Supplementary

Study on Mineral Compositions of Direct Carbonated Steel Slag by QXRD, TG, FTIR, and XPS

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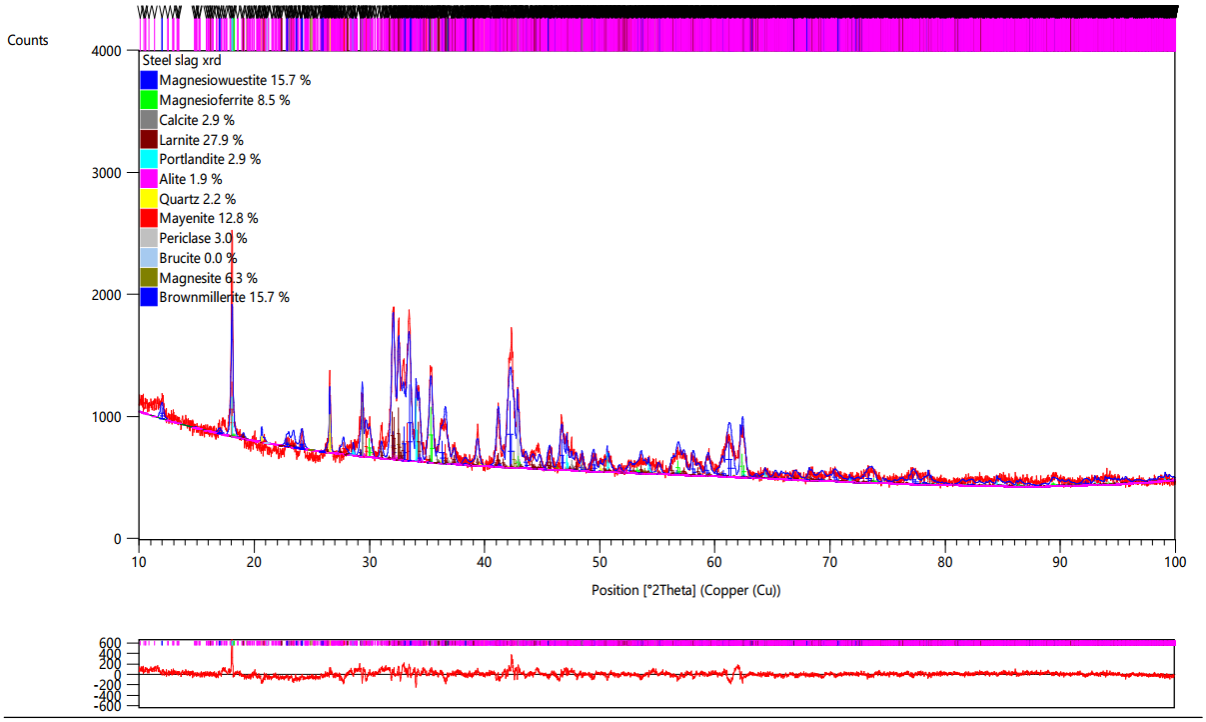
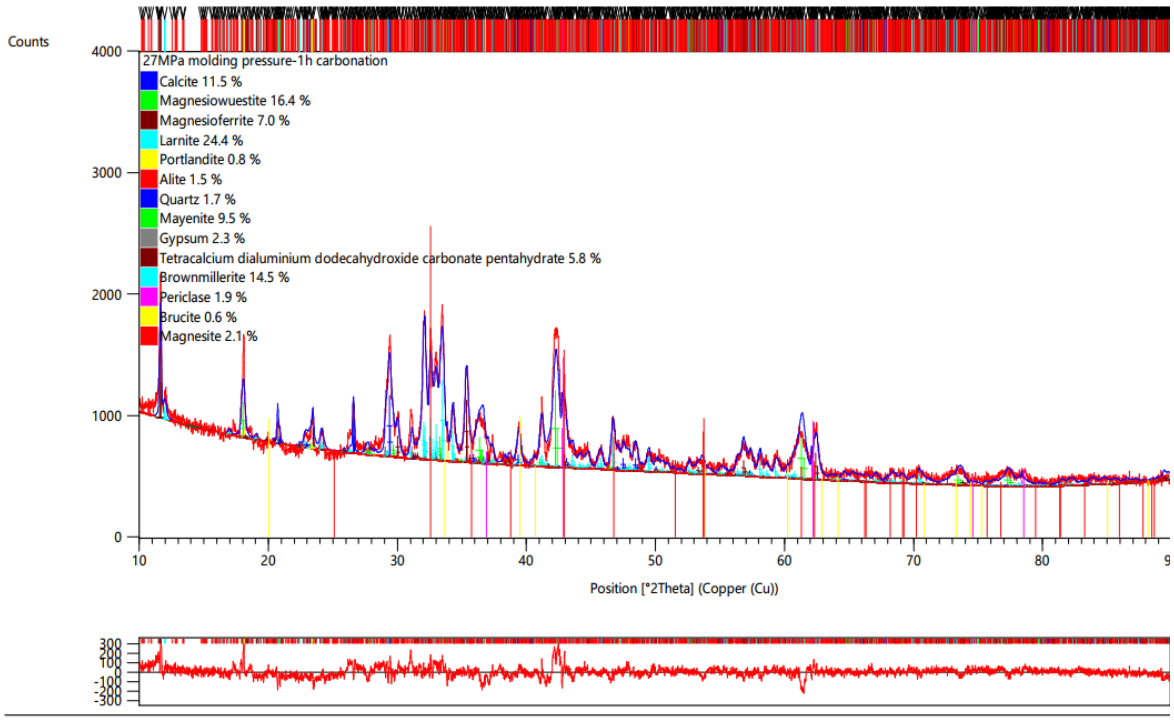
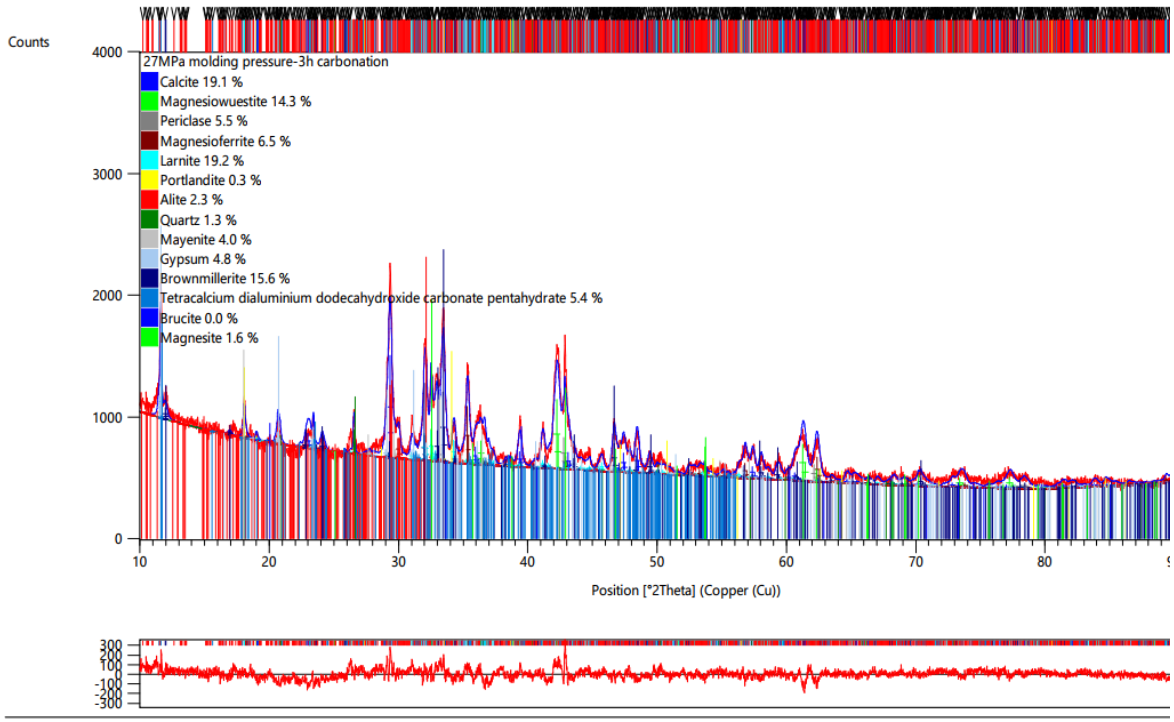


