Supporting Information

Transformation and immobilization of sedimental galena (PbS) by phosphate from surface runoff in simulated storm suspensions

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Table S1. Synthetic freshwater composition (Snoeyink and Jenkins, 1980).

Ions	Concentration (g/L)
Na^+	0.008
K^+	0.0012
Mg^{2+}	0.0081
Ca^{2+}	0.01
Cl^-	0.018
HCO_3^-	0.021
SO_4^{2-}	0.022

Snoeyink, V.L. and Jenkins, D. (1980) Water Chemistry. Wiley

Table S2. The initial dissolution rates of PbS under different DO and pH.

pH	DO (mg/L)	Initial dissolution rate (μM/min)
5	8.4	3.35±1.15
6	8.4	1.15±0.05
7	8.4	0.45±0.05
8	8.4	0.20±0.10
7	0	0.35±0.05
7	3	0.65±0.05
7	5	0.35±0.05

Table S3. Lead mineral saturation index at PbS = 100 mg/L, pH 5, DO = 8.4 mg/L and t = 60 min.

Mineral	log IAP	Saturation index
Anglesite $PbSO_4$	-9.30	-1.51
Cerrusite $PbCO_3$	-14.34	-1.14
Cotunnite $PbCl_2$	-12.17	-7.39
Hydrocerrusite $Pb_3(CO_3)_2(OH)_2$	-24.21	-5.45
Larnakite $Pb_2(SO_4)O$	-4.84	-4.40
Laurionite PbCl(OH)	-3.85	-4.48
Litharge PbO	4.46	-8.23
Massicot PbO	4.46	-8.43
$Pb(OH)_2(s)$	4.46	-3.69
$Pb_{10}(OH)_6O(CO_3)6(s)$	-68.16	-59.40
$Pb_2(OH)_3Cl(s)$	0.61	-8.18
$Pb_2O(OH)_2(s)$	8.93	-17.26
$Pb_2OCO_3(s)$	-9.87	-9.31
$Pb_3O_2CO_3(s)$	-5.41	-16.43
$Pb_3O_2SO_4(s)$	-0.37	-11.06
$Pb_4(OH)_6SO_4(s)$	4.09	-17.01
$Pb_4O_3SO_4(s)$	4.09	-17.79
$PbO:0.3H_2O(s)$	4.46	-8.52
Phosgenite $(PbCl)_2CO_3$	-26.51	-6.70

Table S4. Lead mineral saturation index at PbS = 100 mg/L, pH 6, DO = 8.4 mg/L and t = 60 min.

Mineral	log IAP	Saturation index
Anglesite $PbSO_4$	-9.50	-1.71
Cerrusite $PbCO_3$	-13.54	-0.34
Cotunnite $PbCl_2$	-12.37	-7.59
Hydrocerrusite $Pb_3(CO_3)_2(OH)_2$	-20.82	-2.06
Larnakite $Pb_2(SO_4)O$	-3.23	-2.80
Laurionite PbCl(OH)	-3.05	-3.68
Litharge PbO	6.27	-6.42
Massicot PbO	6.27	-6.62
$Pb(OH)_2(s)$	6.27	-1.88
$Pb_{10}(OH)_6O(CO_3)6(s)$	-56.19	-47.43
$Pb_2(OH)_3Cl(s)$	3.22	-5.58
$Pb_2O(OH)_2(s)$	12.53	-13.66
$Pb_2OCO_3(s)$	-7.28	-6.72
$Pb_3O_2CO_3(s)$	-1.01	-12.03
$Pb_3O_2SO_4(s)$	3.04	-7.65
$Pb_4(OH)_6SO_4(s)$	9.30	-11.80
$Pb_4O_3SO_4(s)$	9.30	-12.58
$PbO:0.3H_2O(s)$	6.27	-6.71
Phosgenite $(PbCl)_2CO_3$	-25.91	-6.10

Table S5. Lead mineral saturation index at PbS = 100 mg/L, pH 7, DO = 8.4 mg/L and t = 60 min.

