Analytical Results for Bound 3-MCPD and Bound Glycidol in Infant Formula (2025 Supplemental)

The data in this table represent 104 samples of infant formulas tested for bound 3-MCPD and bound glycidol in a 2025 suppplemental survey. [a], [b], [c], [d]

Sample Number	Simplified Product Label	Bound 3-MCPD (ppb) MRC (powder) = 0.6 ppb	Bound Glycidol (ppb) MRC (powder) = 0.7 ppb
2	Infant Formula, Powder, Goat Milk-based	<MRC	<MRC
3	Infant Formula, Powder, Cow Milk-based	16.4	<MRC
4	Infant Formula, Powder, Goat Milk-based	17.5	<MRC
5	Infant Formula, Powder, Cow Milk-based	29.8	4.5
6	Infant Formula, Powder, Cow Milk-based	8.5	<MRC
7	Infant Formula, Powder, Goat Milk-based	4.3	<MRC
8	Infant Formula, Powder, Cow Milk-based	11.2	<MRC
9	Infant Formula, Powder, Cow Milk-based	13.5	<MRC
10	Infant Formula, Powder, Goat Milk-based	24.0	<MRC
11	Infant Formula, Powder, Goat Milk-based	29.3	<MRC
12	Infant Formula, Powder, Goat Milk-based	11.7	2.0
13	Infant Formula, Powder, Cow Milk-based	30.4	<MRC
14	Infant Formula, Powder, Cow Milk-based	20.7	<MRC
15	Infant Formula, Powder, Cow Milk-based	11.7	<MRC
16	Infant Formula, Powder, Goat Milk-based	3.7	3.0
17	Infant Formula, Powder, Cow Milk-based	35.3	5.0
19	Infant Formula, Powder, Goat Milk-based	4.3	3.1
21	Infant Formula, Powder, Cow Milk-based	35.2	4.4
22	Infant Formula, Powder, Goat Milk-based	34.4	3.5
25	Infant Formula, Powder, Cow Milk-based	25.2	3.3
26	Infant Formula, Powder, Cow Milk-based	29.8	3.0
27	Infant Formula, Powder, Cow Milk-based	15.5	<MRC
30	Infant Formula, Powder, Goat Milk-based	18.9	<MRC
31	Infant Formula, Powder, Cow Milk-based	35.7	<MRC
32	Infant Formula, Powder, Goat Milk-based	20.3	<MRC
33	Infant Formula, Powder, Cow Milk-based	8.3	<MRC
34	Infant Formula, Powder, Goat Milk-based	30.7	<MRC
36	Infant Formula, Powder, Cow Milk-based	34.6	4.4
37	Infant Formula, Powder, Cow Milk-based	15.5	<MRC
38	Infant Formula, Powder, Cow Milk-based	7.8	<MRC
39	Infant Formula, Powder, Goat Milk-based	15.5	<MRC
40	Infant Formula, Powder, Goat Milk-based	36.2	<MRC
47	Infant Formula, Powder, Goat Milk-based	35.2	3.9
49	Infant Formula, Powder, Cow Milk-based	21.4	<MRC
50	Infant Formula, Powder, Goat Milk-based	21.1	2.8
51	Infant Formula, Powder, Goat Milk-based	11.9	<MRC
52	Infant Formula, Powder, Goat Milk-based	18.2	10.1
55	Infant Formula, Powder, Cow Milk-based	19.5	5.9
56	Infant Formula, Powder, Cow Milk-based	17.5	<MRC
57	Infant Formula, Powder, Goat Milk-based	11.6	7.7
62	Infant Formula, Powder, Goat Milk-based	31.0	<MRC
63	Infant Formula, Powder, Cow Milk-based	20.6	11.9
64	Infant Formula, Powder, Cow Milk-based	11.3	<MRC
65	Infant Formula, Powder, Goat Milk-based	12.8	<MRC
66	Infant Formula, Powder, Cow Milk-based	18.7	9.3
67	Infant Formula, Powder, Cow Milk-based	14.8	<MRC
68	Infant Formula, Powder, Cow Milk-based	11.7	<MRC
69	Infant Formula, Powder, Cow Milk-based	12.3	3.9
77	Infant Formula, Powder, Goat Milk-based	15.8	2.0
78	Infant Formula, Powder, Goat Milk-based	19.0	<MRC
79	Infant Formula, Powder, Goat Milk-based	22.9	11.3
80	Infant Formula, Powder, Goat Milk-based	22.3	15.8
81	Infant Formula, Powder, Cow Milk-based	22.0	17.8
84	Infant Formula, Powder, Cow Milk-based	13.2	<MRC
85	Infant Formula, Powder, Cow Milk-based	11.8	<MRC
86	Infant Formula, Powder, Cow Milk-based	13.0	<MRC
87	Infant Formula, Powder, Goat Milk-based	11.0	<MRC
90	Infant Formula, Powder, Goat Milk-based	13.1	<MRC
91	Infant Formula, Powder, Goat Milk-based	15.0	<MRC
92	Infant Formula, Powder, Goat Milk-based	17.3	<MRC
93	Infant Formula, Powder, Goat Milk-based	12.9	<MRC
94	Infant Formula, Powder, Cow Milk-based	14.1	<MRC
95	Infant Formula, Powder, Cow Milk-based	13.1	<MRC
97	Infant Formula, Powder, Cow Milk-based	21.2	<MRC
98	Infant Formula, Powder, Cow Milk-based	16.5	<MRC
99	Infant Formula, Powder, Cow Milk-based	24.2	<MRC
100	Infant Formula, Powder, Cow Milk-based	15.5	<MRC
101	Infant Formula, Powder, Goat Milk-based	12.6	<MRC
102	Infant Formula, Powder, Goat Milk-based	15.6	<MRC
103	Infant Formula, Powder, Goat Milk-based	2.8	<MRC
104	Infant Formula, Powder, Goat Milk-based	29.0	<MRC
105	Infant Formula, Powder, Cow Milk-based	23.2	<MRC
110	Infant Formula, Powder, Cow Milk-based	25.0	<MRC
111	Infant Formula, Powder, Cow Milk-based	24.3	<MRC
112	Infant Formula, Powder, Cow Milk-based	34.4	<MRC
113	Infant Formula, Powder, Cow Milk-based	31.7	<MRC
114	Infant Formula, Powder, Goat Milk-based	41.0	<MRC
115	Infant Formula, Powder, Goat Milk-based	31.7	9.7
116	Infant Formula, Powder, Goat Milk-based	66.4	4.0
121	Infant Formula, Powder, Goat Milk-based	35.6	13.5
123	Infant Formula, Powder, Cow Milk-based	64.4	10.0
126	Infant Formula, Powder, Cow Milk-based	24.7	<MRC
131	Infant Formula, Powder, Cow Milk-based	22.4	<MRC
132	Infant Formula, Powder, Goat Milk-based	32.3	<MRC
133	Infant Formula, Powder, Goat Milk-based	47.8	13.2
134	Infant Formula, Powder, Goat Milk-based	45.6	13.8

