Supporting Information for

Toxicity of microplastics and natural particles in the freshwater dipteran *Chironomus riparius*: Same same but different?

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Key words: invertebrates, multiple stressors, nanoplastics, thermal desorption GC-MS, imidacloprid

S1) Characterisation of kaolin, diatomite and PVC-MP

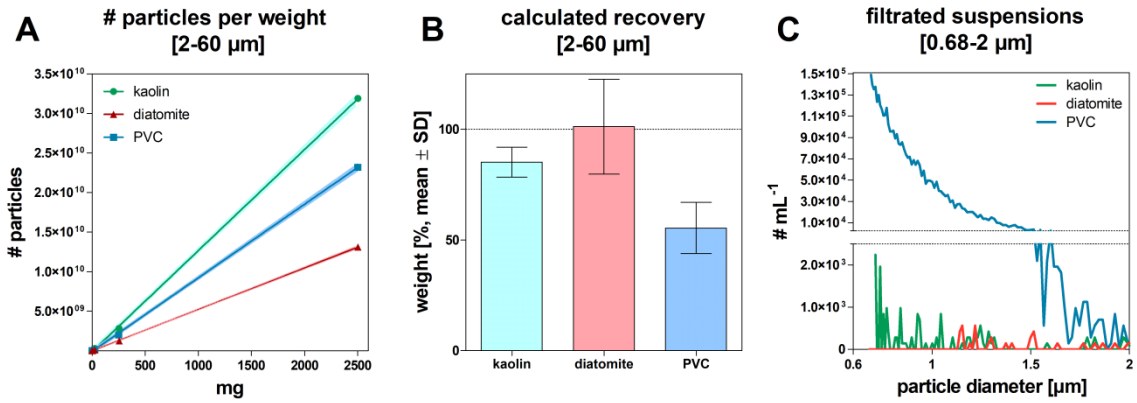


Figure 1: Characterisation of the used FPMs. (A) linear regression of the number of particles per weight by analysing four concentrations (50 mg, 500 mg, 5 g and 50 g per L) of kaolin (r^2= 0.99), diatomite (r^2= 0.99) and PVC (r^2= 0.99), (B) calculated mass recovery of the four FPM suspension assuming spherical shapes, (C) distribution of particles in the size range of 0.68 to 2 µm by analysing FPM filtrates (50 g L^{-1} kaolin, diatomite and PVC).

S2) Chemical Analysis

Table S1: Sample preparation and equipment used for chemical analysis of imidacloprid and phthalate concentrations (sediment and water) and raw PVC particles.

		sample preparation	analysis & equipment
imidacloprid	**water**	I) 1960 µL sample +20 µL imidacloprid-d4 (100 ng/mL) +20 µL phthalate-mix (DEP-d4, DBP-d4, DEHP-d4; ea 100 ng/mL) II) filtration (PTFE, 0.45 µm)	LC-MS • LC: Agilent 1260 • MS: QTrap 4500 AB Sciex; • column: Kinetex 2,6 µm C18 100 Å, 100 x 2.1 mm (Phenomenex) • eluent A: water with 0.1% formic acid • eluent B: acetonitrile with 0.1% formic acid • gradient: 0-0.10 min: A 80% & B 20%, 0.10-2.0 min: A 80→5% & B 20→95%, 2.0-2.50 min: A 5% & B 95%, 2.50-2.60 min: A 5→80% & B: 95→20%, 2.60-7.0 min: A:80% & B: 20% • flow rate: 0.4 mL/min • injection volume: 40 µL • oven temp: 40°C • ESI positive
	sediment	I) 2 g freeze dried sediment + 10 mL methanol + 10 mL acetone + 200 µL phthalate-mix (DEP-d4, DBP-d4,DEHP-d4; ea 100 ng/mL) + 40 µL imidacloprid-d4 (100 ng/mL) II) microwave-extraction (900 W, ramp time: 15 min, hold time: 15 min, temp.: 90°C) III) filtration (glassfiber, 1.0 µm) IV) evaporation with nitrogen V) filtration (glassfiber, 1.0 µm) VI) evaporation with nitrogen to a volume of 0.5 mL VII) adding methanol up to a final volume of 1 mL VIII) 250 µL extract + 750 µL water for analysis	
phthalate	**water**	I) 900 µL sample +100 µL phthalate-mix (DEP-d4, DBP-d4, DEHP-d4; ea 100 ng/L) II) centrifugation (5 min, 5000 g) III) 950 µL of the supernatant for analysis	LC-MS • LC: Agilent 1260 • MS: QTrap 4500 AB Sciex; • trap column: Agilent Poroshell 120 EC-C18 2,7µm 4,6mmx50mm • column: Kinetex 2,6 µm C18 100 Å, 100 x 2.1 mm (Phenomenex). • eluent A: water with 0.1% formic acid • eluent B: acetonitrile with 0.1% formic acid • gradient: 0-0.50 min: A 80% & B 20%, 0.50-3.0 min: A 80→5% & B 20→95%, 3.0-13.0 min: A 5% & B 95%, 13.0-13.10 min: A 5→80% & B: 95→20%, 13.10-17.0 min: A:80% & B: 20% • flow rate: 0.4 mL/min • injection volume: 10 µL • oven temp: 40°C • ESI positive
	sediment	I) 2 g freeze dried sediment + 10 mL methanol + 10 mL acetone + 200 µL phthalate-mix (DEP-d4, DBP-d4, DEHP-d4; ea 100 ng/mL) + 40 µL imidacloprid-d4 (100 ng/mL) II) microwave-extraction (900 W, ramp time: 15 min, hold time: 15 min, temp.: 90°C) III) filtration (glassfiber, 1.0 µm) IV) evaporation with nitrogen V) filtration (glassfiber, 1.0 µm) VI) evaporation with nitrogen to a volume of 0.5 mL VII) adding methanol up to a final volume of 1 mL VIII) 250 µL extract + 750 µL water for analysis	
PVC	**particles**	I) 100 µg PVC-MP weighted into a sample cup	TD-GC-MS • Multi-Shot Pyrolyzer EGA/PY-3030D (Frontier Lab, Koriyama, Japan) coupled to a 7890B gas chromatograph (Agilent Technologies, Santa Clara, USA) and 5977B MSD (Agilent Technologies, Santa Clara, USA) • thermal desorption: temp: 280 °C, t: 5 min • carrier gas: helium • flow rate: 1.2 ml/min • Column: Ultra ALLOY®-UA5 capillary column (30 m, inner diameter 250 µm, film thickness 0.25 µm) • Oven program: 40 °C for 2 min, increased with 20 °C min^{-1} to 320 °C and hold for 13 min • MS: EI, full scan 40-800