Mineral	log IAP	Saturation index
Anglesite $PbSO_4$	-9.91	-2.12
Cerrusite $PbCO_3$	-12.95	0.25
Cotunnite $PbCl_2$	-12.78	-8.00
Hydrocerrusite $Pb_3(CO_3)_2(OH)_2$	-18.04	0.72
Larnakite $Pb_2(SO_4)O$	-2.05	-1.62
Laurionite PbCl(OH)	-2.46	-3.08
Litharge PbO	7.86	-4.83
Massicot PbO	7.86	-5.03
$Pb(OH)_2(s)$	7.86	-0.29
$Pb_{10}(OH)_6O(CO_3)6(s)$	-46.26	-37.50
$Pb_2(OH)_3Cl(s)$	5.41	-3.39
$Pb_2O(OH)_2(s)$	15.73	-10.46
$Pb_2OCO_3(s)$	-5.09	-4.53
$Pb_3O_2CO_3(s)$	2.78	-8.25
$Pb_3O_2SO_4(s)$	5.81	-4.87
$Pb_4(OH)_6SO_4(s)$	13.68	-7.42
$Pb_4O_3SO_4(s)$	13.68	-8.20
$PbO:0.3H_2O(s)$	7.86	-5.12
Phosgenite $(PbCl)_2CO_3$	-25.73	-5.92

Table S6. Lead mineral saturation index at PbS = 100 mg/L, pH 8, DO = 8.4 mg/L and t = 60 min.

Mineral	log IAP	Saturation index
Anglesite $PbSO_4$	-11.14	-3.35
Cerrusite $PbCO_3$	-13.17	0.03
Cotunnite $PbCl_2$	-14.00	-9.22
Hydrocerrusite $Pb_3(CO_3)_2(OH)_2$	-17.68	1.08
Larnakite $Pb_2(SO_4)O$	-2.48	-2.04
Laurionite PbCl(OH)	-2.67	-3.29
Litharge PbO	8.66	-4.03
Massicot PbO	8.66	-4.23
$Pb(OH)_2(s)$	8.66	0.51
$Pb_{10}(OH)_6O(CO_3)_6(s)$	-44.39	-35.63
$Pb_2(OH)_3Cl(s)$	5.99	-2.81
$Pb_2O(OH)_2(s)$	17.31	-8.88
$Pb_2OCO_3(s)$	-4.51	-3.96
$Pb_3O_2CO_3(s)$	4.15	-6.88
$Pb_3O_2SO_4(s)$	6.18	-4.51
$Pb_4(OH)_6SO_4(s)$	14.84	-6.26
$Pb_4O_3SO_4(s)$	14.84	-7.04
$PbO:0.3H_2O(s)$	8.66	-4.32
Phosgenite $(PbCl)_2CO_3$	-27.17	-7.36

Table S7. Lead mineral saturation index right after phosphate addition (t = 180 min): PbS = 100 mg/L, pH 7, DO = 0 mg/L and 0.5 mg-P/L phosphate.

Mineral	log IAP	Saturation index
Anglesite	-9.61	-1.82
Cerrusite	-12.65	0.55
Chloropyromorphite	-64.48	19.95
Cotunnite	-12.47	-7.69
Hydrocerrusite	-17.14	1.62
Hydroxylpyromorphite	-54.16	8.63
Larnakite	-1.43	-1.00
Laurionite	-2.15	-2.77
Litharge	8.17	-4.52
Massicot	8.17	-4.72
$Pb(OH)_2$ (s)	8.17	0.02
$Pb_{10}(OH)_6O(CO_3)_6$ (s)	-43.24	-34.48
$Pb_2(OH)_3Cl$ (s)	6.02	-2.77
$Pb_2O(OH)_2$ (s)	16.35	-9.85
Pb_2OCO_3 (s)	-4.48	-3.92
$Pb_3(PO_4)_2$ (s)	-38.83	4.70
$Pb_3O_2CO_3$ (s)	3.69	-7.33
$Pb_3O_2SO_4$ (s)	6.74	-3.95
$Pb_4(OH)_6SO_4$ (s)	14.91	-6.19
$Pb_4O_3SO_4$ (s)	14.91	-6.96
$PbHPO_4$ (s)	-23.50	0.30
$PbO{:}0.3H_2O$ (s)	8.17	-4.81
Phosgenite	-25.13	-5.32

Table S8. Lead mineral saturation index right after phosphate addition (t = 180 min): PbS = 100 mg/L, pH 7, DO = 3 mg/L and 0.5 mg-P/L phosphate.

Mineral	log IAP	Saturation index
Anglesite	-9.49	-1.70
Cerrusite	-12.54	0.66
Chloropyromorphite	-63.93	20.51
Cotunnite	-12.36	-7.58
Hydrocerrusite	-16.80	1.96
Hydroxylpyromorphite	-53.60	9.19
Larnakite	-1.21	-0.77
Laurionite	-2.04	-2.66
Litharge	8.29	-4.41
Massicot	8.29	-4.61
$Pb(OH)_2$ (s)	8.29	0.14
$Pb_{10}(OH)_6O(CO_3)_6$ (s)	-42.12	-33.36
$Pb_2(OH)_3Cl$ (s)	6.25	-2.55
$Pb_2O(OH)_2$ (s)	16.57	-9.62
Pb_2OCO_3 (s)	-4.26	-3.70
$Pb_3(PO_4)_2$ (s)	-38.50	5.03
$Pb_3O_2CO_3$ (s)	4.03	-6.99
$Pb_3O_2SO_4$ (s)	7.08	-3.61
$Pb_4(OH)_6SO_4$ (s)	15.36	-5.74
$Pb_4O_3SO_4$ (s)	15.36	-6.52
$PbHPO_4$ (s)	-23.39	0.41
$PbO{:}0.3H_2O$ (s)	8.29	-4.70
Phosgenite	-24.90	-5.09