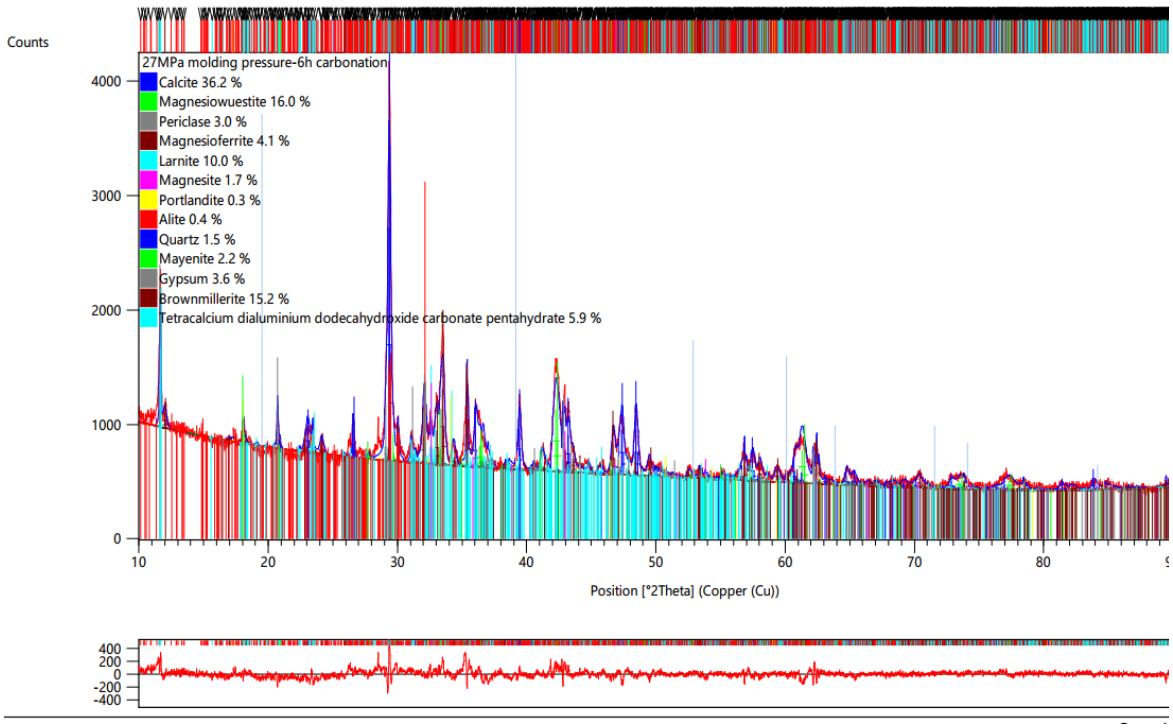
Figure S1. QXRD analysis result of steel slag.


Counts
27MPa molding pressure-1h carbonation
Calcite 11.5 %
Magnesiowuestite 16.4 %
Magnesioferrite 7.0 %
Larnite 24.4 %
Portlandite 0.8 %
Alite 1.5 %
Quartz 1.7 %
Mayenite 9.5 %
Gypsum 2.3 %
Tetracalcium dialuminium dodecahydroxide carbonate pentahydrate 5.8 %
Brownmillerite 14.5 %
Periclase 1.9 %
Brucite 0.6 %
Magnesite 2.1 %
Position [°2Theta] (Copper (Cu))

