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Review



Review of Mg alloy corrosion rates

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Abstract

A review of the literature confirmed that the intrinsic corrosion rate of high-purity Mg as measured by weight-loss is 0.3 mm/y in a concentrated chloride solution. Atmospheric corrosion of Mg alloys has produced corrosion rates of Mg-Al alloys an order of magnitude lower than the intrinsic corrosion rate of Mg in a concentrated chloride solution of 0.3 mm/y. The only successful strategy to produce a Mg alloy with a corrosion rate in a concentrated chloride solution substantially less than the intrinsic corrosion rate as measured by weight loss of Mg of 0.3 mm/y has been to improve the protectiveness of the corrosion product film.

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1. Introduction

Much research has been expended to understand Mg corrosion [1-6] and to produce Mg alloys with low corrosion rates, particularly in aggressive concentrated chloride solutions. Mg alloys are sought with corrosion rates as measured by weigh loss lower than the intrinsic corrosion rate of high-purity Mg of 0.3 mm/y in a concentrated chloride solution. This benchmark identifies the intrinsic corrosion rate as measured by weight loss of Mg in concentrated chloride solutions as the lowest reliable corrosion rate for Mg in these solutions [7-10]. It is of importance to understand the Mg alloy development strategies that have produced Mg alloys with low corrosion rates.

The aims of this review are:

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- (i) to review Mg corrosion rates,
- (ii) to confirm that the intrinsic corrosion rate of high-purity Mg as measured by weight loss is 0.3 mm/y in a concentrated chloride solution,
- (iii) to understand the Mg alloy development strategies that have produced Mg alloys with low corrosion rates in such solutions, and
- (iv) to examine the recent claims of a new highly-corrosionresistant Mg alloy [11,12].

To explore these aims, the recent literature of Mg corrosion was reviewed, with an emphasis on corrosion rates measured using weight loss, P_W (mm/y). Weight loss corrosion rate measurements were preferred, because there are issues with the other common methods for measuring the corrosion rate of Mg alloys [1,3,13]. The Mg corrosion rate is also evaluated (i) from the evolved hydrogen, P_H [14], (ii) by Tafel extrapolation of polarisation curves to give P_i , and (iii) from electrochemical impedance spectroscopy to give, $P_{i/EIS}$, [15].

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Fig. 1. Values of corrosion rate from Table 1 as measured by electrochemical techniques by Tafel extrapolation of polarisation curves, P_i or from electrochemical impedance spectra, $P_{i,EIS}$, plotted against the corrosion rate measured from the evolved hydrogen, P_H or measured by weight loss, P_W . Note that there is usually good agreement between P_H and P_W . The line drawn on the figure is a guide to the eye and shows the condition for equality of the two measurements of the corrosion rates.

The corrosion rate of Mg measured using hydrogen evolution in a chloride solution, $P_{\rm H}$, is typically in good agreement with the corrosion rate measured by weight loss, provided the corrosion rate is substantial [14,16,17]. This provides confidence that both techniques provide a reliable measurement of the Mg alloy steady-state corrosion rate. In contrast, experimental evidence [2,13] indicates that electrochemical measurements of the corrosion rates of Mg alloys have not provided a good measurement of the steady-state corrosion rate of Mg alloys. This is confirmed by the data in Table 1 and by Fig. 1.

The results of the review of Mg corrosion rates are presented in Table 1 and plotted in Figs. 1 and 2. In particular, Table 1 and Fig. 2 provide corrosion rates for Mg alloys in chloride solutions with an emphasis on the recent literature.

2. Electrochemical corrosion rate measurements

Fig. 1 shows the values of corrosion rate from Table 1 as measured by electrochemical techniques by Tafel extrapolation of polarisation curves, P_i , or from electrochemical impedance spectra, $P_{i,EIS}$, plotted against the corrosion rate measured from the evolved hydrogen, P_H or measured by weight loss, P_W . Note that there is usually good agreement between P_H and P_W . The plotted data do not fall on the line drawn. Thus, P_i and $P_{i,EIS}$ consistently underestimated the steady-state corrosion rates for Mg alloys in chloride solutions as measured from P_H and P_W . Fig. 1 provides reinforcement that electrochemical methods have not been reliable for the measurement of the steady-state corrosion rate of Mg alloys in concentrated chloride solutions [4,5,13].



