Additions and Corrections

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Janice K. Huwe* and David J. Smith: Accumulation, Whole-Body Depletion, and Debromination of Decabromodiphenyl Ether in Male Sprague−Dewley Rats Following Dietary Exposure

The reported amounts of PBDEs in feces were found to be low by a factor of 10. During further investigations into the uptake and excretion of PBDEs in rats, a discrepancy was noted between fecal excretion rates of BDE-209 in the two studies. This led to a re-examination of the first published study and discovery of an error in a spreadsheet. Only the fecal excretion data were affected by this error and have been corrected in a revised Table 2 given below.

This error does not affect any of the tissue distribution, bioconcentration, or depuration and half-life data or related conclusions. Regarding the metabolism and possible reductive debromination of BDE-209, 55% of the dose was recovered in tissues and excreta as parent BDE-209 still suggesting that a significant amount (45%) of the BDE-209 may have been metabolized to other compounds or inextractably bound residues. Three PBDE congeners putatively formed via reductive debromination of BDE-209 were recovered in particularly high amounts in the tissues compared to the actual dose: BDEs-207 (155% of dose), BDE-197 (>1100% of dose), and BDE-201 (>800% of dose). The addition of the corrected fecal excretion amounts only adds to this mass balance discrepancy; however, the extent of reductive debromination still represents a minor fraction of the BDE-209 dose (<3%). Based on the corrected fecal data, BDEs-206 and 203 appear to be largely excreted in the feces with no evidence of extensive metabolism.

Abstract: Decabromodiphenyl ether (BDE-209) is the major component in the flame retardant formulation DecaBDE which is incorporated into numerous consumer goods ranging from upholsteries to electronics. Because of the high volume of DecaBDE produced, its presence in consumer products and the environment, and the finding of BDE-209 in the blood of exposed workers, the extent of bioavailability, persistence, and potential debromination are important issues. To measure the bioconcentration, distribution, reductive debromination, and whole-body half-lives of BDE-209 after multiple low doses in an animal model, we dosed rats with a commercial DecaBDE (0.3 μg/g diet) for 21 days and measured tissue polybrominated diphenyl ether levels during a 21 day withdrawal period. BDE-209, three nona-BDEs, and four octa-BDEs accumulated in the rats and distributed proportionately throughout the body. Only 5% of the total BDE-209 dose was present as parent compound in the rats after 21 days of dosing and 50% in the feces, suggesting extensive metabolism. A nona-BDE (BDE-207) and two octa-BDEs (BDE-201 and -197) appeared to form via *meta*-debromination(s) of BDE-209 to a minimal extent (3% of the total BDE-209 dose). The whole-body half-lives tended to increase with decreasing bromination; however, two octa-BDEs, presumably forming from debromination, increased in the rats after 21 days of withdrawal and demonstrated the potential for BDE-209 to form more persistent lipophilic compounds in vivo.

TABLE 2. (Revisions in Bold) PBDE Amounts (ng ± SD) in the Dose and in the Dosed Rat Tissues, Plasma, and Feces from a 21 Day Feeding Study with a DecaBDE Formulation and the Average Percent of Each Congener Retained and Excreted by the Rats (n = 3)[a]

BDE no.[b]	dose[c] (n = 3)	av control-subtracted amts (ng) in dosed rat tissues and feces (n = 3)					% of dose	
		liver	carcass	GI tract	plasma	feces	retained	excreted
209	71,770 ± 6400	320 ± 60	3020 ± 810	190 ± 30	11.6 ± 4.0	**35940 ± 732**	5	**50**
206	1060 ± 330	6 ± 5	80 ± 26	4 ± 1	0.1 ± 0.1	**830 ± 75**	9	**79**
207[d]	450 ± 170	50 ± 26	620 ± 15	30 ± 6	1.7 ± 0.4	**830 ± 97**	155	**183**
208[d]	90 ± 20	6 ± 5	70 ± 20	4 ± 1	nd (0.15)	**270 ± 44**	85	**290**
196[d]	24 ± 9.9	1 ± 0.5	20 ± 3	1 ± 0.2	0.01 ± 0.01	**8.8 ± 6.4**	108	**37**
203	12 ± 4.9	0.2 ± 0.1	4 ± 1	0.1 ± 0.04	nd (0.01)	**6.4 ± 0.7**	35	**56**
197[d]	8 ± 0.7	5 ± 1	80 ± 5	4 ± 1	0.07 ± 0.03	**11.1 ± 9.4**	1170	**146**
201[d]	nd (2.4)	1 ± 0.5	20 ± 2	0.5 ± 0.4	0.01 ± 0.01	**7.6 ± 1.0**	845	**217**
183	4 ± 0.6	0.2 ± 0.1	6 ± 1	0.2 ± 0.1	0.01 ± 0.01	**nd (0.13)**	150	**3**

[a] The total amounts in the dosed tissues, plasma, and feces are corrected for the amounts in the control rats. For nondetected congeners (nd), the maximum amount possible based on the detection limit is given in Parentheses. [b] PBDEs are listed in reverse elution order and numbered according to the IUPAC numbering system and have the following bromine substitutions: 209 = deca; 208 = 2,2′,3,3′,4,5,5′,6,6′-nona; 207 = 2,2′,3,3′,4,4′,5,6,6′-nona; 206 = 2,2′,3,3′,4,4′,5,5′,6-nona; 201 = 2,2′,3,3′,4,5′,6,6′-octa; 197 = 2,2′,3,3′,4,4′,6,6′-octa; 203 = 2,2′,3,4,4′,5,5′,6-octa; 196 = 2,2′,3,3′,4,4′,5′,6-octa; 183 = 2,2′,3,4,4′,5′,6-hepta. [c] Total amount of PBDEs fed to each rat over 21 days. [d] These values are estimates because exact standards were not available to validate the analytical method; standards were obtained later to identify congeners by GC retention time comparisons.

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