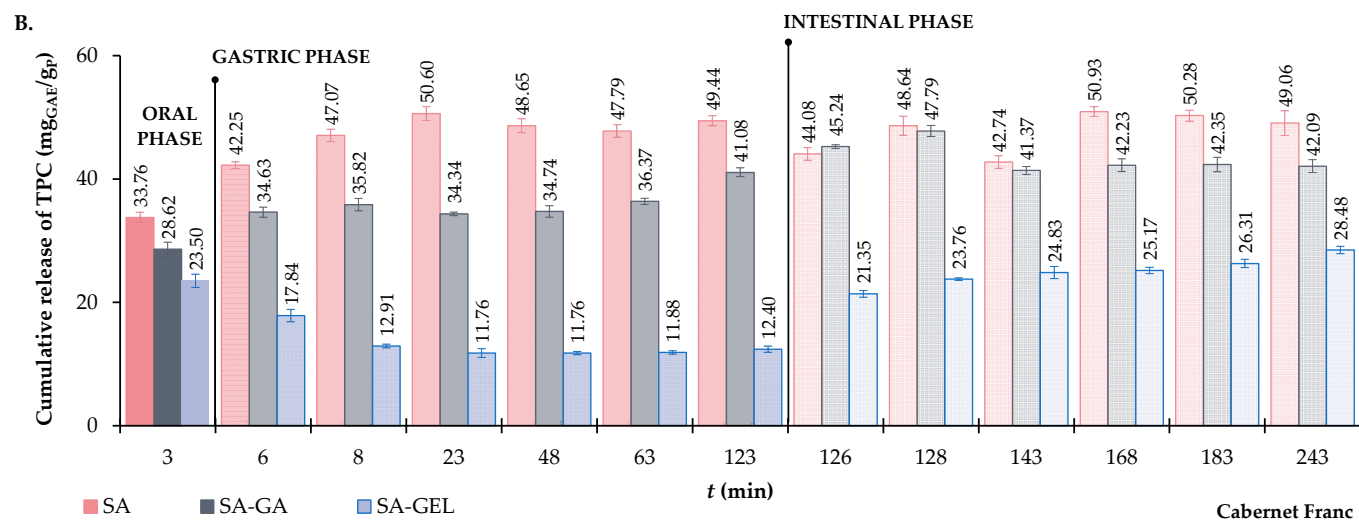
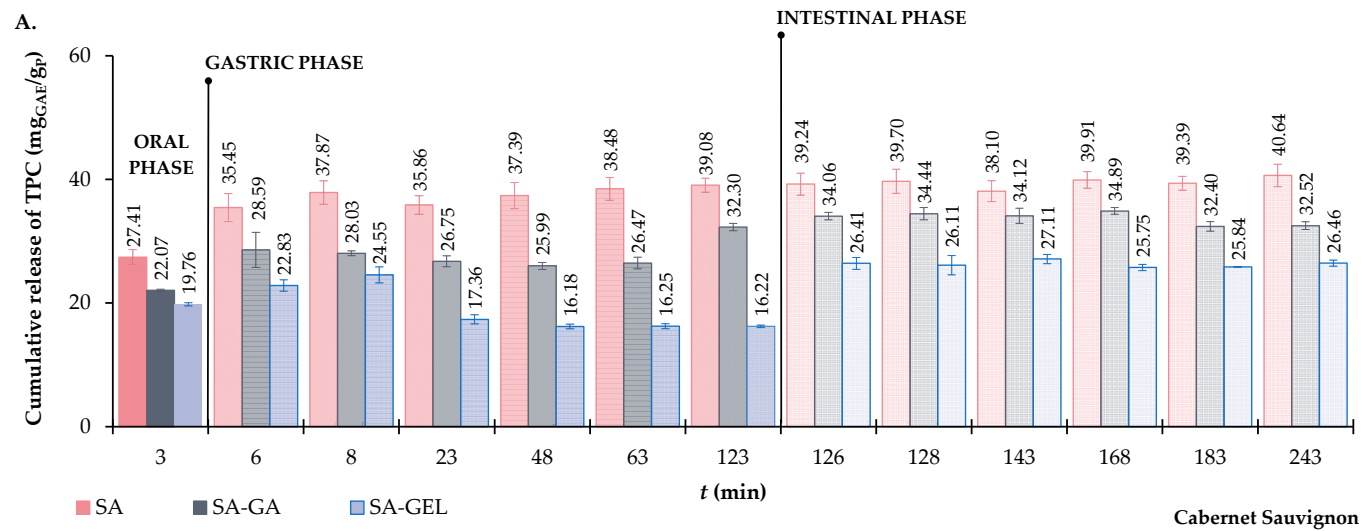
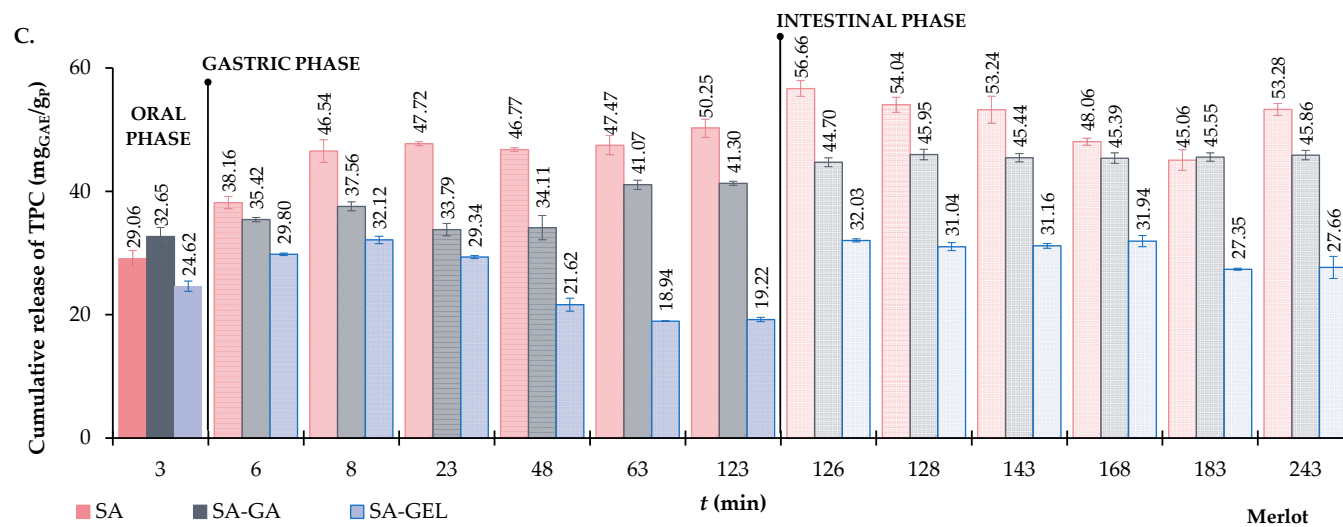