Fig. 2. Plot of the corrosion rate, $P_{\rm W}$ or $P_{\rm H}$, against total alloying content for the Mg alloys in Table 1, with a horizontal line drawn at the intrinsic corrosion rate as measured by weight loss of Mg of 0.3 mm/y as shown by high-purity (HP) Mg and a second horizontal line drawn at a corrosion rate of 1 mm/y. These lines are drawn as a guide to the eye.

Reasons [1,3,4] why electrochemical measurements give corrosion rates for Mg alloys less than the steady-state corrosion rates include:

- (1) The corrosion rate soon after specimen immersion can be orders of magnitude smaller than the steady state corrosion rate. Electrochemical measurements are typically carried out soon after specimen immersion in the solution, before there is steady state corrosion behaviour [93,98].
- (2) The evolving hydrogen (from the cathodic partial reaction) can isolate part of the specimen, so that this self-corrosion cannot be detected by any electrochemical measurement [17].

3. Mg corrosion rates

The Mg corrosion rates from Table 1 are presented in Fig. 2. Fig. 2 plots the corrosion rate, P_W and P_H , against total alloying content (TA). A horizontal line is at the intrinsic corrosion rate as measured by weight loss of Mg of 0.3 mm/y. A second horizontal line is at a corrosion rate of 1 mm/y. These lines are a guide to the eye.

Fig. 2 provides confirmation that the intrinsic corrosion rate as measured by weight loss for Mg is ~0.3 mm/y in concentrated chloride solutions as the lowest reliable corrosion rate in these solutions for high purity Mg. Research that has measured corrosion rates between 0.2 and 0.4 for HP and UHP Mg includes the following: Hanawalt, Nelson, Peloubet [7] measured $P_W = 0.3 \text{ mm/y}$ for alternate immersion in 3 wt% NaCl solution for 16 weeks (the specimen was dipped in the solution for 30s, followed by 2 min in air during which the specimens did not completely dry); Cao et al. [8] measured $P_W = 0.25 \text{ mm/y}$ for immersion in

Table 1

Corrosion rates (CR, mm/y) for Mg alloys, with an emphasis on corrosion rates determined by weight loss, P_{W} . Corrosion rates from Tafel extrapolation of polarisation curves, P_i , are only quoted if these can be calculated from i_{corr} values in the paper or if i_{corr} values can be easily and accurately determined; evaluation is difficult for curved polarisation curves. P_i relates to corrosion rate evaluated by Tafel extrapolation, $P_{i,EIS}$ relates to corrosion rate evaluated from EIS [7–9,11,16–104].

