

+
58

6100 18279.67 27.42 11126.11

1300

3000

2021 5 28

2105-450109-04-01-581249 2

682

2018 12 29

2021

13 18 135

10 1 15 1000

2021 6 21

1

108 49 42.87 22 37 33.01 108.82858,22.62584

+ A/O

8 0.3

15

2

0.035%

3

7

3.8

2010 12 22

4

2019

< 16

>

5

1

2

3

4

5

1	.....	1
1.1	.....	1
1.2	.....	5
1.3	.....	7
1.4	.....	13
1.5	.....	21
2	.....	23
2.1	.....	23
2.2	.....	31
3	.....	59
3.1	.....	59
3.2	.....	64
3.3	.....	83
4	.....	84
4.1	.....	84
4.2	.....	90
5	.....	113
5.1	.....	113
5.2	.....	117
5.3	.....	130
6	.....	132
6.1	.....	132
6.2	.....	132
6.3	.....	133

6.4	.....	133
6.5	.....	134
7	.....	135
7.1	.....	135
7.2	.....	139
7.3	.....	141
7.4	.....	146
7.5	.....	148
8	.....	149
8.1	.....	149
8.2	.....	149
8.3	.....	150
8.4	.....	152
8.5	.....	155
8.6	.....	155
8.7	.....	
8.8	.....	156
8.9	.....	156
8.10	.....	156

•

• •

1		2014		2015	1	1		
2			2018	12	29		2018	12
29								
3			2017	6	27		2018	1 1
4			2018	10	26		2018	10
26								
5				2020	4	29		2020
9	1							
6			2018	12	29		2018	
12	29							
7			2010	12	25		2011	3 1
8		2016	7					
9			2019	8	26		2020	1 1
10			2016	5	16		2016	7
1								
11			2018	1	1			
12			2007	10	28		2008	4 1
13			2011	2	16		2011	12 1

14				2021	5	1		
15				2015	4	24		
16				2012	12	28		
17				2013	6	29		
..								
1				2017		2017	10	1
2				2021				
16	2021	1	1					
3				2019	1	1		
4				2015	6	5		
5							2012	98
6							2014	56
7							2011	35
8								2012
77								
9				2021				
					15	2021	1	1
10								
	2016	150						
11				2019.3.28				
12								
2017	84							
13								2012
77								
14		<			>		2013	37
15		<			>		2015	17

16	<	>	2016	31
17			2005	39
18		2000	38	2000 11
26				
19			2014	56
20				
2016			150	
21	<	>		
2016			81	
22				
9	2019	11	1	
23				
2005			139	
24		2010	7	
25				
2019			42	
26			2014	789
27			2017	25
28	2019	2020	1	1
..				
1		2019	7	25
2		2020	5	1
3		2019	1	1
4		2008	8	
5			2018	1
6				2011
52				

1.2 -1

• •

1.2-2

	H	
	13	
	K^{+} N^{+} C^{2+} M^{2+} CO_3^{2-} HCO_3^{-} C^{-} H 20	COD NH_3-N
	O_3 O_2 NO_2 PM_{10} $PM_{2.5}$ CO P	NH_3 H_2 PM_{10}
	L_A	L_A

•

• •

• • •

2008

2-1

2-1-18

2010

2-1

2-1-11

• • •

GB3095-2012

GB3095-2012

2018 9 1

• • •

300

GB3838-2002

• • •

GB/ 14848-2017

• • •

GB3096-2008

2 3 4

GB3096-2008 3

4

2

1.3-1

1.3-1

1		2-1
2		GB3095-2012 2018 9 1
3		GB3838-2002
4		GB/ 14848-2017
5		GB3096-2008 3
6		4
7		
8		
9		

..

1

GB 3095-2012 2018

NH₃ H₂

-

HJ 2.2-2018

1.3-2

1	O ₂		60 / 3	3095-2012 2018 GB
		24	150 / 3	
		1	500 / 3	
2	NO ₂		40 / 3	
		24	80 / 3	
		1	200 / 3	
3	P		200 / 3	
		24	300 / 3	
4	PM ₁₀		70 / 3	
		24	150 / 3	
5	PM _{2.5}		35 / 3	
		24	75 / 3	
6	O ₃	8	160 / 3	
		24	200 / 3	
7	CO	24	4 / 3	
		1	10 / 3	
8	NH ₃		0.2 / 3	HJ 2.2-2018 - D
9	H ₂		0.01 / 3	

2

GB 3838-2002

1.3-3

1.3-3

/L

1		1 2
2	H	6 9
3		2
4		15
5	COD	40
6	BOD ₅	10
7		2.0
8		0.4
9		0.1
10		1.0

11		1.0
12	/L	40000

3

GB/ 14848-2017

1.3-4

1.3-4

/L H

		/ - 0			/ - 0
1	H	6.5 H 8.5	11	HCO ₃ ⁻	/
2		450	12		0.005
3		3	13		1.0
4		0.50	14		/
5		250	15		200
6		20.0	16		/
7		1.00	17		/
8	C	0.05	18	F	0.3
9	C ⁻	250	19	M	1.0
10	CO ₃ ²⁻	/	20		3 MPN/100

4

GB 3096-2008 2 3 4

GB3096-2008 3

4

GB3096-2008 2

1.3-5

1.3-5

(GB 3096-2008)

B A

2	60	50
3	65	55
4	70	60

..

1

GB16297-1996 2

1.3-6

1.3-6

2

/ 3

1			0.40
2			0.12
3			1.0

GB13271-2014

2

8

GB14554-93

1

2

GB18483-2001

2

1.3-7

2

/ 3

1		50	
2		200	
3		20	

1.3-8

1			4.9 /	1.5 / 3
2		15	0.33 /	0.06 / 3
3	()		/	20

1.3-9

()

/ 3		2.0	
%	60	75	85

2

GB13457-92

3

1.3-10

1.3-10

		-			
		/	/		
1		300	5.4	150	150
2	BOD ₅	250	4.5	110	110
3	COD _C	500	9.0	250	250
4		50	0.9		50
5				30	30
6				35	35
7				3	3
8	H	6.0 8.8		/	
9	^{3/}	18.0			

3

GB 12523-2011

1.3-11

1.3-11

L B(A)

	70	55

GB 12348-2008 3

GB 12348-2008 4

13-12

1.3-12

B A

	65	55	3
	70	55	4

4

GB

18599-2020

GB 18597-2001

2013 36

•
• •

(HJ2.2-2018) 5.3

A

AE C EEN

1 P D_{10%}

(HJ2.2-2018)

P

$$P_i = \frac{C_i}{C_{0i}} \times 100\%$$



%

 C_i

1

/ 3

 C_{0i} / 3 C₀

GB3095-2012 1

O₂ NO₂

GB3095-2012 1

PM₁₀

GB3095-2012

NH₃ H₂

HJ2.2-2018

D

2

1.4-1

	P 10%
	1% P <10%

	P <1%
--	-------

2

1.4-2

			(/)	
			500	GB 3095-2012
			200	GB 3095-2012
			150	GB 3095-2012
NH ₃			200	GB 3095-2012
H ₂			10	GB 3095-2012

3

1.4-3 1.4-4

1.4-3 ()

	()									
				()	()	()	()			
1#	108.4955347 0	22.625806 44	96	8.0	0.3	76	3400	O ₂	3.5 10 ⁻⁶	/
								NO ₂	0.078	/
									0.012	/
2#	108.4954491 4	22.625826 51	96	15.0	0.8	25	6500	NH ₃	0.00267	/
								H ₂	0.00002	/
3#	108.4956523 6	22.625967 04	96	15.0	0.4	25	1500	NH ₃	0.0079	/
								H ₂	0.0003	/

1.4-4 ()

				/	/	/			
	108.49524590	22.625279 89	96	56	12	7.8	NH ₃	0.00198	/
							H ₂	0.00002	/
	108.49556944	22.625429 96	96	15	85	6.45	NH ₃	0.0058	/
							H ₂	0.0002	/

4

1.4-5

1.4-5

/	/	
	()	/
		40.4 C
		-2.1 C
	()	90
	/	/
	/	/

6

P D_{10%}1.4-6 P D_{10%}

		(/)		(/)	(%)	0%()
1#	O ₂	500		0.0003	0.0001	/
	NO ₂	200		6.6810	3.34	/
		450		1.0279	0.23	/
2#	NH ₃	200		0.4471	0.22	/
	H ₂	10		0.0033	0.03	/
3#	NH ₃	200		1.4028	0.70	/
	H ₂	10		0.0533	0.53	/
	NH ₃	200		2.0664	1.03	/
	H ₂	10		0.0209	0.21	/
	NH ₃	200		.	.	/
	H ₂	10		0.2953	2.95	/

P

NH₃ P

4.28% C 8.5637 / 3 (HJ2.2-2018)

5

..

HJ 2.3-2018

HJ 2.3-2018

B

1.4-7

	/(/) /()			
	Q 20000	600000		
	Q 200	6000		A
				B

..

HJ 610-2016

1.4-8

1.4-8

1.7-9

HJ 610-2016 A N 98 10
100

1.5-9

2

HJ 610-2016

1.5-10

1.5-10

	20	
	6-20	
	6	

6²

4.5²

7

..

2

5 B

200

..

HJ 964

2018 A

..

18279.67² 2²

HJ19-2011

1.5-10

	2 ² 50		
	18279.67 ² 2 ²		

200

..

HJ169-2018

1

HJ169-2018

B Q

Q

Q

$$Q= \quad /Q$$

Q

Q 1

Q 1 Q 1 Q 10 10 Q 100 Q 100

(HJ 169 2018) B

1.125

0.4

5 2500

$$Q=1.125/5+0.4/2500=0.225 \quad Q<1 \qquad \qquad \qquad I$$

2

HJ169-2018

1.5-11

1.5-11

	+			

• •

1.5-12

1.5-12

	HJ2.2-2018 1% P 10%	NH ₃ P 4.28% 1% 10%	
	HJ 2.3-2018 B		B
	HJ 610-2016 A	N 98 10 100	
	HJ2.4-2009 GB 3096 2 3 4	2 5 B	
	HJ 964-2018 A	HJ 964-2018 A	
	HJ19-2011 2 2 50	18279.67 2 <2 2	
	HJ 169-2018	Q 1	

•

1.5-1

1.5-1

		22.625107	108.494278			84				29
		22.624897	108.494845			29900				35
		22.625045	108.491647			410				200
		22.637177	108.492182			410				1.1
		22.635599	108.496396			128				1.0
		22.635140	108.504268			228				1.2
		22.632050	108.510503			47				1.9
		22.626299	108.508261			43				1.7
		22.612481	108.504667			20				2.1
		22.611279	108.494474			422				1.8
		22.608919	108.489561			52				2.2
		22.624883	108.479475			400				1.2
		22.622244	108.471322			280				2.0
		22.625107	108.494278			84				29

22.624897

108.494845

29900

35

/

/

/

/

•

• •

1

2

3

4

108 49 42.87

22 37 33.01

0.5

1

5

1300

3000

6

18279.67

27.42

11126.11

2020 42

7

10

7

85

513

300

3

8

6100

9

2021 10

2022 10

12			
10		175	360
8	30		
..			