Table S9. Lead mineral saturation index right after phosphate addition (t = 180 min): PbS = 100 mg/L, pH 7, DO = 5 mg/L and 0.5 mg-P/L phosphate.

Mineral	log IAP	Saturation index
Anglesite	-9.42	-1.63
Cerrusite	-12.47	0.73
Chloropyromorphite	-63.55	20.88
Cotunnite	-12.29	-7.51
Hydrocerrusite	-16.58	2.18
Hydroxylpyromorphite	-53.23	9.56
Larnakite	-1.06	-0.63
Laurionite	-1.96	-2.59
Litharge	8.36	-4.33
Massicot	8.36	-4.53
$Pb(OH)_2$ (s)	8.36	0.21
$Pb_{10}(OH)_6O(CO_3)_6$ (s)	-41.38	-32.62
$Pb_2(OH)_3Cl$ (s)	6.40	-2.40
$Pb_2O(OH)_2$ (s)	16.72	-9.47
Pb_2OCO_3 (s)	-4.11	-3.55
$Pb_3(PO_4)_2$ (s)	-38.27	5.26
$Pb_3O_2CO_3$ (s)	4.25	-6.77
$Pb_3O_2SO_4$ (s)	7.30	-3.39
$Pb_4(OH)_6SO_4$ (s)	15.66	-5.44
$Pb_4O_3SO_4$ (s)	15.66	-6.22
$PbHPO_4$ (s)	-23.32	0.49
$PbO:0.3H_2O$ (s)	8.36	-4.62
Phosgenite	-24.76	-4.95

Table S10. Lead mineral saturation index right after phosphate addition (t = 180 min): PbS = 100 mg/L, pH 7, DO = 8.4 mg/L and 0.5 mg-P/L phosphate.

Mineral	log IAP	Saturation index
Anglesite	-9.62	-1.83
Cerrusite	-12.67	0.53
Chloropyromorphite	-64.57	19.86
Cotunnite	-12.49	-7.71
Hydrocerrusite	-17.19	1.57
Hydroxylpyromorphite	-54.25	8.54
Larnakite	-1.47	-1.03
Laurionite	-2.17	-2.79
Litharge	8.16	-4.54
Massicot	8.16	-4.74
$Pb(OH)_2$ (s)	8.16	0.01
$Pb_{10}(OH)_6O(CO_3)_6$ (s)	-43.41	-34.65
$Pb_2(OH)_3Cl$ (s)	5.99	-2.81
$Pb_2O(OH)_2$ (s)	16.31	-9.88
Pb_2OCO_3 (s)	-4.52	-3.96
$Pb_3(PO_4)_2$ (s)	-38.89	4.65
$Pb_3O_2CO_3$ (s)	3.64	-7.38
$Pb_3O_2SO_4$ (s)	6.69	-4.00
$Pb_4(OH)_6SO_4$ (s)	14.84	-6.26
$Pb_4O_3SO_4$ (s)	14.84	-7.04
$PbHPO_4$ (s)	-23.52	0.29
$PbO{:}0.3H_2O$ (s)	8.16	-4.83
Phosgenite	-25.16	-5.35

Table S11. Lead mineral saturation index right after phosphate addition (t = 180 min): PbS = 100 mg/L, pH 5, DO = 8.4 mg/L and 0.5 mg-P/L phosphate.