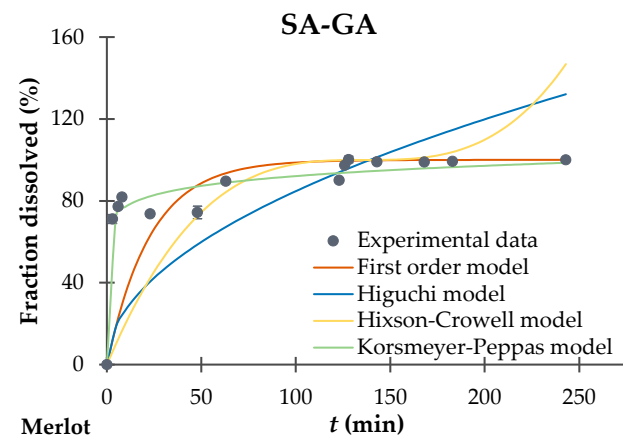
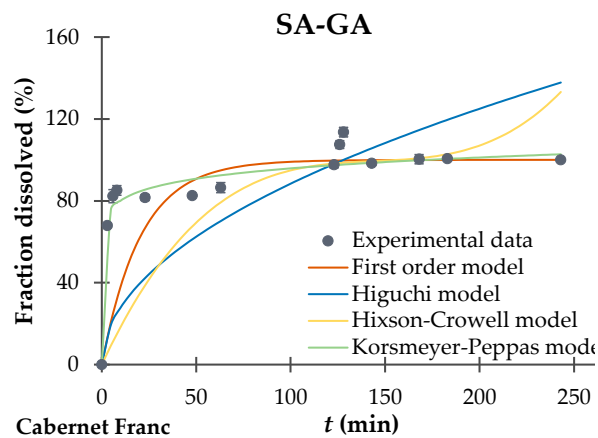
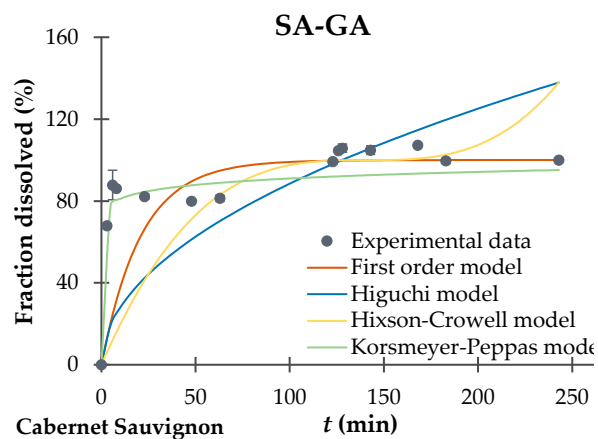
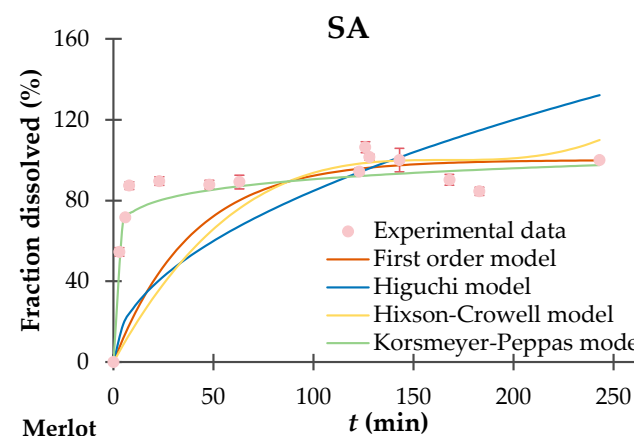
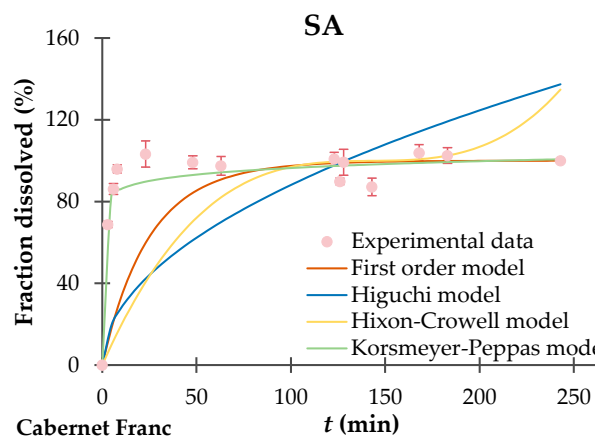
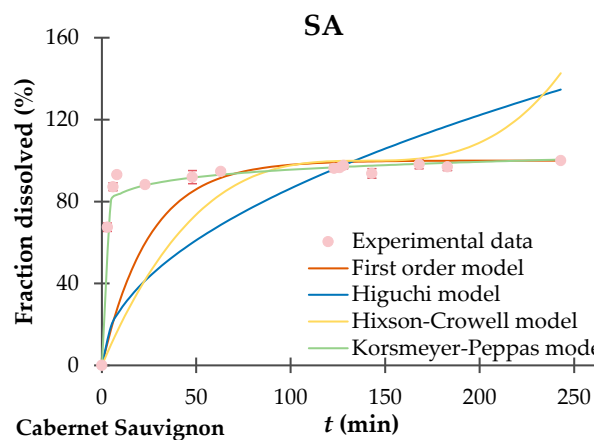
Supplementary Materials

