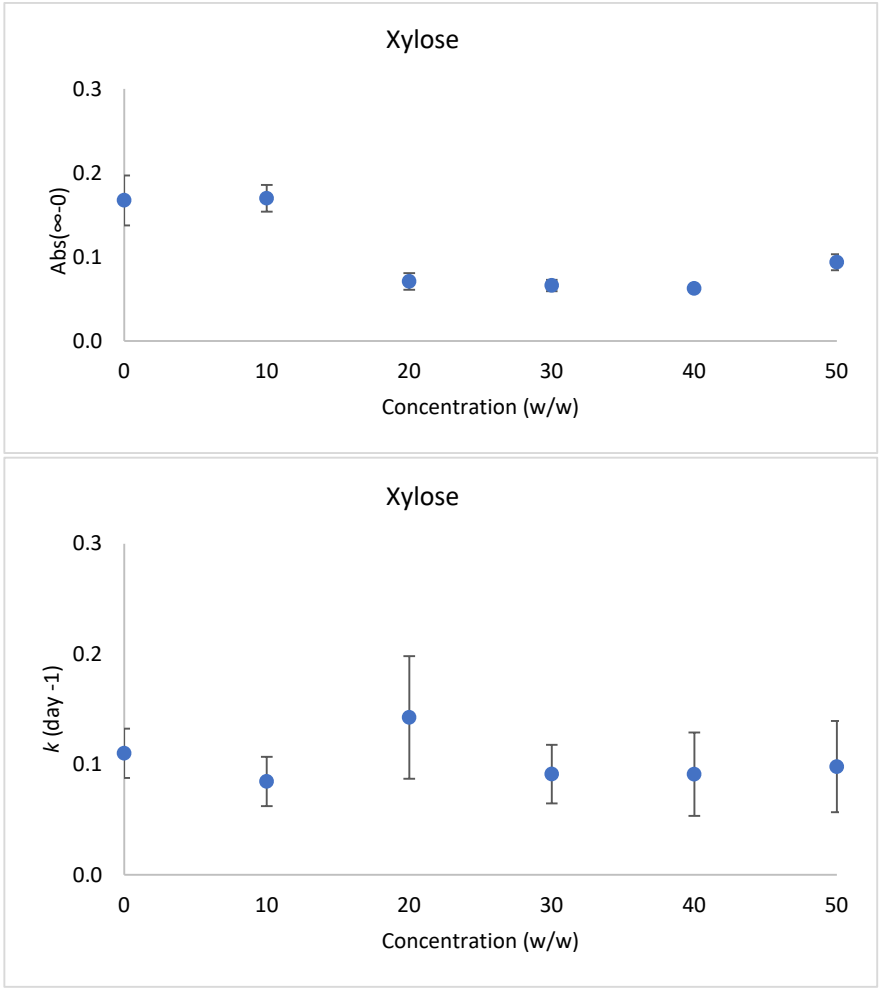


Figure S1. Plots of 620 nm absorbances after 28 days (Abs_{∞}) with one standard deviation, changes of 620 nm absorbances from day 0 to day 28 ($Abs_{(\infty-0)}$) with one standard deviation, and the calculated Avrami rate constants (k) with 95% confidence intervals that were grouped by sweetener concentrations within sweeteners.

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