Year	First Author	Alloy, condition/form	Composition, wt%	С	TA, %	Exp	М	CR, mm/v	Ref
2019	Bahmani	MgMnCa, XM11	Mg0.52Mn0.39Ca	В	0.9	1,7d	P_{W}	1.7	18
2019	Bahmani	MgMnCa, XM11	Mg0.52Mn0.39Ca	В	0.9	1, 0.5 h	P_{i}	0.64	18
2019	Bahmani	MgMnCaAl, AXM211	Mg0.48Mn0.42Ca2.38Al	В	3.3	1, 7 d	P_{W}	8.7	18
2019	Bahmani	MgMnCaAl, AXM211	Mg0.48Mn0.42Ca2.38Al	В	3.3	1, 0.5 h	Pi	1.5	18
2019	Bahmani	MgMnCaSn, TXM911	Mg0.54Mn0.49Ca9.14Sn	В	10	1, 7 d	P_{W}	8.8	18
2019	Bahmani	MgMnCaSn, TXM911	Mg0.54Mn0.49Ca9.14Sn	В	10	1, 0.5 h	Pi	2.0	18
2019	Bahmani	MgMnCaZn, ZXM411	Mg0.56Mn0.44Ca3.90Zn	B	4.9	1,7d	Pw	3.6	18
2019	Bahmani	MgMnCaZn, ZXM411	Mg0.56Mn0.44Ca3.90Zn	B	4.9	1, 0.5 h	Pi	0.46	18
2019	Cao	Pure Mg, ep	Mg0.0028 Fe	P	0.08	2,70	P AH D: pro	0.3	19
2019	Cao	Pure Mg, ep	Mg0.0028 Fe	B	0.08	2, 7d	P	16	19
2019	Cao	Pure Mg, ep	M-0.0028 Fe	B	0.08	3,7d	P: ric	10	19
2019	Gore	Pure Mg	[Fe] < 0.001	P	0.06	4.1.d	P_W	0.8	20
2019	Gore	Pure Mg	[Fe] < 0.001	B	0.06	4. 10 m	Pi	0.3	20
2019	Gore	Mg0.14In	[Fe] = 0.002, 0.14In	В	0.2	4.1 d	Pw	7	20
2019	Gore	Mg0.14In	[Fe] = 0.002, 0.14In	В	0.2	4, 10 m	Pi	0.6	20
2019	Gore	Mg0.11Au	[Fe] = 0.003, 0.11Au	В	0.2	4, 1 d	P_{W}	50	20
2019	Gore	Mg0.11Au	[Fe] = 0.003, 0.11Au	В	0.2	4, 10 m	P_{i}	1.0	20
2019	Cain	AZ31B-H24	3.02A10.99 Zn0.33Mn0.005Fe	В	4.3	5, 1 d	P_i	3.4	21
2019	Cain	Mg1Sn	1.23Sn0.02Al0.005Zn0.002Mn0.002Fe	В	1.2	5, 1 d	P_i	6.8	21
2019	Cain	Mg5Sn	5.48Sn0.03Al0.005Zn0.004Mn 0.007Fe	В	5.4	5, 1 d	P_i	4.1	21
2019	Cain	Mg10Sn	10.65Sn0.02A1 0.004Zn0.002Mn0.001Fe	В	10.6	5, 1 d	P_i	1.4	21
2019	Hu	AZ91	9.12A10.89Zn0.23Mn	R	10.2	4, 1 d	P_{W}	1.0	22
2019	Hu	AZ910.5Sm	8.98A11.12Zn0.19Mn0.48Sm	R	10.8	4, 1 d	P_{W}	0.9	22
2019	Hu	AZ911.0Sm	9.08Al0.96Zn0.18Mn0.92Sm	R	11.1	4, 1 d	P_{W}	0.7	22
2019	Kim	CP Mg	0.001Al0.001Mn0.003Y0.402Fe	В	0.4	6, 3 d	P_{W}	230	23
2019	Kim	Mg3Al	2.878Al0.004Mn0.003Y0.291Fe	В	3.2	6, 3 d	P_{W}	215	23
2019	Kim	Mg3Al0.3Mn	2.598Al0.253Mn0.003Y0.0094Fe	B	2.9	6, 3 d	Pw	17	23
2019	Kim	Mg3Al0.03Y	2.598Al0.001Mn0.033Y0.0061Fe	B	2.6	6, 3 d	Pw	5.6	23
2019	Kim	Mg3Al0.2Y	2.660A10.001Mn0.176Y0.0051Fe	B	2.8	6, 3 d	Pw	1.4	23
2019	Abdal	Mg3Al0.5 Y	2.900Al0.001M 0.548 Y 0.0039Fe	B	3.3	0, 3 0	PW	1.8	23
2019	Gawad	rute Mg	Undisclosed	Б	0.01	7, 10 u	ΓW	5.0	24
2019	Abdel-	Pure Mo	Undisclosed	в	0.01	7.05h	P_i	0.13	24
2017	Gawad	i are mg	Chaiseiosea	D	0.01	7, 0.5 1	11	0.15	2 1
