

[2015] 0005

100%

2014 12 31

3.204

575.71	Li ₂ O	59521	365.64
Li ₂ O	37526.50	10.86	
12.86	40 /	Li ₂ O>5%	
		1910.26 /	
64.10 /		11234.59	9692.37
		227.62	196.17 /
	175.93 /	8.35%	

11432.55

[2015] 0005

100%

2014 12 31

1

2 A 23 2306A

110000001459830

0000007

[2002]025

2

2.1

B

(

1997 12 2

(010)68083972

(010)68081109

2

A 23

100045

(

2000 3 2

*

2.2

2010 3 3

2010 3 3 2030 3 2

2017 6 27

3

C3600002009045110010143

40.00 /
3.204

2014 6 27 2017 6 27
10

	X	Y		X	Y
1	2953747.51	39415749.78	6	2954847.53	39418349.81
2	2952397.49	39415699.79	7		

				4	
	6.60	2012	6	27	2014 6
27	3.204		+615		0
	40 /				
					2014
40 /		2014	6	27	2017 6 27
					-
					[2003]04
2003 6					
192.74			2003	7	
			200		
				2003	6
5					
	100%				
6					
	2014	12	31		
7					
7.1					
7.2					
7.3					

7.4				
7.5				
7.6				
7.7				
7.8				
8				
8.1				
8.1.1		1996	8	29
8.1.2				
8.1.3			1998	241
8.1.4		1998	2	12
242				
8.1.5		2000	11	1
[2000]309				
8.1.6				
[2008]174				
8.1.7		2007	3	16
8.1.8				
				[2008]170
8.1.9			1985	2 8
[1985]19				
8.1.10				
2005	8	20		448
8.1.11				
		66		
8.1.13				150
8.1.14				2012 16

8. 1. 15

[1997]174

8. 1. 16

[2004]324

8. 2

8. 2. 1

2008

6

8. 2. 2

8. 2. 3

CMVS30800-2008

8. 2. 4

(2006)

2006

8. 2. 5

/

GB/T17766 1999

8. 2. 6

(GB/T13908-2002)

8. 2. 7

(DZ T 0203-2002)

8. 2. 8

2007 1

CMV 13051-2007

8. 2. 9

8. 3

8. 3. 1

C3600002009045110010143

8. 3. 2 2011 10

8. 3. 3

[2011]131

8. 3. 4

[2011] 24

8. 3. 5

2012 12

8.3.6 2014 1

8.3.7 2011 6

8.3.8

9

9.1 2015 1

9.2 2015 1 29 2 1

9.3 2015 2 2 2 18

9.4 2015 3 30

10

10.1

25Km

319

2km

10.2

615m

270m

345m

1588mm

280

+300m

6

10.3

1970

1972 1973

Nb₂O₅ D

130 Ta₂O₅ D 47

Nb₂O₅

0.0162% Ta₂O₅ 0.0077%

2000 6 -2002 12

C+D 248.21 Li₂O 27309.9

C 13.98 Li₂O 1646.44 2003 1

[2003]15

2002 3 -2004 3

332+333+3341

364.66 Li₂O 38502.52

332+333+3341 294.18 Li₂O 30804.44

2009	4	2011	10				
					2011	10	30
		122b+333			575.71		Li ₂ O
59520.98		Li ₂ O	1.03%		122b		298.45
	Li ₂ O	29731.08			Li ₂ O	1.00%	333
277.26	Li ₂ O	29789.90			Li ₂ O	1.08%	
10.4							
10.4.1				Q		Zh	
Zh							
317m							
10.4.2							
		50		SE	40	70	
					Li 27	Li 25	Li 26
Li 67							Li 66
		80	90	S	30	60	
		Li 33	Li 38				
10.4.3							
		660			40		