S2.1) Results

S2.2.1) Phthalates

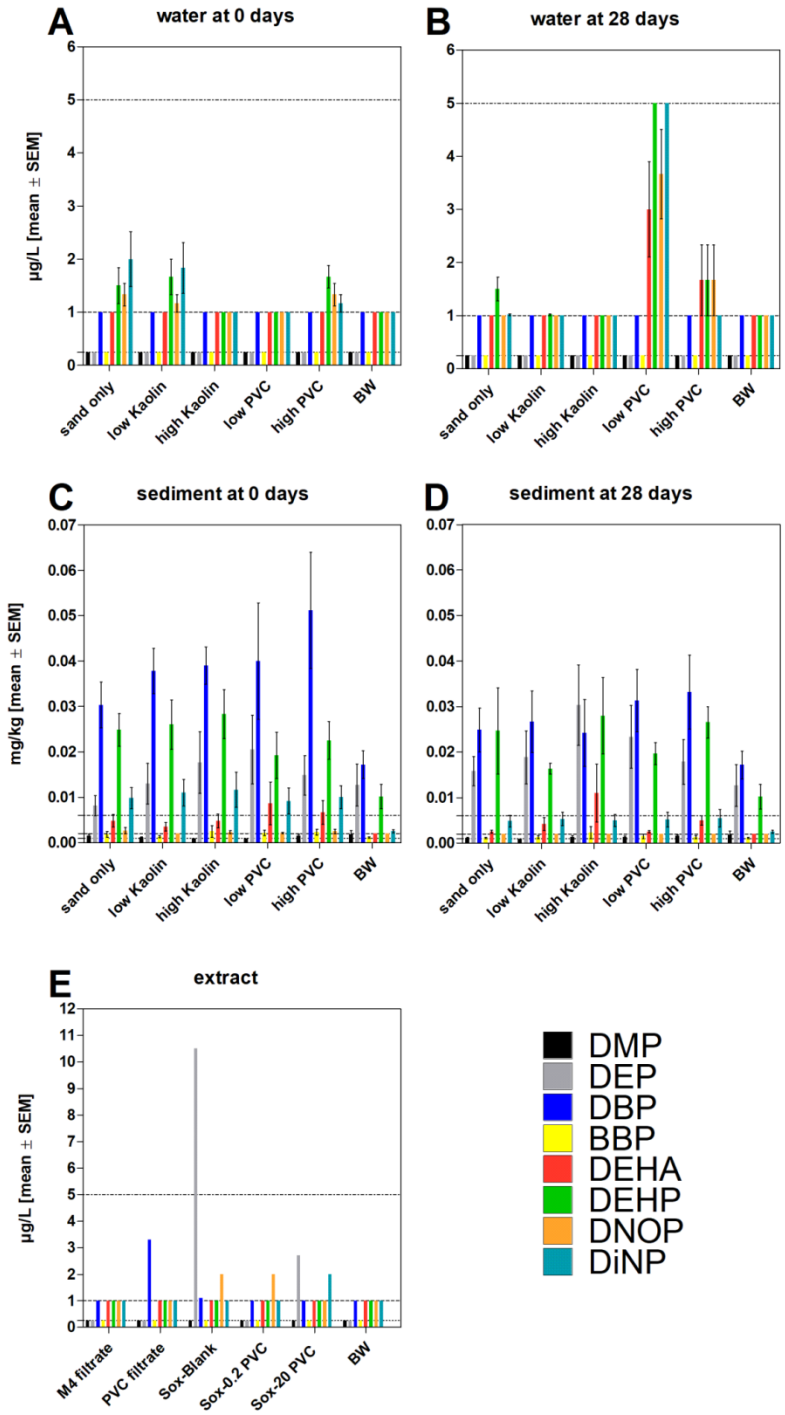


Figure S2: Measured additive concentrations in water [µg/L] and sediment [mg/kg] samples of 28 days chronic toxicity experiment with *Chironomus riparius*. (A-D) measured concentrations in the experiment with imidacloprid, in which all imidacloprid concentrations were pooled. Low Kaolin = 0.2 g kaolin per 100 g sediment, high Kaolin = 20 g kaolin per 100 g sediment, low PVC = 0.2 g PVC per 100 g sediment, high PVC = 20 g PVC per 100 g sediment. (E) Measured waterborne concentrations of phthalates and adipates in filtrated PVC M4 suspensions (20 g PVC per 400 mL M4 medium), PVC extracts representing 0.2 and 20 g PVC equivalents and the corresponding controls. DMP = dimethyl phthalate, DEP = diethyl phthalate, DBP = dibutyl phthalate, BBP = benzyl butyl phthalate, DEHA = bis(2-ethylhexyl) adipate, DEHP = Bis(2-ethylhexyl) phthalate, DNOP = di-n-octyl phthalate, DiNP = diisononyl phthalate.

S2.2.2) Imidacloprid

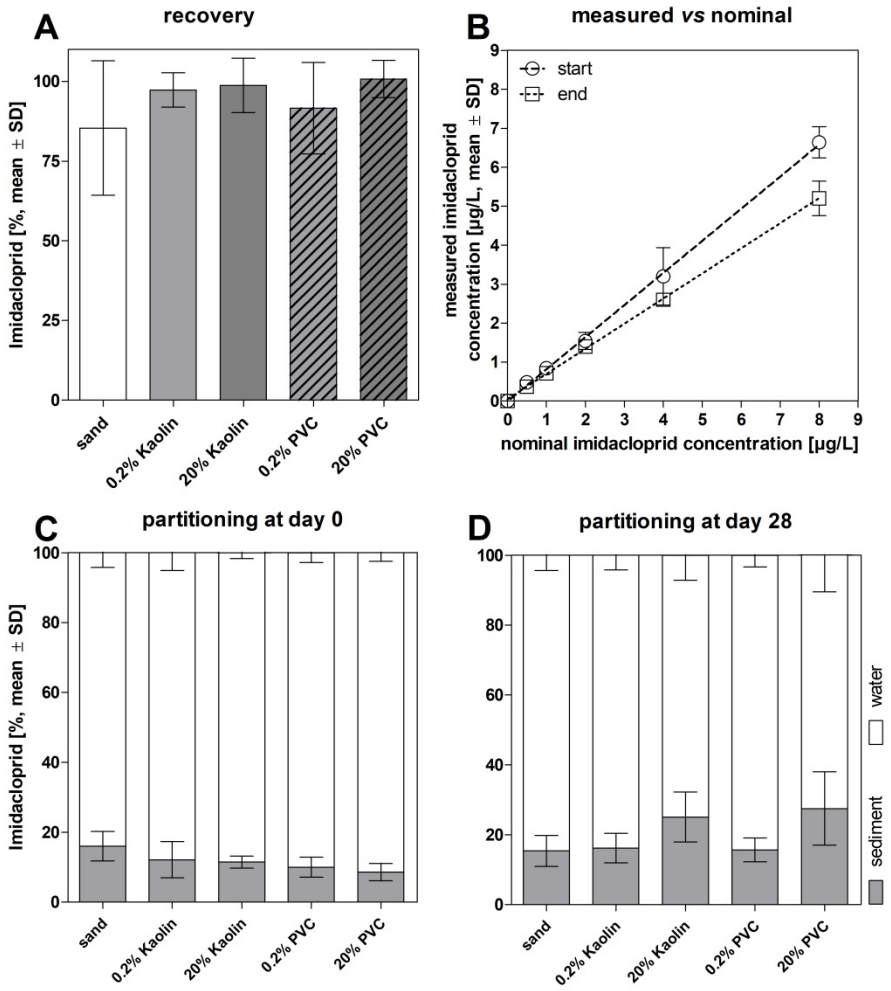


Figure S3: Recovery, measured concentrations and partitioning of imidacloprid during the 28 days chronic toxicity experiment with *Chironomus riparius*. (A) recovered imidacloprid (%) from water and sediment samples, (B) measured concentrations of imidacloprid in the test media at the start (0 days) and end (28 days) of the experiment, (C-D) partitioning of imidacloprid (%) at the start (0 days) and the end (28 days) of the experiment. 0.2% kaolin = 0.2 g kaolin per 100 g sediment, 20% kaolin = 20 g kaolin per 100 g sediment, 0.2% PVC = 0.2 g PVC per 100 g sediment, 20% PVC = 20 g PVC per 100 g sediment

S3) Statistical Analysis

S3.1) Material and Method

S3.2) Results

Table S2: Application via sediment. Analysis of the GLMs after AIC-based selection of the optimal model parameterisation. For emergence and EMT50, the GLM distribution family was binomial with a logit-link, as the data was expressed binarily as either success or non-success (1 or 0, respectively). For weight and development rate, an exponential Gamma family distribution with inverse-link was used, because the data showcased increased variance with increased average values. Parameters were analysed using χ^2-tests with marginal (type III) sum-of-squares. Exact p-values are given and statistically significant parameters are expressed as ★★★ = p<0.001, ★★= p<0.01, ★= p<0.05. Est. = estimate. CI= confidence interval.