2019	Abdel-	Mg1Zn0.6Ca, cast	1.037Zn0.019Fe0.079V0.014Ti0.245Si0.56	В	1.9	7, 10 d	$P_{\rm W}$	3.9	24
	Gawad		7Ca			.,			
2019	Abdel-	Mg1Zn0.6Ca, cast	1.037Zn0.019Fe0.079V0.014Ti,	В	1.9	7, 0.5 h	P_i	0.07	24
	Gawad		0.245Si0.567Ca						
2019	Abdel-	Mg2Zn0.6Ca, cast	2.016Zn0.012Fe0.052V,	В	2.9	7, 10 d	P_{W}	2.2	24
	Gawad		0.010Ti0.179Si0.600Ca						
2019	Abdel-	Mg2Zn0.6Ca, cast	2.016Zn0.012Fe0.052V0.010Ti	В	2.9	7, 0.5 h	P_i	0.04	24
2010	Gawad	M 2 67 1 60	0.179Si0.600Ca	D	1.2	7 101	D		24
2019	Abdel-	Mg2.5Zn1.5Ca, cast	2.540Zn0.013Fe0.050V0.00811	в	4.2	7, 10d	$P_{\rm W}$	5.5	24
2010	Abdel	Ma2 57n1 5Ca. aast	2.540Zp0.013Ea0.050V0.008T;	P	4.2	7.05h	D.	0.28	24
2019	Gawad	wig2.52111.5Ca, cast	0 180Si1 440Ca	Б	4.2	7, 0.5 ff	1 1	0.20	24
2019	Jiang	Mø47n e	3 63Zn0 00Sn0 06Ee0 06Si	В	3.8	8 7 d	P_{W}	1.87	25
2019	Jiang	Mg4Zn0.9Sn. e	3.56Zn0.92Sn0.04Fe 0.04Si.	Bl	4.6	8, 7 d	Pw	0.62	25
2019	Jiang	Mg4Zn1.4Sn, e	3.56Zn1.43Sn0.02Fe0.03Si.	Bl	5.0	8, 7 d	Pw	0.45	25
2019	Jiang	Mg4Zn1.9Sn, e	3.58Zn1.88Sn0.03Fe0.07Si,	Bl	5.6	8, 7 d	P_{W}	0.77	25
2019	Zuo	Pure Mg, e&cd	Not provided	В	0.01	9, <u>1</u> 4 d	$P_{\rm W}$	1.6	26
2019	Zuo	Pure Mg, e&cd	Not provided	В	0.01	10, 14 d	$P_{\rm W}$	2.2	26
2019	Zuo	Pure Mg, e&cd	Not provided	В	0.01	11, 14 d	P_{W}	1.5	26
2019	Song	Mg2Zn0.5Mn1Ca1.4Ce,	2.00Zn0.50Mn1.02 Ca1.35 Ce	В	4.9	12, 1 h	P_i	0.63	27
		cast							
2019	Song	Mg2Zn0.5Mn1Ca1.4Ce,	2.00Zn0.50Mn1.02 Ca1.35 Ce	В	4.9	12, 1 h	P_{i}	0.90	27
2010	0	ECAP	00.00 /0/	DI	0.01	12 10 1	D	0.07	20
2019	Gao	HP-Mg, e	99.99 wt%	BI	0.01	12, 10 d	PW	0.27	28
2019	Gao	HP Mg e	99,99 W170	DI	0.01	12, 10 0	P'W D	0.72	∠ð 20
2019	Gao	HP-Mg e+ts	99.99 wt%	B	0.01	13,8 W	r W Pw	0.03	∠0 28
2019	Dvorsky	Pure More	undisclosed	B	0.01	14 14 14	Pw	1.05	20
2019	Dvorsky	WE43. e	Mø4Y3Nd	Bl	7.0	14, 14 d	Pw	0.4	2.9
2019	Dvorsky	EZ30. e	Mg3Nd0.5Zn	B	3.5	14, 14 d	Pw	14	29
2019	Dvorsky	WZ21, e	Mg2Y1Zn	B	3.0	14, 14 d	Pw	2.5	29
2019	Dong	Mg1.5Sr, e	Mg1.5Sr, < 0.001Fe, <0.001 Ni	Bl	1.5	12, 14 d	Pw	0.2	30
2019	Dong	Mg1.5Sr, T4 450 C for 5 h	Mg1.5Sr, < 0.001Fe, <0.001Ni	Bl	1.5	12, 14 d	P_{W}	0.1	30
2019	Dong	Mg1.5Sr, T4 560 C for 5 h	Mg1.5Sr, < 0.001Fe, <0.001Ni	Bl	1.5	12, 14 d	P_{W}	0.4	30
2019	Dong	Mg1.5Sr, T6 560 C for 5	Mg1.5Sr, < 0.001Fe, <0.001Ni	Bl	1.5	12, 14 d	P_{W}	0.7	30
	-	h, 10 h at 200 C							
2019	Dong	Mg1.5Sr, T6 560 C for 5 h, 40 h at 200 C	Mg1.5Sr, < 0.001Fe, <0.001 Ni	В	1.5	12, 14 d	P_{W}	4.7	30

