



Figure S1. *In vitro* solubility of Zn from both Zn sources (ZnSO₄, ZnGly), subjected to different buffers simulating gastric digestion in 0.2M Gly-HCl at pH 2.0, or simulating small intestinal digestion in 0.2M sodium acetate buffer at pH 4.8 and 6.8.

Data were analyzed using two-way ANOVA, followed by the post hoc Tukey's multiple comparisons test. Significant differences between Zn source, dose and pH are presented in the Table S1.

Table S1. Individual significant differences between parameters *in vitro* solubility of Zn from both Zn sources (ZnSO₄, ZnGly), subjected to different buffers simulating gastric digestion in 0.2M Gly-HCl at pH 2.0, or simulating small intestinal digestion in 0.2M sodium acetate buffer at pH 4.8 and 6.8.

Tukey's multiple comparisons test	Predicted (LS) mean diff.	95.00% CI of diff.	Summary	Adjusted P Value
pH 2.0:ZnSO ₄ 20 vs. pH 2.0:ZnSO ₄ 100	-0.2667	-9.521 to 8.988	ns	>0.9999
pH 2.0:ZnSO ₄ 20 vs. pH 2.0:ZnSO ₄ 150	-0.4667	-9.721 to 8.788	ns	>0.9999
pH 2.0:ZnSO ₄ 20 vs. pH 2.0:ZnGly 20	8.033	-1.221 to 17.29	ns	0.1461
pH 2.0:ZnSO ₄ 20 vs. pH 2.0:ZnGly 100	5.900	-3.354 to 15.15	ns	0.5871
pH 2.0:ZnSO ₄ 20 vs. pH 2.0:ZnGly 150	4.133	-5.121 to 13.39	ns	0.9488
pH 2.0:ZnSO ₄ 20 vs. pH 4.8:ZnSO ₄ 20	2.358	-4.186 to 8.902	ns	0.9927
pH 2.0:ZnSO ₄ 20 vs. pH 4.8:ZnSO ₄ 100	2.092	-9.243 to 13.43	ns	>0.9999
pH 2.0:ZnSO ₄ 20 vs. pH 4.8:ZnSO ₄ 150	1.892	-9.443 to 13.23	ns	>0.9999
pH 2.0:ZnSO ₄ 20 vs. pH 4.8:ZnGly 20	10.39	-0.9426 to 21.73	ns	0.1000
pH 2.0:ZnSO ₄ 20 vs. pH 4.8:ZnGly 100	8.258	-3.076 to 19.59	ns	0.3719
pH 2.0:ZnSO ₄ 20 vs. pH 4.8:ZnGly 150	6.492	-4.843 to 17.83	ns	0.7433
pH 2.0:ZnSO ₄ 20 vs. pH 6.8:ZnSO ₄ 20	13.23	6.689 to 19.78	****	<0.0001
pH 2.0:ZnSO ₄ 20 vs. pH 6.8:ZnSO ₄ 100	12.97	1.632 to 24.30	*	0.0136
pH 2.0:ZnSO ₄ 20 vs. pH 6.8:ZnSO ₄ 150	12.77	1.432 to 24.10	*	0.0160
pH 2.0:ZnSO ₄ 20 vs. pH 6.8:ZnGly 20	21.27	9.932 to 32.60	****	<0.0001