Response/ Parameter	Est.	Std. error	Lower CI	Upper CI	χ^2-value	p-value	Sig.
Emergence							
(Intercept)	2.165	0.114	1.941	2.389	-	<2.00E-16	***
PVC	-0.083	0.015	-0.112	-0.054	27.97	1.25E-08	***
Diatomite	-0.039	0.017	-0.073	-0.005	4.54	2.31E-02	*
EmT_{50}							
(Intercept)	-11.84	0.248	-12.32	-11.35	-	<2.00E-16	***
Day	0.673	0.014	0.646	0.700	10069.30	<2.00E-16	***
Sex	0.292	0.245	-0.189	0.772	1.43	2.34E-01	
Kaolin	-0.782	0.128	-1.033	-0.532	74.70	8.98E-10	***
PVC	-1.511	0.297	-2.093	-0.929	81.30	3.66E-07	***
Diatomite	-0.271	0.081	-0.430	-0.111	15.80	8.67E-04	***
Day:Kaolin	0.046	0.007	0.032	0.061	80.50	3.99E-10	***
Day:PVC	0.084	0.017	0.051	0.116	79.70	4.23E-07	***
Day:Diatomite	0.016	0.005	0.007	0.025	16.70	7.07E-04	***
Sex:Kaolin	-0.027	0.009	-0.046	-0.008	8.80	4.48E-03	**
Sex:PVC	-1.063	0.297	-1.645	-0.480	21.50	3.47E-04	***
Sex:Diatomite	0.216	0.081	0.056	0.375	8.70	7.96E-03	**
Day:Sex	-0.034	0.014	-0.061	-0.007	6.20	1.35E-02	*
Day:Sex:PVC	0.061	0.017	0.029	0.094	23.10	2.31E-04	***
Day:Sex:Diatomite	-0.013	0.005	-0.022	-0.004	10.10	4.92E-03	**
Weight							
(Intercept)	0.908	0.004	0.900	0.916	-	<2.00E-16	***
PVC	0.005	7.7E-04	0.003	0.006	46.10	1.32E-10	***
Kaolin	0.002	7.8E-04	7.3E-05	0.003	4.30	4.03E-02	*
Diatomite	0.005	8.6E-04	0.003	0.006	31.20	8.02E-08	***
Sex	-0.343	0.004	-0.351	-0.335	9170.80	<2.00E-16	***
Kaolin:Sex	-0.002	7.8E-04	-0.003	-7.3E-06	4.00	4.92E-02	*
Diatomite:Sex	-0.001	8.6E-04	-0.003	4.3E-04	2.20	1.45E-01	
Development rate							
(Intercept)	17.43	0.248	16.94	17.92	-	<2.00E-16	***

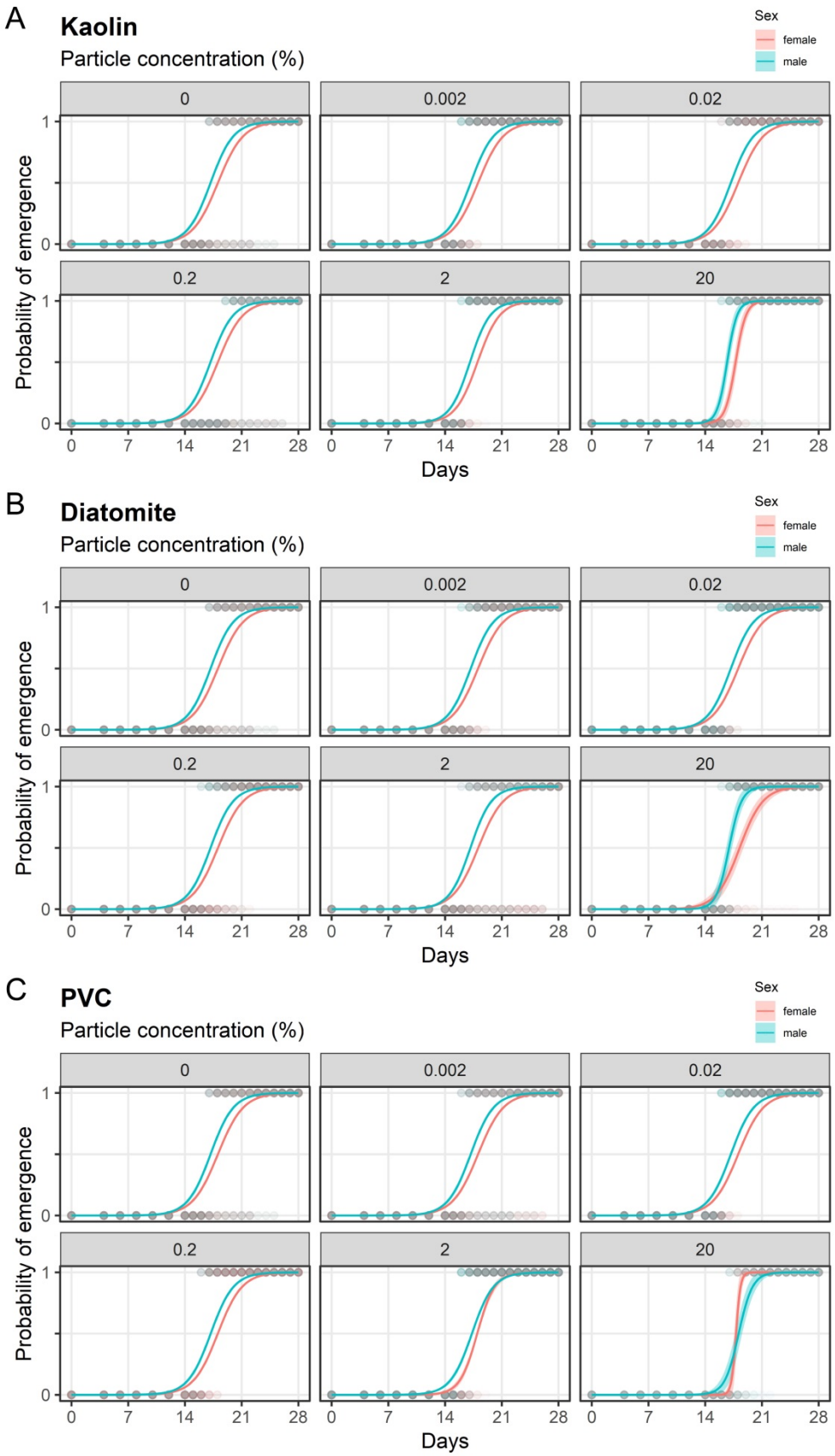


Figure S4: Modelled emergence probabilities of *Chironomus riparius* exposed to kaolin (A), diatomite (B) and PVC (C) via sediment. Points are raw data, lines are predictions from GLM (see above) and shaded areas are the 95% confidence interval for the predictions. Details for GLM are given in Table S2.

Table *S3*: Application via water. Analysis of the GLMs after AIC-based selection of the optimal model parameterisation. For emergence and EMT_{50}, the GLM distribution family was binomial with a logit-link, as the data was expressed binarily as either success or non-success (1 or 0, respectively). For weight and development rate, an exponential Gamma family distribution with inverse-link was used, because the data showcased increased variance with increased average values. Parameters were analysed using χ^2-tests with marginal (type III) sum-of-squares. Exact p-values are given and statistically significant parameters are expressed as ★★★ = p<0.001, ★★= p<0.01, ★= p<0.05. Est. = estimate. CI= confidence interval.