(continued on next page)

2019 2019	Zhao Feliu	AZ31, e AZ31, unspecified	Mg3.14Al1.02Zn0.44Mn0.003Si0.0018Fe Mg3.0Al1.0Zn0.2Mn	Bl B	4.6 4.2	12, 230 h 15, 20 C, 4	$P_{\rm AH}$ $P_{\rm W}$	0.56	31 32
2019	Feliu	AZ31, unspecified	Mg3.0A11.0Zn0.2Mn	В	4.2	d 15, 37 C, 4	$P_{\rm W}$	7.2	32
						d			
2019	Grimm	Pure Mg	undisclosed	В	0.01	16, 7 d	P_{W}	4	33
2019	Grimm	Mg-18Al	Mg18Al0.0029Fe0.0104Si0.023Mn	В	18	16, 7 d	P_{W}	4	33
2019	Yan	Mg0.06Cu, cast	Mg0.057Cu-<0.005Fe-0.012Si	В	0.06	12, 7 d	$P_{\rm W}$	30	34
2019	Yan	Mg0.06Cu, cast	Mg0.057Cu-<0.005Fe-0.012Si	В	0.06	12, 30 m	P_i	0.12	34
2019	Yan	Mg0.06Cu, sht	Mg0.057Cu-<0.005Fe-0.012Si	Bl	0.06	12, 7 d	P_{W}	0.6	34
2019	Yan	Mg0.06Cu, sht	Mg0.057Cu-<0.005Fe-0.012Si	В	0.06	12, 30 m	P_i	0.05	34
2019	Zhang	Mg2Nd0.2Zn	Mg2Nd0.2Cu	Bl	2.2	12, 7 d	$P_{\rm W}$	0.3	35
2019	Johnston	HP Mg	HP Mg	B1	0.01	17, 7 d	$P_{\rm W}$	0.4	36
2019	Soltan	WE43B, T6	Mg3.51Y2.09Nd0.40Gd0.49Zr0.004Fe	R	6.5	1, 21 d	$P_{\rm W}$	0.2	37
2019	Soltan	EV31A, T6	Mg2.78Nd1.35Gd0.43Zr0.003Fe	R	4.6	1, 21 d	$P_{\rm W}$	0.9	37
2019	Soltan	Pure Mg, cast	Mg0.003Zn0.003Fe0.008Mn	В	0.01	1, 21 d	$P_{\rm W}$	1.6	37
2019	Soltan	ZE41A, T5	Mg4.36Zn0.66Zr0.002Fe	В	5.0	1, 21 d	$P_{\rm W}$	8.5	37
2018	Jia	Pure Mg	Mg > 99.95 wt%	Bl	0.05	18, 14 d	$P_{\rm W}$	0.6	38
2018	Jia	Pure Mg	Mg > 99.95 wt%	Bl	0.05	18, 56 d	P_{W}	0.4	38
2018	Jia	Pure Mg, porous, round pores	Mg > 99.95 wt%	В	0.05	18, 14 d	$P_{\rm W}$	3.7	38
2018	Jia	Pure Mg, porous, round	Mg > 99.95 wt%	В	0.05	18, 56 d	P_{W}	1.4	38
2018	Jia	Pure Mg, porous, irregular	Mg > 99.95 wt%	В	0.05	18, 14 d	$P_{\rm W}$	1.7	38
2018	Jia	Pure Mg, porous, irregular	Mg > 99.95 wt%	Bl	0.05	18, 56 d	$P_{\rm W}$	0.5	38
2018	Feng	polyhedral Mg25Al, cast, a+b	Mg25Al	В	25	6, 6 d	$P_{\rm W}$	4.2	39
2018	Feng	Mg25Al, sht, a+b	Mg25Al	В	25	6, 6 d	$P_{\rm W}$	5.0	39
2018	Feng	Mg25 Al, USS, a	Mg25Al	В	25	6, 6 d	$P_{\rm W}$	1.2	39
2018	Feng	Mg25 Al, USS + age, a + 10-100 nm b	Mg25Al	R	25	6, 6 d	$P_{\rm W}$	0.6	39
2018	Wu	MgGdYZnZr, $sht + age:surface = oxide + alpha$	Mg10.2Gd5.7Y1.6Zn0.4Zr	R	18	1, 3 d	P_H	0.4	40
