

Supplementary Material

Table S1 Chemical composition of the fly ash and bentonite used for making BFA pellets.

	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	S ₂ O ₃
Fly ash	46.44	25.10	5.86	3.86	0.93	0
Bentonite	56.63	10.13	6.01	8.21	6.79	0

Table S2 ANOVA analysis results for: Effect of (a) shaking time of Fe³⁺ with BFA, (b) mass ratio of Fe³⁺: BFA, (c) molar ratio of Fe³⁺: BH₄⁻ and (d) shaking time of Fe³⁺ with BH₄⁻ on the amount of iron on BFA.

(a) ANOVA One Way: shaking time of Fe³⁺ with BFA

Descriptive Statistics

	Sample Size	Mean	Standard Deviation	SE of Mean
Fe%	2	0.351855	0	0
C	2	0.3769875	0	0
D	2	0.3267225	0.035542722356342	0.0251325
E	2	0.3769875	0.035542722356341	0.0251325
F	2	0.351855	0	0

One Way ANOVA
Overall ANOVA

	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	0.003537198315	8.8429957875001E-4	1.7500000000001	0.27549433041967
Error	5	0.0025265702249999	5.0531404499999E-4		
Total	9	0.00606376854			

Null Hypothesis: The means of all levels are equal.

Alternative Hypothesis: The means of one or more levels are different.

At the 0.05 level, the population means are not significantly different.

Fit Statistics

R-Square	Coeff Var	Root MSE	Data Mean
0.58333333333334	0.062987830352106	0.022479191377805	0.3568815

Means Comparisons

Tukey Test

Alpha	Sig	MeanDiff	SEM	q Value	Prob
		LCL	UCL		

2h	1h	0.0251325		0.022479191377805	1.5811388300842
0.79282297689951	0.05	0	-0.065042925865951	0.11530792586595	
4h	1h	-0.0251325		0.022479191377805	1.5811388300842
0.79282297689951	0.05	0	-0.11530792586595	0.065042925865951	
4h	2h	-0.050265		0.022479191377805	3.1622776601684
0.29931140078627	0.05	0	-0.14044042586595	0.039910425865951	
6h	1h	0.025132500000001	0.022479191377805	1.5811388300842	0.7928229768995
0.05	0	-0.06504292586595	0.11530792586595		
6h	2h	4.9960036108132E-16	0.022479191377805	3.1430917355208E-14	1
0.05	0	-0.09017542586595	0.090175425865951		
6h	4h	0.050265		0.022479191377805	3.1622776601684
0.29931140078627	0.05	0	-0.03991042586595	0.14044042586595	
8h	1h	0		0.022479191377805	0
0.05	0	-0.090175425865951	0.090175425865951		
8h	2h	-0.0251325		0.022479191377805	1.5811388300842
0.79282297689951	0.05	0	-0.11530792586595	0.065042925865951	
8h	4h	0.0251325		0.022479191377805	1.5811388300842
0.79282297689951	0.05	0	-0.065042925865951	0.11530792586595	
8h	6h	-0.025132500000001	0.022479191377805	1.5811388300842	0.7928229768995
0.05	0	-0.11530792586595	0.06504292586595		

Sig equals 1 indicates that the means difference is significant at the 0.05 level.
 Sig equals 0 indicates that the means difference is not significant at the 0.05 level.

(b) ANOVA One Way: mass ratio of Fe³⁺: BFA

Descriptive Statistics

	Sample Size	Mean	Standard Deviation	SE of Mean
1:80	2	0.26389125	0.017771361178171	0.01256625
1:40	2	0.32923575	0.0035542722356342	0.00251325
1:20	2	0.33928875	0.017771361178171	0.01256625
1:10	2	0.351855	0	0
1:5	2	0.36442125	0.017771361178171	0.01256625

One Way ANOVA
 Overall ANOVA

	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	0.0122387061699	0.003059676542475	15.934210526316	0.0047352912374026
Error	5	9.600966855E-4	1.920193371E-4		
Total	9	0.0131988028554			

Null Hypothesis: The means of all levels are equal.
 Alternative Hypothesis: The means of one or more levels are different.
 At the 0.05 level, the population means are significantly different.