2.1-1

2.1-1

		/	
1		3000	
2		16000	
3		220	
4		330	
5		110	
6		42	
7		130	
8		260	
9		40	
10		65	
11		65	
12		1300	

..

18279.67 27.42 11126.11

2.1-2

		1573.20 ² 7.8	1 /2
		2055.37 ² 8	2
		1	
		1325.31 ²	2
		420.00 ²	1
		1274.75 ² 6.45	
		40.00 ²	
		140.00	/
		15.17 2	/
		7.8	
		H=8 DN=300	/
		1 H=15 DN=800	/
		DN=400 1 H=15	/
			/
		+ 900 ^{3/} +A/O	
			/
		700 /	/
			/
			/
			/

			/
			/
		900 ^{3/}	/
			/
			/

..

2.1-3

. -

/			00		
	A01		120		
			2		
			2		
			1		
			12		
			2		30
			100		
			1		
		B	2		
	A02		1		
	A03		1		L=9 /18
	A04		1		

	A05		1		
	A06		1		,38 4
	A07		2		
	A08		1		
	A09		1		
	A10		1		
	A11		2		
	A12		1		
	A13		1		
+	B01		115		
			2		2.2K
			2		
			2		3.7K
			12		
			2		30
		B	2		
	B02		1		
	B03		2		
	B04		1		
	B10		1		
	B11		1		80
	B12		3		L=6.5
	C01		0		10
	C02		1		

..

2.1-4

.-

	/	/		
	20000	/	1300	
	1.125	N C O		
	120	C O		
PAC	72			
PAM	12			
	0.5	22		
	50			
	28 ^{3/}	/		/
	1000 /	/		/
	10.08 ^{3/}	CH ₄		
	200 ^{3/}	/		0.4
	40.8			
	0.17			3 4
				250

.-

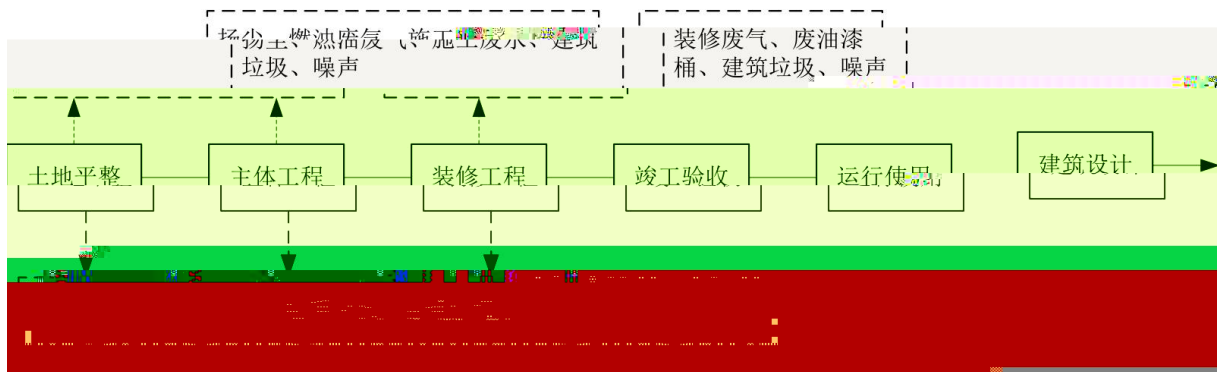
	/	/	
	N C O	CA 7681-52-9	
PAC	A 2(OH) C 6-	CA 1327-41-9	/
PAM	(C ₃ H ₅ NO)	CA 9003-05-8	/