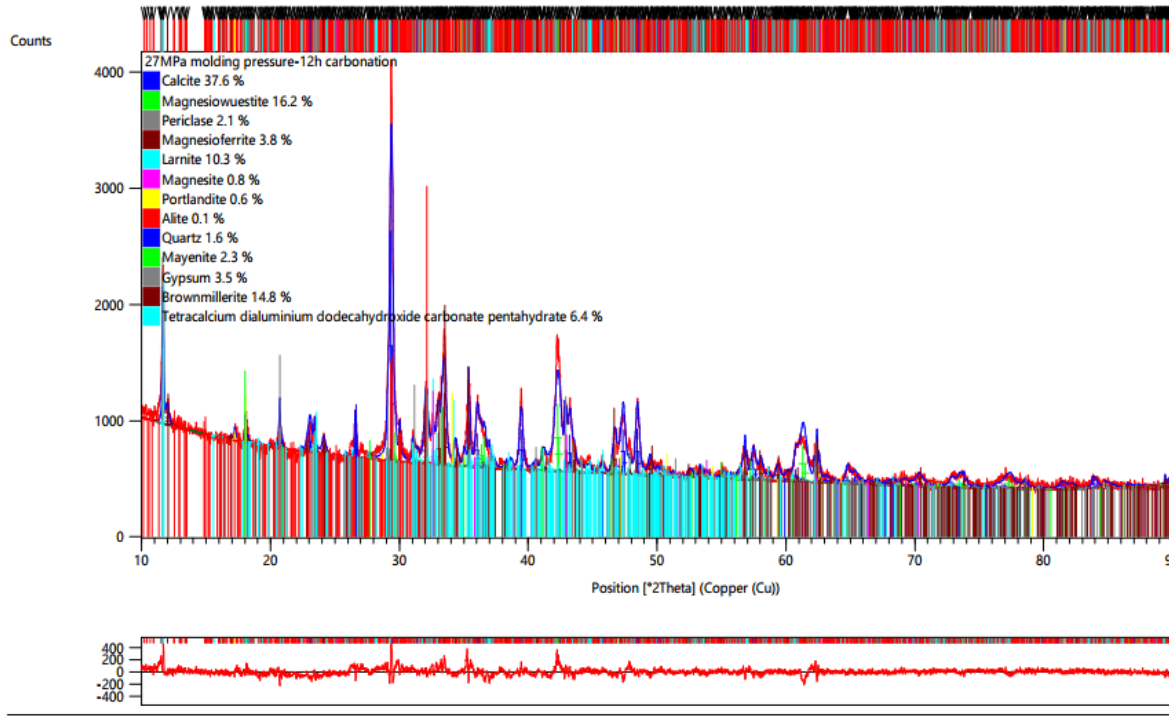
(**a**)


Counts
27MPa molding pressure-3h carbonation
Calcite 19.1 %
Magnesiowuestite 14.3 %
Periclase 5.5 %
Magnesioferrite 6.5 %
Larnite 19.2 %
Portlandite 0.3 %
Alite 2.3 %
Quartz 1.3 %
Mayenite 4.0 %
Gypsum 4.8 %
Brownmillerite 15.6 %
Tetracalcium dialuminium dodecahydroxide carbonate pentahydrate 5.4 %
Brucite 0.0 %
Magnesite 1.6 %
Position [°2Theta] (Copper (Cu))