Fit Statistics

R-Square	Coeff Var	Root MSE	Data Mean
0.92725880551302	0.042024538878324	0.013857104210476	0.3297384

Means Comparisons
Tukey Test

Alpha	Sig	LCL	MeanDiff	UCL	SEM	q Value	Prob
0.05	1	Level2 Level1	0.0653445	0.12093236579318	0.013857104210476	6.6688592885535	0.026645897653551
0.05	1	Level3 Level1	0.0753975	0.13098536579318	0.013857104210476	7.6948376406387	0.014736315397538
0.05	0	Level3 Level2	0.010053	0.065640865793176	0.013857104210476	1.0259783520852	0.94145843849005
0.05	1	Level4 Level1	0.08796375	0.14355161579318	0.013857104210476	8.9773105807451	0.0075549607389804
0.05	0	Level4 Level2	0.02261925	0.078207115793176	0.013857104210476	2.3084512921916	0.53793320885799
0.05	0	Level4 Level3	0.01256625	0.068154115793176	0.013857104210476	1.2824729401064	0.88317877008349
0.05	1	Level5 Level1	0.10053	0.15611786579318	0.013857104210476	10.259783520852	0.0041503784604242
0.05	0	Level5 Level2	0.0351855	0.090773365793176	0.013857104210476	3.590924232298	0.21860853224679
0.05	0	Level5 Level3	0.0251325	0.080720365793176	0.013857104210476	2.5649458802129	0.455396183299
0.05	0	Level5 Level4	0.01256625	0.068154115793176	0.013857104210476	1.2824729401064	0.88317877008348

Sig equals 1 indicates that the means difference is significant at the 0.05 level.
Sig equals 0 indicates that the means difference is not significant at the 0.05 level.

(c) ANOVA One Way: molar ratio of Fe³⁺: BH₄⁻

Descriptive Statistics

	Sample Size	Mean	Standard Deviation	SE of Mean
1:3	2	0.30159	0	0
1:5	2	0.30159	0.035542722356342	0.0251325
1:9	2	0.28902375	0.053314083534513	0.03769875

One Way ANOVA
Overall ANOVA

	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	2.1054751875E-4	1.05273759375E-4	0.076923076923077	0.92772898501212
Error	3	0.004105676615625	0.001368558871875		
Total	5	0.004316224134375			

Null Hypothesis: The means of all levels are equal.
Alternative Hypothesis: The means of one or more levels are different.
At the 0.05 level, the population means are not significantly different.

Fit Statistics

R-Square	Coeff Var	Root MSE	Data Mean
0.048780487804878	0.12439099811729	0.036994038328831	0.29740125

Means Comparisons

Tukey Test

Sig	LCL	MeanDiff	UCL	SEM	q Value	Prob	Alpha
0	-0.15458714240179	0	0.15458714240179	0.036994038328831	0	1	0.05
0	-0.16715339240179	0	0.14202089240179	0.036994038328831	0.48038446141526	0.93962020436439	0.05
0	-0.16715339240179	0	0.14202089240179	0.036994038328831	0.48038446141526	0.93962020436439	0.05

Sig equals 1 indicates that the means difference is significant at the 0.05 level.
 Sig equals 0 indicates that the means difference is not significant at the 0.05 level.

(d) ANOVA One Way: shaking time of Fe³⁺ with BH₄⁻ on the amount of iron on BFA.

Descriptive Statistics

	Sample Size	Mean	Standard Deviation	SE of Mean
B	2	0.28902375	0.017771361178171	0.01256625
C	2	0.30159	0	0
D	2	0.31415625	0.017771361178171	0.01256625
E	2	0.31415625	0.017771361178171	0.01256625

One Way ANOVA
 Overall ANOVA

	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	8.6850851484375E-4	2.8950283828125E-4	1.22222222222222	0.4104056754971
Error	4	9.47463834375E-4	2.3686595859375E-4		
Total	7	0.0018159723492188			

Null Hypothesis: The means of all levels are equal.
 Alternative Hypothesis: The means of one or more levels are different.
 At the 0.05 level, the population means are not significantly different.