		H 3 9	
22	CHC F ₂	CA 75-45-6 200	5000 /
	CH ₄	CA 74-82-8 25 30%	/
	/	70 70 100 8% 10%	/
	/	10 22	/

• •

•
• •
• • •

2.2-1



2.2-1

2.2-2

1

1

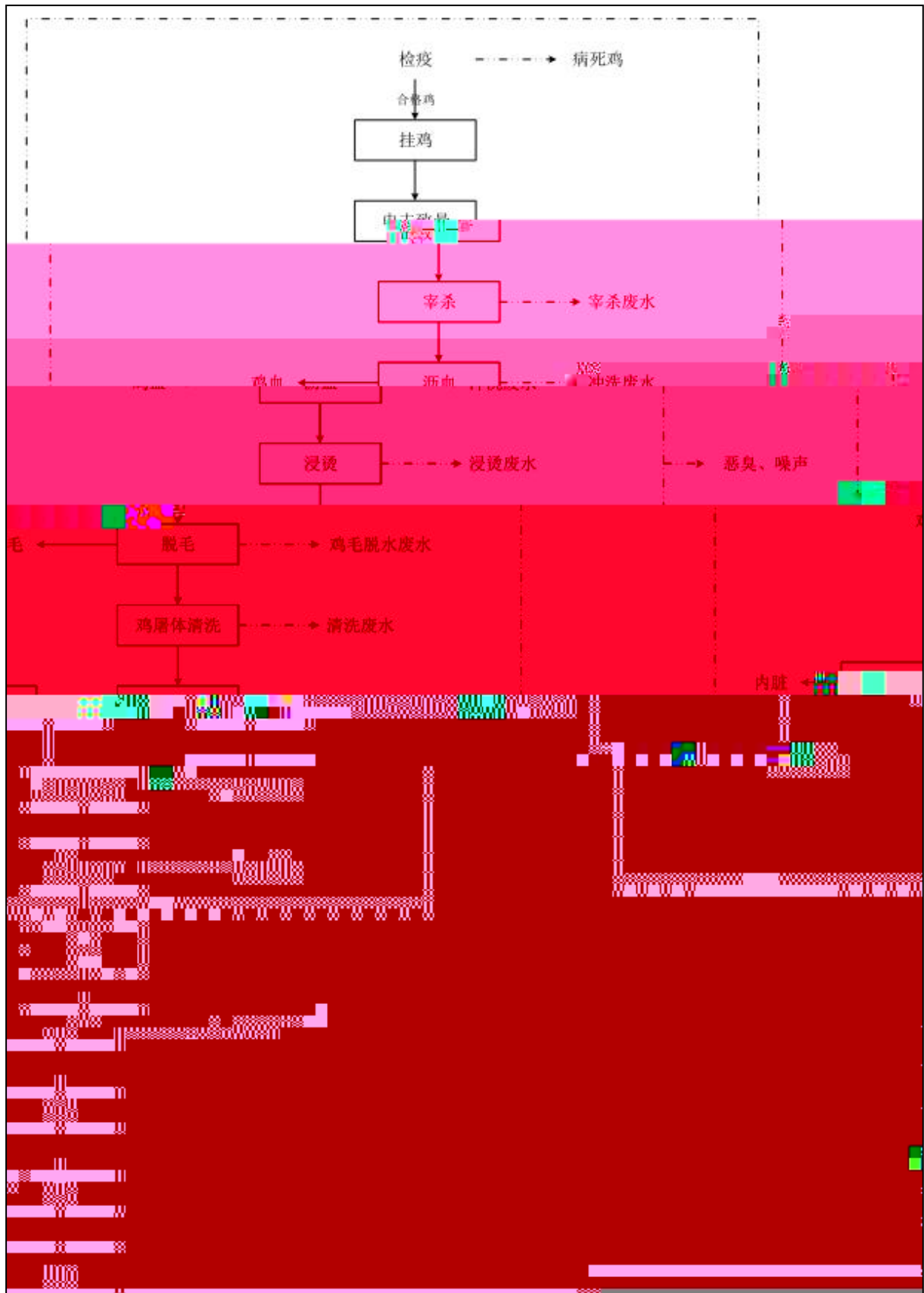
2 3

36 70

2.5 3

59-61

40-90



2.2-2

2

3

40 60

6

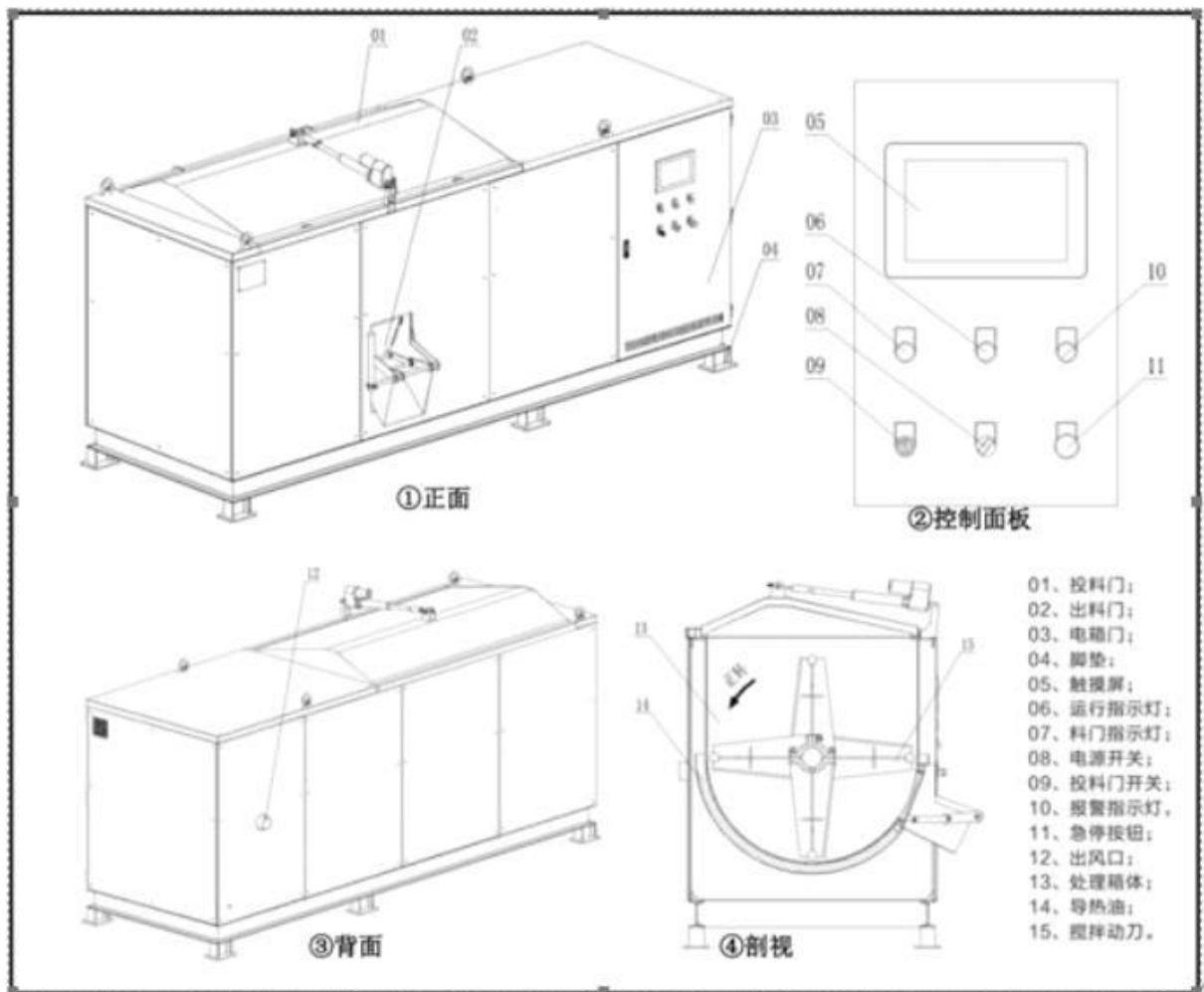
10

2 3

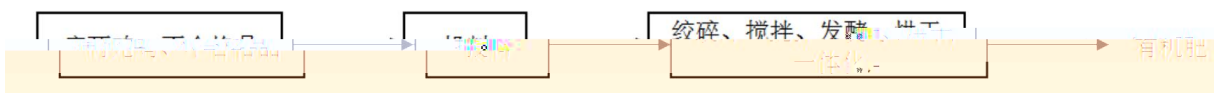
4

2.2-3

2.2-4



2.2-3



2.2-4

1

2

150

10 20

3

75 95

40% 50%

4

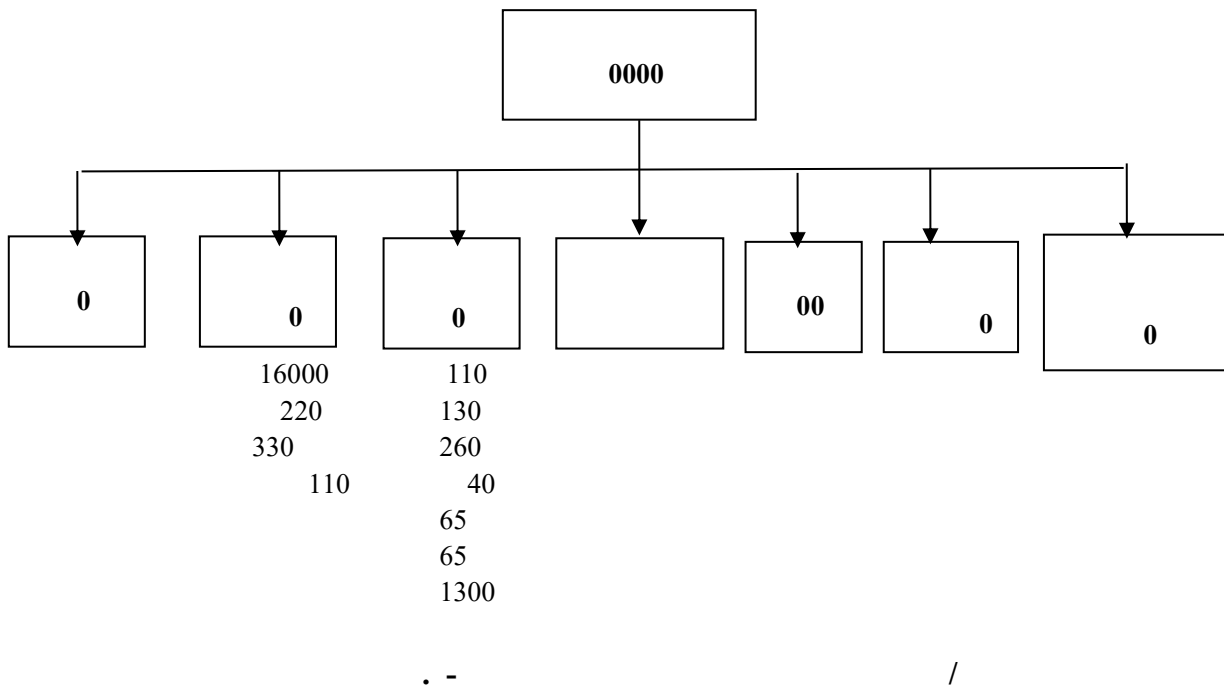
...

2.2-1

2.2-5

2.2-1

		/		/
1		20000		20
2				16000
3				220
4				330
5				110
6				42
7				130
8				260
9				40
10				65
11				65
12				1300
13				18
14				700
15				20
16				680
	/	20000 /	/	20000 /



15.5^{3/} 5580^{3/}4^{3/} 1440^{3/}2^{3/} 720^{3/}

175 30 145
 360 8 GB50015-2010
 50L/ 200L/
 13.25^{3/} 4770^{3/}

2.2-2

2.2-6

. -

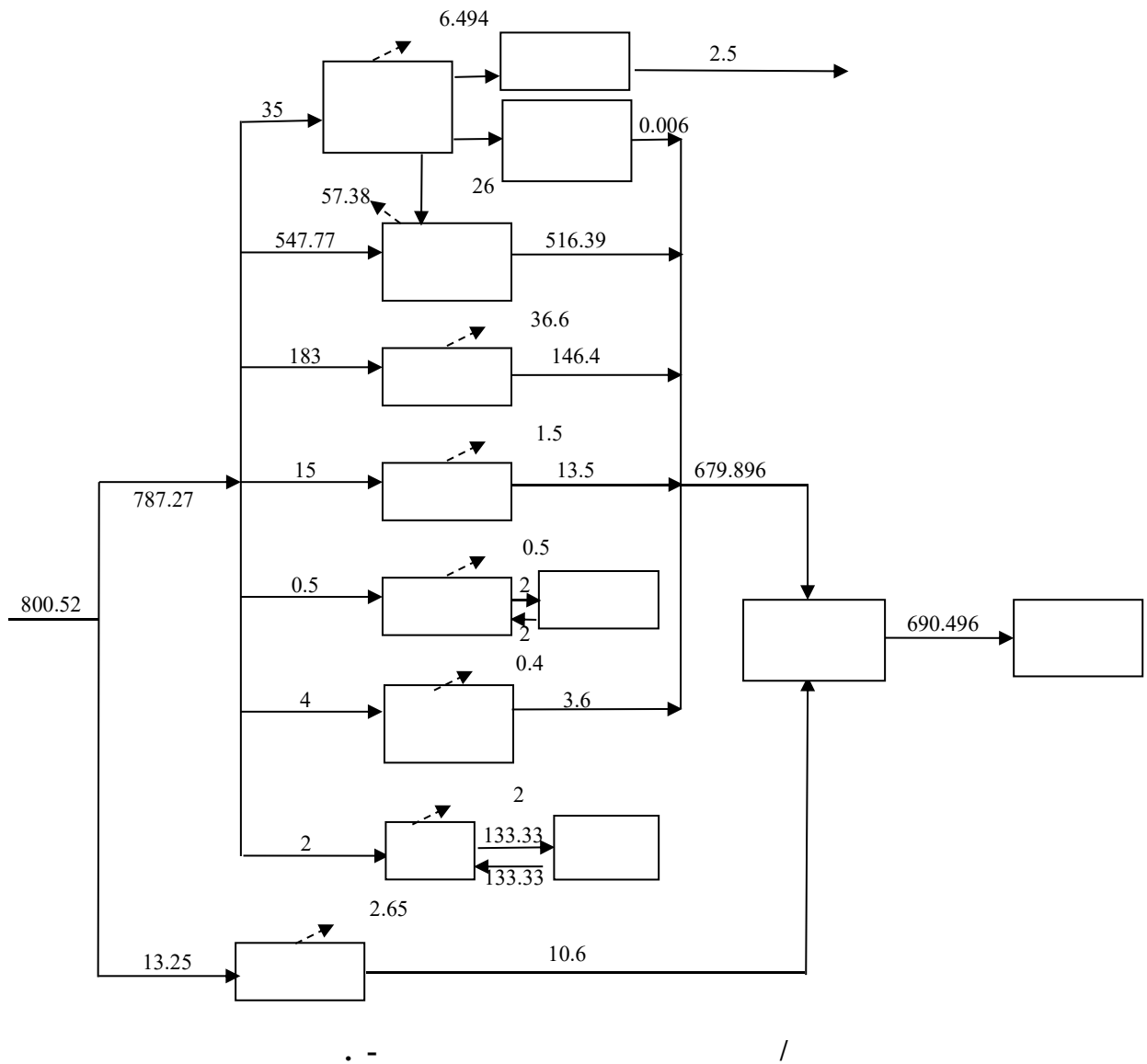
			/	/		/	/			
			35	12600		6.494	2337.84			
						0.006	2.16			
						2.5	900			
						/	/			
			547.77	197197.2	26	57.38	20656.8			
						516.39	185900.4			
			183	65880		146.40	52704			
						36.60	13176			
			2	720		2	720			
						15.5	5580		13.5	4860
									2	720
			4	1440		3.6	1296			
						0.4	144			
			133.33	47998.8		133.33	47998.8			
						2	720			
			13.25	4770		10.6	3816			
						2.65	954			
			.	0		.	0			

935.85 ^{3/} 336906 ^{3/}
 922.60 ^{3/} 787.27 ^{3/} 135.33 ^{3/} 0 ^{3/}
 13.25 ^{3/} 4770 ^{3/} 690.496 ^{3/} 248578.56 ^{3/}

+A/O

GB18918-2002

A



..

18279.67

11126.11

1

1

0.05 0.1³0.07^{3/2}11126.11²778.83³

2

12

20

50L/

1^{3/}

80%

0.8^{3/}

2.2-3

2.2-3

								-	
	/	/	/	/	/	/	/	/	/
	0.8	350	0.280	200	0.160	250	0.200	30	0.024
	0.8	220	0.176	110	0.088	120	0.096	27	0.022

2

1

. -

()

		103 B A	
		105 B A	
		107 B A	
		95 B A	
		105 B A	
		105 B A	
		105 B A	
		80 B A	
		80 B A	
		100 B A	

2

85 B(A) 95 B(A)

4

1

2

100 ²

0.15

100 ²

0.1

11126.11 ²

27.82

3

12

20

0.5 /

10 /

5

1

2

• •

• • •

2.2.1.4

690.496 ^{3/} 248578.56 ^{3/}

1

400 /L 100 /L COD_C 300 /L BOD₅250 /L

NH₃-N30 /L

5

2.2.1.4

10.6 ³/ 3816 /

COD_C BOD₅

NH₃-N

2007

2.2-6

. -

	³ /	COD _C		BOD ₅				NH ₃ -N	
	3816	/L	/	/L	/	/L	/	/L	/
		350	1.336	250	0.954	250	0.954	35	0.134
	3816	220	0.840	190	0.725	120	0.458	30	0.114

6

+A/O+

HJ 2007-2010

HJ

2047-2015 - -

HJ 576-2010

2.2-7

. -

³ /		COD _C	BOD ₅		NH ₃ -N		
248578.56	/L	1569.814	809.967	844.414	119.742	173.249	260000 /100 L
	/	390.222	201.340	209.903	29.765	43.066	/
	/L	250	110	150	30	20	2559 /100 L
	/	62.145	27.344	37.287	7.457	4.972	/
		250	110	150	30	50	/

GB18918-2002

A

. . .