8 15
 5 40% 10 40% 10 25% 1 35% 2
 5%

10.5

10.5.1

7

Li 38 Li 33 Li 27 Li 26 Li 25 Li 66 Li 67 Li 33

67.86%

Li 26 Li 38 Li 25

15.13% 10.38% 6.64%

Li 27 Li 66 Li 67

Li 27 Li 26 Li 25

Li 33 Li 38 Li 66 Li 67

Li 38

150 -210 20 -57

25

500

1.87 21.93

7.08

Li 26				Li 33
1000-1500				
Li 26-1	Li 26-2			
Li 26-1				
70		60		10 -20
145	60		20-25	190
150		70	+265	1.01 8.37
4.00		Li ₂ O	2.055%	0.278%
1.07%				
Li 26-2			330	86-90
50-90		150	75-82	420
350			300 +100	
40			1.48 9.77	3.89
Li ₂ O		3.44%	0.15%	1.15%
Li 25			Li 26	250-300
Li 26				
				40 -50
+250 +200				60 -70
			155	40 -70
35-45				

30 40%

37%

10 15%

12%

10 50

25 30%

26%

7-35%

16%

40%

3.128

1.0 8cm

10 100cm

3%-5%

Li₂O

Li⁺

Na⁺

K⁺

Fe⁺⁺

Li₂O

95%-99%

Li₂O

6.5%-7.20%

Li⁺

Li₂O

0.035%

K₂O 6.48%

Na₂O 1.38%

4.88%

Li⁺

Li⁺

SiO₂ 70.63% Al₂O₃ 17.53% Li₂O 0.7

2.2% K₂O 1.95% Na₂O 4.10% P₂O₅ 0.89% MnO 0.12% Nb₂O₅ 0.012%

Ta₂O₅ 0.0044% Fe₂O₃ 0.2% FeO 0.45%

Li Nb

Ta Rb Be Cs Zr Hf

Li₂O

Nb₂O₅

Ta₂O₅

Rb₂O

Fe₂O₃ MnO

(Nb+Ta)₂O₅ 30% Ta₂O₅ 15% 50-
55%

+
YS/T394-2007

10.5.6

10.6

200 + 75%-

4 + 3-

3-4

	(Li ₂ O, %)	(Li ₂ O, %)	(Li ₂ O, %)	(%)	(%)
2006	1.05	5.60	0.31	70.5	13.21
2007	1.00	5.83	0.28	72.3	12.40
2008	0.95	5.58	0.29	70.0	11.92
2009 1-10	0.98	5.63	0.28	71.2	12.39
	1.00	5.66	0.29	71.0	12.48

TFe 0.4-0.6% P₂O₅ 0.2-0.3% MnO

0.15-0.2% Al₂O₃ 21-23% SiO₂ 65-67% Li₂O>5%

6-8% TFe 0.2-0.4%

K₂O+Na₂O

0.1%

10.7

10.7.1

10.7.2

Li 38 Li 33

10 30m

10.7.3

10.8

+

2006

2010

40 /

2010

2011

40

40

11

2012

12

40

2014 1

40

CMVS12100 2008

CMVS30800

2008

$$P = \sum_{t=1}^n (CI - CO)_t \frac{1}{1+i^t}$$

P --

CI --

CO --

--

i --

t -- $t = 1, 2, \dots, n$

n --

12

2011

10

2012 12

2014 1

2006

2011 10

(DZ T 0203-2002)

[2011]131

[2011] 24

2012 12

40 /

2014 1

40 /

2011 6

2012 12

2013 2014

12.1

12.1.1

					2011 10 31
	122b + 333		575.71	Li ₂ O	59521
Li ₂ O	1.03%	122b	298.45	Li ₂ O	
29731.08	Li ₂ O	1.00%	333	277.26	Li ₂ O
29789.9	Li ₂ O	1.07%			
	Nb ₂ O	679	0.0245%	Ta ₂ O	289
	0.005%				