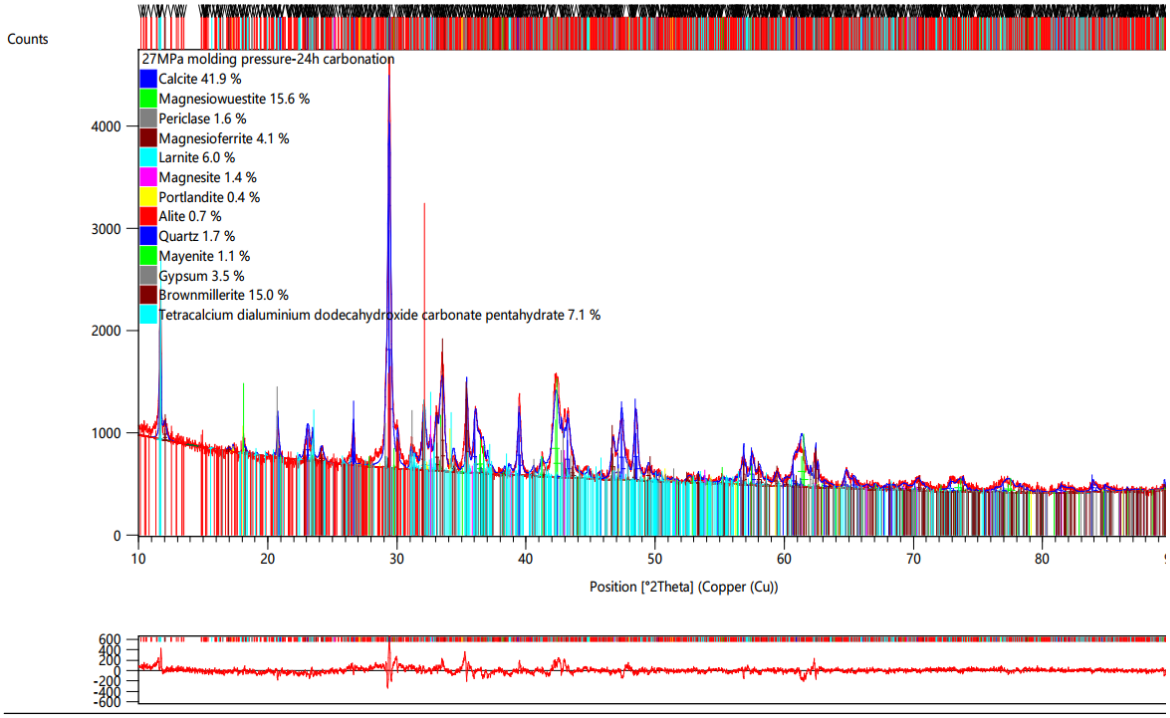
(**b**)


Counts
27MPa molding pressure-6h carbonation
Calcite 36.2 %
Magnesiowuestite 16.0 %
Periclase 3.0 %
Magnesioferrite 4.1 %
Larnite 10.0 %
Magnesite 1.7 %
Portlandite 0.3 %
Alite 0.4 %
Quartz 1.5 %
Mayenite 2.2 %
Gypsum 3.6 %
Brownmillerite 15.2 %
Tetracalcium dialuminium dodecahydroxide carbonate pentahydrate 5.9 %
4000
3000
2000
1000
0
10
20
30
40
50
60
70
80
Position [°2Theta] (Copper (Cu))
400
200
0
-200
-400

(**c**)