pH 2.0:ZnSO ₄ 20 vs. pH 6.8:ZnGly 100	19.13	7.799 to 30.47	****	<0.0001
pH 2.0:ZnSO ₄ 20 vs. pH 6.8:ZnGly 150	17.37	6.032 to 28.70	***	0.0003
pH 2.0:ZnSO ₄ 100 vs. pH 2.0:ZnSO ₄ 150	-0.2000	-9.454 to 9.054	ns	>0.9999
pH 2.0:ZnSO ₄ 100 vs. pH 2.0:ZnGly 20	8.300	-0.9544 to 17.55	ns	0.1171
pH 2.0:ZnSO ₄ 100 vs. pH 2.0:ZnGly 100	6.167	-3.088 to 15.42	ns	0.5159
pH 2.0:ZnSO ₄ 100 vs. pH 2.0:ZnGly 150	4.400	-4.854 to 13.65	ns	0.9178

pH 2.0:ZnSO4 100 vs. pH 4.8:ZnSO4 20	2.625	-8.709 to 13.96	ns	>0.9999
pH 2.0:ZnSO4 100 vs. pH 4.8:ZnSO4 100	2.358	-4.186 to 8.902	ns	0.9927
pH 2.0:ZnSO4 100 vs. pH 4.8:ZnSO4 150	2.158	-9.176 to 13.49	ns	>0.9999
pH 2.0:ZnSO4 100 vs. pH 4.8:ZnGly 20	10.66	-0.6759 to 21.99	ns	0.0827
pH 2.0:ZnSO4 100 vs. pH 4.8:ZnGly 100	8.525	-2.809 to 19.86	ns	0.3235
pH 2.0:ZnSO4 100 vs. pH 4.8:ZnGly 150	6.758	-4.576 to 18.09	ns	0.6884
pH 2.0:ZnSO4 100 vs. pH 6.8:ZnSO4 20	13.50	2.166 to 24.83	**	0.0087
pH 2.0:ZnSO4 100 vs. pH 6.8:ZnSO4 100	13.23	6.689 to 19.78	****	<0.0001
pH 2.0:ZnSO4 100 vs. pH 6.8:ZnSO4 150	13.03	1.699 to 24.37	*	0.0129
pH 2.0:ZnSO4 100 vs. pH 6.8:ZnGly 20	21.53	10.20 to 32.87	****	<0.0001
pH 2.0:ZnSO4 100 vs. pH 6.8:ZnGly 100	19.40	8.066 to 30.73	****	<0.0001
pH 2.0:ZnSO4 100 vs. pH 6.8:ZnGly 150	17.63	6.299 to 28.97	***	0.0002
pH 2.0:ZnSO4 150 vs. pH 2.0:ZnGly 20	8.500	-0.7544 to 17.75	ns	0.0987
pH 2.0:ZnSO4 150 vs. pH 2.0:ZnGly 100	6.367	-2.888 to 15.62	ns	0.4638
pH 2.0:ZnSO4 150 vs. pH 2.0:ZnGly 150	4.600	-4.654 to 13.85	ns	0.8881
pH 2.0:ZnSO4 150 vs. pH 4.8:ZnSO4 20	2.825	-8.509 to 14.16	ns	>0.9999
pH 2.0:ZnSO4 150 vs. pH 4.8:ZnSO4 100	2.558	-8.776 to 13.89	ns	>0.9999
pH 2.0:ZnSO4 150 vs. pH 4.8:ZnSO4 150	2.358	-4.186 to 8.902	ns	0.9927
pH 2.0:ZnSO4 150 vs. pH 4.8:ZnGly 20	10.86	-0.4759 to 22.19	ns	0.0714
pH 2.0:ZnSO4 150 vs. pH 4.8:ZnGly 100	8.725	-2.609 to 20.06	ns	0.2898
pH 2.0:ZnSO4 150 vs. pH 4.8:ZnGly 150	6.958	-4.376 to 18.29	ns	0.6456
pH 2.0:ZnSO4 150 vs. pH 6.8:ZnSO4 20	13.70	2.366 to 25.03	**	0.0074