Response / Parameter	Est.	Std. error	Lower CI	Upper CI	χ^2-value	p-value	Sig.
Emergence							
(Intercept)	1.254	0.078	1.093	1.398	-	<2.00E-16	***
EmT_{50}							
(Intercept)	-16.09	0.369	-16.813	-15.367	-	<2.00E-16	***
Day	0.868	0.020	0.829	0.906	10085.1	<2.00E-16	***
Sex	-1.063	0.369	-1.786	-0.339	8.30	3.99E-03	**
Kaolin	-0.699	0.830	-2.327	0.928	0.80	4.00E-01	
PVC	-7.698	1.839	-11.303	-4.092	35.10	2.85E-05	***
Diatomite	-3.016	1.138	-5.247	-0.786	9.60	8.03E-03	**
Day:Kaolin	0.044	0.046	-0.046	0.133	1.00	3.38E-01	
Day:PVC	0.448	0.104	0.244	0.652	39.00	1.69E-05	***
Day:Diatomite	0.159	0.062	0.038	0.280	9.00	1.03E-02	*
Sex:Kaolin	2.469	0.830	0.841	4.096	11.00	2.95E-03	**
Sex:PVC	4.996	1.839	1.391	8.601	10.00	6.61E-03	**
Sex:Diatomite	3.634	1.138	1.404	5.865	13.30	1.41E-03	**
Day:Sex	0.037	0.020	-0.002	0.076	3.50	6.13E-02	
Day:Sex:Kaolin	-0.139	0.046	-0.229	-0.050	11.80	2.33E-03	**
Day:Sex:PVC	-0.291	0.104	-0.495	-0.087	10.90	5.15E-03	**
Day:Sex:Diatomite	-0.209	0.062	-0.331	-0.088	15.50	7.24E-04	***
Weight							
(Intercept)	0.925	0.004	0.917	0.932	-	<2.00E-16	***
PVC	0.049	0.008	0.034	0.064	45.20	1.42E-10	***
Kaolin	-0.011	0.005	-0.020	-0.002	5.30	2.00E-02	*
Diatomite	0.009	0.006	-0.001	0.020	2.90	8.93E-02	
Sex	-0.361	0.004	-0.367	-0.354	13254.90	<2.00E-16	***
PVC:Sex	-0.018	0.008	-0.032	-0.003	5.70	1.88E-02	*
Development rate							
(Intercept)	18.38	0.210	17.97	18.79	-	<2.00E-16	***
PVC	-0.205	0.393	-0.976	0.565	0.27	6.04E-01	

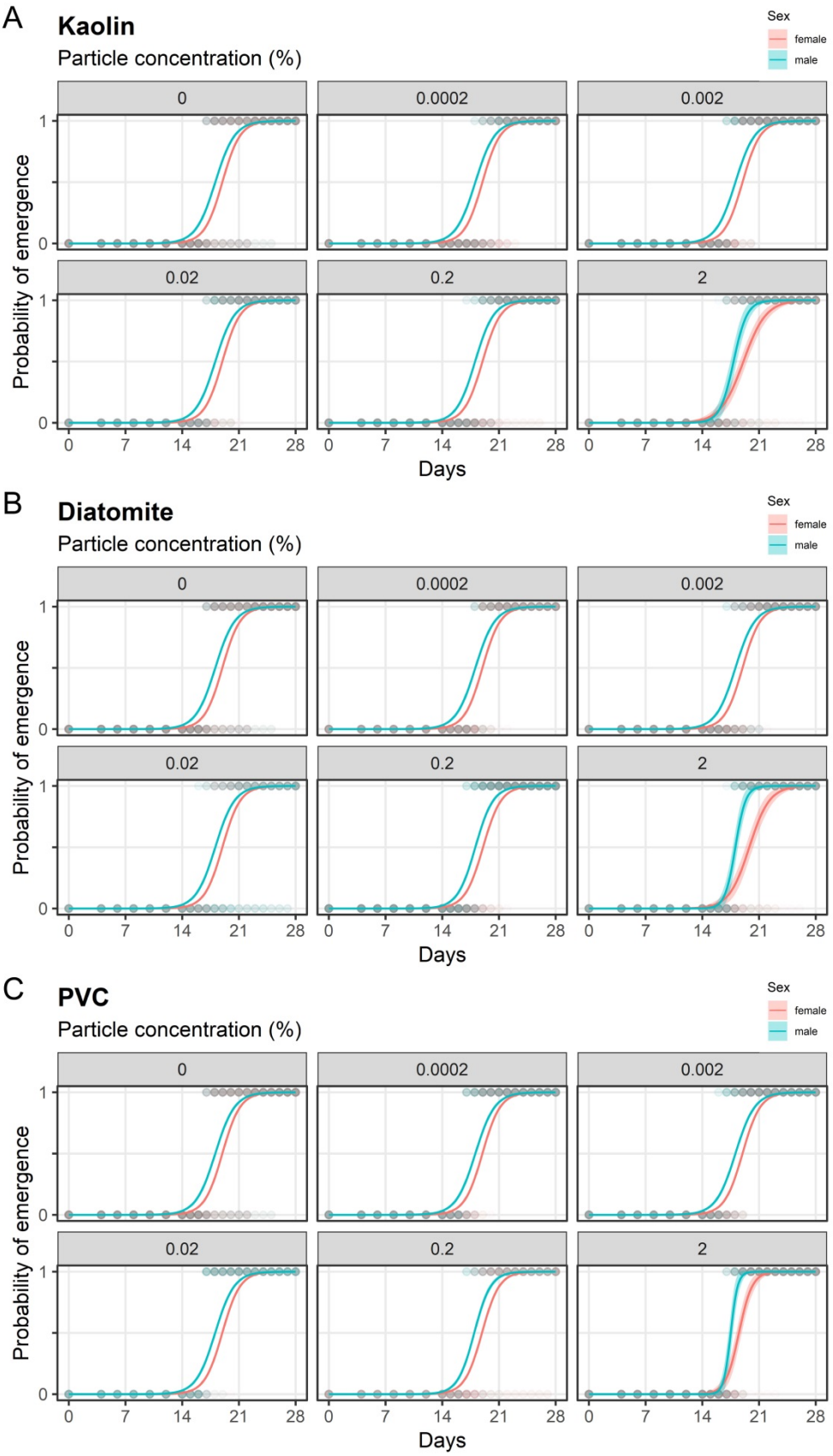
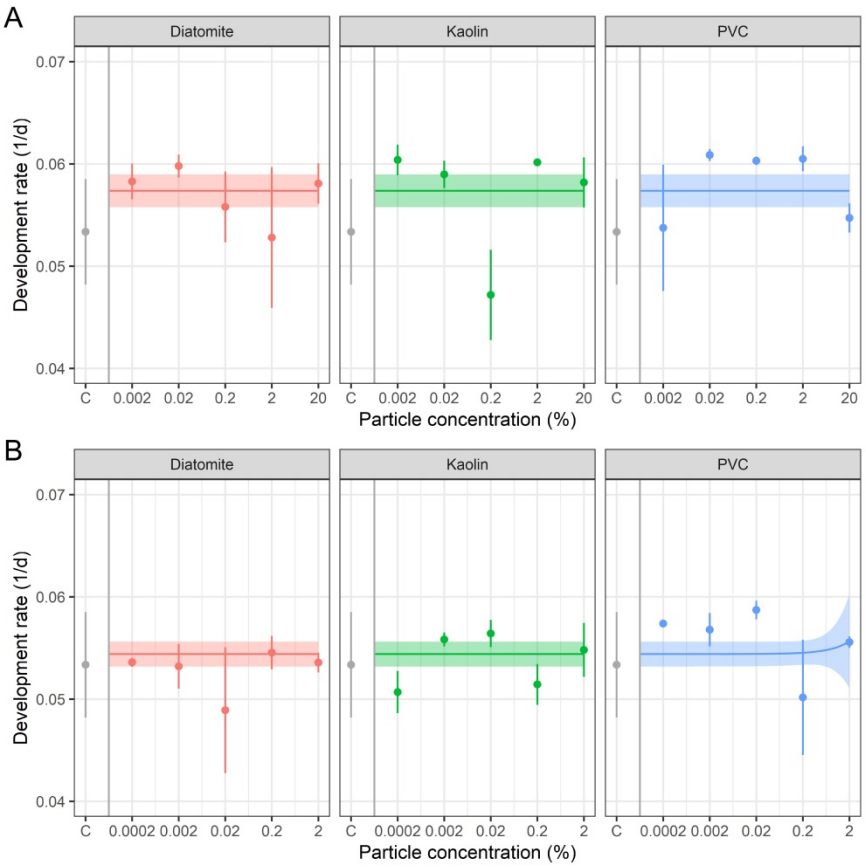