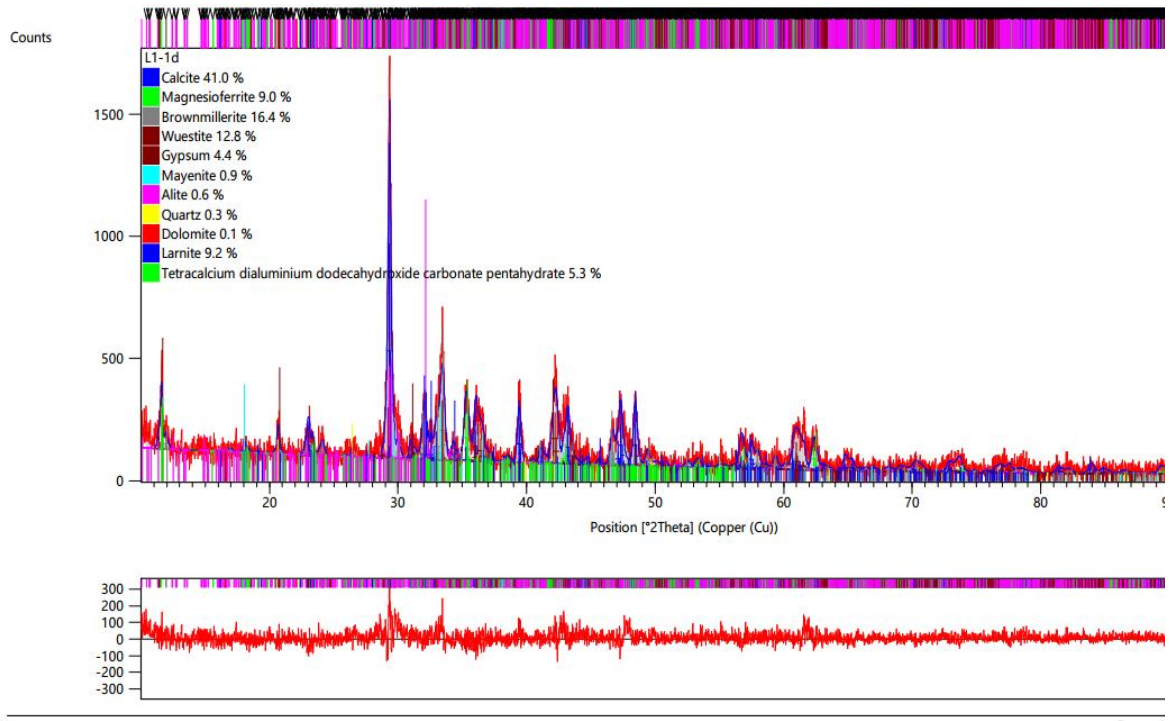

Counts
27MPa molding pressure-12h carbonation
Calcite 37.6 %
Magnesiowuestite 16.2 %
Periclase 2.1 %
Magnesioferrite 3.8 %
Larnite 10.3 %
Magnesite 0.8 %
Portlandite 0.6 %
Alite 0.1 %
Quartz 1.6 %
Mayenite 2.3 %
Gypsum 3.5 %
Brownmillerite 14.8 %
Tetracalcium dialuminium dodecahydroxide carbonate pentahydrate 6.4 %
4000
3000
2000
1000
0
10
20
30
40
50
60
70
80
Position [°2Theta] (Copper (Cu))
400
200
0
-200
-400

(**d**)