pH 2.0:ZnSO4 150 vs. pH 6.8:ZnSO4 100	13.43	2.099 to 24.77	**	0.0092
pH 2.0:ZnSO4 150 vs. pH 6.8:ZnSO4 150	13.23	6.689 to 19.78	****	<0.0001
pH 2.0:ZnSO4 150 vs. pH 6.8:ZnGly 20	21.73	10.40 to 33.07	****	<0.0001
pH 2.0:ZnSO4 150 vs. pH 6.8:ZnGly 100	19.60	8.266 to 30.93	****	<0.0001
pH 2.0:ZnSO4 150 vs. pH 6.8:ZnGly 150	17.83	6.499 to 29.17	***	0.0002
pH 2.0:ZnGly 20 vs. pH 2.0:ZnGly 100	-2.133	-11.39 to 7.121	ns	>0.9999
pH 2.0:ZnGly 20 vs. pH 2.0:ZnGly 150	-3.900	-13.15 to 5.354	ns	0.9682
pH 2.0:ZnGly 20 vs. pH 4.8:ZnSO4 20	-5.675	-17.01 to 5.659	ns	0.8826
pH 2.0:ZnGly 20 vs. pH 4.8:ZnSO4 100	-5.942	-17.28 to 5.393	ns	0.8430
pH 2.0:ZnGly 20 vs. pH 4.8:ZnSO4 150	-6.142	-17.48 to 5.193	ns	0.8093
pH 2.0:ZnGly 20 vs. pH 4.8:ZnGly 20	2.358	-4.186 to 8.902	ns	0.9927
pH 2.0:ZnGly 20 vs. pH 4.8:ZnGly 100	0.2250	-11.11 to 11.56	ns	>0.9999
pH 2.0:ZnGly 20 vs. pH 4.8:ZnGly 150	-1.542	-12.88 to 9.793	ns	>0.9999
pH 2.0:ZnGly 20 vs. pH 6.8:ZnSO4 20	5.200	-6.134 to 16.53	ns	0.9369
pH 2.0:ZnGly 20 vs. pH 6.8:ZnSO4 100	4.933	-6.401 to 16.27	ns	0.9584
pH 2.0:ZnGly 20 vs. pH 6.8:ZnSO4 150	4.733	-6.601 to 16.07	ns	0.9706
pH 2.0:ZnGly 20 vs. pH 6.8:ZnGly 20	13.23	6.689 to 19.78	****	<0.0001
pH 2.0:ZnGly 20 vs. pH 6.8:ZnGly 100	11.10	-0.2343 to 22.43	ns	0.0597
pH 2.0:ZnGly 20 vs. pH 6.8:ZnGly 150	9.333	-2.001 to 20.67	ns	0.2022
pH 2.0:ZnGly 100 vs. pH 2.0:ZnGly 150	-1.767	-11.02 to 7.488	ns	>0.9999
pH 2.0:ZnGly 100 vs. pH 4.8:ZnSO4 20	-3.542	-14.88 to 7.793	ns	0.9984
pH 2.0:ZnGly 100 vs. pH 4.8:ZnSO4 100	-3.808	-15.14 to 7.526	ns	0.9965
pH 2.0:ZnGly 100 vs. pH 4.8:ZnSO4 150	-4.008	-15.34 to 7.326	ns	0.9940
pH 2.0:ZnGly 100 vs. pH 4.8:ZnGly 20	4.492	-6.843 to 15.83	ns	0.9816
pH 2.0:ZnGly 100 vs. pH 4.8:ZnGly 100	2.358	-4.186 to 8.902	ns	0.9927
pH 2.0:ZnGly 100 vs. pH 4.8:ZnGly 150	0.5917	-10.74 to 11.93	ns	>0.9999
pH 2.0:ZnGly 100 vs. pH 6.8:ZnSO4 20	7.333	-4.001 to 18.67	ns	0.5636

pH 2.0:ZnGly 100 vs. pH 6.8:ZnSO4 100	7.067	-4.268 to 18.40	ns	0.6220