Figure S5: Modelled emergence probabilities of *Chironomus riparius* exposed to kaolin (A), diatomite (B) and PVC (C) via water. Points are raw data, lines are predictions from GLM (see above) and shaded areas are the 95% confidence interval for the predictions. Details for GLM are given in Table S3.



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81 **Figure S6: Modelled mean development rates of *Chironomus riparius* exposed to FPM (kaolin, diatomite, PVC)**
82 **via sediment (A) and water (B).** Details for GLM are given in Table S2 and S3.

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Table S4: Migrates and extract. Analysis of the GLMs after AIC-based selection of the optimal model parameterisation. For emergence and EMT50, the GLM distribution family was binomial with a logit-link, as the data was expressed binarily as either success or non-success (1 or 0, respectively). For weight and development rate, an exponential Gamma family distribution with inverse-link was used, because the data showcased increased variance with increased average values. Parameters were analysed using χ^2-tests with marginal (type III) sum-of-squares. Exact p-values are given and statistically significant parameters are expressed as ★★★ = p<0.001, ★★= p<0.01, ★= p<0.05. Est. = estimate. CI= confidence interval.

Response / Parameter	Est.	Std. error	Lower CI	Upper CI	χ^2-value	p-value	Sig.
Emergence							
(Intercept)	1.169	0.132	0.910	1.427	-	<2.00E-16	***
PVC	-0.057	0.011	-0.078	-0.036	27.49	1.52E-07	***
PVC:Method	-0.041	0.009	-0.058	-0.024	24.62	1.90E-06	***
EmT_{50}							
(Intercept)	-25.12	2.117	-29.27	-20.97	-	<2.00E-16	***
Day	1.283	0.108	1.071	1.495	1201.60	<2.00E-16	***
Sex	-0.411	0.156	-0.717	-0.105	7.19	8.48E-03	**
Kaolin	0.477	0.112	0.258	0.697	24.88	1.85E-05	***
PVC	-0.331	0.086	-0.499	-0.164	17.92	1.09E-04	***
PVC:Method	0.296	0.084	0.131	0.461	12.78	4.48E-04	***
Kaolin:Method	-0.058	0.034	-0.125	0.010	3.02	9.34E-02	
Day:Kaolin	-0.022	0.006	-0.033	-0.011	19.96	9.57E-05	***
Day:PVC	0.017	0.005	0.008	0.026	17.31	1.44E-04	***
Sex:Kaolin	-0.062	0.031	-0.122	-0.002	4.26	4.16E-02	*
Sex:PVC	0.141	0.082	-0.020	0.303	3.08	8.61E-02	
Day:Sex:Kaolin	0.004	0.002	0.001	0.007	6.45	1.24E-02	*
Day:Sex:PVC	-0.008	0.004	-0.017	0.000	3.91	5.44E-02	
Day:PVC:Method	-0.018	0.005	-0.027	-0.009	17.08	5.96E-05	***
Day:Kaolin:Method	0.003	0.002	0.000	0.007	3.21	8.42E-02	
Day:Sex:Kaolin:Method	-0.001	0.000	-0.001	0.000	8.83	3.32E-03	**
Day:Sex:PVC:Method	0.001	0.000	0.000	0.002	2.43	1.20E-01	
Weight							
(Intercept)	0.926	0.005	0.917	0.935	-	<2.00E-16	***
PVC	-0.001	3.7E-04	-0.001	6.0E-05	3.20	7.30E-02	
Sex	-0.349	0.004	-0.357	-0.341	8268.60	<2.00E-16	***
Development rate							
(Intercept)	19.44	0.694	18.08	20.80	-	<2.00E-16	***
PVC	0.007	0.033	-0.057	0.072	0.05	8.23E-01	
Kaolin	-0.053	0.039	-0.130	0.023	1.89	1.88E-01	

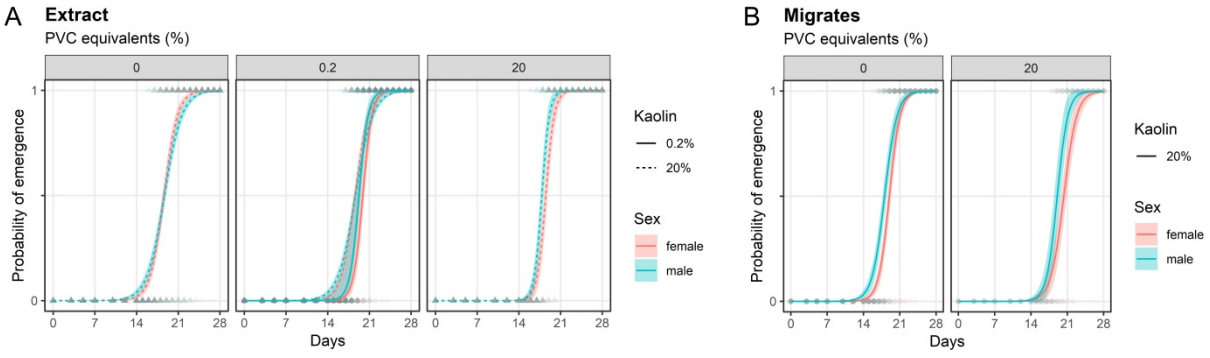

Figure S7: Modelled emergence probabilities of *Chironomus riparius* exposed to PVC migrates and extracts. Points are raw data, lines are predictions from GLM (see above) and shaded areas are the 95% confidence interval for the predictions. Details for GLM are given in Table S4.

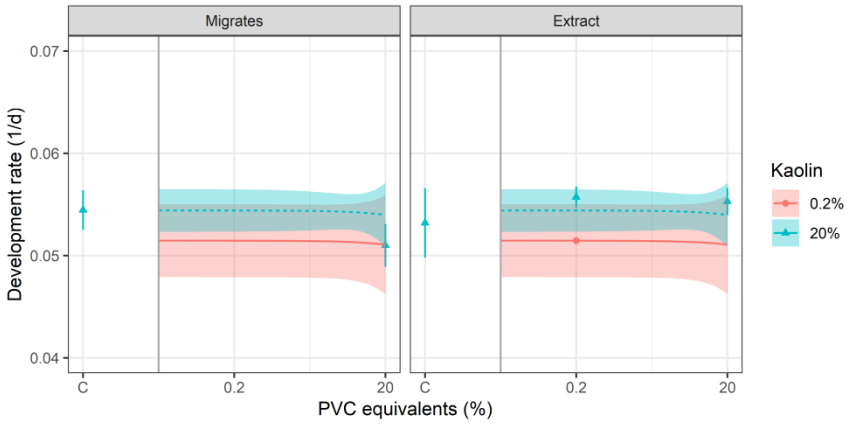

Figure S8: Modelled mean development rates of Chironomus riparius exposed to migrates and extracts. Details for GLM are given in S2.