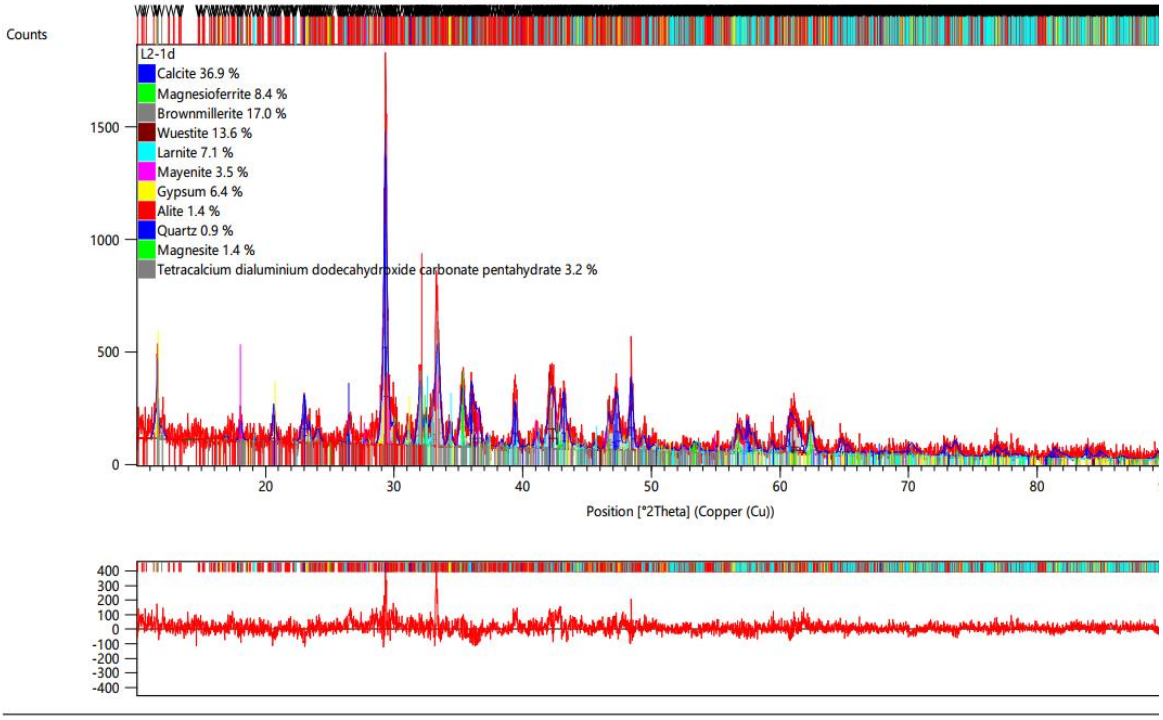


(**e**)

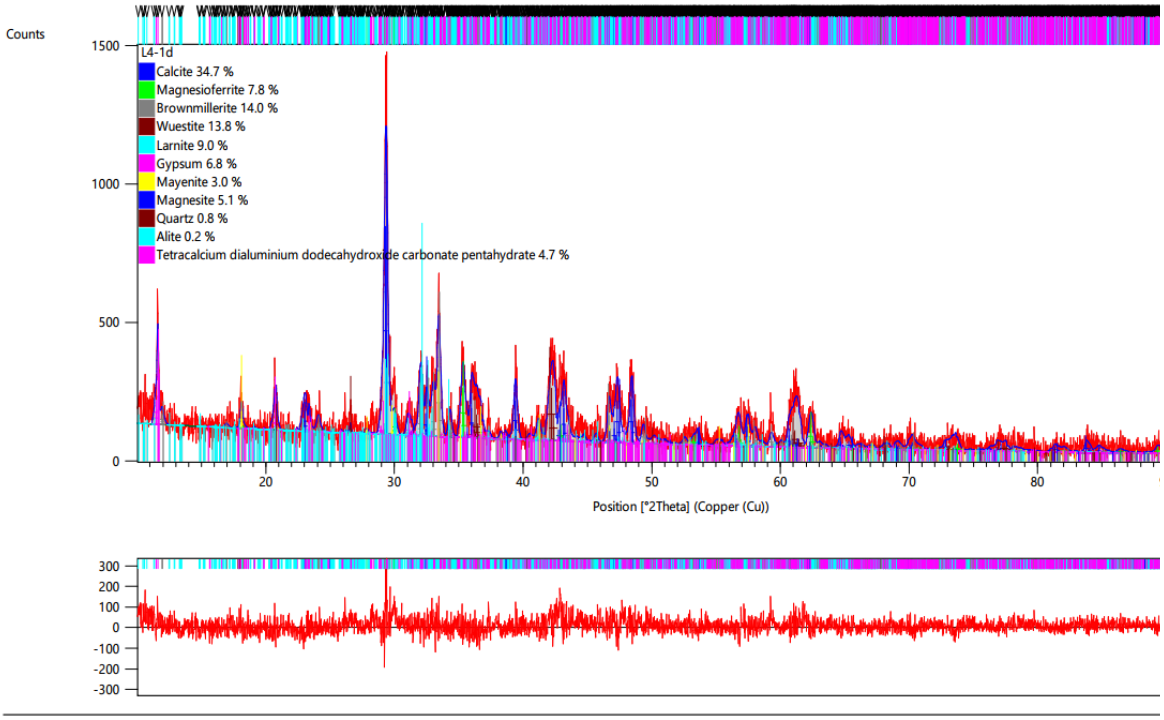
Figure S2. QXRD analysis results of steel slag after (**a**) 1 h, (**b**) 3 h, (**c**) 6 h, (**d**)12 h, and (**e**) 24 h carbonation. (molding pressure: 27 MPa, G/SS: 1/16, w/s: 0.2).