2018	Wu	MgGdYZnZr, sht + age: bulk = oxide + ppts	Mg10.2Gd5.7Y1.6Zn0.4Zr	В	18	1, 6 d	P_{H}	2.7	40
2018	Liu	Commercially pure Mg, e	Mg0.02Si0.006Fe	В	0.03	4, 24 h	$P_{\rm W}$	21	41
2018	Liu	Mg0.2Sb, cast	Mg0.23Sn0.002Fe	В	0.2	4, 24 h	$P_{\rm W}$	1.1	41
2018	Liu	Mg0.1Bi, cast	Mg0.13B-0.001Fe	В	0.1	4, 24 h	$P_{\rm W}$	1.5	41
2018	Liu	Mg0.1Ge, cast	Mg0.09Ge0.003Fe	В	0.09	4, 24 h	$P_{\rm W}$	1.7	41
2018	Liu	Mg0.3Ge, cast	Mg0.33Ge0.001Fe	R	0.3	4, 24 h	$P_{\rm W}$	0.8	41
2018	Liu	Mg0.1Sn, cast	Mg0.11Sn0.001Fe	R	0.1	4, 24 h	$P_{\rm W}$	0.9	41
2018	Liu	Mg0.1Pb, cast	Mg0.14Pb0.001Fe	R	0.1	4, 24 h	$P_{\rm W}$	0.8	41
2018	Liu	CP Mg	Mg0.02Si0.06Fe	В	0.02	4, 24 h	P_{W}	21	42
2018	Liu	Mg1Zn, sht at 400 C, e at	Mg1Zn	В	1	4, 24 h	P_{W}	4.0	42
2018	Liu	Mg1Zn0.3Ge, sht at 400 C. e at 180 C	Mg1.01Zn0.27Ge	В	1.3	4, 24 h	$P_{\rm W}$	1.2	42
2018	Liu	Mg1Zn0.5Ge, sht at 400 C, e at 180 C	Mg1.03Zn0.52Ge	В	1.6	4, 24 h	$P_{\rm W}$	1.4	42
2018	Baek	Mg8Sn1Zn1Al, e at 280	Mg7.7Sn0.95Zn0.94A10.009Mn0.002Fe0.0 02Si	В	9.6	5, 72 h	$P_{\rm W}$	250	43
2018	Baek	Mg8Sn1Zn1Al, e at 180	Mg7.7Sn0.95Zn0.94A10.009Mn0.002Fe0.0 02Si	В	9.6	5, 72 h	$P_{\rm W}$	28	43
2018	Sadeghi	AZ31		R	4	1, 7 d	$P_{\rm AH}$	0.95	44
2018	Sadeghi	AZ31+0.4Sr (or 0.8Sr)		В	4.4	1, 7 d	$P_{\rm AH}$	1.8	44
2018	Liu	AZ91	Mg9.3Al0.67Zn0.25Mn0.003Fe	В	10.2	6, 1w	$P_{\rm W}$	23	45
2018	Liu	AZ91 + fsp	Mg9.3A10.67Zn0.25Mn0.003Fe	В	10.2	6, 1 w	$P_{\rm W}$	12	45
2018	Zhang	Mg13Gd1.6Ag0.41Zr, sht	+0.007Fe0.0013Ni0.0011Cu	В	15.0	19, 24 h	P_{W}	1.4	46
2018	Zhang	Mg13Gd1.6Ag0.41Zr, sht	+0.007Fe0.0013Ni0.0011Cu	В	15.0	19, 10 m	P_{i}	0.15	46
2018	Zhang	Mg13Gd1.6Ag0.41Zr, aged	+0.007Fe0.0013Ni0.0011Cu	В	15.0	19, 24 h	$P_{\rm W}$	3.2	46
2018	Zhang	Mg13Gd1.6Ag0.41Zr, aged	+0.007Fe0.0013Ni0.0011Cu	В	15.0	19, 10 m	P_{i}	0.22	46
2018	Zhang	Mg16Gd0.36Zr, sht	+0.007Fe0.0016Ni0.0009Cu	В	16.4	19, 72 h	$P_{\rm W}$	0.25	46
2018	Zhang	Mg16Gd0.36Zr, sht	+0.007Fe0.0016Ni0.0009Cu	В	16.4	19, 10 m	P_{i}	0.15	46
2018	Zhang	Mg16Gd0.36Zr, aged	+0.007Fe0.0016Ni0.0009Cu	В	16.4	19, 72 h	$P_{\rm W}$	0.36	46
2018	Zhang	Mg16Gd0.367r. aged	+0.007Fe0.0016Ni0.0009Cu	в	16.4	19.10 m	P_{i}	0.16	46