1

0.5 /

8 / 360 /

2880

12³

HJ991-2018

HJ953-2018

$$V_{gy}=0.285Q_{net}+0.343$$

N^{3/3} N^{3/}

Q

MJ/³35.5MJ/N³10.461N^{3/3}

125.526

N^{3/}

HJ991-2018

$$E_{SO_2} = 2R \times S_t \times \left(1 - \frac{\eta_s}{100}\right) \times K \times 10^{-5}$$

E_{o2}

3

/³0.042 /³

% 0%

K

K=1

$$E_{NO_i} = \rho_{NO_x} \times Q \times \left(1 - \frac{\eta_{NO_i}}{100}\right) \times 10^{-9}$$

E_{NO}

NO

/ ³

HJ 991

180 / ³

Q

³

NO

% 0%

$$E_j = R \times \beta_j \times \left(1 - \frac{\eta}{100}\right) \times 10^{-3}$$

E

³

/

/

³

HJ 953

2.86 /

³

% 0%

125.526 N ³/ O₂

0.0000101 / 0.0000035 / NO

0.226 / 0.078 /

0.0343 / 0.012 /

3400 ³/

O₂ NO

0.00103 / ³ 23.075 / ³ 3.505 / ³

8

0.3

O₂ NO

GB13271-2014 2

2

NH₃ H₂

NH₃ H₂

500

2020 7

2.2-8

2.2-9

2.2-8

500	500 / 1.38 /	
	1300 / 3.6 /	

2.2-9

			/	/
500	1.3 /	NH ₃	4.73 10 ⁻³ 8.02 10 ⁻³	6.05 10 ⁻³
		H ₂	4.47 10 ⁻⁵ 1.08 10 ⁻⁴	5.63 10 ⁻⁵

90%

1

85%

1 15 0.8

6500 3/

10%

2.2-10 NH₃ H₂

GB14554-93 2 15

. - 0

		(3/)	(/ 3)	/		%	(/)	(/ 3)	/
	NH ₃	6500	2.7376	0.15374		85	0.00267	0.41063	0.02306
	H ₂		0.0255	0.00143			0.00002	0.00382	0.00021
	NH ₃	/	/	0.01708		0	0.00198	/	0.01708
	H ₂		/	0.00016			0.00002	/	0.00016

3

 NH_3 H_2 NH_3 H_2

15000

90%

1 15 0.4

1500 ³/2.2-12 NH₃ H₂

GB14554-93 2 15

. -

		(³ /)	(³ /)	/		%	(/)	(³ /)	/
	NH ₃	1500	35.043	0.4542		85	0.0079	5.257	0.0681
	H ₂		1.357	0.0176			0.0003	0.203	0.0026
	NH ₃	/	/	0.0505		0	0.0058	/	0.0505
	H ₂		/	0.0020			0.0002	/	0.0020

4

5

2 500 +300

0.035% 0# 0.84 10³ / ³O₂ NO CO HC

96

96

212.5 /

40.8 / 425 / 72.857 ³/

505.952L/

O₂4.00 /L 0.714 /L

NO 2.56 /L CO1.52 /L HC1.49 /L

12 ³/

2.2-13

GB16297-1996 2

. -

		O ₂	NO		CO	HC
/L	12 ³ /	4.00	2.56	0.714	1.52	1.49
/	489600 ³ /	0.194	0.124	0.035	0.074	0.072
/	5100 ³ /	2.024	1.295	0.361	0.769	0.754
/ ³	/	264.550	169.312	47.222	100.529	98.545
/ ³	/	550	240	120		

6

3

4 /

175

360

2.0 /100

3.50 / 1.26 /

3%

0.105 / 0.0378 /

2000³/

75%

4.375 /³1.094 /³

GB18483-2001 2

2.0 /³

0.026 / 0.009 /

7

4

. . .

1

60 95 B A

2.2-14

		/ ()		/ ()	/ ()
		60 75		10 15	50 65
		70 80		10 20	60 70
		60 70		10 15	50 60
		70 80		10 15	60 70
		60 70		10 15	50 60
		70 80		10 15	60 70
		60 70		10 15	50 60
		60 70		10 15	50 60
		70 80		10 15	60 70
		80 90		10 20	65 75
		85 95		10 15	65 75
		65 75		10 20	55 65
		70 80		10 20	60 70
		65 75		10 20	55 65
		80 90		10 20	65 75
		60 75		10 20	55 65

2

60 75 B A

60 70 B A

75 80 B A

. . .

1

8

BOD₅162.8 /

98% 226 / 81.4 /

80% 22.6 / 8.14 /

7

3 4

250

3

2

0.17 /

8

1 /

2021

H 08

900-214-08

9

175

360

0.5 /

87.5 / 31.5 /

2.2-15

. -

					/
					700
					680
					20
					18
					28.14
					0.17
					1
					31.5

. . .

. . .

1

50%

2.2-16

. -

³/ ÅCOD_CBOD₅NH₃-N

/100 L

Pb/D

390.222

201.340

209.903

29.<

248578.56

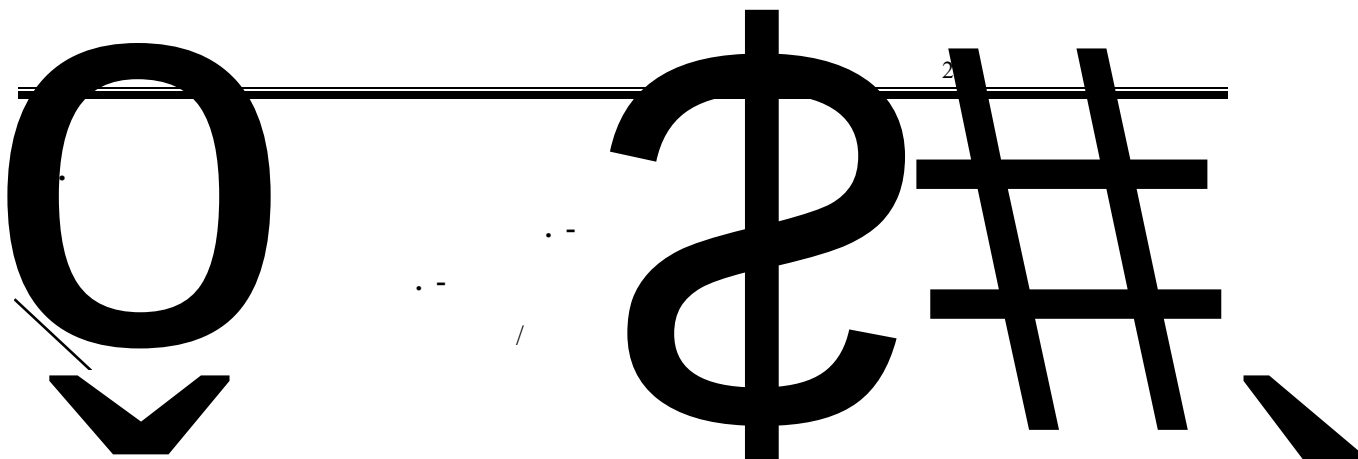
2

50%

2.2-17

. -

		(³ /)	(/ ³)	/		%	(/)	(/ ³)	/
NH ₃	H ₂	6500	2.7376	0.15374		50	0.0089	1.369	0.0769
			0.0255	0.00143			0.0001	0.013	0.0007
NH ₃	H ₂	1500	35.043	0.4542		50	0.0263	17.523	0.2271
			1.357	0.0176			0.0003	0.204	0.0026



0.8 ³/₄

0.8

		/			
O ₂	0.0000101				0.0000101
NO	0.226		+8		0.226
	0.0343				0.0343
NH ₃	0.15374			1 15	0.02306
H ₂	0.00143	0.8			0.00021
NH ₃	0.01708				0.01708
H ₂	0.00016				0.00016
NH ₃	0.4542			1 15	0.0681
H ₂	0.0176	0.4			0.0026
NH ₃	0.0505				0.0505
H ₂	0.0020				0.0020
O ₂	0.194				0.194
NO	0.124				0.124
	0.035				0.035
CO	0.074				0.074
HC	0.072				0.072
	0.0378				0.009

•
• •

107 19 109 38

22 12 24 2

32

108 29 42.87

22 37 33.01 1

• •
• • •

5 57.78%

4.6%

300 600 25 40

2.61%

300 400 120 160 200 250
80 100 15.59%
120

1004.1 P	79%	21.6	1
12.8	-2.1	7	28.2
40.4			

		12%
7%	1.9 /	15.7 /

39

12.2	28
------	----

. . .

764.5 ²

116.4	38
-------	----

73728 ²	418 ³	1290 ^{3/}	20600 ^{3/}
--------------------	------------------	--------------------	---------------------

95.6 ^{3/}	0.24 / ³	95.6 / ²
--------------------	---------------------	---------------------

485	21	307	8	9
-----	----	-----	---	---

9	9
---	---

6

3

3

1

0.32 ^{3/}

2

3

2

3

10 30

1.5 3

796.8 2

5 10

1 3

10.8 3/

55.55

1.11 2

165.9

600

18

300

3.8

7

3.1-1

1.5-1

. -

		3.8	

. .

400 ^{3/}

4000 ^{3/}

2021 6

GB18918-2002 A

6

. .

3.8

.

. .

. . .

. . .

. . .

• •

• • •

HJ 2.2-2018

2020

2020

3.2-1

• -

/ 3					
O ₂		8	60	13.33%	
NO ₂		24	40	60.00%	
PM ₁₀		46	70	65.71%	
PM _{2.5}		26	35	74.29%	
CO / 3	95 24	1.0	10	10.00%	
O ₃	90 8	118	160	73.75%	

O₂ NO₂ PM₁₀ PM_{2.5} CO O₃

GB3096-2012

• • •

2018 12 1

HJ2.2-2018

HJ2.2-2018 20

5 1 2

7

NH₃ H₂ P 7

2

3.2-2 5

H₂ NH₃ P

2021 7 1 7 7 7 NH₃ H₂ 4 1

4 P 24

H₂ NH₃ 4 45

GB3095-2012

3.2-3

	HJ 533-2009	0.01 / ³
	2003	0.001 / ³
P	GB/ 15432-1995	1 / ³
	GB/ 14675-1993	10

HJ 2.2 2018 D

P C/C₀

P

C / ³

C₀ / ³

P>1

3.2-4

3.2-5

3.2-6

7

		· -		%		/
2021.07.01		29.1	99.59	78		0.3
		34.1	99.10	67		0.7
		30.7	99.40	78		0.5
		28.8	99.61	79		0.1
2021.07.02		30.6	99.30	73		0.8
		33.8	99.13	68		0.9
		31.0	99.37	75		2.1
		29.3	99.62	76		0.4
2021.07.03		29.7	99.30	74		0.3
		35.0	99.03	69		0.8
		30.4	99.38	70		0.4
		28.7	99.69	75		0.1
2021.07.04		29.0	99.32	70		1.0
		33.8	99.06	69		0.6
		30.0	99.29	75		0.9
		28.8	99.70	75		0.5
2021.07.05		28.6	99.40	76		1.3
		34.1	99.00	70		0.9
		30.0	99.33	68		0.4
		28.8	99.35	76		2.1
2021.07.06		29.4	99.32	77		1.4
		35.0	99.00	75		2.4
		30.2	99.34	69		0.7
		29.2	99.34	70		0.2
2021.07.07		29.4	99.31	78		0.6
		34.2	99.02	74		1.4
		30.4	99.31	75		0.2
		28.8	99.40	72		0.3

. -

. -

/

...