**Microencapsulation of Grape Pomace Extracts with Alginate-Based Coatings by Freeze-Drying: Release Kinetics and In Vitro Bioaccessibility Assessment of Phenolic Compounds**

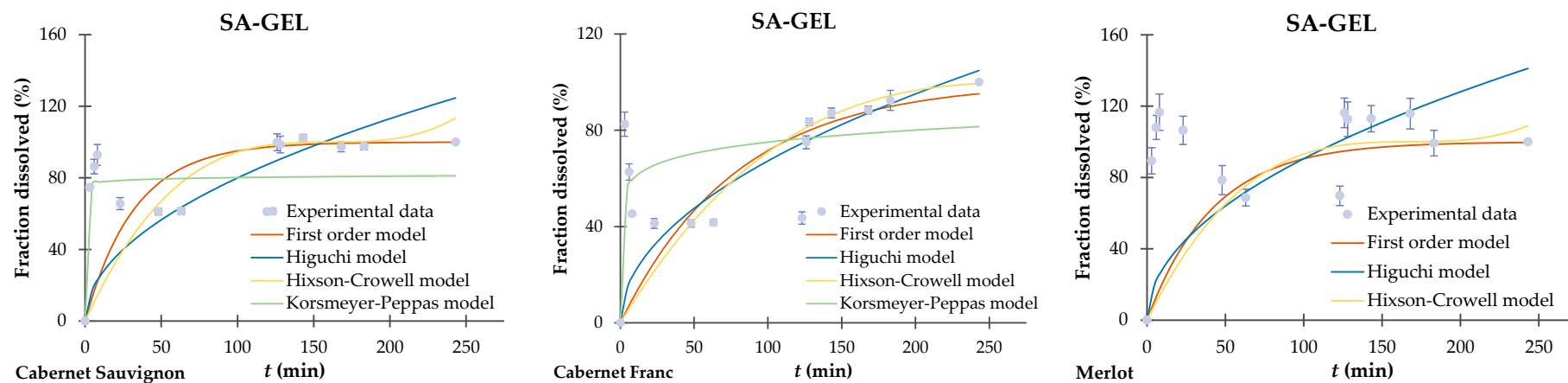




**Figure S1.** Cumulative release of total phenolic compounds (TPC) from freeze-dried microencapsulated powders containing grape pomace phenol-rich extracts (A. – Cabernet Sauvignon, B. – Cabernet Franc and C. – Merlot) coated with sodium alginate (SA), sodium alginate with gum arabica (SA-GA) and sodium alginate with gelatin (SA-GEL) expressed as mg gallic acid equivalent (GAE) per g of freeze-dried microencapsulated powders ( $\text{mg}_{\text{GAE}}/\text{g}_\text{P}$ ).



Continuing **Figure S2**.



**Figure S2.** Kinetics of phenolic compound release from the freeze-dried microencapsulated powders containing grape pomace extracts of Cabernet Sauvignon, Cabernet Franc and Merlot varieties prepared with different coatings (NA – sodium alginate; SA-GA – combination of sodium alginate and gum Arabic; SA-GEL – combination of sodium alginate and gelatin; symbols – experimental data, lines – approximate curves according to different mathematical models).

**Table S1.** Content of individual phenolic compounds of phenol-rich grape pomace extract Cabernet Sauvignon (CSE), sodium alginate microencapsulated powder (SA), sodium alginate with gum Arabic microencapsulated powder (SA-GA), and sodium alginate with gelatin microencapsulated powder (SA-GEL) during three phases of in vitro simulated digestion.