2010 7

12. 1. 2

122b 332
333

0.5 0.8 333
0.7 333

0.7

122b + 333 492. 53

Li₂O 50584 Li₂O 1.03% 122b
298. 45 Li₂O 29731. 08 Li₂O 1.00% 333
194. 08 Li₂O 20852. 93 Li₂O 1.03%

Nb₂O Ta₂O
Nb₂O Ta₂O Nb₂O Ta₂O

12. 2

+

Li 38

Li 33 Li 26 Li 25

12. 3

Li₂O>5%

12. 4

85. 6% 15. 8%
71% 70%

85.6%		15.8%			71%
		70%			
12.5					
				122b+333	
65.38	Li ₂ O	6744.64	Li ₂ O	1.03%	122b
35.86	Li ₂ O	3586.00	Li ₂ O	1.00%	333
29.52	Li ₂ O	3158.64	Li ₂ O	1.07%	

				122b + 333	365.64
	Li ₂ O	37526.50	Li ₂ O	1.03%	122b
224.78	Li ₂ O	22380.19	Li ₂ O	1.00%	333
140.86	Li ₂ O	15146.31	Li ₂ O	1.08%	

				40 /	
40 /				40 /	40 /

40 /

$$T = \frac{Q}{A(1 - \rho)}$$

 T Q A ρ

T 365.64 40 1-15.8% 10.86

10.86

40 /

1

1

1

12.86 =10.86+2

12.7

12.7.1

CMVS30800-2008

5

2009

1

5 10

-

4

		http://www.battery-dg.com		2012	
	58.6		26.3%	207	
35.3%		2012		39.2	
32%	556.8		39.4%		
					1251.5
		30%	2013		
	47.68			16.9%	
			2014		
29868Mwh		31%	2017		
69514Mwh	3		33%		
2014	4396Mwh		2017	25458Mwh	2014
					5
		2014			
2015					50
2020					200
	500				
			2013		7.6
3.8			2.2		0.23
	7.6				
				2014	
2013					2014
			4.07		2.05
1.23	0.26		4.26		3.11