(continued on next page)

3.5 wt% NaCl saturated with Mg(OH)₂ for 14 days; Yang et al. [9] measured $P_W = 0.22$ and 0.33 mm/y for immersion in 3.5 wt% NaCl solution for 2 days; Liu et al. [10] measured $P_W = 0.2$ mm/y for immersion in Hanks' solution for 3 days and 15 days (0.8 wt% NaCl, 0.14 M NaCl); Gao et al. [28] measured $P_W = 0.27$ mm/y for immersion in Hanks' solution for 3 days and 15 days (0.8 wt% NaCl, 0.14 M NaCl); Gao et al. [28] measured $P_W = 0.27$ mm/y for immersion in Hanks' solution for 3 days and 15 days (0.8 wt% NaCl, 0.14 M NaCl); Gao et al. [28] measured $P_W = 0.27$ mm/y for immersion in Hanks' solution for 3 days and 15 days (0.8 wt% NaCl, 0.14 M NaCl); Gao et al. [28] measured $P_W = 0.27$ mm/y for immersion in Hanks' solution for 3 days and 15 days (0.8 wt% NaCl, 0.14 M NaCl); Gao et al. [28] measured $P_W = 0.27$ mm/y for immersion in Hanks' solution for 3 days and 15 days (0.8 wt% NaCl, 0.14 M NaCl); Gao et al. [28] measured $P_W = 0.27$ mm/y for immersion in Hanks' solution for 3 days and 15 days (0.8 wt% NaCl, 0.14 M NaCl); Gao et al. [28] measured $P_W = 0.27$ mm/y for immersion in Hanks' solution for 3 days and 15 days (0.8 wt% NaCl, 0.14 M NaCl); Gao et al. [28] measured $P_W = 0.27$ mm/y for immersion in Hanks' solution for 3 days and 15 days (0.8 wt% NaCl, 0.14 M NaCl); Gao et al. [28] measured $P_W = 0.27$ mm/y for immersion in Hanks' solution for 3 days and 15 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days and 15 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days and 15 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days and 15 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days (0.8 wt% NaCl, 0.14 M NaCl); for 3 days (0.8

lution for 10 days; Johnston [36,50] measured $P_W = 0.4$ mm/y for immersion in Hanks' solution for 1 week; Jia et al. [38] measured $P_W = 0.4$ mm/y for immersion in Dulbecco's modified eagle medium (DMEM) + 10 vol.% foetal bovine serum, 100 units/mL penicillin + 100 units/mL Streptomycin, at 37 C with 5 vol% CO₂ atmosphere for 56 days (DMEM