Fit Statistics

R-Square	Coeff Var	Root MSE	Data Mean
0.47826086956522	0.050504943150169	0.015390450240125	0.3047315625

Means Comparisons
Tukey Test

Sig	LCL	MeanDiff	UCL	SEM	q Value	Prob	Alpha
0	1h 30min	0.01256625	0.075218900886466	0.015390450240125	1.1547005383793	0.84464486830259	0.05
0	2h 30min	0.0251325	0.087785150886466	0.015390450240125	2.3094010767585	0.4552115296941	0.05
0	2h 1h	0.01256625	0.075218900886466	0.015390450240125	1.1547005383793	0.84464486830259	0.05
0	4 30min	0.0251325	0.087785150886466	0.015390450240125	2.3094010767585	0.4552115296941	0.05
0	4 1h	0.01256625	0.075218900886466	0.015390450240125	1.1547005383793	0.84464486830259	0.05
0	4 2h	0	0.062652650886466	0.015390450240125	0	1	0.05

Sig equals 1 indicates that the means difference is significant at the 0.05 level.
Sig equals 0 indicates that the means difference is not significant at the 0.05 level.

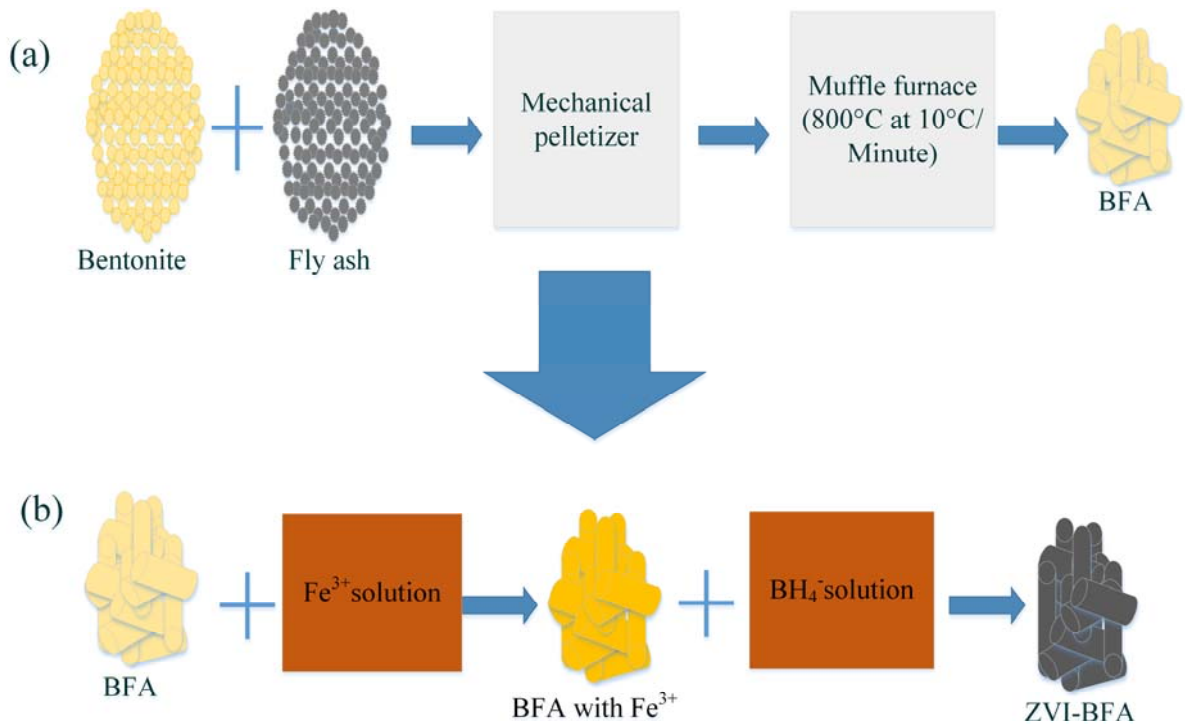


Fig. S1 Schematic representation of (a) preparation of BFA and (b) preparation of ZVI-BFA