3.2-8

. -

H	H HJ 1147-2020	--
	GB 13195-1991	--
	HJ 506-2009	0.2 /L
	GB 11892-1989	0.5 /L
	HJ 828-2017	4 /L
	BOD5 HJ 505-2009	
	GB 11893-1989	0.025 /L
	GB 11893-1989	0.01 /L
	4- HJ 503-2009	0.0003 /L
		0.01 /L
	GB/ 16489-1996	0.005 /L
	2002	/

...

3

3

1

...

GB3838-2002

...

HJ2.3-2018

1



$$, = , /$$

$$C \quad /L$$

$$C \quad /L$$

○ H

$$, = (7.0 - \quad) / (7.0 - \quad) \quad H \quad 7.0$$

$$, = (\quad - 7.0) / (\quad - 7.0) \quad H \quad 7.0$$

$$H, \quad H$$

$$H \quad H$$

$$H \quad H$$

$$H \quad H$$

○ DO

$$S = \frac{DO_s - DO_j}{DO_s - DO_f} \quad DO_j < DO_f$$

$$DO_j = \frac{|DO_f - DO_j|}{DO_f - DO_s} \quad DO_j > DO_f$$

DO

$$DO \quad /L$$

$$DO \quad /L$$

$$DO \quad /L$$

...

3.2-9

3.2-10

5

3.2-9 3.2-10

GB3838-2002

.. -

--	--	--	--

			# - 00	# - 00	# - 00

. - 0

			/	/	/	/

• •

• • •

7 3.2-11

• -

D1		H CO ₃ ²⁻ HCO ₃ ⁻	
D2			
D3			

• • •

H
CO₃²⁻ HCO₃⁻
20

• • •

GB/ 5750-2006

	H	H GB 6920-1986	0.01 ()
		ED A GB 7477-1987	5.0 /L
		1.1 GB/ 5750.7-2006	0.05 /L
		HJ 535-2009	0.025 /L
		GB 7493-1987	0.001 /L
		GB 7480-1987	0.02 /L
		() HJ/ 342-2007	1 /L
		GB 7467-1987	0.004 /L
		HJ/ 343-2007	2.5 /L
	CO ₃ ²⁻	D / 0064.49-2021	/
	HCO ₃ ⁻		/
		GB 7475-1987	0.001 /L
			0.05 /L
		GB 11911-1989	0.03 /L
			0.01 /L
		GB 11904-1989	0.05 /L
			0.01 /L
		GB 11905-1989	0.02 /L
			0.002 /L
		HJ 1001-2018	10 MPN/L

...

2021 7 1 7 3

3

3 1

...

GB/ 14848-2017

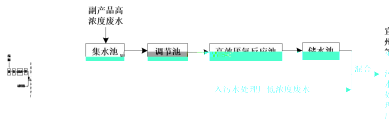
...

1
=C/C

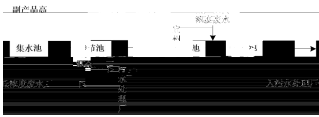
C /L

C /L

2 H



H 7



H>7)

P_H H

H H

H H

H H

1

...

3.2-13 3.2-14 5

3.2-13 3.2-14

GB/ 14848-2017

. -

			/	/	/	/

• •

• • •

HJ2.4-2009

6

3.2-15

• -

N1		1
N2		1
N3		1
N4		1
N5		
N6		

• • •

A

• • •

GB 3096-2008

• • •

2021 7 1 7 2

2

• • •

3.2-16

7

• -

3.2-16

GB3096-2008 3

GB3096-2008 4

GB3096-2008 2

•

2.5

10 7 85 513 300

•

• •

1

1

$3 / ^3$ 20 $1.303 / ^3 50$ $0.722 / ^3 100$ $0.402 / ^3$
 100

•

•

•

.

.

.

.

29

2

CO NO₂ HC

CO NO₂ HC

3

GB/ 18883-2002

..

1

2

..

85 B A

2.2-7

$$L_{A_s}(r) = L_{A_s}(r_0) - A_s$$

$$A = A_{div} + A_{atm} + A_{bar} + A_{gr} + A_{misc}$$

$$LA(\) \qquad \qquad \qquad B$$

$$LA(\ 0) \qquad \qquad \qquad B$$

$$0$$

$$A \qquad \qquad \qquad B$$

$$A \qquad \qquad A \quad =20 \qquad / \ 0 \qquad B$$

$$A \qquad \qquad A \quad = \quad - \ 0 \quad /1000 \quad B$$

$$A \qquad \qquad \qquad B$$

$$A \qquad \qquad \qquad B$$

$$A \qquad \qquad \qquad B \quad 0.025 \ B/$$

$$L_{eqs} = 10 \lg \left(\sum_{i=1}^n 10^{0.1 Leqi} \right)$$

$$L \qquad \qquad \qquad B(A)$$

$$L \qquad \qquad \qquad B(A)$$

4.1-1

4.1-1

B(A)

			10	30	55	100	150	200	350		
		103	83.0	77.0	73.5	64.9	63.0	59.5	57.0	70	55
		105	85.0	79.0	75.5	66.9	65.0	61.5	59.0		
		107	87.0	81.0	77.5	68.9	67.0	63.5	61.0		
		105	85.0	79.0	75.5	66.9	65.0	61.5	59.0		
		95	75.0	69.0	65.5	56.9	55.0	51.5	49.0		
		105	85.0	79.0	75.5	66.9	65.0	61.5	59.0		
		105	85.0	79.0	75.5	66.9	65.0	61.5	59.0		
		105	85.0	79.0	75.5	66.9	65.0	61.5	59.0		
		105	85.0	79.0	75.5	66.9	65.0	61.5	59.0		
		100	80.0	70.5	65.2	65.2	56.5	54.0	49.1		

4.1-1

30 55

200 350

29

35

3

35

5 13 B A

GB12523-2011

..

1

2

11126.11⁻²

27.82

3

12

20

0.5 /

10 /

..

1

2

	C	8	0.3				O ₂
NO					GB13271-2014	2	
				1.4-6			
	O ₂	NO			GB3096-2012		
		1	15	0.8			
6500	³ /						
		1	15	0.4			
1500	³ /	1.4-6			NH ₃	H ₂	
				GB3096-2012			
							500
300			O ₂	NO	P		
							0.035%
					GB18483-2001		
				2.0	/	³	
75%					0.0378	/	
4.375	/	³			75%		
		1.094	/	³			
GB18483-2001		2			2.0	/	³

		/ /
1	O ₂	0.0084672
2	NO ₂	188.5968
3	NH ₃	0.11504
4	H ₂	0.00323

690.496^{3/}

H COD BOD

GB18918-2002

A

. .

. . .