Mineral	log IAP	Saturation index
Anglesite	-9.15	-1.36
Cerrusite	-14.19	-0.99
Chloropyromorphite	-73.44	10.99
Cotunnite	-12.02	-7.24
Hydrocerrusite	-23.76	-5.00
Hydroxylpyromorphite	-65.12	-2.33
Larnakite	-4.54	-4.11
Laurionite	-3.71	-4.33
Litharge	4.61	-8.08
Massicot	4.61	-8.28
$Pb(OH)_2$ (s)	4.61	-3.54
$Pb_{10}(OH)_6O(CO_3)_6$ (s)	-66.68	-57.92
$Pb_2(OH)_3Cl$ (s)	0.91	-7.89
$Pb_2O(OH)_2$ (s)	9.22	-16.97
Pb_2OCO_3 (s)	-9.58	-9.02
$Pb_3(PO_4)_2$ (s)	-44.95	-1.42
$Pb_3O_2CO_3$ (s)	-4.96	-15.98
$Pb_3O_2SO_4$ (s)	0.07	-10.61
$Pb_4(OH)_6SO_4$ (s)	4.69	-16.42
$Pb_4O_3SO_4$ (s)	4.69	-17.19
$PbHPO_4$ (s)	-24.78	-0.98
$PbO:0.3H_2O$ (s)	4.61	-8.37
Phosgenite	-26.21	-6.40

Table S12. Lead mineral saturation index right after phosphate addition (t = 180 min): PbS = 100 mg/L, pH 6, DO = 8.4 mg/L and 0.5 mg-P/L phosphate.

Mineral	log IAP	Saturation index
Anglesite	-9.30	-1.51
Cerrusite	-13.35	-0.15
Chloropyromorphite	-68.27	16.16
Cotunnite	-12.17	-7.39
Hydrocerrusite	-20.23	-1.47
Hydroxylpyromorphite	-58.95	3.84
Larnakite	-2.83	-2.40
Laurionite	-2.85	-3.48
Litharge	6.47	-6.22
Massicot	6.47	-6.42
$Pb(OH)_2$ (s)	6.47	-1.68
$Pb_{10}(OH)_6O(CO_3)_6$ (s)	-54.21	-45.45
$Pb_2(OH)_3Cl$ (s)	3.62	-5.18
$Pb_2O(OH)_2$ (s)	12.93	-13.26
Pb_2OCO_3 (s)	-6.88	-6.32
$Pb_3(PO_4)_2$ (s)	-41.46	2.07
$Pb_3O_2CO_3$ (s)	-0.41	-11.43
$Pb_3O_2SO_4$ (s)	3.63	-7.05
$Pb_4(OH)_6SO_4$ (s)	10.10	-11.00
$Pb_4O_3SO_4$ (s)	10.10	-11.78
$PbHPO_4$ (s)	-23.96	-0.16
$PbO:0.3H_2O$ (s)	6.47	-6.51
Phosgenite	-25.52	-5.71

Table S13. Lead mineral saturation index right after phosphate addition (t = 180 min): PbS = 100 mg/L, pH 7, DO = 8.4 mg/L and 0.5 mg-P/L phosphate.

Mineral	log IAP	Saturation index
Anglesite	-9.70	-1.91
Cerrusite	-12.75	0.45
Chloropyromorphite	-64.97	19.46
Cotunnite	-12.57	-7.79
Hydrocerrusite	-17.43	1.33
Hydroxylpyromorphite	-54.65	8.14
Larnakite	-1.63	-1.19
Laurionite	-2.25	-2.87
Litharge	8.08	-4.61
Massicot	8.08	-4.81
$Pb(OH)_2$ (s)	8.08	-0.07
$Pb_{10}(OH)_6O(CO_3)_6$ (s)	-44.20	-35.44
$Pb_2(OH)_3Cl$ (s)	5.83	-2.96
$Pb_2O(OH)_2$ (s)	16.15	-10.04
Pb_2OCO_3 (s)	-4.68	-4.12
$Pb_3(PO_4)_2$ (s)	-39.12	4.41
$Pb_3O_2CO_3$ (s)	3.40	-7.62
$Pb_3O_2SO_4$ (s)	6.45	-4.24
$Pb_4(OH)_6SO_4$ (s)	14.53	-6.58
$Pb_4O_3SO_4$ (s)	14.53	-7.35
$PbHPO_4$ (s)	-23.60	0.21
$PbO{:}0.3H_2O$ (s)	8.08	-4.90
Phosgenite	-25.32	-5.51

Table S14. Lead mineral saturation index right after phosphate addition (t = 180 min): PbS = 100 mg/L, pH 8, DO = 8.4 mg/L and 0.5 mg-P/L phosphate.

