



# Properties of Commercially Sourced Gluten-Free Ingredients

Analytical Properties <sup>1,2</sup>	Amaranth Flour	Sorghum Flour	Millet Flour	Quinoa Flour <sup>4</sup>	Quinoa Flour <sup>5</sup>	Brown Rice Flour	White Rice Flour
<b>Particle Size Distribution:</b>							
d (0.1) µm	65.3	18.9	29.2	29.4	20.4	39.5	39.0
d (0.5) µm	236.6	103.5	178.7	233.9	168.0	150.3	157.7
d (0.9) µm	434.9	210.5	374.1	484.2	423.7	311.4	326.2
Volume Weighted Mean, µm	248.0	110.2	192.3	249.7	197.2	164.9	172.1
<b>Composition:</b>							
Protein, %	22.2	11.1	13.5	13.2	13.9	9.1	8.0
Starch, %	48.9	71.6	72.6	65.1	63.6	75.6	84.3
Amylose <sup>3</sup> , (% w/w)	5.6	28.9	32.1	10.5	13.9	24.1	24.2
Amylopectin <sup>3</sup> , (% w/w)	94.4	71.1	67.9	89.5	86.1	75.9	75.8
<b>Pasting Properties:</b>							
Peak Viscosity, RVU	101	281	237	350	19	462	612
Hot Paste Viscosity, RVU	80	193	136	334	12	186	235
Breakdown, RVU	22	88	100	16	7	276	377
Final Viscosity, RVU	99	626	441	376	24	364	486
Setback, RVU	19	432	305	42	12	178	252
Pasting Time, min	5.29	5.36	5.36	6.72	3.39	5.18	5.29
<b>Functional Properties:</b>							
Starch Damage, %	5.83	11.26	4.80	6.22	5.73	6.31	5.62
Water Absorption Capacity, g/g	1.33	1.51	1.03	1.13	0.91	1.16	1.15
Oil Absorption Capacity, g/g	1.29	0.90	0.73	1.01	1.00	0.64	0.73
Foam Capacity, %	21.5	17.5	13.0	7.0	14.5	n/a	n/a
Foam Stability, % 10 min	60.5	100.0	92.0	92.3	76.0	n/a	n/a
30 min	50.0	82.8	78.4	69.6	62.9	n/a	n/a
60 min	44.7	65.7	70.3	61.9	57.7	n/a	n/a
120 min	39.5	57.2	62.3	54.2	52.9	n/a	n/a
Emulsifying Activity, %	10.9	0.0	0.0	27.0	7.1	0.0	1.8
Emulsifying Stability, %	0.0	n/a	n/a	22.4	55.4	n/a	0.0

<sup>1</sup> Results reported on a dry weight basis unless otherwise indicated

<sup>2</sup> For explanation of testing methodology refer to Glossary of Analytical Testing

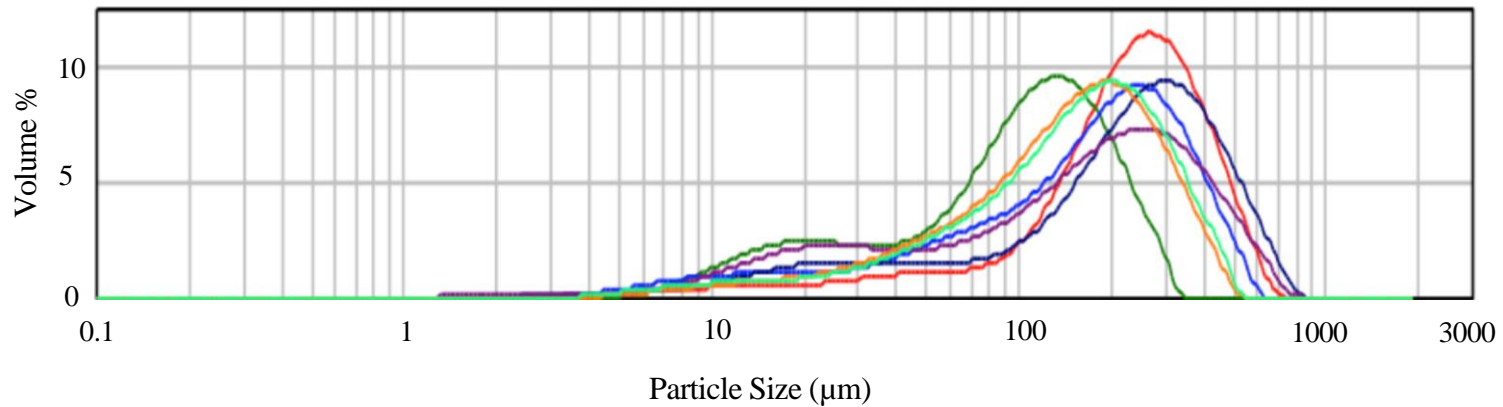
<sup>3</sup> Amylose and amylopectin reported as percentage of starch content and are reported on an “as is” basis

<sup>4</sup> Peruvian quinoa

<sup>5</sup> Bolivian quinoa



## Particle Size Distribution Curves for Commercially Sourced Gluten-Free Ingredients



- Amaranth Flour
- Sorghum Flour
- Millet Flour
- Peruvian Quinoa Flour
- Bolivian Quinoa Flour
- Brown Rice Flour
- White Rice Flour

### CONTACT US

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and by The Alberta Agriculture Funding Consortium.