• • •

1

2

3

HJ610-2016

100 1000

4

COD NH₃-N

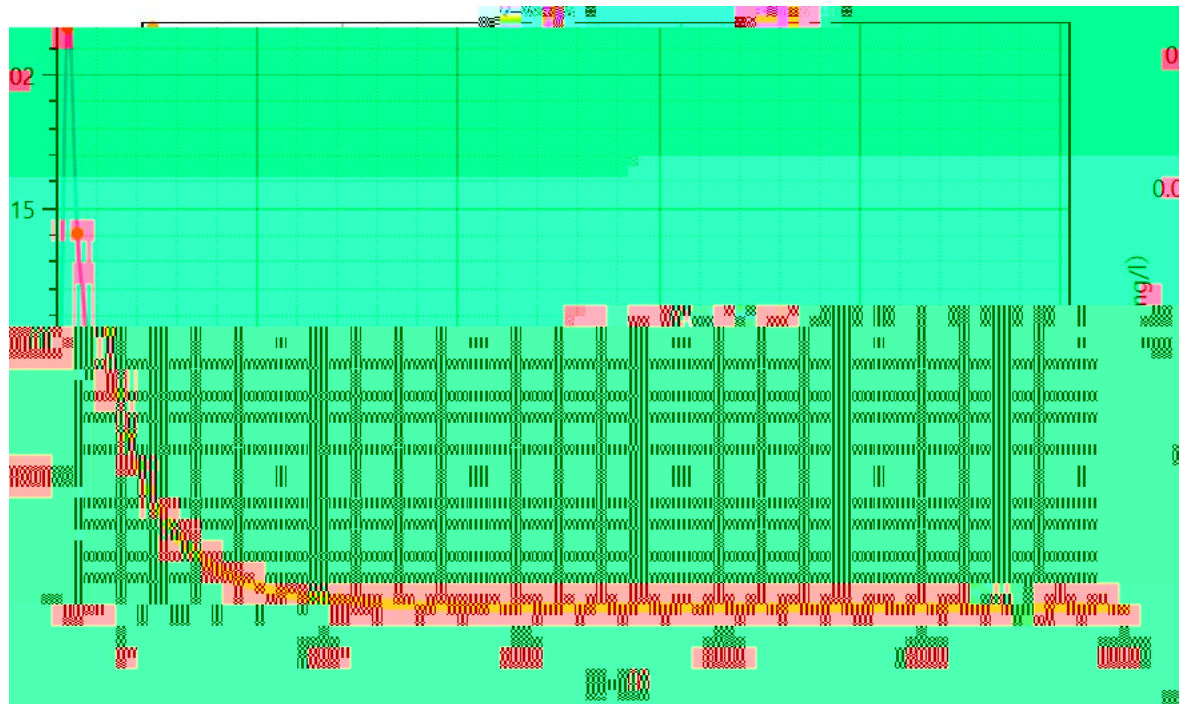
300³

5%

4.2-3

4.2-3

5%

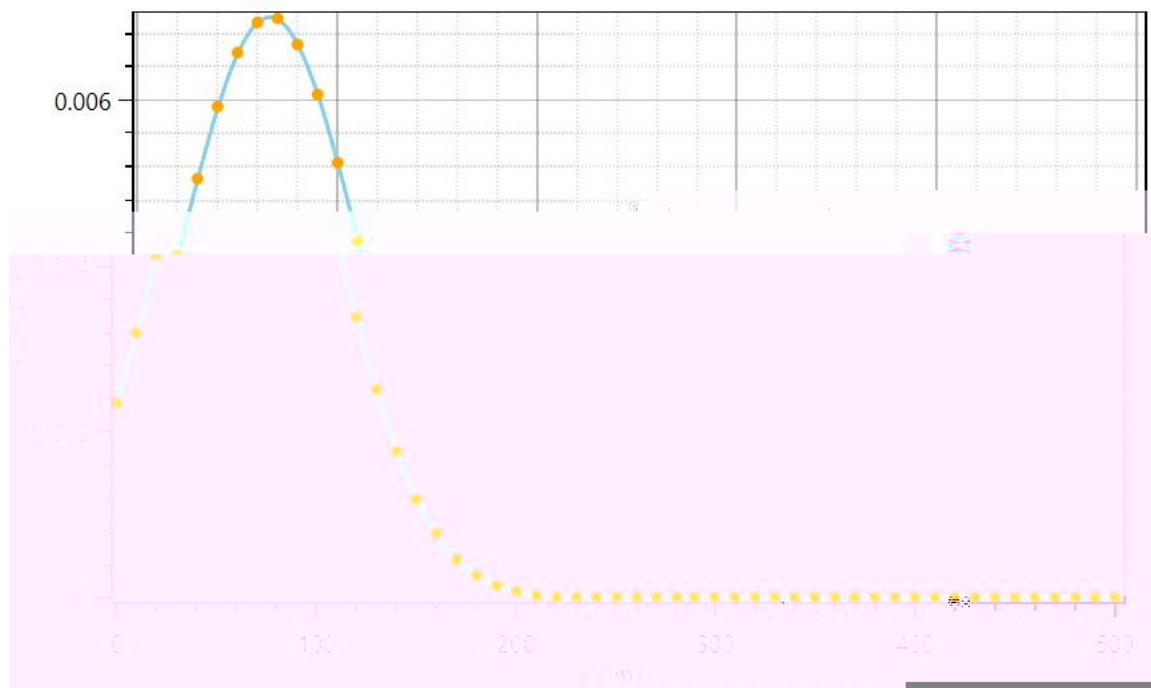


4.2-1

5%

4

COD

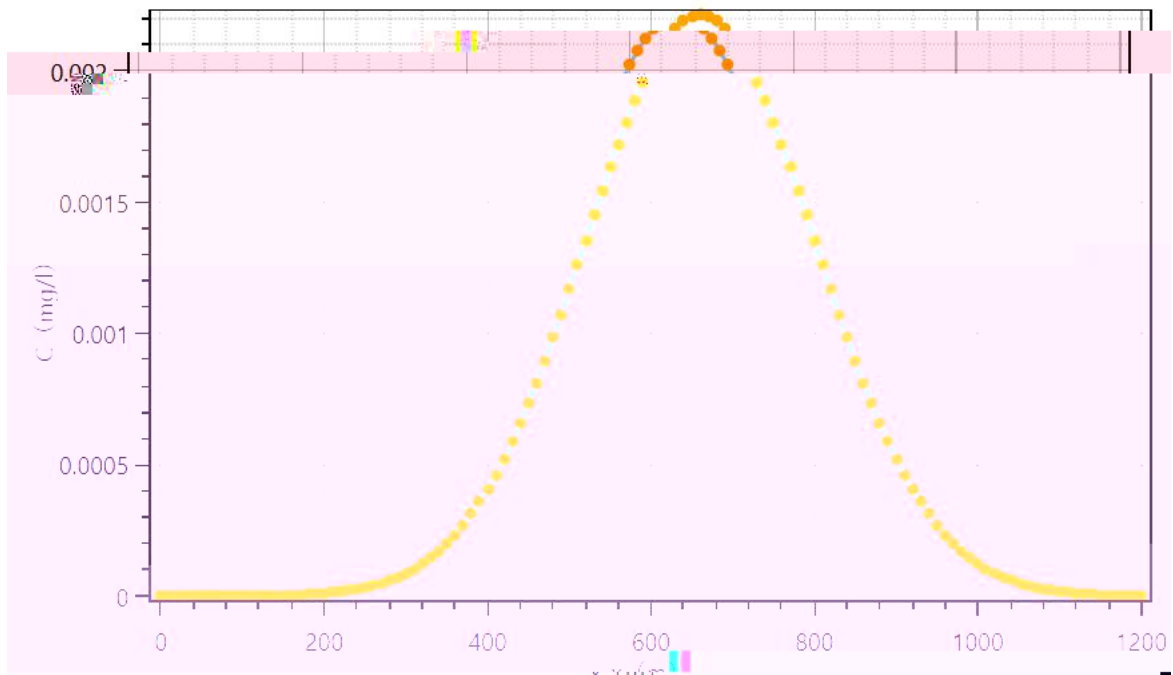


4.2-2

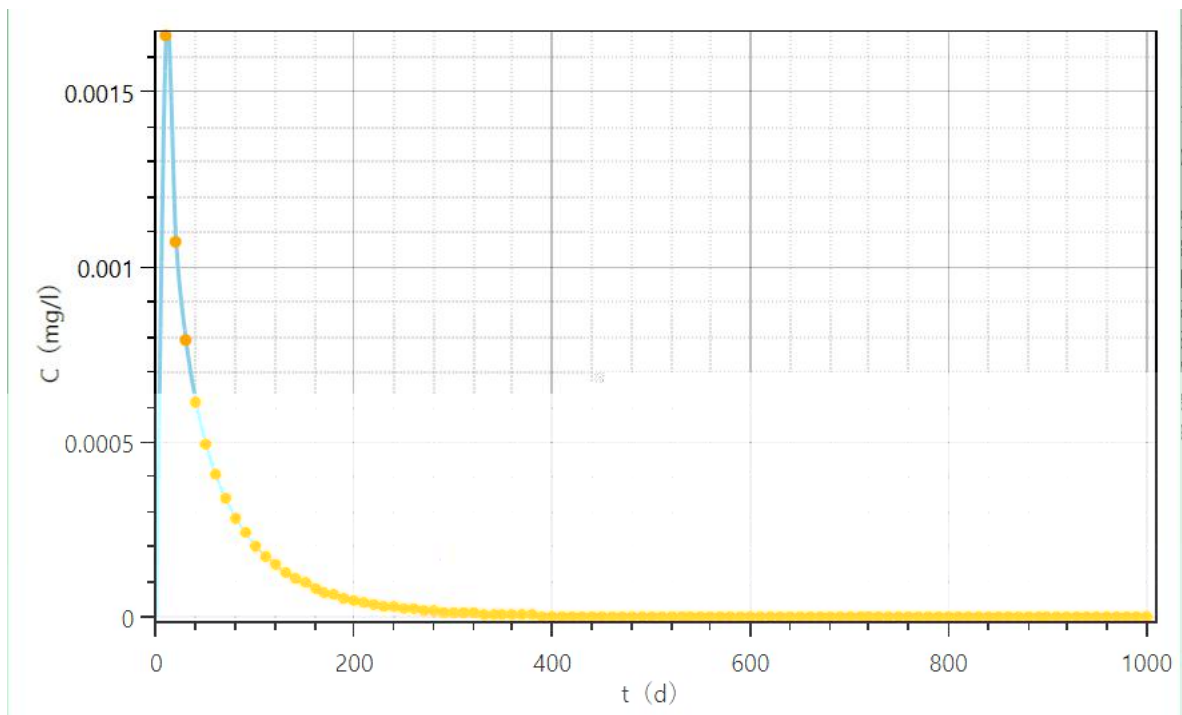
5%

100

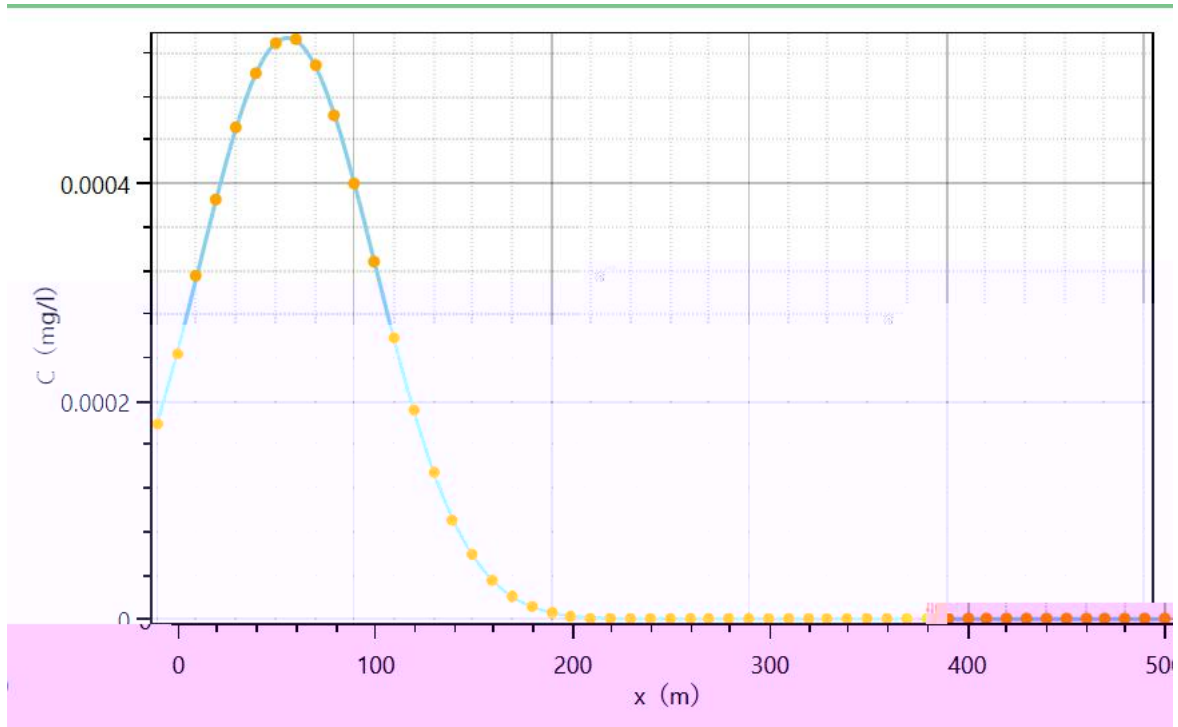
COD



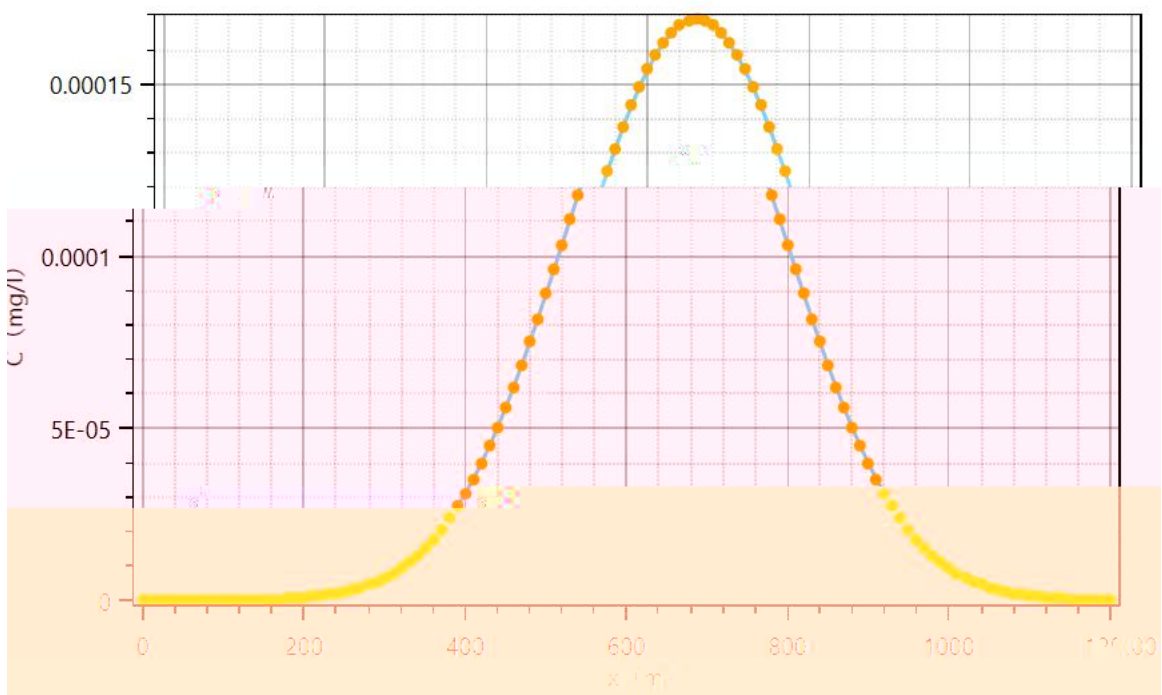
4.2-3 5% 1000 COD



4.2-4 5% 4 $\text{NH}_3\text{-N}$



4.2-5 5% 100 $\text{NH}_3\text{-N}$



4.2-6 5% 1000 $\text{NH}_3\text{-N}$

5%

0.074	/L	1	COD	
NH ₃ -N		GB/ 14848-2017		100
1000		COD NH ₃ -N		
		GB/ 14848-2017		
			100	
66		COD NH ₃ -N		
0.907	/L	0.0725 /L	1000	660
		COD NH ₃ -N	0.902 /L	0.0722 /L
		GB/ 14848-2017		
2				
		300		
		5%	300	COD
NH ₃ -N		0.003 /L	0.0002 /L	

$$K = 1 \cdot 10^{-7} \quad /$$

..

$$65 \cdot 95 \cdot B(A)$$

$$2.2-14$$

$$200$$

$$75 \cdot B(A)$$

$$L = L \quad 20L \quad 8 \quad L$$

$$L \quad B(A)$$

$$L \quad B(A)$$

B(A)	0
------	---

$$= 10 \left(\sum_{i=1}^n 10^{-0.1} \right)$$

L ₁	L ₂	1	2	B(A)
----------------	----------------	---	---	------

1 2

$$\Delta \qquad \qquad \qquad \text{B(A)}$$

$$L \qquad \qquad \qquad B(A)$$

L B(A)

4.2-4

4.2-1

		()		
1#	26.11	51.4	51.41	0