Table S5: Imidacloprid and application of PVC and kaolin via sediment. Analysis of the GLMs after AIC-based selection of the optimal model parameterisation. For emergence and EMT50, the GLM distribution family was binomial with a logit-link, as the data was expressed binarily as either success or non-success (1 or 0, respectively). For weight and development rate, an exponential Gamma family distribution with inverse-link was used, because the data showcased increased variance with increased average values. Parameters were analysed using χ^2-tests with marginal (type III) sum-of-squares. Exact p-values are given and statistically significant parameters are expressed as ★★★ = p<0.001, ★★= p<0.01, ★= p<0.05. Est. = estimate. CI= confidence interval.

Parameter	Est.	Std. error	Lower CI	Upper CI	χ^2-value	p-value	Sig.
Emergence							
(Intercept)	3.630	0.178	3.281	3.978	-	<2.00E-16	***
Kaolin	0.085	0.026	0.034	0.136	13.30	1.09E-03	**
PVC	-0.167	0.012	-0.190	-0.143	205.61	<2.00E-16	***
Imidacloprid	-1.395	0.075	-1.542	-1.248	1119.88	<2.00E-16	***
Kaolin:Imidacloprid	-0.027	0.010	-0.047	-0.007	8.58	7.53E-03	**
PVC:Imidacloprid	0.030	0.007	0.017	0.043	17.30	5.82E-06	***
EmT_{50}							
(Intercept)	-25.20	0.704	-26.58	-23.82	-	<2.00E-16	***
Day	1.461	0.040	1.381	1.540	6657.30	<2.00E-16	***
Sex	2.912	0.627	1.683	4.140	22.70	3.38E-06	***
Kaolin	0.193	0.046	0.102	0.284	16.40	3.03E-05	***
PVC	0.490	0.060	0.373	0.607	57.10	2.58E-16	***
Imidacloprid	0.527	0.437	-0.328	1.383	1.40	2.27E-01	
Day:Kaolin	-0.009	0.003	-0.015	-0.004	10.50	9.03E-04	***
Day:PVC	-0.037	0.003	-0.043	-0.032	131.60	<2.00E-16	***
Day:Imidacloprid	-0.070	0.024	-0.117	-0.024	8.30	3.10E-03	**
Sex:Kaolin	-0.125	0.046	-0.216	-0.035	7.30	6.60E-03	**
Sex:PVC	-0.222	0.046	-0.312	-0.132	24.00	1.34E-06	***
Sex:Imidacloprid	0.856	0.339	0.192	1.520	6.50	1.15E-02	*
Kaolin:Imidacloprid	0.015	0.005	0.006	0.025	10.60	1.14E-03	**
PVC:Imidacloprid	-0.135	0.058	-0.250	-0.020	5.70	2.11E-02	*
Day:Sex	-0.219	0.036	-0.289	-0.148	39.90	1.16E-09	***
Day:Sex:Kaolin	0.008	0.003	0.002	0.013	7.40	6.13E-03	**
Day:Sex:PVC	0.013	0.002	0.009	0.017	33.20	1.42E-08	***
Day:Sex:Imidacloprid	-0.037	0.018	-0.072	-0.002	4.30	3.87E-02	*
Sex:Kaolin:Imidacloprid	-0.010	0.005	-0.019	-0.001	4.60	3.33E-02	*
Day:PVC:Imidacloprid	0.007	0.003	0.002	0.012	7.80	6.74E-03	**
Weight							
(Intercept)	0.900	0.005	0.889	0.910	-	<2.00E-16	***
Kaolin	0.005	0.000	0.004	0.006	159.30	<2.00E-16	***
PVC	0.012	0.001	0.011	0.014	213.80	<2.00E-16	***
Imidacloprid	0.054	0.004	0.045	0.062	152.10	<2.00E-16	***
Sex	-0.328	0.005	-0.338	-0.317	4333.50	<2.00E-16	***
PVC:Imidacloprid	0.004	0.001	0.002	0.006	21.40	5.56E-06	***
Kaolin:Sex	-0.001	0.000	-0.002	-0.001	11.00	9.67E-04	***
PVC:Sex	-0.003	0.001	-0.005	-0.002	25.50	6.61E-07	***
Imidacloprid:Sex	-0.008	0.004	-0.017	0.001	3.40	6.58E-02	.
Development rate							
(Intercept)	17.31	0.164	16.99	17.63	-	<2.00E-16	***
PVC	0.210	0.020	0.170	0.249	120.45	<2.00E-16	***
Kaolin	-0.042	0.012	-0.064	-0.019	12.66	5.61E-04	***
Imidacloprid	0.481	0.126	0.235	0.728	14.86	2.45E-04	***

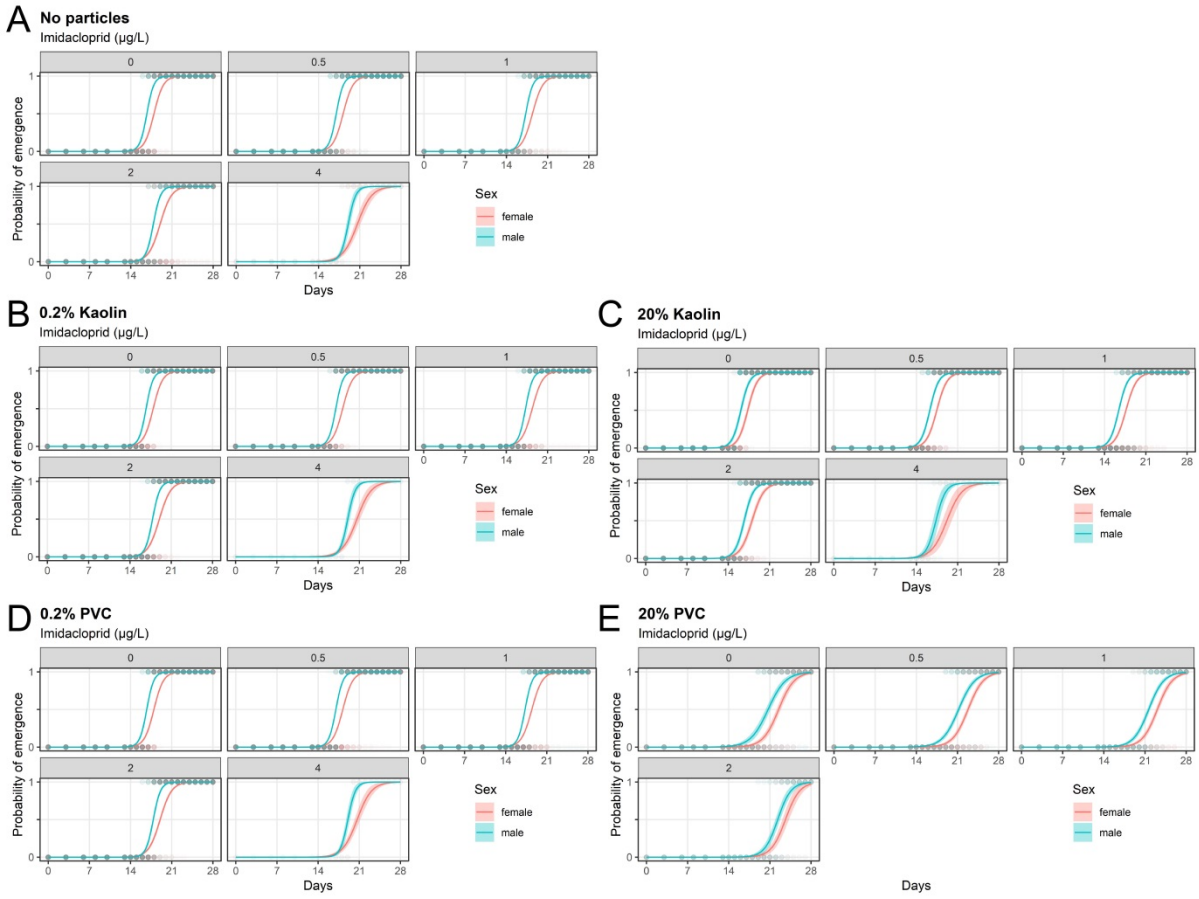

Figure S9: Modelled emergence probabilities of *Chironomus riparius* exposed to imidacloprid and five different sediments consisting of sand only, 0.2 and 20 % kaolin or 0.2 and 20 % PVC. Points are raw data, lines are predictions from GLM (see above) and shaded areas are the 95% confidence interval for the predictions. Details for GLM are given in Table S5.