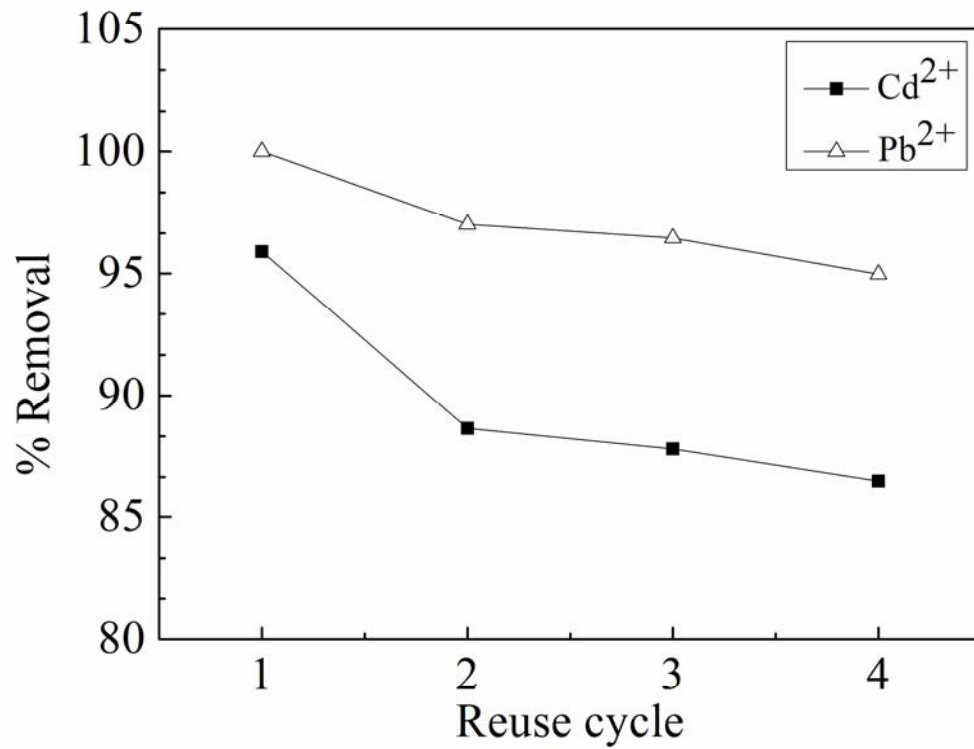


Fig. S2 Reuse test for ZVI-BFA on the removal of Cd²⁺ and Pb²⁺ at 50mg/L using 1g of ZVI-BFA

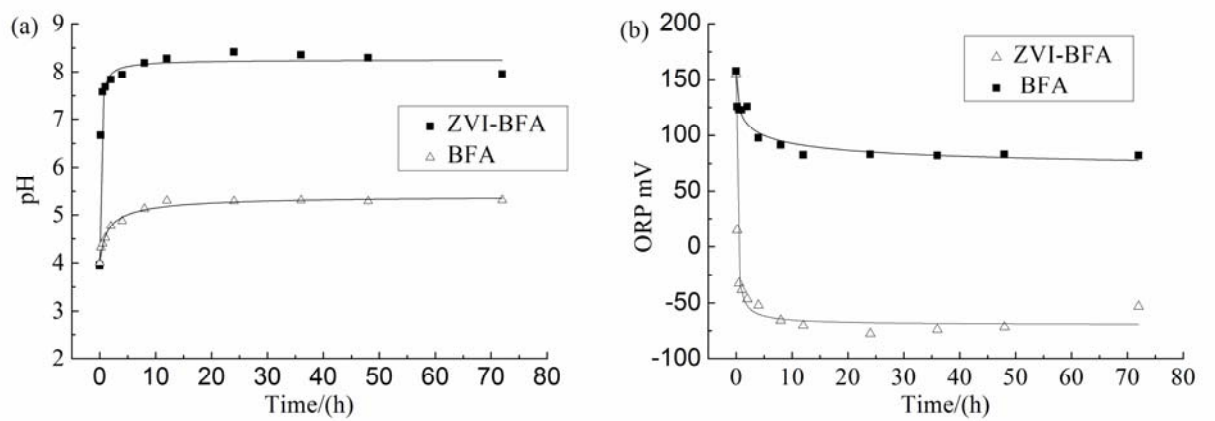


Fig. S3 (a) Variation of pH and (b) ORP with time during removal of Pb²⁺ by ZVI-BFA and BFA