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
Phenolic acids (µg/100 mg <sub>EXT</sub> )							
Gallic acid	CSE	0.70 ± 0.04	-	1.25 ± 0.01	-	36.26 ± 1.29	22.4 ± 0.8
	SA	3.49 ± 0.37	14.19 ± 0.70	9.94 ± 0.11	37.44 ± 1.89	7.81 ± 0.92	4.8 ± 0.6
	SA-GA	1.81 ± 0.02	7.77 ± 0.00	13.98 ± 1.69	66.39 ± 0.39	52.84 ± 0.84	32.6 ± 0.5
	SA-GEL	3.66 ± 0.03	6.93 ± 0.10	5.85 ± 0.36	41.98 ± 1.13	42.46 ± 7.08	26.2 ± 4.4
3,4-Dihydroxybenzoic acid	CSE	nd	-	nd	-	11.36 ± 0.37	18.3 ± 0.6
	SA	nd	nd	nd	9.80 ± 0.84	6.41 ± 0.18	10.3 ± 0.3
	SA-GA	nd	nd	nd	22.01 ± 0.13	17.89 ± 0.45	28.8 ± 0.7
	SA-GEL	nd	nd	nd	11.50 ± 0.41	19.52 ± 0.10	31.5 ± 0.2
Syringic acid	CSE	9.94 ± 0.04	-	3.10 ± 0.06	-	nd	0.0
	SA	3.89 ± 0.09	3.84 ± 0.37	3.59 ± 0.15	nd	nd	0.0
	SA-GA	3.79 ± 0.00	4.53 ± 0.06	4.93 ± 0.49	nd	nd	0.0
	SA-GEL	4.57 ± 0.44	4.52 ± 0.62	4.76 ± 0.67	nd	nd	0.0
Vanillic acid	CSE	nd	-	nd	-	2.39 ± 0.11	22.9 ± 1.1
	SA	nd	nd	nd	3.86 ± 0.09	4.42 ± 0.62	42.3 ± 5.9
	SA-GA	nd	nd	nd	4.52 ± 0.06	5.59 ± 0.19	57.4 ± 1.9
	SA-GEL	nd	nd	nd	6.26 ± 0.82	7.40 ± 0.62	70.9 ± 5.9
Ellagic acid	CSE	nd	-	nd	-	1.63 ± 0.11	1.7 ± 0.1
	SA	nd	2.10 ± 0.07	2.18 ± 0.13	13.66 ± 0.31	12.67 ± 0.40	13.4 ± 0.4
	SA-GA	nd	nd	nd	2.37 ± 0.00	6.18 ± 0.06	6.5 ± 0.1
	SA-GEL	1.42 ± 0.52	3.21 ± 0.10	4.55 ± 0.87	30.85 ± 2.06	25.84 ± 0.62	27.3 ± 0.7

Table S1. – continued

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
Phenolic acids (µg/100 mg <sub>EXT</sub> )							
p-Hydroxybenzoic acid	CSE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
o-Coumaric acid	CSE	nd	-	nd	-	5.87 ± 0.93	78.7 ± 12.4
	SA	10.96 ± 0.41	21.80 ± 0.11	22.08 ± 0.24	16.53 ± 0.57	15.65 ± 0.31	209.8 ± 4.1
	SA-GA	nd	nd	nd	29.54 ± 0.45	26.35 ± 0.39	353.2 ± 5.2
	SA-GEL	15.91 ± 0.70	18.23 ± 0.62	30.29 ± 2.31	18.55 ± 1.34	15.46 ± 1.74	207.2 ± 23.4
p-Coumaric acid	CSE	0.59 ± 0.14	-	0.21 ± 0.07	-	2.99 ± 0.11	87.0 ± 3.3
	SA	nd	nd	nd	4.64 ± 0.04	0.68 ± 0.00	20.0 ± 0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Caffeic acid	CSE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Ferulic acid	CSE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Stilbenes (µg/100 mg <sub>EXT</sub> )							
Resveratrol	CSE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
ε-Viniferin	CSE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0

Table S1. – continued

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
Flavanols (µg/100 mg <sub>EXT</sub> )							
Epicatechin	CSE	79.11 ± 1.67	-	34.62 ± 0.71	-	50.19 ± 1.13	49.8 ± 1.1
	SA	47.93 ± 0.70	92.28 ± 0.84	87.55 ± 3.57	275.31 ± 1.06	261.25 ± 6.43	259.4 ± 6.4
	SA-GA	33.06 ± 0.06	78.24 ± 0.06	102.89 ± 7.62	297.23 ± 0.39	247.32 ± 8.80	245.6 ± 8.7
	SA-GEL	79.90 ± 1.08	101.49 ± 1.34	182.25 ± 17.90	287.26 ± 18.11	224.20 ± 0.10	222.6 ± 0.1
Catechin	CSE	61.78 ± 1.82	-	12.14 ± 0.57	-	nd	0.0
	SA	59.59 ± 0.64	55.82 ± 3.06	66.85 ± 1.28	nd	nd	0.0
	SA-GA	40.33 ± 0.02	56.31 ± 0.10	67.50 ± 6.64	nd	nd	0.0
	SA-GEL	54.37 ± 5.44	24.64 ± 4.74	74.91 ± 2.26	nd	nd	0.0
Epicatechin gallate	CSE	nd	-	6.99 ± 0.16	-	6.75 ± 0.76	116.8 ± 13.2
	SA	nd	24.12 ± 0.04	27.89 ± 0.75	26.61 ± 0.04	33.64 ± 2.86	582.6 ± 49.5
	SA-GA	nd	13.35 ± 0.13	15.59 ± 0.52	37.67 ± 0.32	38.11 ± 0.19	659.9 ± 3.4
	SA-GEL	nd	nd	6.69 ± 0.10	55.44 ± 6.59	55.38 ± 0.72	958.9 ± 12.4
Gallocatechin gallate	CSE	nd	-	nd	-	182.35 ± 7.51	251.4 ± 10.4
	SA	nd	nd	nd	333.26 ± 3.17	330.87 ± 8.58	456.2 ± 11.8
	SA-GA	nd	nd	nd	426.04 ± 0.58	478.95 ± 12.75	660.3 ± 17.6
	SA-GEL	nd	nd	nd	671.87 ± 19.14	716.07 ± 5.75	987.3 ± 7.9
Procyanidin B1	CSE	21.28 ± 1.36	-	nd	-	nd	0.0
	SA	26.27 ± 0.02	21.43 ± 3.50	18.75 ± 5.57	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Procyanidin B2	CSE	22.85 ± 0.34	-	8.81 ± 0.07	-	nd	0.0
	SA	14.38 ± 0.23	19.62 ± 1.17	18.24 ± 0.75	nd	nd	0.0
	SA-GA	7.98 ± 0.02	11.71 ± 0.06	15.68 ± 1.36	nd	nd	0.0
	SA-GEL	10.01 ± 0.90	nd	nd	nd	nd	0.0