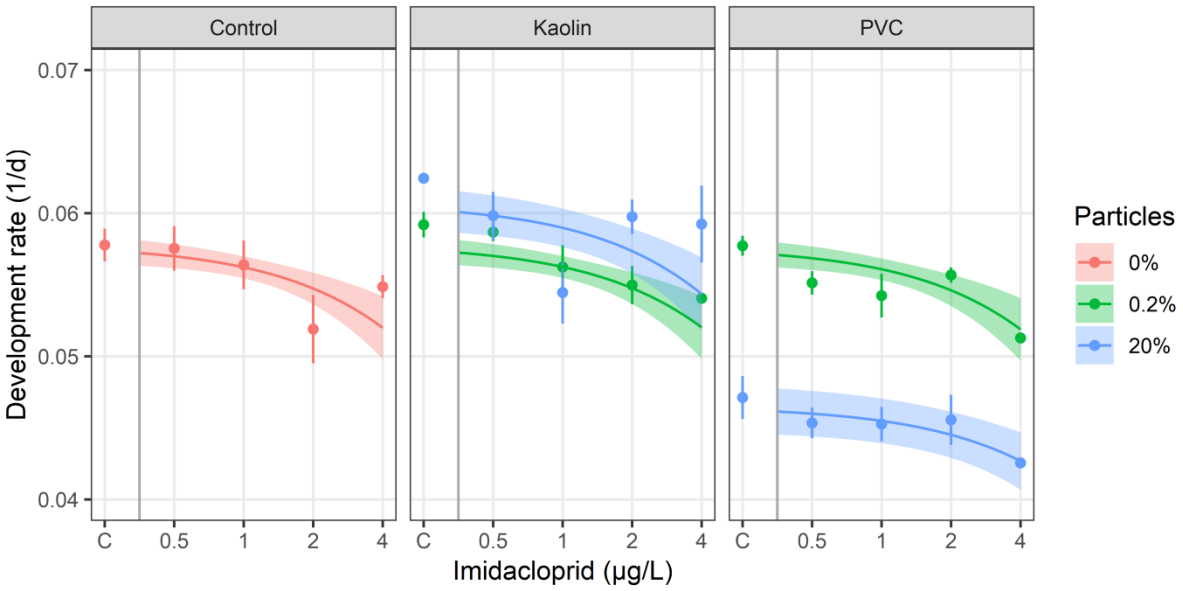

Figure S10: Modelled mean development rates of *Chironomus riparius* exposed to imidacloprid and five different sediments consisting of sand only, 0.2 and 20 % kaolin or 0.2 and 20 % PVC. Details for GLM are given in S2.

S4) Results: mean time of emergence (EmT_{50})

S4.1) Application via sediment and water

Table S6: Modelled EmT_{50} [95% CI] values of *Chironomus riparius* exposed to fine particulate materials (kaolin, diatomite and PVC) via sediment or water application. EmT_{50}-values are based on the binomial logit-linked GLM after AIC-based selection of the optimal model parameterization. Initial parameters for sediment application were experimental day, sex of chironomids, concentrations of kaolin, PVC and diatomite, as well as interactions between day:kaolin, day:PVC, day:diatomite, sex:kaolin, sex:PVC, sex:diatomite, day:sex, day:sex:PVC, day:sex:diatomite and for water exposure the experimental day, the sex of chironomids, concentrations of kaolin, PVC and diatomite, as well as the interactions between day:kaolin, day:PVC, day:diatomite, sex:kaolin, sex:PVC, sex:diatomite, day:sex, day:sex:kaolin, day:sex:PVC and day:sex:diatomite.

	%	kaolin		diatomite		PVC	
		male	female	male	female	male	female
Application via sediment	0	17.17 [17.02-17.31]	18.07 [17.94-18.2]	17.17 [17.02-17.31]	18.07 [17.94-18.2]	17.17 [17.02-17.31]	18.07 [17.94-18.2]
	0.002	17.17 [17.02-17.31]	18.07 [17.94-18.2]	17.17 [17.02-17.31]	18.07 [17.94-18.2]	17.17 [17.02-17.31]	18.07 [17.94-18.2]
	0.02	17.17 [17.02-17.31]	18.07 [17.94-18.2]	17.16 [17.02-17.31]	18.07 [17.94-18.21]	17.17 [17.02-17.31]	18.07 [17.94-18.2]
	0.2	17.15 [17.01-17.29]	18.07 [17.94-18.19]	17.16 [17.02-17.3]	18.08 [17.95-18.21]	17.18 [17.04-17.32]	18.06 [17.93-18.18]
	2	17.07 [16.94-17.2]	18 [17.88-18.12]	17.13 [16.99-17.26]	18.09 [17.97-18.22]	17.31 [17.17-17.45]	17.97 [17.85-18.09]
	20	16.7 [16.41-17]	17.75 [17.46-18.03]	16.94 [16.58-17.29]	18.25 [17.77-18.72]	18.13 [17.71-18.55]	17.8 [17.57-18.01]
Application via water	0	18.09 [17.95-18.22]	18.96 [18.84-19.08]	18.09 [17.95-18.22]	18.96 [18.84-19.08]	18.09 [17.95-18.22]	18.96 [18.84-19.08]
	0.0002	18.09 [17.95-18.22]	18.96 [18.84-19.08]	18.09 [17.95-18.22]	18.96 [18.84-19.08]	18.09 [17.95-18.22]	18.96 [18.84-19.08]
	0.002	18.09 [17.95-18.22]	18.96 [18.84-19.08]	18.09 [17.95-18.22]	18.96 [18.84-19.08]	18.09 [17.95-18.22]	18.96 [18.84-19.08]
	0.02	18.08 [17.95-18.22]	18.96 [18.84-19.08]	18.09 [17.95-18.22]	18.97 [18.85-19.08]	18.07 [17.94-18.2]	18.95 [18.84-19.07]
	0.2	18.06 [17.93-18.18]	18.97 [18.85-19.08]	18.09 [17.96-18.21]	19.03 [18.92-19.15]	17.95 [17.83-18.08]	18.9 [18.79-19.01]
	2	17.85 [17.46-18.25]	19.07 [18.61-19.52]	18.08 [17.75-18.41]	19.8 [19.32-20.27]	17.5 [17.24-17.77]	18.52 [18.18-18.86]

S4.2) Migrates and extracts

Table S7: Modelled EmT_{50} [95% CI] values of *Chironomus riparius* exposed to PVC-migrates or PVC-extracts. EmT_{50}-values are based on the binomial logit-linked GLM after AIC-based selection of the optimal model parameterization. Initial parameters were the experimental day, the sex of chironomids, concentrations of kaolin and PVC, as well as the interactions between PVC:method, kaolin:method, day:kaolin, day:PVC, sex:kaolin, sex:PVC, day:sex:kaolin, day:sex:PVC, day:PVC:method, day:kaolin:method, day:sex:kaolin:method and day:sex:PVC:method, whereas method describes the application of filtrates or extracts.