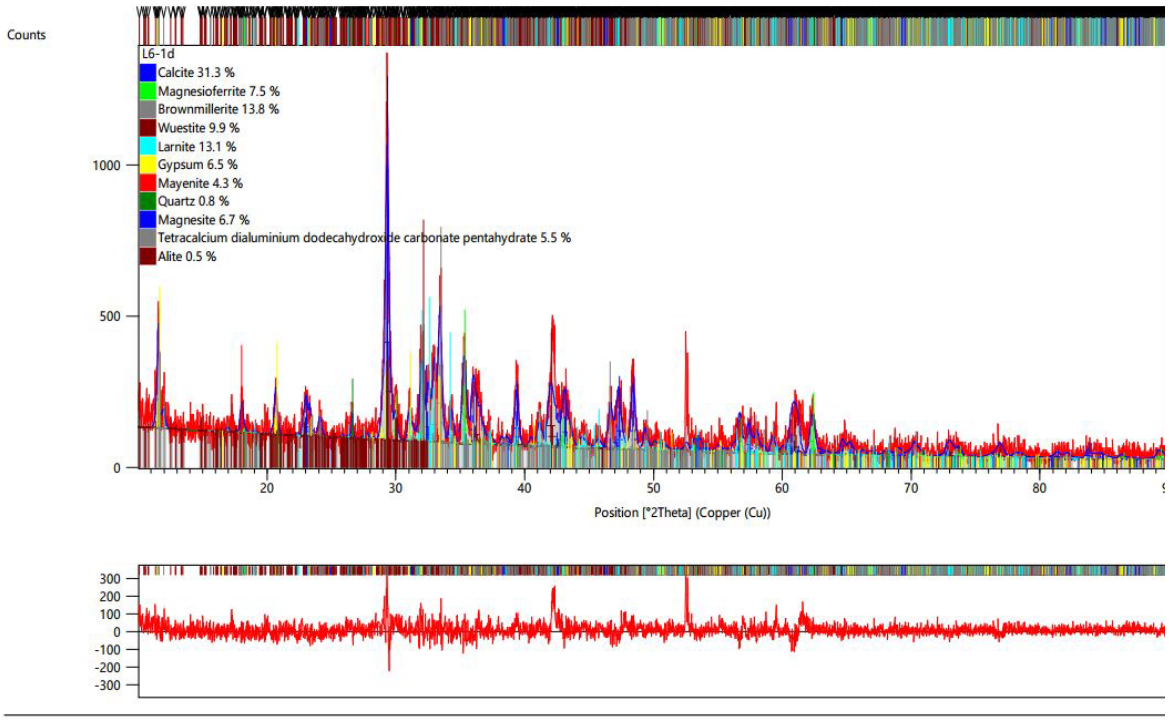
(**a**)


Counts
L2-1d
Calcite 36.9 %
Magnesioferrite 8.4 %
Brownmillerite 17.0 %
Wuestite 13.6 %
Larnite 7.1 %
Mayenite 3.5 %
Gypsum 6.4 %
Alite 1.4 %
Quartz 0.9 %
Magnesite 1.4 %
Tetracalcium dialuminium dodecahydroxide carbonate pentahydrate 3.2 %
1500
1000
500
0
20
30
40
50
60
70
80
Position [°2Theta] (Copper (Cu))
400
300
200
100
0
-100
-200
-300
-400

(**b**)


Counts
L4-1d
Calcite 34.7 %
Magnesioferrite 7.8 %
Brownmillerite 14.0 %
Wuestite 13.8 %
Larnite 9.0 %
Gypsum 6.8 %
Mayenite 3.0 %
Magnesite 5.1 %
Quartz 0.8 %
Alite 0.2 %
Tetracalcium dialuminium dodecahydroxide carbonate pentahydrate 4.7 %
1500
1000
500
0
20
30
40
50
60
70
80
Position [°2Theta] (Copper (Cu))
300
200
100
0
-100
-200
-300

(**c**)



(**d**)

Figure S3. QXRD analysis results of steel slag with different w/s ratio of (**a**) 1/5, (**b**) 1/6, (**c**) 1/8, and (**d**) 1/10. (molding pressure: 9 MPa, G/SS: 1/16, carbonation duration: 1d).