Table S1. – continued

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
Flavonols (µg/100 mg <sub>EXT</sub> )							
Quercetin	CSE	17.75 ± 0.06	-	1.60 ± 0.08	-	nd	0.0
	SA	13.34 ± 0.18	17.60 ± 0.86	17.86 ± 0.31	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	7.70 ± 0.77	7.84 ± 1.50	11.67 ± 0.36	nd	nd	0.0
Rutin	CSE	4.95 ± 0.13	-	2.53 ± 0.07	-	nd	0.0
	SA	2.79 ± 0.53	3.25 ± 0.07	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Kaempferol	CSE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Anthocyanins (µg/100 mg <sub>EXT</sub> )							
Oenin chloride	CSE	47.12 ± 0.25	-	64.71 ± 0.01	-	31.42 ± 2.56	34.4 ± 2.8
	SA	28.57 ± 0.36	50.48 ± 0.35	46.26 ± 0.37	8.62 ± 0.13	7.91 ± 0.18	8.7 ± 0.2
	SA-GA	40.73 ± 3.87	15.23 ± 0.52	15.86 ± 0.26	nd	nd	0.0
	SA-GEL	57.80 ± 1.01	44.69 ± 1.96	44.03 ± 1.29	13.53 ± 0.62	12.92 ± 0.21	14.2 ± 0.2
Myrtillin chloride	CSE	2.29 ± 0.03	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Petunidin chloride	CSE	0.96 ± 0.04	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Peonidin-3-O-glucoside chloride	CSE	5.40 ± 0.04	-	6.29 ± 0.21	-	2.41 ± 0.42	24.7 ± 4.3
	SA	2.36 ± 0.21	4.39 ± 0.48	3.53 ± 0.24	nd	nd	0.0
	SA-GA	3.66 ± 0.34	1.81 ± 0.29	1.60 ± 0.13	nd	nd	0.0
	SA-GEL	4.08 ± 0.52	3.17 ± 0.77	2.65 ± 0.26	nd	nd	0.0

Table S1. – continued

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
<i>Anthocyanins</i> (µg/100 mg <sub>EXT</sub> )							
Kuromanin chloride	CSE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0

GP – gastric phase, IP – intestinal phase, OP – oral phase, nd – not detected, “-” – not determined. Index numbers associated with abbreviations indicate the time interval when a certain sample was taken (i.e. GP<sub>123</sub> – 123rd minute of the gastric phase). For the CSE, only the endpoints of the oral, gastric, and intestinal phases are shown (OP<sub>3</sub>, GP<sub>123</sub>, IP<sub>243</sub>). Phenolic contents are expressed as mean value (µg/100 mg<sub>EXT</sub>) ± SD.

**Table S2.** Content of individual phenolic compounds of phenol-rich grape pomace extract Cabernet Franc (CFE), sodium alginate microencapsulated powder (SA), sodium alginate with gum Arabic microencapsulated powder (SA-GA), and sodium alginate with gelatin microencapsulated powder (SA-GEL) during three phases of in vitro simulated digestion.

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
Phenolic acids (μg/100 mg <sub>EXT</sub> )							
Gallic acid	CFE	2.09 ± 0.06	-	1.19 ± 0.17	-	141.38 ± 6.37	108.8 ± 4.9
	SA	0.86 ± 0.16	5.17 ± 0.96	3.16 ± 0.37	4.79 ± 0.00	16.01 ± 0.75	12.3 ± 0.6
	SA-GA	nd	6.15 ± 1.96	2.72 ± 0.51	102.85 ± 7.20	90.77 ± 1.22	69.8 ± 0.9
	SA-GEL	2.93 ± 0.08	8.47 ± 0.16	3.94 ± 0.11	11.65 ± 0.31	9.51 ± 0.00	7.3 ± 0.0
3,4-Dihydroxybenzoic acid	CFE	nd	-	nd	-	17.01 ± 0.08	70.6 ± 0.4
	SA	nd	nd	nd	13.95 ± 0.00	8.61 ± 0.04	35.7 ± 0.2
	SA-GA	nd	nd	nd	32.76 ± 1.99	30.00 ± 0.51	124.5 ± 2.1
	SA-GEL	nd	nd	nd	5.64 ± 0.21	15.90 ± 0.00	66.0 ± 0.0
Syringic acid	CFE	6.92 ± 0.78	-	nd	-	nd	0.0
	SA	3.49 ± 0.07	5.79 ± 0.09	3.75 ± 0.77	nd	nd	0.0
	SA-GA	9.51 ± 0.66	6.85 ± 0.51	8.92 ± 0.80	2.23 ± 0.19	2.36 ± 0.26	78.3 ± 8.5
	SA-GEL	nd	nd	nd	nd	nd	0.0
Vanillic acid	CFE	nd	-	nd	-	4.39 ± 0.00	29.6 ± 0.0
	SA	nd	nd	nd	3.92 ± 0.00	3.89 ± 0.13	26.2 ± 0.9
	SA-GA	nd	nd	nd	5.59 ± 0.58	5.23 ± 0.06	35.2 ± 0.4
	SA-GEL	nd	nd	nd	6.23 ± 0.00	6.98 ± 0.00	47.1 ± 0.0
Ellagic acid	CFE	nd	-	nd	-	1.28 ± 0.00	1.6 ± 0.0
	SA	nd	1.41 ± 0.15	1.73 ± 0.07	13.01 ± 0.00	13.46 ± 0.13	16.5 ± 0.2
	SA-GA	nd	nd	nd	9.54 ± 1.67	9.68 ± 0.45	11.9 ± 0.6
	SA-GEL	nd	1.57 ± 0.21	1.60 ± 0.05	16.77 ± 0.00	19.16 ± 0.00	23.6 ± 0.0