2013 6 2500 66%

wi nd 2010 1 2014 12 31

2010

2013

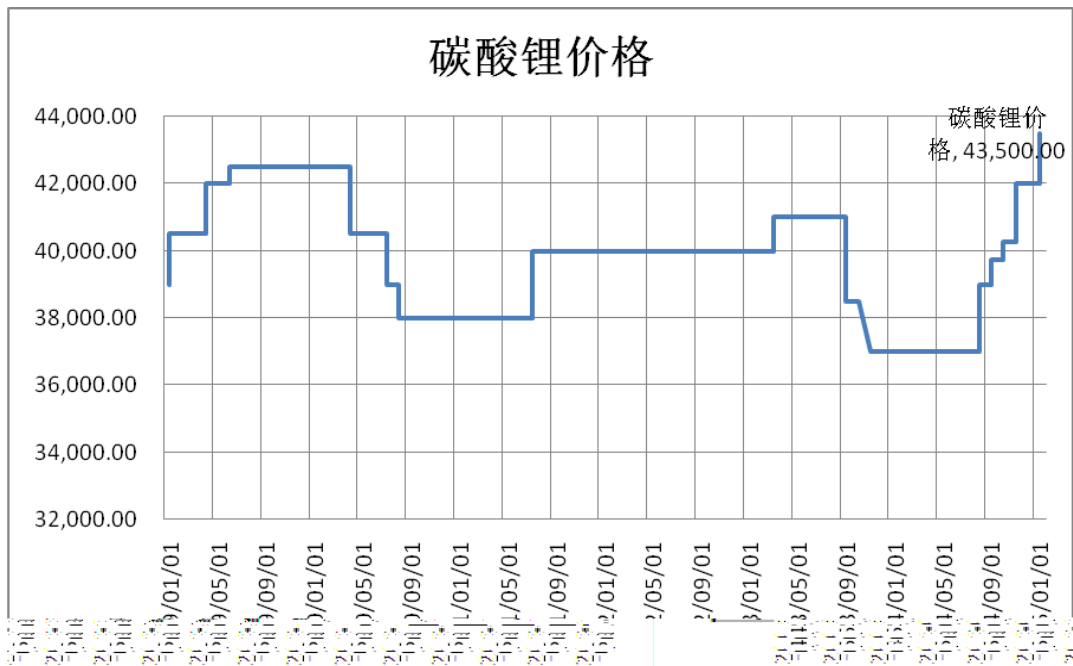
2014 8

2014 12

13.5%

2015 1

43500 /



2009 1 2014 12

39794.44 /

2010 12 2011 3 2010 12

1353.84 / 2011 3

1709.40 /

2013 12 19

Tal i osn 2011 2150 / 2012 2500

/ 2013 2800 / 2015 1 8

002466 2014 375 /

2014	6.1428	2303.55
/ 2015		
(3		
	2235 /	1910.26 /
12.7.2		
K ₂ O>9% Na ₂ O 3% Fe ₂ O ₃ <0.001%)	200	

12.8				
12.8.1				
				5081.38
	2980.41		2015.08	
1319.83		889.87	440.39	
	17.19	5.78		2176.43
	1220.19	235.66		129.74
	105.92			
			4089.28	
2179.53		240.09		1277.54
	392.12			
4089.28		2410.69		265.55
1413.04				
			286.06	
			278.54	
7.52				
5081.38	2980.41			2015.08
1319.83		889.87		440.39
2176.43		1220.19		235.66
129.74		105.92		

			9692.37
7591.41		4555.51	3860.26
	2302.90	1853.43	2833.96
	1877.72		

12.8.2

		146.31	
			2010 8
		37.53	
		2010 11 4	
			43.78
		227.62	146.31+37.53+43.78

12.8.3

	15% 20%	18%
1744.63	=9692.37	

12.9

2006

CMVS30800-2008

12.9.1

1

40.93 /

34.98 =40.93 1.17 /

34.98 /

2

44.56 /

38.09 =44.56 1.17 /

38.09 /

3

36.83 /

488

324

104

15

45

4

3.65

3.25

5.8

40683.4

49.63

14%

56.58 =49.63+49.63 14% /

4

20

10

20

12

5%

2176.43 1-5% 20 103.38

889.87 1-5% 12 70.45

657.53 1-5% 20 31.24

1207.72 1-5% 12 95.61

103.38 70.45 31.24 95.61 40 7.52 /

7.52 /

4.5 /

5%

2.88 /

[2004]324

15 18

15 /

2006

3%					1
	2013	77			
					3%
2%				7.98	/
4					
				8	/
	2012	16			
10	/				
2012	16			1.5	/
11.5	/				
5					
				5	/
5	/				
				27.20	=0.52+2.20+7.98+11.5+5 /
12.9.3					
1744.63			70%		30%
		5.6%		1,221.24	
68.39	=1744.63	70%	5.6%		1.71 =68.39
40					
12.9.4					
				1.5%	2.96 /
		1.5%		4.21	/
12.9.5					

196.17 /

175.93 /

12.10

12.10.1

(

17%

= 11234.59 17%= 1909.88

17%

= 1399.32+ 1523.42 17%= 496.86

=1909.88 496.86=1413.02

([2008]170

)

([2010]98

) 2%

5%

=

=1413.02 70.65

12.10.4

[1997]174

1 /

1 /

=14.13+70.65+40=124.78

12.11

25%

25%

815.79

12.12

2014 11 22 5

5 4.25%

14.3

14.3.1

14.3.2

14.3.3

14.3.4

14.3.5

14.3.6

14.4

14.5

14.6

14.7

14.7.1

14.7.2

14.7.3

14.7.4

14.8

15

2015 3 30

16

C3600002009045110010143

2011 10

[2011]131

[2011] 24

2012 12

2014 1

2011 6