Mineral	log IAP	Saturation index
Anglesite	-10.90	-3.11
Cerrusite	-12.96	0.24
Chloropyromorphite	-67.12	17.31
Cotunnite	-13.76	-8.98
Hydrocerrusite	-17.03	1.74
Hydroxylpyromorphite	-55.80	7.00
Larnakite	-2.01	-1.58
Laurionite	-2.44	-3.06
Litharge	8.89	-3.80
Massicot	8.89	-4.00
$Pb(OH)_2$ (s)	8.89	0.74
$Pb_{10}(OH)_6O(CO_3)_6$ (s)	-42.19	-33.43
$Pb_2(OH)_3Cl$ (s)	6.45	-2.34
$Pb_2O(OH)_2$ (s)	17.78	-8.41
Pb_2OCO_3 (s)	-4.07	-3.51
$Pb_3(PO_4)_2$ (s)	-40.16	3.37
$Pb_3O_2CO_3$ (s)	4.82	-6.20
$Pb_3O_2SO_4$ (s)	6.88	-3.81
$Pb_4(OH)_6SO_4$ (s)	15.77	-5.34
$Pb_4O_3SO_4$ (s)	15.77	-6.11
$PbHPO_4$ (s)	-24.53	-0.72
$PbO:0.3H_2O$ (s)	8.89	-4.09
Phosgenite	-26.72	-6.91

Table S15. Lead mineral saturation index right after phosphate addition (t = 180 min): PbS = 100 mg/L, pH 7, DO = 8.4 mg/L and 0.25 mg-P/L phosphate.

Mineral	log IAP	Saturation index
Anglesite	-9.62	-1.83
Cerrusite	-12.67	0.53
Chloropyromorphite	-65.48	18.95
Cotunnite	-12.49	-7.71
Hydrocerrusite	-17.18	1.58
Hydroxylpyromorphite	-55.16	7.63
Larnakite	-1.47	-1.04
Laurionite	-2.17	-2.79
Litharge	8.15	-4.54
Massicot	8.15	-4.74
$Pb(OH)_2$ (s)	8.15	0.004
$Pb_{10}(OH)_6O(CO_3)_6$ (s)	-43.39	-34.63
$Pb_2(OH)_3Cl$ (s)	5.99	-2.81
$Pb_2O(OH)_2$ (s)	16.31	-9.88
Pb_2OCO_3 (s)	-4.51	-3.96
$Pb_3(PO_4)_2$ (s)	-39.49	4.04
$Pb_3O_2CO_3$ (s)	3.64	-7.38
$Pb_3O_2SO_4$ (s)	6.68	-4.00
$Pb_4(OH)_6SO_4$ (s)	14.84	-6.26
$Pb_4O_3SO_4$ (s)	14.84	-7.04
$PbHPO_4$ (s)	-23.82	-0.02
$PbO:0.3H_2O$ (s)	8.15	-4.83
Phosgenite	-25.16	-5.35

Table S16. Lead mineral saturation index right after phosphate addition (t = 180 min): PbS = 100 mg/L, pH 7, DO = 8.4 mg/L and 0.5 mg-P/L phosphate.

Mineral	log IAP	Saturation index
Anglesite	-9.70	-1.91
Cerrusite	-12.75	0.45
Chloropyromorphite	-64.97	19.46
Cotunnite	-12.57	-7.79
Hydrocerrusite	-17.43	1.33
Hydroxyapatite	-43.66	0.68
Hydroxylpyromorphite	-54.65	8.14
Larnakite	-1.63	-1.19
Laurionite	-2.25	-2.87
Litharge	8.08	-4.61
Massicot	8.08	-4.81
$Pb(OH)_2$ (s)	8.08	-0.07
$Pb_{10}(OH)_6O(CO_3)_6$ (s)	-44.20	-35.44
$Pb_2(OH)_3Cl$ (s)	5.83	-2.96
$Pb_2O(OH)_2$ (s)	16.15	-10.04
Pb_2OCO_3 (s)	-4.68	-4.12
$Pb_3(PO_4)_2$ (s)	-39.12	4.41
$Pb_3O_2CO_3$ (s)	3.40	-7.62
$Pb_3O_2SO_4$ (s)	6.45	-4.24
$Pb_4(OH)_6SO_4$ (s)	14.53	-6.58
$Pb_4O_3SO_4$ (s)	14.53	-7.35
$PbHPO_4$ (s)	-23.60	0.21
$PbO{:}0.3H_2O$ (s)	8.08	-4.90
Phosgenite	-25.32	-5.51

Table S17. Lead mineral saturation index right after phosphate addition (t = 180 min): PbS = 100 mg/L, pH 7, DO = 8.4 mg/L and 1 mg-P/L phosphate.