Table S2. – continued

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
Phenolic acids (μg/100 mg <sub>EXT</sub> )							
p-Hydroxybenzoic acid	CFE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
o-Coumaric acid	CFE	nd	-	nd	-	9.37 ± 0.06	48.1 ± 0.3
	SA	20.41 ± 0.20	27.06 ± 0.72	25.98 ± 0.57	18.49 ± 0.00	21.54 ± 0.66	110.6 ± 3.4
	SA-GA	nd	nd	nd	68.42 ± 5.78	82.63 ± 2.57	424.2 ± 13.2
	SA-GEL	17.23 ± 1.37	21.67 ± 1.21	22.92 ± 1.16	15.58 ± 0.00	19.76 ± 0.00	101.4 ± 0.0
p-Coumaric acid	CFE	0.43 ± 0.06	-	0.44 ± 0.00	-	3.93 ± 0.70	272.8 ± 49.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Caffeic acid	CFE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Ferulic acid	CFE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Stilbenes (μg/100 mg <sub>EXT</sub> )							
Resveratrol	CFE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
ε-Viniferin	CFE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0

Table S2. – continued

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
Flavanols (μg/100 mg <sub>EXT</sub> )							
Epicatechin	CFE	343.19 ± 7.06	-	324.16 ± 4.16	-	nd	0.0
	SA	160.11 ± 4.18	171.72 ± 0.64	180.02 ± 6.53	200.24 ± 0.00	167.33 ± 1.10	30.6 ± 0.2
	SA-GA	210.82 ± 0.90	352.28 ± 7.83	417.18 ± 4.40	100.63 ± 8.93	80.82 ± 2.31	14.8 ± 0.4
	SA-GEL	154.16 ± 4.14	185.78 ± 5.80	155.10 ± 1.26	107.82 ± 3.88	164.60 ± 1.68	30.1 ± 0.3
Catechin	CFE	100.95 ± 12.01	-	139.84 ± 2.90	-	nd	0.0
	SA	102.30 ± 2.23	77.12 ± 0.15	49.66 ± 3.21	nd	nd	0.0
	SA-GA	118.90 ± 0.08	96.28 ± 1.51	90.47 ± 8.70	nd	nd	0.0
	SA-GEL	21.09 ± 0.66	42.90 ± 1.37	45.21 ± 1.21	nd	nd	0.0
Epicatechin gallate	CFE	nd	-	nd	-	32.06 ± 0.06	98.8 ± 0.2
	SA	nd	nd	nd	27.46 ± 0.00	25.68 ± 1.06	79.1 ± 3.3
	SA-GA	nd	nd	nd	47.61 ± 3.34	51.82 ± 2.83	159.7 ± 8.7
	SA-GEL	nd	nd	nd	61.29 ± 2.52	54.82 ± 0.00	168.9 ± 0.0
Gallocatechin gallate	CFE	nd	-	nd	-	190.83 ± 6.03	150.0 ± 4.7
	SA	nd	nd	nd	381.74 ± 0.00	374.86 ± 5.85	294.6 ± 4.6
	SA-GA	nd	nd	nd	443.58 ± 6.17	450.08 ± 1.41	353.8 ± 1.1
	SA-GEL	nd	nd	nd	558.30 ± 1.68	601.79 ± 0.00	473.0 ± 0.0
Procyanidin B1	CFE	60.20 ± 0.10	-	72.36 ± 7.13	-	nd	0.0
	SA	81.43 ± 6.36	61.88 ± 2.52	49.69 ± 3.26	nd	nd	0.0
	SA-GA	68.20 ± 3.38	61.72 ± 4.24	66.34 ± 1.73	nd	nd	0.0
	SA-GEL	24.87 ± 4.01	nd	nd	nd	nd	0.0
Procyanidin B2	CFE	111.71 ± 5.15	-	137.25 ± 3.75	-	nd	0.0
	SA	3.49 ± 0.07	5.79 ± 0.09	3.75 ± 0.77	nd	nd	0.0
	SA-GA	64.41 ± 0.29	65.10 ± 4.08	92.86 ± 3.02	24.12 ± 4.95	34.95 ± 6.36	27.6 ± 5.0
	SA-GEL	31.92 ± 0.05	28.87 ± 0.95	38.66 ± 3.74	nd	nd	0.0

Table S2. – continued

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
Flavonols (µg/100 mg <sub>EXT</sub> )							
Quercetin	CFE	19.62 ± 0.67	-	15.89 ± 0.38	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Rutin	CFE	46.81 ± 0.68	-	64.19 ± 0.00	-	18.86 ± 1.80	29.0 ± 2.8
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Kaempferol	CFE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Anthocyanins (µg/100 mg <sub>EXT</sub> )							
Oenin chloride	CFE	511.54 ± 1.17	-	733.77 ± 1.11	-	259.78 ± 23.24	32.7 ± 2.9
	SA	355.94 ± 2.52	224.77 ± 12.53	219.88 ± 33.29	61.27 ± 3.61	96.68 ± 10.81	12.2 ± 1.4
	SA-GA	378.04 ± 18.53	277.57 ± 2.05	306.86 ± 19.26	61.97 ± 1.28	65.32 ± 4.56	8.2 ± 0.6
	SA-GEL	310.17 ± 0.24	254.76 ± 0.58	248.77 ± 0.26	60.92 ± 0.94	49.10 ± 4.31	6.2 ± 0.5
Myrtillin chloride	CFE	7.98 ± 0.30	-	6.73 ± 0.01	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Petunidin chloride	CFE	3.11 ± 0.17	-	3.62 ± 0.22	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Peonidin-3-O-glucoside chloride	CFE	45.42 ± 0.90	-	61.59 ± 1.32	-	18.64 ± 2.23	24.0 ± 2.9
	SA	28.84 ± 1.23	16.32 ± 0.70	19.68 ± 2.71	4.36 ± 0.18	7.24 ± 0.31	9.3 ± 0.4
	SA-GA	29.92 ± 1.97	20.60 ± 0.06	22.77 ± 2.09	nd	nd	0.0
	SA-GEL	22.91 ± 1.61	19.44 ± 0.58	18.79 ± 0.58	nd	nd	0.0