	PVC equival.	0.2 % Kaolin		PVC migrate		PVC extract	
		male	female	male	female	male	female
filtrate & Soxhlet	0			18.07 [17.65-18.49]	18.99 [18.63-19.35]	18.68 [18.38-18.97]	18.59 [18.32-18.85]
	0.2	19.24 [18.93-19.55]	19.88 [19.55-20.22]			18.66 [18.37-18.95]	18.59 [18.33-18.85]
	20			19.06 [18.45-19.68]	20.32 [19.76-20.89]	17.87 [17.59-18.15]	18.52 [18.2-18.84]

S4.3) Imidacloprid and Kaolin/PVC

Table S8: Modelled EmT_{50} [95% CI] values of *Chironomus riparius* exposed to Imidacloprid [µg/L] and five different sediments consisting of sand only, 0.2 and 20 % kaolin or 0.2 and 20 % PVC. EmT_{50}-values are based on the binomial logit-linked GLM after AIC-based selection of the optimal model parameterization. Initial parameters were the experimental day, sex of chironomids, concentrations of kaolin and PVC, the concentration of Imidacloprid, as well as the interactions between day:kaolin, day:PVC, day:Imidacloprid, sex:kaolin, sex:PVC, sex:Imidacloprid, kaolin:Imidacloprid, PVC:Imidacloprid, day:sex, day:sex:kaolin, day:sex:PVC, day:sex:Imidacloprid, sex:kaolin:Imidacloprid and day:PVC:Imidacloprid.

	Imida [µg/L]	0.2 % Kaolin		20% Kaolin		sand only	
		male	female	male	female	male	female
Kaolin & imidacloprid exposure	0	16.73 [16.62-16.85]	17.94 [17.82-18.05]	16.14 [15.94-16.35]	17.30 [17.10-17.51]	16.74 [16.62-16.85]	17.94 [17.83-18.06]
	0.5	17 [16.92-17.08]	18.16 [18.07-18.26]	16.28 [16.12-16.43]	17.46 [17.30-17.62]	17.01 [16.92-17.09]	18.17 [18.08-18.26]
	1	17.27 [17.19-17.35]	18.41 [18.33-18.5]	16.42 [16.27-16.56]	17.63 [17.49-17.78]	17.28 [17.2-17.36]	18.42 [18.33-18.51]
	2	17.83 [17.7-17.96]	18.99 [18.84-19.13]	16.70 [16.47-16.93]	18.03 [17.77-18.30]	17.84 [17.71-17.97]	18.99 [18.85-19.14]
	4	19.02 [18.72-19.35]	20.59 [20.14-21.1]	17.32 [16.79-17.88]	19.16 [18.40-19.98]	19.04 [18.73-19.37]	20.6 [20.16-21.12]
	8	- -	- -	- -	- -	- -	- -

	Imida [µg/L]	0.2 % PVC		20 % PVC	
		male	female	male	female
PVC & imidacloprid exposure	0	16.75 [16.64-16.87]	17.97 [17.85-18.09]	20.69 [20.25-21.11]	22.49 [22.12-22.86]
	0.5	17.02 [16.94-17.11]	18.2 [18.11-18.29]	21.2 [20.9-21.5]	22.8 [22.52-23.08]
	1	17.3 [17.22-17.38]	18.45 [18.37-18.54]	21.63 [21.35-21.91]	23.09 [22.8-23.39]
	2	17.86 [17.73-17.99]	19.03 [18.89-19.18]	22.33 [21.92-22.75]	23.64 [23.12-24.23]
	4	19.07 [18.76-19.4]	20.64 [20.2-21.16]	23.32 [22.61-24.19]	24.61 [23.59-25.98]
	8	- -	- -	- -	- -

S5) Results: mean development rate (DR)

S5.1) DR: Application via sediment and water

Table S9: Development rate (1/d) [95%-CI] of *Chironomus riparius* exposed to different amounts of fine particulate materials via sediment or water application.

%	Application via sediment			Application via water		
	Kaolin	Diatomite	PVC	Kaolin	Diatomite	PVC
0	0.0542 [0.0441-0.0643]	0.0542 [0.0441-0.0643]	0.0542 [0.0441-0.0643]	0.0542 [0.0441-0.0643]	0,0542 [0,0441-0,0643]	0,0542 [0,0441-0,0643]
0.0002	- -	- -	- -	0.0506 [0.0465-0.0546]	0,0536 [0,0527-0,0544]	0,0574 [0,0573-0,0575]
0.002	0.0603 [0.0574-0.0632]	0.0583 [0.0548-0.0617]	0.0548 [0.0427-0.0669]	0.0559 [0.0545-0.0572]	0,0531 [0,0489-0,0574]	0,057 [0,0538-0,0602]
0.02	0.0590 [0.0563-0.0616]	0.0598 [0.0576-0.062]	0.0609 [0.0598-0.0621]	0.056 [0.0534-0.0586]	0,0516 [0,0396-0,0637]	0,0588 [0,057-0,0605]
0.2	0.0484 [0.0397-0.057]	0.0560 [0.0492-0.0628]	0.0604 [0.0595-0.0612]	0.0519 [0.048-0.0558]	0,0546 [0,0513-0,0578]	0,0539 [0,0428-0,0649]
2	0.0601 [0.0599-0.0604]	0.0519 [0.0384-0.0654]	0.0606 [0.0582-0.0629]	0.0549 [0.0497-0.06]	0,0534 [0,0515-0,0553]	0,0557 [0,0546-0,0568]
20	0.0581 [0.0533-0.0629]	0.0580 [0.0541-0.0618]	0.0554 [0.0526-0.0582]	- -	- -	- -

S5.2) DR: Filtrate and extract

Table S10: Development rate (1/d) [95%-CI] of *Chironomus riparius* exposed to PVC-filtrate and PVC-extracts.

PVC equival.	PVC- filtrate and extract		
	PVC-filtrate [with 20 % Kaolin]	PVC-extract [with 20 % Kaolin]	PVC-extract [with 0.2% Kaolin]
0	0.0545 [0.0507-0.0582]	0.0532 [0.0466-0.0598]	- -
0.2	- -	0.0557 [0.0537-0.0578]	0.0515 [0.0508-0.0521]
20	0.051 [0.0469-0.0551]	0.0553 [0.0527-0.0579]	- -

S3.2.3) DR: Imidacloprid and kaolin/PVC

Table S11: Development rate (1/d) [95%-CI] of *Chironomus riparius* exposed to imidacloprid [µg/L] and five different sediments consisting of sand only, 0.2 and 20 % kaolin or 0.2 and 20 % PVC.

µg/L	PVC/ Kaolin & Imidacloprid exposure				
	sand only	0.2 % Kaolin	20 % Kaolin	0.2 % PVC	20 % PVC
0	0.0577 [0.0554-0.0599]	0.0593 [0.0575-0.061]	0.0624 [0.0622-0.0627]	0.0578 [0.0564-0.0592]	0.0471 [0.0442-0.05]
0.5	0.0573 [0.0542-0.0604]	0.0587 [0.0575-0.0599]	0.0598 [0.0566-0.0631]	0.0552 [0.0536-0.0568]	0.0457 [0.0436-0.0478]
1	0.0567 [0.0533-0.06]	0.0563 [0.0533-0.0593]	0.0544 [0.0502-0.0587]	0.0542 [0.0512-0.0572]	0.0453 [0.0429-0.0476]
2	0.0523 [0.0476-0.057]	0.0552 [0.0525-0.0578]	0.0598 [0.0575-0.0622]	0.0557 [0.0547-0.0568]	0.0444 [0.041-0.0479]
4	0.0551 [0.0535-0.0567]	0.0541 [0.0541-0.0541]	0.0603 [0.055-0.0655]	0.0513 [0.0513-0.0513]	0.0426 [0.0426-0.0426]
8	- -	- -	- -	- -	- -