135	Infant Formula, Powder, Cow Milk-based	17.9	11.1
145	Infant Formula, Powder, Cow Milk-based	25.0	<MRC
147	Infant Formula, Powder, Goat Milk-based	12.9	<MRC
148	Infant Formula, Powder, Goat Milk-based	9.6	<MRC
149	Infant Formula, Powder, Cow Milk-based	18.1	<MRC
150	Infant Formula, Powder, Goat Milk-based	11.8	<MRC
151	Infant Formula, Powder, Goat Milk-based	12.5	12.2
152	Infant Formula, Powder, Goat Milk-based	23.0	13.0
154	Infant Formula, Powder, Goat Milk-based	11.7	9.0
157	Infant Formula, Powder, Goat Milk-based	20.0	13.3
158	Infant Formula, Powder, Goat Milk-based	2.1	<MRC
159	Infant Formula, Powder, Goat Milk-based	<MRC	<MRC
160	Infant Formula, Powder, Cow Milk-based	1.6	<MRC
161	Infant Formula, Powder, Cow Milk-based	15.5	<MRC
162	Infant Formula, Powder, Cow Milk-based	12.9	<MRC
163	Infant Formula, Powder, Cow Milk-based	25.0	<MRC
164	Infant Formula, Powder, Cow Milk-based	13.8	<MRC
165	Infant Formula, Powder, Cow Milk-based	27.6	2.0

[a] The 104 formulas above are all powder formulas and were analyzed as sold. Results are reported on a per gram of powder basis, where ppb = parts per billion.

[b] The minimum reporting concentration (MRC) represents the lowest concentration of total bound 3-MCPD or bound glycidol that can be reliably quantified in a sample (bound 3-MCPD MRC = 0.6 ppb powder; bound glycidol MRC = 0.7 ppb powder). Total bound 3-MCPD and bound glycidol are not measured directly. Instead, they are calculated by summing the concentrations of the individual 3-MCPD esters or glycidyl esters detected in the sample after converting them to their corresponding “bound” 3-MCPD or “bound” glycidol equivalents. As a result, the MRC for each bound analyte represents the lowest concentration that would be obtained if only a single ester were present at its limit of quantitation (LOQ). The LOQ varies slightly for each individual ester and ranges from approximately 6–34 ppb powder Because bound 3-MCPD and bound glycidol concentrations are measured on a fat basis, conversion of the MRC to a concentration per gram of infant formula powder depends on the fat content of the formula, which varies between products. For the purpose of calculating the MRC on a powder basis for this data set, the minimum fat content required for infant formula under 21 CFR § 107.100 (3.3 g fat per 100 kcal) was used. This corresponds to approximately 25 g of powder per 100 kcal, depending on formula density, resulting in a minimum fat percentage of approximately 13% in a powder infant formula product. For all products evaluated in this study, the fat content in each product exceeded 13%.

[c] Results below the MRC are reported as <MRC.

[d] Analyses were conducted using liquid chromatography-tandem mass spectrometry (LC-MS/MS) following the method:
(Beekman) Leigh, J. K.; MacMahon, S J. Agric. Food. Chem. 2016, 64, 9442. (https://pubmed.ncbi.nlm.nih.gov/27960288/)