Mineral	log IAP	Saturation index
Anglesite	-9.68	-1.89
Cerrusite	-12.74	0.46
Chloropyromorphite	-63.95	20.48
Cotunnite	-12.55	-7.77
Hydrocerrusite	-17.38	1.38
Hydroxyapatite	-42.76	1.58
Hydroxylpyromorphite	-53.63	9.16
Larnakite	-1.58	-1.15
Laurionite	-2.22	-2.85
Litharge	8.10	-4.59
Massicot	8.10	-4.79
$Pb(OH)_2$ (s)	8.10	-0.05
$Pb_{10}(OH)_6O(CO_3)_6$ (s)	-44.03	-35.27
$Pb_2(OH)_3Cl$ (s)	5.88	-2.92
$Pb_2O(OH)_2$ (s)	16.20	-9.99
Pb_2OCO_3 (s)	-4.64	-4.08
$Pb_3(PO_4)_2$ (s)	-38.45	5.08
$Pb_3O_2CO_3$ (s)	3.46	-7.56
$Pb_3O_2SO_4$ (s)	6.52	-4.17
$Pb_4(OH)_6SO_4$ (s)	14.62	-6.48
$Pb_4O_3SO_4$ (s)	14.62	-7.26
$PbHPO_4$ (s)	-23.28	0.53
$PbO{:}0.3H_2O$ (s)	8.10	-4.88
Phosgenite	-25.28	-5.47

Table S18. Lead mineral saturation index right after phosphate addition (t = 180 min): PbS = 100 mg/L, pH 7, DO = 8.4 mg/L and 2 mg-P/L phosphate.

Mineral	log IAP	Saturation index
Anglesite	-9.71	-1.92
Cerrusite	-12.79	0.41
Chloropyromorphite	-63.21	21.22
Cotunnite	-12.58	-7.80
Hydrocerrusite	-17.51	1.25
Hydroxylpyromorphite	-52.89	9.90
Larnakite	-1.65	-1.21
Laurionite	-2.26	-2.88
Litharge	8.07	-4.62
Massicot	8.07	-4.82
$Pb(OH)_2$ (s)	8.07	-0.08
$Pb_{10}(OH)_6O(CO_3)_6$ (s)	-44.48	-35.72
$Pb_2(OH)_3Cl$ (s)	5.81	-2.98
$Pb_2O(OH)_2$ (s)	16.13	-10.06
Pb_2OCO_3 (s)	-4.72	-4.17
$Pb_3(PO_4)_2$ (s)	-37.95	5.58
$Pb_3O_2CO_3$ (s)	3.34	-7.68
$Pb_3O_2SO_4$ (s)	6.42	-4.27
$Pb_4(OH)_6SO_4$ (s)	14.49	-6.61
$Pb_4O_3SO_4$ (s)	14.49	-7.39
$PbHPO_4$ (s)	-23.01	0.80
$PbO:0.3H_2O$ (s)	8.07	-4.91
Phosgenite	-25.37	-5.56

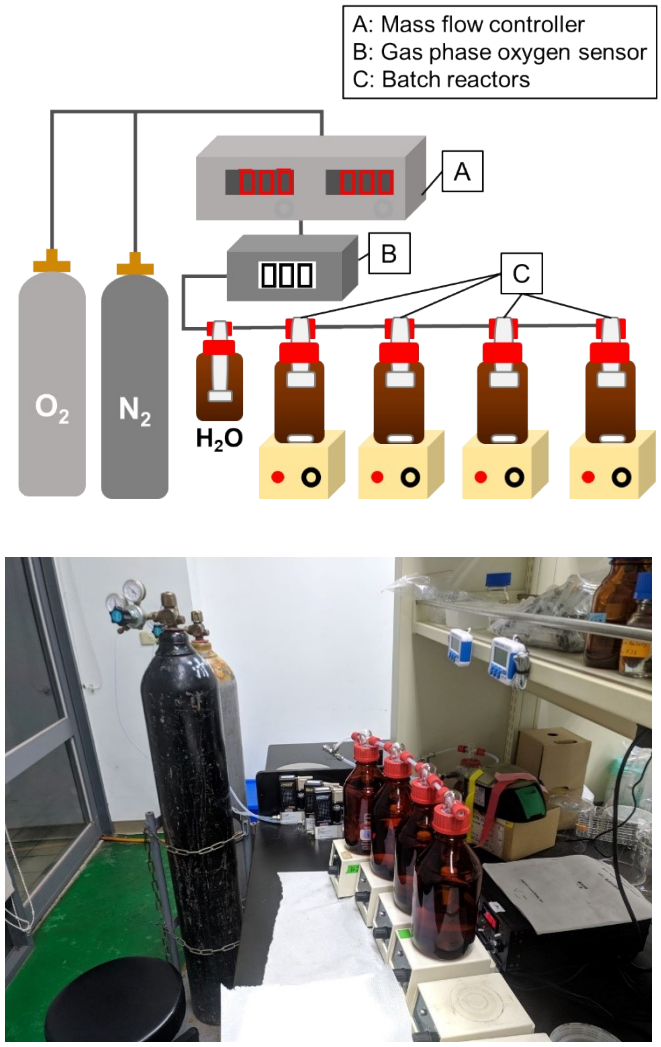

Fig. S1. Schematic and photograph of the experimental setup.