# Properties of Commercially Sourced Gluten-Free Ingredients

Analytical Properties <sup>1,2</sup>	Arrowroot Starch	Tapioca Starch	Potato Starch	Brown Teff Flour	Corn Flour	Buckwheat Flour	Ground Brown Flax
<b>Particle Size Distribution:</b>							
d (0.1) µm	9.6	9.3	24.3	46.3	14.6	22.4	303.2
d (0.5) µm	15.6	14.7	41.3	178.7	163.2	218.2	867.9
d (0.9) µm	24.9	22.9	67.9	334.9	435.9	770.7	1511.6
Volume Weighted Mean, µm	16.6	15.5	44.0	187.3	195.8	325.2	892.6
<b>Composition:</b>							
Protein, %	0.2	0.3	0.2	10.3	9.2	16.8	19.5
Starch, %	94.5	95.6	94.7	71.0	70.4	63.2	n/a
Amylose <sup>3</sup> , (% w/w)	21.3	21.0	21.7	23.4	24.4	22.3	71.9
Amylopectin <sup>3</sup> , (% w/w)	78.7	79.0	78.3	76.6	75.6	77.7	28.1
<b>Pasting Properties:</b>							
Peak Viscosity, RVU	625	779	1061	227	227	329	n/a
Hot Paste Viscosity, RVU	265	255	208	148	101	281	n/a
Breakdown, RVU	360	524	854	79	125	48	n/a
Final Viscosity, RVU	362	355	548	326	288	661	78
Setback, RVU	97	100	340	178	187	380	n/a
Pasting Time, min	3.55	3.12	2.69	5.89	4.62	5.62	n/a
<b>Functional Properties:</b>							
Starch Damage, %	0.65	0.69	0.50	4.74	4.02	3.42	0.3
Water Absorption Capacity, g/g	0.82	0.85	0.79	1.06	1.27	1.08	3.32
Oil Absorption Capacity, g/g	0.94	0.73	0.62	0.82	0.80	0.80	1.23
Foam Capacity, %	n/a	n/a	n/a	10.0	3.0	29.0	n/a
Foam Stability, % 10 min	n/a	n/a	n/a	86.8	52.7	67.9	n/a
30 min	n/a	n/a	n/a	58.9	42.7	40.1	n/a
60 min	n/a	n/a	n/a	45.0	9.5	32.1	n/a
120 min	n/a	n/a	n/a	34.1	9.5	28.0	n/a
Emulsifying Activity, %	0.0	0.0	0.0	1.8	0.0	3.6	1.92
Emulsifying Stability, %	n/a	n/a	n/a	100.0	n/a	100.0	14.4

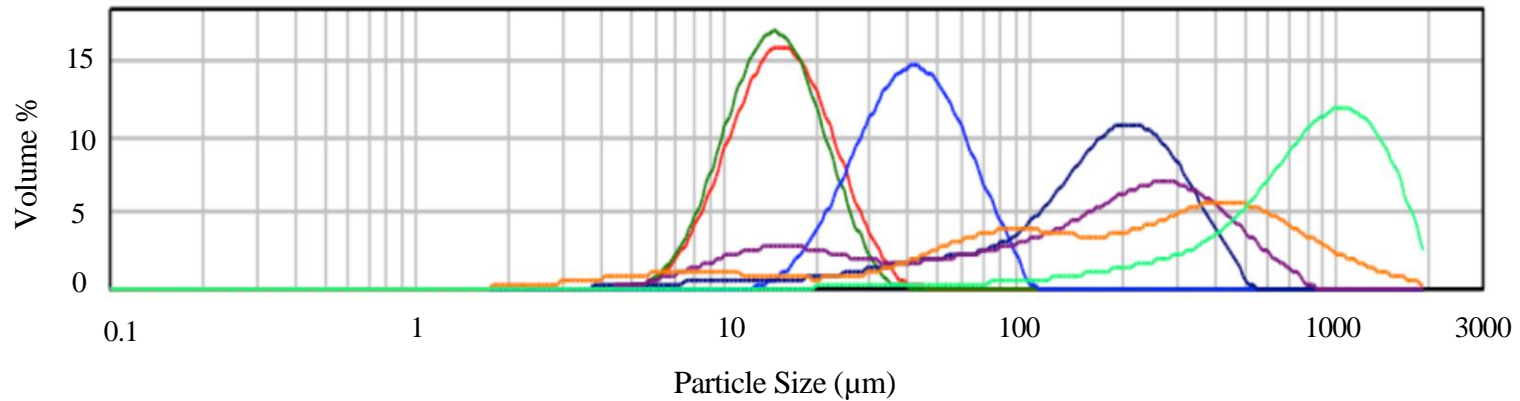
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## Particle Size Distribution Curves for Commercially Sourced Gluten-Free Ingredients



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- Tapioca Starch
- Potato Starch
- Brown Teff Flour
- Corn Flour
- Buckwheat Flour
- Ground Brown Flax

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