pH 2.0:ZnGly 100 vs. pH 6.8:ZnSO4 150	6.867	-4.468 to 18.20	ns	0.6654
pH 2.0:ZnGly 100 vs. pH 6.8:ZnGly 20	15.37	4.032 to 26.70	**	0.0018
pH 2.0:ZnGly 100 vs. pH 6.8:ZnGly 100	13.23	6.689 to 19.78	****	<0.0001
pH 2.0:ZnGly 100 vs. pH 6.8:ZnGly 150	11.47	0.1324 to 22.80	*	0.0452
pH 2.0:ZnGly 150 vs. pH 4.8:ZnSO4 20	-1.775	-13.11 to 9.559	ns	>0.9999
pH 2.0:ZnGly 150 vs. pH 4.8:ZnSO4 100	-2.042	-13.38 to 9.293	ns	>0.9999
pH 2.0:ZnGly 150 vs. pH 4.8:ZnSO4 150	-2.242	-13.58 to 9.093	ns	>0.9999
pH 2.0:ZnGly 150 vs. pH 4.8:ZnGly 20	6.258	-5.076 to 17.59	ns	0.7882
pH 2.0:ZnGly 150 vs. pH 4.8:ZnGly 100	4.125	-7.209 to 15.46	ns	0.9919
pH 2.0:ZnGly 150 vs. pH 4.8:ZnGly 150	2.358	-4.186 to 8.902	ns	0.9927
pH 2.0:ZnGly 150 vs. pH 6.8:ZnSO4 20	9.100	-2.234 to 20.43	ns	0.2332
pH 2.0:ZnGly 150 vs. pH 6.8:ZnSO4 100	8.833	-2.501 to 20.17	ns	0.2726
pH 2.0:ZnGly 150 vs. pH 6.8:ZnSO4 150	8.633	-2.701 to 19.97	ns	0.3049
pH 2.0:ZnGly 150 vs. pH 6.8:ZnGly 20	17.13	5.799 to 28.47	***	0.0004
pH 2.0:ZnGly 150 vs. pH 6.8:ZnGly 100	15.00	3.666 to 26.33	**	0.0024
pH 2.0:ZnGly 150 vs. pH 6.8:ZnGly 150	13.23	6.689 to 19.78	****	<0.0001
pH 4.8:ZnSO4 20 vs. pH 4.8:ZnSO4 100	-0.2667	-9.521 to 8.988	ns	>0.9999
pH 4.8:ZnSO4 20 vs. pH 4.8:ZnSO4 150	-0.4667	-9.721 to 8.788	ns	>0.9999
pH 4.8:ZnSO4 20 vs. pH 4.8:ZnGly 20	8.033	-1.221 to 17.29	ns	0.1461
pH 4.8:ZnSO4 20 vs. pH 4.8:ZnGly 100	5.900	-3.354 to 15.15	ns	0.5871
pH 4.8:ZnSO4 20 vs. pH 4.8:ZnGly 150	4.133	-5.121 to 13.39	ns	0.9488
pH 4.8:ZnSO4 20 vs. pH 6.8:ZnSO4 20	10.88	4.331 to 17.42	****	<0.0001
pH 4.8:ZnSO4 20 vs. pH 6.8:ZnSO4 100	10.61	-0.7259 to 21.94	ns	0.0857
pH 4.8:ZnSO4 20 vs. pH 6.8:ZnSO4 150	10.41	-0.9259 to 21.74	ns	0.0988
pH 4.8:ZnSO4 20 vs. pH 6.8:ZnGly 20	18.91	7.574 to 30.24	****	<0.0001
pH 4.8:ZnSO4 20 vs. pH 6.8:ZnGly 100	16.78	5.441 to 28.11	***	0.0005
pH 4.8:ZnSO4 20 vs. pH 6.8:ZnGly 150	15.01	3.674 to 26.34	**	0.0024
pH 4.8:ZnSO4 100 vs. pH 4.8:ZnSO4 150	-0.2000	-9.454 to 9.054	ns	>0.9999