Table S2. – continued

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
Anthocyanins (µg/100 mg <sub>EXT</sub> )							
Kuromanin chloride	CFE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Callistephin chloride	CFE	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0

GP – gastric phase, IP – intestinal phase, OP – oral phase, nd – not detected, “-” – not determined. Index numbers associated with abbreviations indicate the time interval when a certain sample was taken (i.e. GP<sub>123</sub> – 123rd minute of the gastric phase). For the CFE, only the endpoints of the oral, gastric, and intestinal phases are shown (OP<sub>3</sub>, GP<sub>123</sub>, IP<sub>243</sub>). Phenolic contents are expressed as mean value (µg/100 mg<sub>EXT</sub>) ± SD.

**Table S3.** Content of individual phenolic compounds of phenol-rich grape pomace extract Merlot (ME), sodium alginate microencapsulated powder (SA), sodium alginate with gum Arabic microencapsulated powder (SA-GA), and sodium alginate with gelatin microencapsulated powder (SA-GEL) during three phases of in vitro simulated digestion.

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
Phenolic acids (µg/100 mg <sub>EXT</sub> )							
Gallic acid	ME	1.57 ± 0.16	-	1.61 ± 0.04	-	98.41 ± 0.59	47.4 ± 0.3
	SA	nd	nd	nd	78.31 ± 9.37	30.06 ± 0.26	14.5 ± 0.1
	SA-GA	nd	nd	nd	113.77 ± 1.33	95.89 ± 0.00	46.2 ± 0.0
	SA-GEL	nd	nd	nd	101.35 ± 4.29	183.87 ± 0.61	88.5 ± 0.3
3,4-Dihydroxybenzoic acid	ME	nd	-	nd	-	9.33 ± 0.17	12.3 ± 0.2
	SA	nd	nd	nd	17.19 ± 0.60	8.59 ± 0.04	11.4 ± 0.1
	SA-GA	nd	nd	nd	21.94 ± 0.51	23.50 ± 0.00	31.1 ± 0.0
	SA-GEL	nd	nd	nd	24.18 ± 1.33	35.90 ± 0.51	47.5 ± 0.7
Syringic acid	ME	12.14 ± 2.90	-	11.88 ± 0.13	-	nd	0.0
	SA	3.49 ± 0.01	2.77 ± 0.19	4.09 ± 0.00	nd	nd	0.0
	SA-GA	7.04 ± 0.76	3.25 ± 0.60	nd	nd	nd	0.0
	SA-GEL	5.38 ± 0.03	nd	nd	nd	nd	0.0
Vanillic acid	ME	nd	-	nd	-	2.72 ± 0.08	22.1 ± 0.7
	SA	nd	nd	nd	3.80 ± 0.64	4.04 ± 0.30	32.7 ± 2.4
	SA-GA	nd	nd	nd	6.13 ± 0.19	6.52 ± 0.00	52.9 ± 0.0
	SA-GEL	nd	nd	nd	5.20 ± 0.20	6.55 ± 0.10	53.1 ± 0.8
Ellagic acid	ME	nd	-	nd	-	2.52 ± 0.08	15.5 ± 0.5
	SA	nd	nd	nd	2.37 ± 0.17	3.13 ± 0.04	19.2 ± 0.3
	SA-GA	nd	nd	nd	4.52 ± 0.19	6.12 ± 0.19	37.5 ± 1.2
	SA-GEL	nd	nd	nd	11.62 ± 1.33	13.16 ± 0.51	80.7 ± 3.1



Table S3. – continued

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
Phenolic acids (μg/100 mg <sub>EXT</sub> )							
p-Hydroxybenzoic acid	ME	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
o-Coumaric acid	ME	nd	-	nd	-	5.92 ± 0.06	61.7 ± 0.6
	SA	nd	nd	nd	14.49 ± 0.13	15.49 ± 0.09	161.4 ± 0.9
	SA-GA	nd	nd	nd	25.57 ± 2.22	23.24 ± 0.00	242.2 ± 0.0
	SA-GEL	nd	nd	nd	28.87 ± 4.08	23.74 ± 2.44	247.4 ± 25.4
p-Coumaric acid	ME	0.28 ± 0.03	-	0.36 ± 0.03	-	2.16 ± 0.08	65.4 ± 2.5
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Caffeic acid	ME	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Ferulic acid	ME	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Stilbenes (μg/100 mg <sub>EXT</sub> )							
Resveratrol	ME	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
ε-Viniferin	ME	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0