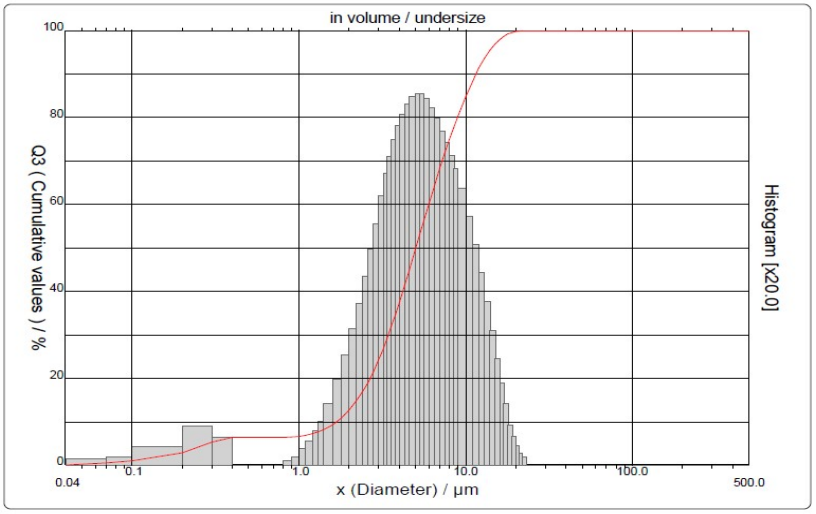

Fig. S2. Particle size distribution of PbS.