2#	25.62	50.6	50.61	0
GB3096 2008 2		60 B(A)		
1	37.33	49.3	/	0
1	32.67	50.5	/	0
1	46.04	51.8	/	0
1	32.47	49.9	/	0
GB12348 2008		3	65 B(A)	55 B(A)
3 4		4	70 B(A)	55 B(A)

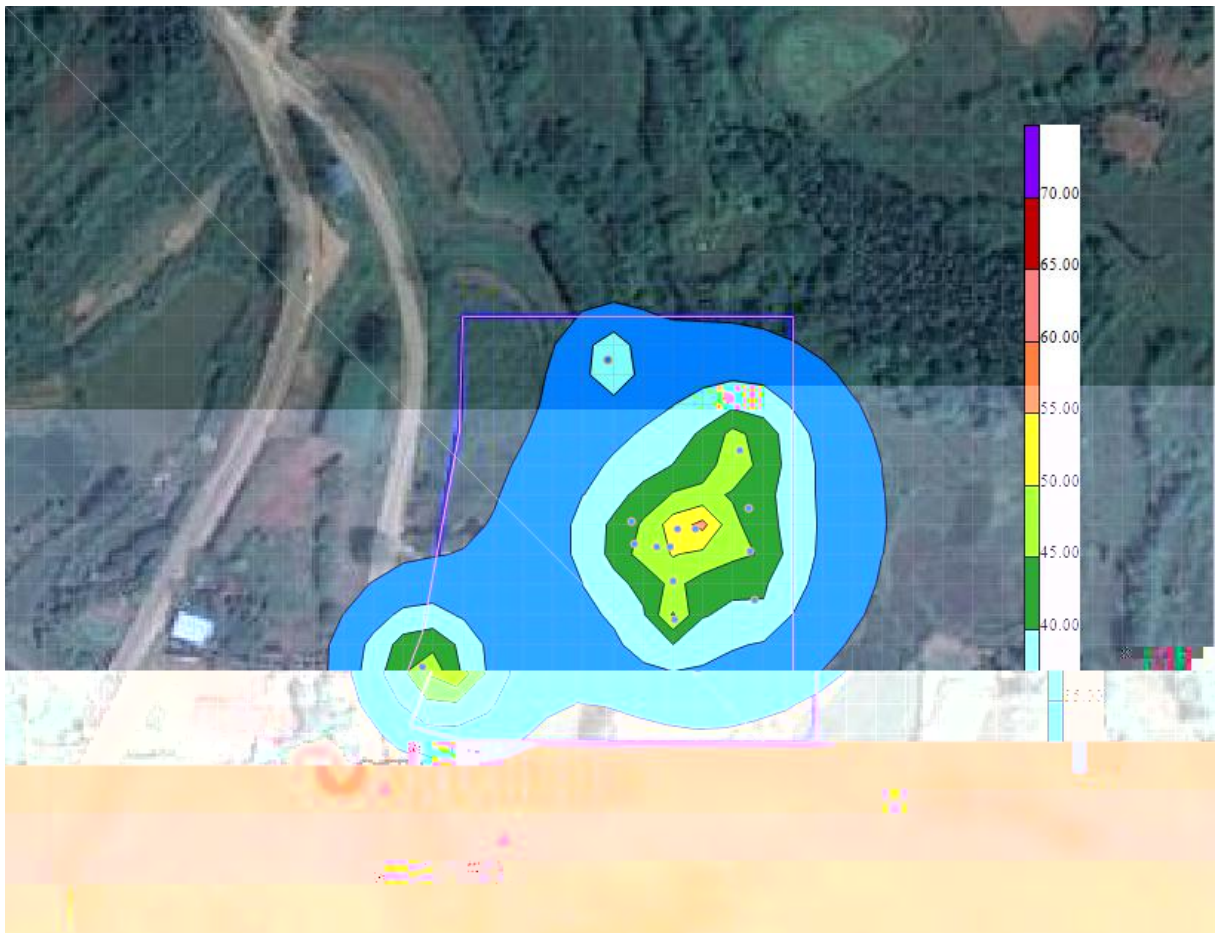
4.2-4

GB3096 2008 2

GB

12348-2008 3

GB 12348-2008 4



• -

• •

1

8

2

700 /

3

680 /

4

20 /

5

18 /

6

246 /

7

0.17 /

8

1 /

GB18599-2001 2013

9

87.5 / 31.5 /

..

...

.....

4.2-5

. -

			/	/	
			1.125	5	/
			0.4	2500	
	/		/	2500	
	/		/	10	

.....

1

2018

Q

Q

Q

Q

Q 1

Q 1

Q

1 Q 10 1

B

1.125

0.4

5 2500

$Q=1.125/5+0.4/2500=0.225$

Q 1

3

1.5-1 5

. . .

. . . .

HJ 169-2018 B

1

74.44 (=1)1.1

-6 102.2 P /

2

16.04 (=1)0.55

-182.5 -161.5 -188 -82.6 538

4.59MP

3

GB/ 4016-83

70

70

100

8% 10%

. . . .

1

2

3

. . .

1

 $20 / 3$

2

3

...

1

1

2

50

10

50

GB/ 13869-1992

2

4.2-7

. -

108 49 42.87

22 37 33.01

100%

8

9

• •

2

3

4

5

..

1

2

3

4

5

6

7

8

•

• •

• • •

8 0.3

O₂ NO

GB13271-2014 2

O₂ NO

• • •

NH₃ H₂

2

1

1

1

15

2

CO₂ H₂O

HJ 2004-2010

2012 5 2020 6

2 15

GB14554-93 2 15

100% 91%

. . .

GB18483-2001

. . .

0.035%

. . .

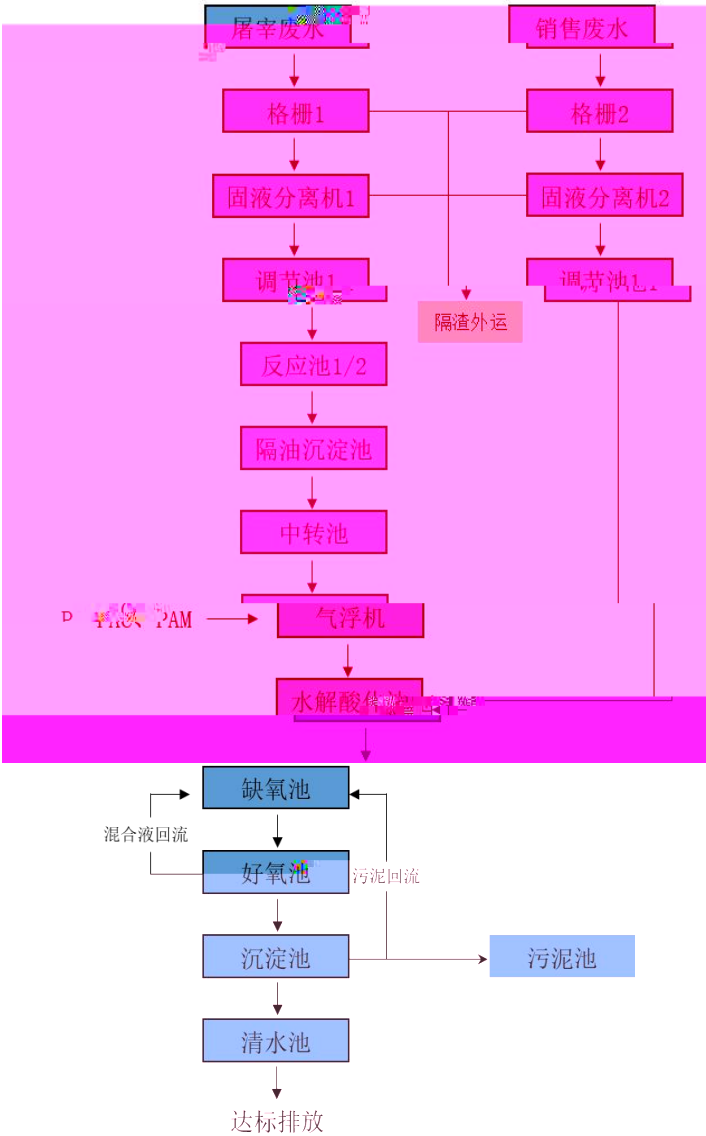
..