Table S3. – continued

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
Flavanols (μg/100 mg <sub>EXT</sub> )							
Epicatechin	ME	190.58 ± 9.18	-	200.57 ± 2.08	-	38.79 ± 0.53	15.6 ± 0.2
	SA	50.41 ± 0.00	181.44 ± 24.74	111.66 ± 0.00	219.09 ± 2.49	221.07 ± 3.99	89.0 ± 1.6
	SA-GA	138.47 ± 5.04	212.47 ± 20.05	167.31 ± 6.31	266.94 ± 11.40	227.80 ± 0.00	91.7 ± 0.0
	SA-GEL	103.49 ± 0.13	104.19 ± 0.00	179.46 ± 2.04	279.58 ± 8.88	223.65 ± 16.18	90.1 ± 6.5
Catechin	ME	101.90 ± 6.52	-	98.69 ± 1.03	-	nd	0.0
	SA	58.13 ± 0.10	52.31 ± 0.98	71.67 ± 0.00	nd	nd	0.0
	SA-GA	68.05 ± 3.73	52.45 ± 2.16	36.20 ± 5.81	nd	nd	0.0
	SA-GEL	62.14 ± 0.20	37.59 ± 0.00	73.99 ± 0.61	69.16 ± 11.03	56.83 ± 1.02	20.9 ± 0.4
Epicatechin gallate	ME	nd	-	nd	-	7.35 ± 0.73	88.7 ± 8.8
	SA	nd	nd	nd	26.40 ± 1.16	27.54 ± 1.07	332.4 ± 13.0
	SA-GA	nd	17.68 ± 1.46	17.79 ± 0.28	35.91 ± 4.69	39.32 ± 0.00	474.6 ± 0.0
	SA-GEL	nd	nd	nd	53.06 ± 3.57	59.13 ± 2.44	713.7 ± 29.5
Gallocatechin gallate	ME	104.18 ± 3.47	-	114.91 ± 2.29	-	178.11 ± 0.17	234.0 ± 0.2
	SA	nd	nd	nd	269.21 ± 1.46	277.94 ± 2.58	365.2 ± 3.4
	SA-GA	nd	nd	nd	405.34 ± 0.82	442.38 ± 0.00	581.2 ± 0.0
	SA-GEL	nd	nd	nd	747.57 ± 27.97	782.73 ± 7.63	1028.4 ± 10.0
Procyanidin B1	ME	28.71 ± 0.46	-	44.79 ± 5.83	-	nd	0.0
	SA	27.64 ± 0.00	27.82 ± 2.35	38.08 ± 0.00	nd	nd	0.0
	SA-GA	38.59 ± 1.25	27.73 ± 1.08	18.21 ± 3.28	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Procyanidin B2	ME	58.30 ± 2.27	-	61.28 ± 0.54	-	nd	0.0
	SA	14.74 ± 0.00	28.74 ± 0.19	19.83 ± 0.00	nd	nd	0.0
	SA-GA	40.40 ± 1.49	23.78 ± 2.03	21.67 ± 2.81	nd	nd	0.0
	SA-GEL	12.15 ± 0.13	55.77 ± 0.00	50.29 ± 0.10	nd	nd	0.0

Table S3. – continued

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
Flavonols (µg/100 mg <sub>EXT</sub> )							
Quercetin	ME	13.12 ± 0.81	-	5.93 ± 0.31	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Rutin	ME	7.00 ± 1.00	-	8.30 ± 0.01	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Kaempferol	ME	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Anthocyanins (µg/100 mg <sub>EXT</sub> )							
Oenin chloride	ME	26.58 ± 0.64	-	38.08 ± 0.28	-	20.56 ± 1.49	62.6 ± 4.5
	SA	16.06 ± 1.29	13.09 ± 0.11	13.25 ± 0.00	9.27 ± 0.21	8.99 ± 0.09	27.4 ± 0.3
	SA-GA	12.66 ± 0.21	6.44 ± 0.22	5.33 ± 0.16	3.90 ± 0.44	2.86 ± 0.13	8.7 ± 0.4
	SA-GEL	14.26 ± 0.41	7.25 ± 0.46	9.11 ± 0.56	10.03 ± 0.10	8.06 ± 0.20	24.5 ± 0.6
Myrtillin chloride	ME	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Petunidin chloride	ME	0.27 ± 0.01	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0
Peonidin-3-O-glucoside chloride	ME	5.49 ± 0.20	-	7.34 ± 0.13	-	3.04 ± 0.42	42.4 ± 5.9
	SA	2.69 ± 0.09	2.42 ± 0.17	2.17 ± 0.17	2.25 ± 0.17	1.61 ± 0.04	22.5 ± 0.6
	SA-GA	1.83 ± 0.05	nd	nd	nd	nd	0.0
	SA-GEL	2.14 ± 0.03	nd	nd	nd	nd	0.0

Table S3. – continued

Component	Sample	Oral phase	Gastric phase		Intestinal phase		Bioaccessibility index
		OP <sub>3</sub>	GP <sub>63</sub>	GP <sub>123</sub>	IP <sub>183</sub>	IP <sub>243</sub>	BI (%)
<i>Anthocyanins</i> (µg/100 mg <sub>EXT</sub> )							
Kuromanin chloride	ME	nd	-	nd	-	nd	0.0
	SA	nd	nd	nd	nd	nd	0.0
	SA-GA	nd	nd	nd	nd	nd	0.0
	SA-GEL	nd	nd	nd	nd	nd	0.0

GP – gastric phase, IP – intestinal phase, OP – oral phase, nd – not detected, “-” – not determined. Index numbers associated with abbreviations indicate the time interval when a certain sample was taken (i.e. GP<sub>123</sub> – 123rd minute of the gastric phase). For the ME, only the endpoints of the oral, gastric, and intestinal phases are shown (OP<sub>3</sub>, GP<sub>123</sub>, IP<sub>243</sub>). Phenolic contents are expressed as mean value (µg/100 mg<sub>EXT</sub>) ± SD.