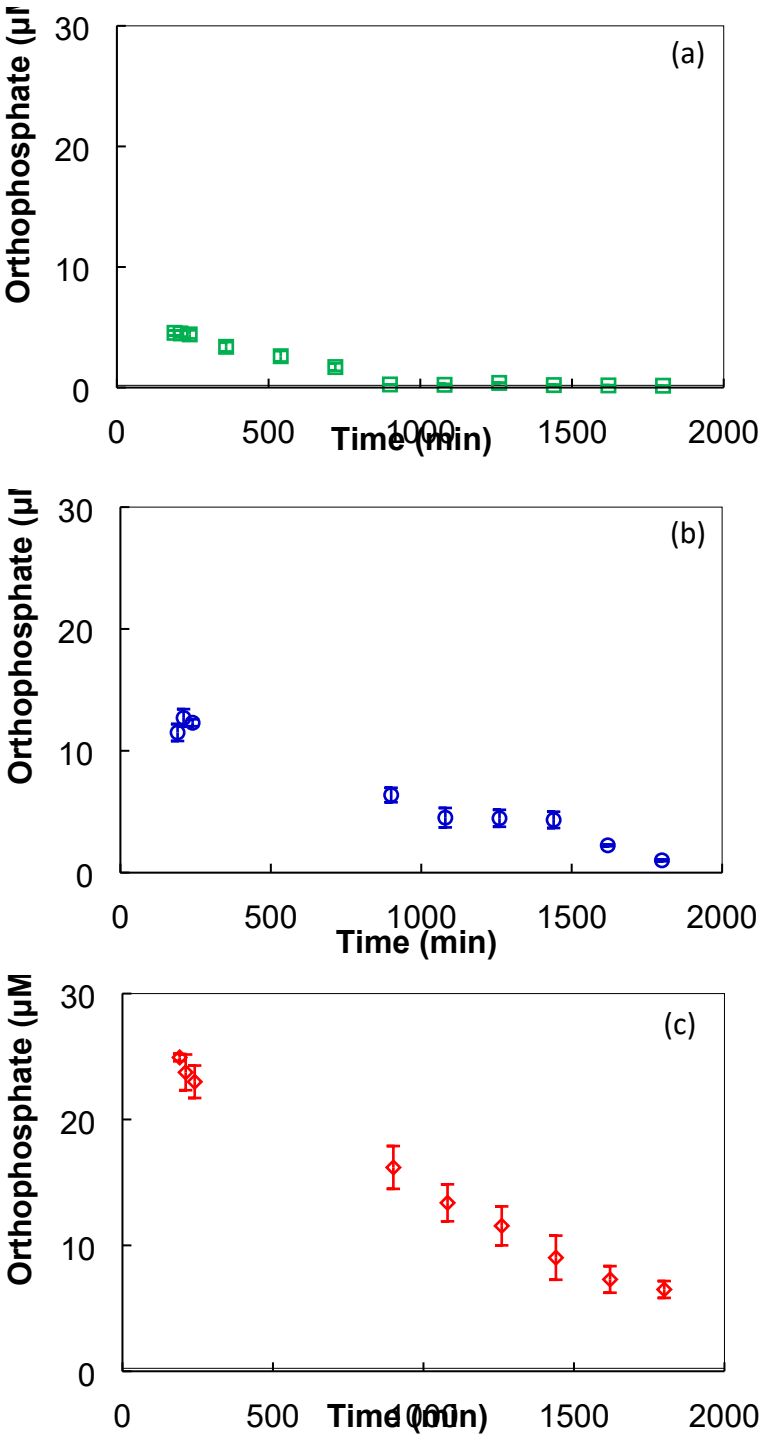

Fig. S3. The variation of orthophosphate concentration as a function of time for the addition of (a) 0.25, (b) 0.5 and (c) 1.0 mg/L as P of orthophosphate

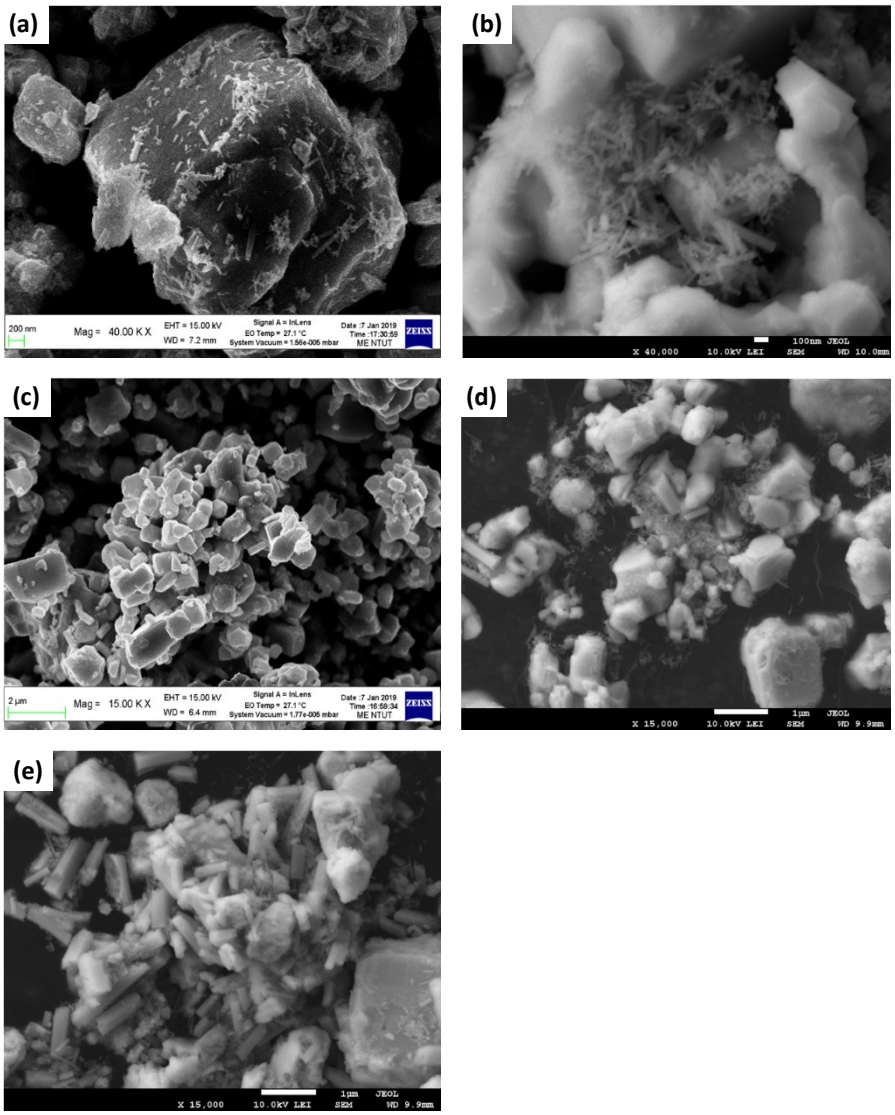

Fig. S4. SEM images of PbS after experiment for (a) DO= 3.0 mg/L, pH 7, P= 0.5 mg/L, (b) DO= 5.0 mg/L, pH 7, P= 0.5 mg/L, (c) DO= 8.4 mg/L, pH 6, P= 0.5 mg/L, (d) DO=8.4 mg/L, pH 7, P= 0.5 mg/L, and (e) DO=8.4 mg/L, pH 7, P= 1 mg/L. Reaction time = 72 hr. P indicates orthophosphate added at 180 min.