pH 4.8:ZnSO4 100 vs. pH 4.8:ZnGly 20	8.300	-0.9544 to 17.55	ns	0.1171
pH 4.8:ZnSO4 100 vs. pH 4.8:ZnGly 100	6.167	-3.088 to 15.42	ns	0.5159
pH 4.8:ZnSO4 100 vs. pH 4.8:ZnGly 150	4.400	-4.854 to 13.65	ns	0.9178
pH 4.8:ZnSO4 100 vs. pH 6.8:ZnSO4 20	11.14	-0.1926 to 22.48	ns	0.0579
pH 4.8:ZnSO4 100 vs. pH 6.8:ZnSO4 100	10.88	4.331 to 17.42	****	<0.0001
pH 4.8:ZnSO4 100 vs. pH 6.8:ZnSO4 150	10.68	-0.6593 to 22.01	ns	0.0817
pH 4.8:ZnSO4 100 vs. pH 6.8:ZnGly 20	19.18	7.841 to 30.51	****	<0.0001
pH 4.8:ZnSO4 100 vs. pH 6.8:ZnGly 100	17.04	5.707 to 28.38	***	0.0004
pH 4.8:ZnSO4 100 vs. pH 6.8:ZnGly 150	15.28	3.941 to 26.61	**	0.0019
pH 4.8:ZnSO4 150 vs. pH 4.8:ZnGly 20	8.500	-0.7544 to 17.75	ns	0.0987
pH 4.8:ZnSO4 150 vs. pH 4.8:ZnGly 100	6.367	-2.888 to 15.62	ns	0.4638
pH 4.8:ZnSO4 150 vs. pH 4.8:ZnGly 150	4.600	-4.654 to 13.85	ns	0.8881
pH 4.8:ZnSO4 150 vs. pH 6.8:ZnSO4 20	11.34	0.007412 to 22.68	*	0.0497
pH 4.8:ZnSO4 150 vs. pH 6.8:ZnSO4 100	11.08	-0.2593 to 22.41	ns	0.0608
pH 4.8:ZnSO4 150 vs. pH 6.8:ZnSO4 150	10.88	4.331 to 17.42	****	<0.0001
pH 4.8:ZnSO4 150 vs. pH 6.8:ZnGly 20	19.38	8.041 to 30.71	****	<0.0001
pH 4.8:ZnSO4 150 vs. pH 6.8:ZnGly 100	17.24	5.907 to 28.58	***	0.0003
pH 4.8:ZnSO4 150 vs. pH 6.8:ZnGly 150	15.48	4.141 to 26.81	**	0.0016
pH 4.8:ZnGly 20 vs. pH 4.8:ZnGly 100	-2.133	-11.39 to 7.121	ns	>0.9999
pH 4.8:ZnGly 20 vs. pH 4.8:ZnGly 150	-3.900	-13.15 to 5.354	ns	0.9682

pH 4.8:ZnGly 20 vs. pH 6.8:ZnSO4 20	2.842	-8.493 to 14.18	ns	0.9999
pH 4.8:ZnGly 20 vs. pH 6.8:ZnSO4 100	2.575	-8.759 to 13.91	ns	>0.9999
pH 4.8:ZnGly 20 vs. pH 6.8:ZnSO4 150	2.375	-8.959 to 13.71	ns	>0.9999
pH 4.8:ZnGly 20 vs. pH 6.8:ZnGly 20	10.88	4.331 to 17.42	****	<0.0001
pH 4.8:ZnGly 20 vs. pH 6.8:ZnGly 100	8.742	-2.593 to 20.08	ns	0.2871
pH 4.8:ZnGly 20 vs. pH 6.8:ZnGly 150	6.975	-4.359 to 18.31	ns	0.6420
pH 4.8:ZnGly 100 vs. pH 4.8:ZnGly 150	-1.767	-11.02 to 7.488	ns	>0.9999
pH 4.8:ZnGly 100 vs. pH 6.8:ZnSO4 20	4.975	-6.359 to 16.31	ns	0.9554