1 900 3/

+A/O+

1

5.2-1



5.2-1

+ +A/O

A/O

PAM PAC

HJ 860.3 2018

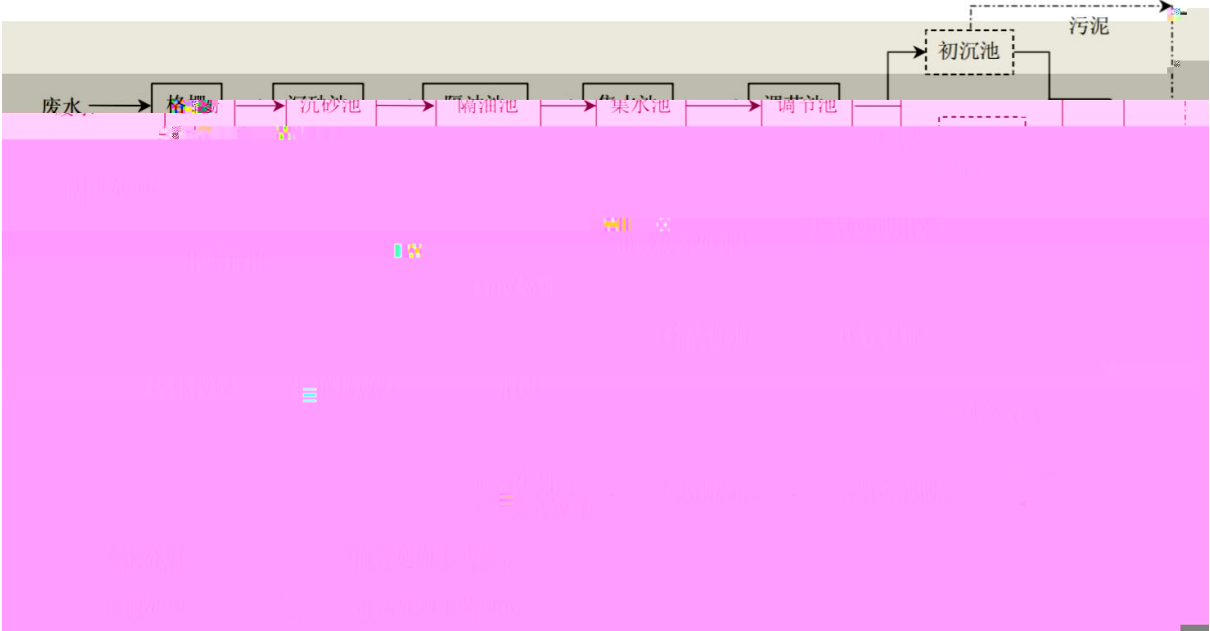
7

-

A/O PAM PAC

HJ 2004-2010

HJ 2004-2010



5.2-2 HJ 2004-2010

4320

2019 12

2300 ^{3/} + + + +A/O + +

8

. -

				0
1		150	150	62
2	BOD ₅	110	110	28
3	COD _C	250	250	96
4		/	50	0.15
5		30	30	4.90
6		35	35	/
7		3	3	/
8	H	/	/	7.52

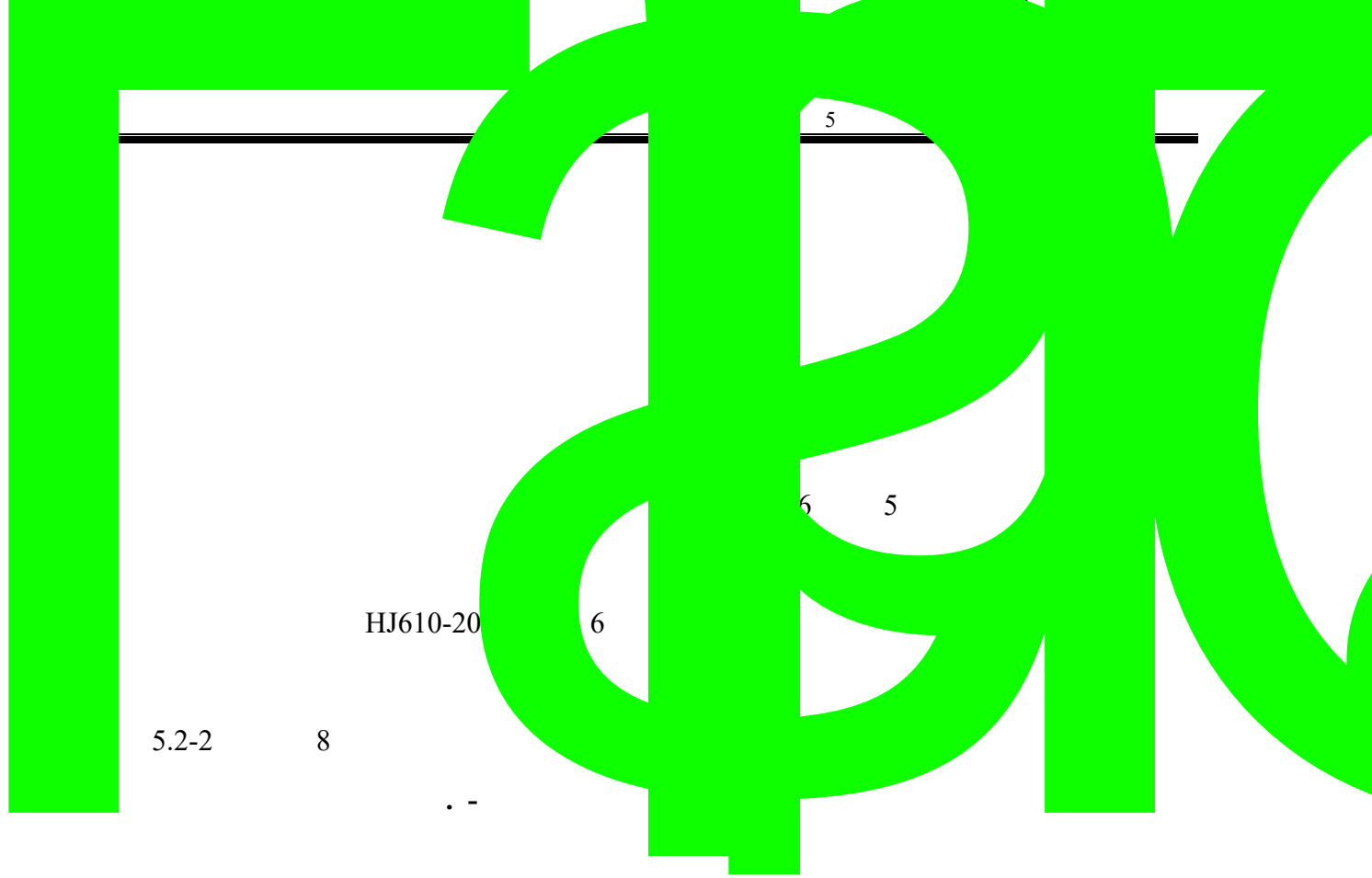
2000

2020 5

1200 ^{3/} + + + +A/O + +

690.496 ^{3/} 248578.56 ^{3/}

900 ^{3/}



1

5.2-2

8

HJ610-20

6

. -

M 6.0

K 1

□ □

GB18597-2001

2

1.0 10-12 /

HDPE

3

.

.

.

.

1

1

.

.

4

HJ610-2016

• •

1

2

3

4

GB12348 2008 3

95 2013
3300

24
75 90

N P K 7% 75% 30%
N 525-2011 5% 45% 30%

5.2-3

. -

	%	%	%		/
	5	45	30		1200 1500
	8	60	30		1200 1500

	7	75	30		800
	7	75	30		2000

N 525-2011

5

6

7

900-214-08

GB18597-2001

10

•

• •

6100

650

10.66 %

.

1

650

20

32.50

/

2

2 /

3

2%

7.81

5.85 /

6.3-1

. -

1		32.5
2		2
3		13
		47.5

.

2

15

2

8

+A/O+

•

•

• •

1

2

2

3

4

..

7.1-1

1

2

682

<

>

7.1-1 7.1-2

. -

		1 2 3 4
		1 2 3 4 5 6 7 8 9 10 11 12

..

			/		
		O ₂	0.0000101	+8	0.0000101
		NO	0.226		0.226
			0.0343		0.0343
		NH ₃	0.15374	0.8	0.02306
		H ₂	0.00143		0.00021
		NH ₃	0.01708		0.01708
		H ₂	0.00016		0.00016
		NH ₃	0.4542	0.4	0.0681
		H ₂	0.0176		0.0026
		NH ₃	0.0505		0.0505
		H ₂	0.0020		0.0020
		O ₂	0.194		0.194
		NO	0.124		0.124
			0.035		0.035
		CO	0.074		0.074
		HC	0.072		0.072
			0.0378		0.009 /
			248578.56 ^{3/}		248578.56 ^{3/}
		COD _c	390.222		62.145
		BOD ₅	201.340		27.344
			209.903		37.287
		NH ₃ -N	29.765		7.457
			43.066		4.972
			700		700
			680		680
			20		20
			18		18
			28.14		28.14
			0.17		0.17
			1		1
			31.5		31.5

• •

1

2010	97					COD
NH ₃		O ₂		NO		

2

						COD
NH ₃ -N	O ₂	NO				COD
NH ₃ -N						

				O ₂	NO	
0.194 /	0.350 /		O ₂	0.194 /	NO	
	0.350 /					

•

• •

..

HJ819-2017

HJ942 2018



2		CO_3^{2-}	HCO_3^-		
---	--	--------------------	------------------	--	--

. . .

HJ 2.2-2018

HJ 860.3-2018

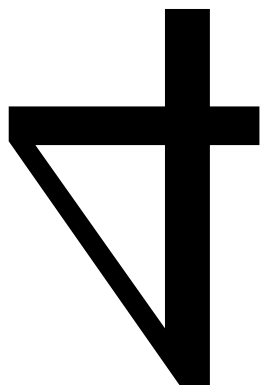
7.3-3

. -

ryA(U.Ôô7A:QH
 C GB12348-2008 C-Àă y p S „9I•W
 jrt™Up“*o
 1A/BB QACôôôpCm€Q O q O ž ÔñĐ
 B-A(“ Su„, O9u beñ, 8 C-A(P
 GB12348-2008 1
 4

A

1 /



..

HJ942 2018

HJ 860.3 2018

HJ

820-2017

1

2

3

5

4

1

2

3

2014 56

4

•

<

>

682

2017 10 1

2017 4

2017 10 1

2018 9

7.4-1

. -

.

7.5-1

. -

	1 2 3 4

2

..

1# 2# 3#

GB/ 14848-2017 III

..

•

..

1

2

3

(GB 12523-2011

4

..

1

O₂ NO

GB3096-2012

NH₃ H₂

15

15

NH₃ H₂NH₃ H₂

-

HJ 2.2-2018

D

2

+A/O+

3

GB12348-2008 3

4

GB3096-2008 2

4

•

• •

1

2

3

3

35

4

5

..

1

8 0.3

O₂ NO

GB13271-2014 2

O₂ NO

2

2	1	
	1	15
2		
3		
		GB18483-2001
4		
		0.035%
5		
		+A/O+
		GB18918-2002
A		

•

•

4000

2019

2005

40

•

6100

650

10.66 %

•

•