pH 4.8:ZnGly 100 vs. pH 6.8:ZnSO4 100	4.708	-6.626 to 16.04	ns	0.9719
pH 4.8:ZnGly 100 vs. pH 6.8:ZnSO4 150	4.508	-6.826 to 15.84	ns	0.9810
pH 4.8:ZnGly 100 vs. pH 6.8:ZnGly 20	13.01	1.674 to 24.34	*	0.0131
pH 4.8:ZnGly 100 vs. pH 6.8:ZnGly 100	10.88	4.331 to 17.42	****	<0.0001
pH 4.8:ZnGly 100 vs. pH 6.8:ZnGly 150	9.108	-2.226 to 20.44	ns	0.2320
pH 4.8:ZnGly 150 vs. pH 6.8:ZnSO4 20	6.742	-4.593 to 18.08	ns	0.6919
pH 4.8:ZnGly 150 vs. pH 6.8:ZnSO4 100	6.475	-4.859 to 17.81	ns	0.7466
pH 4.8:ZnGly 150 vs. pH 6.8:ZnSO4 150	6.275	-5.059 to 17.61	ns	0.7851
pH 4.8:ZnGly 150 vs. pH 6.8:ZnGly 20	14.78	3.441 to 26.11	**	0.0029
pH 4.8:ZnGly 150 vs. pH 6.8:ZnGly 100	12.64	1.307 to 23.98	*	0.0178
pH 4.8:ZnGly 150 vs. pH 6.8:ZnGly 150	10.88	4.331 to 17.42	****	<0.0001
pH 6.8:ZnSO4 20 vs. pH 6.8:ZnSO4 100	-0.2667	-9.521 to 8.988	ns	>0.9999
pH 6.8:ZnSO4 20 vs. pH 6.8:ZnSO4 150	-0.4667	-9.721 to 8.788	ns	>0.9999
pH 6.8:ZnSO4 20 vs. pH 6.8:ZnGly 20	8.033	-1.221 to 17.29	ns	0.1461
pH 6.8:ZnSO4 20 vs. pH 6.8:ZnGly 100	5.900	-3.354 to 15.15	ns	0.5871
pH 6.8:ZnSO4 20 vs. pH 6.8:ZnGly 150	4.133	-5.121 to 13.39	ns	0.9488
pH 6.8:ZnSO4 100 vs. pH 6.8:ZnSO4 150	-0.2000	-9.454 to 9.054	ns	>0.9999
pH 6.8:ZnSO4 100 vs. pH 6.8:ZnGly 20	8.300	-0.9544 to 17.55	ns	0.1171
pH 6.8:ZnSO4 100 vs. pH 6.8:ZnGly 100	6.167	-3.088 to 15.42	ns	0.5159
pH 6.8:ZnSO4 100 vs. pH 6.8:ZnGly 150	4.400	-4.854 to 13.65	ns	0.9178
pH 6.8:ZnSO4 150 vs. pH 6.8:ZnGly 20	8.500	-0.7544 to 17.75	ns	0.0987
pH 6.8:ZnSO4 150 vs. pH 6.8:ZnGly 100	6.367	-2.888 to 15.62	ns	0.4638
pH 6.8:ZnSO4 150 vs. pH 6.8:ZnGly 150	4.600	-4.654 to 13.85	ns	0.8881
pH 6.8:ZnGly 20 vs. pH 6.8:ZnGly 100	-2.133	-11.39 to 7.121	ns	>0.9999
pH 6.8:ZnGly 20 vs. pH 6.8:ZnGly 150	-3.900	-13.15 to 5.354	ns	0.9682
pH 6.8:ZnGly 100 vs. pH 6.8:ZnGly 150	-1.767	-11.02 to 7.488	ns	>0.9999

Asterisks represent p- value classification (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ **** $p < 0.0001$).