2010	V.	M. 2E. Ch.	M-2E-00:2() (- ()	D	0.004	< 40.1	n	0.22	0
2018	rang	Mgsre, nim	Mg5Fe9Si26Mn (ppm)	P	0.004	0, 48 n	PW	0.22	9
2018	Yang	Mg11Fe. film	Mg11Fe114Si108Mn (ppm)	Р	0.02	6.48 h	P_W	0.32	9
2010	V	M 16E 0	M 15F 1(C'100M ())	D	0.02	6, 10 1	D	1.00	0
2018	Yang	Mg15Fe, fb	Mg15Fe16Si180Mn (ppm)	В	0.02	6, 48 h	P_{W}	1.98	9
2018	Yang	Mg18Fe. fb	Mg18Fe35Si176Mn (nnm)	B	0.02	6.48 h	P_{W}	14.8	9
2010	V	M OCE 0	M 25F 1225F216M (ppm)	D	0.04	6, 10 1	D	107	0
2018	Yang	Mg25Fe, fb	Mg25Fe1235Si216Mn (ppm)	В	0.04	6, 48 h	P_{W}	107	9
2018	Turan	AZ91 pm	99.7% purity	B	0.3	6 24 h	P_{W}	1.6	47
2010		1 1001		2	0.0	6,211		1.0	
2018	Turan	AZ91, pm	99.7% purity	В	0.3	6, 15 m	Pi	1.5	4/
2018	Yan	Mg-0.1Cu, cast	Mg-0.1Cu <0.005Fe <0.01Si <0.001Ni	В	0.1	20. 7 d	P_{W}	50	48
2010	1.011	Mg offed, tast	Mg offed offoorte official ofform	D DI	0.1	20,74	2.0	1	40
2018	Yan	Mg0.1Cu, sht 510 C 10 h	Mg-0.1Cu-<0.005Fe-<0.01S1-<0.001N1	BI	0.1	20, 7 d	P_W	1	48
2018	Li	Mo4Lie		B	4	4 5 d	P_{W}	1.8	49
2010	1.1	ing ini, e		D		1,54		2.0	10
2018	Li	Mg7.5L1, e		В	7.5	4, 5 d	P_{W}	3.2	49
2018	T i	Mal4Li e		P	1.4	4.5.d	p_{w}	0.8	40
2010	LI	Nigi+Li, c		K	17	7, J u	1 W	0.0	77
2018	Johnston	HP Mg	Mg0.017Al0.001Fe0.018Ca0.008Mn	BI	0.05	17, 7 d	P_W	0.3	50
2018	Iohnston	LIHP Ma	Mg0.0027n0.004Ca=<0.001Fe	B1	0.006	17.7.d	D _W	0.4	50
2010	Johnston	Offi Mg	Wg0.002210.004Ca- <0.0011 C	DI	0.000	17, 7 u	1 W	0.4	50
2018	Johnston	UHP ZX00	Mg0.43Zn0.42Ca0.002Fe	BI	0.85	17, 7 d	P_W	0.5	50
2019	Laborton	7E41	Mg4 67p1 0Co0 511 o0 1Dr0 004Eo	D	6.2	17.7.4	D	1.4	50
2016	Joiniston	ZE41	Mg4.0ZIII.0Ce0.31La0.1F10.004Fe	D	0.2	17, 7 u	T W	1.4	50
2017	Miao	Mg2.33Zn0.84Gd, e,	Mg2.33Zn0.84Gd	B1	3.2	12, 10 d	P_W	0.27	51
		comple A	Ŭ.						
		sample A					_		
2017	Miao	Mg2.33Zn0.84Gd, sht + e,	Mg2.33Zn0.84Gd	BI	3.2	12, 10 d	P_W	0.21	51
		sample B	-						
		Sumple D							
2017	Xiang	Mg5L11Al, e to 2 mm	Mg4.99L11.07Al0.0053Fe	В	6.1	6, 14 d	P_{W}	- 38	52
2017	Viana	Mg5Li1AL e to 2 mm	Mg4 99L i1 07A10 0053Ee	B	6.1	6.20 m	<i>P</i> :	22	52
2017	Alang	Nigoterinti, e to 2 min	Mg4.77E11.07110.00551C	0	0.1	0, 20 m	X 1	22	52
2017	Xiang	Mg5Li1Al, e + 20% rd	Mg4.66Li1.03Al0.0054Fe	В	5.7	6, 14 d	P_{W}	10	52
2017	Xiang	Mg5Li 1AL $e \pm 20\% rA$	Mg4 66L i1 03A10 0054Ee	в	57	6.20 m	<i>P</i> .	0.7	52
2017	2 stang	1115010-1711, C + 207010	115 1.00L11.00710.00341 C	0	5.1	0, 20 m	× 1	0.7	34
2017	Jia	Mg2Zn, ds	Not provided	В	2	21, 2 d	P_{W}	2.7	53
2017	Iia	Mg2Zn ds	Not provided	в	2	21 10 m	<i>p</i> .	0.27	53
2017	51G	1715-211, 40		<u>р</u>	4	21, 10 11	1 1 	0.47	55
2017	Baek	Mg5.5Al0.7Zn0.3Mn0.5C	Mg5.53Al0.67Zn0.29Mn0.48Ca<0.001Y0.	В	7.0	5, 3 d	P_{W}	1.8	54
		a	0021Ee	-				1	
		a	002110					-	
2017	Baek	Mg5.5Al0.7Zn0.3Mn0.5C	Mg5.53Al0.67Zn0.29Mn0.48Ca0.24Y0.00	R	7.2	5, 3 d	P_W	0.3	54
1		a0.2V	21Fe				1	1	
		uu	2 11 V	<u> </u>			<u> </u>		
2017	Turan	CP Mg	99.7% Mg	В	0.3	6, 15 m	P_i	2.7	55
2017	Turan	Math 5wt %GNP	-	Р	0.5	6.15 m	<i>p</i> .	22	55
2017	Turan	Mg0.5wt.70GINF		D	0.5	0, 15 m	Γ_1	23	55
2017	Caralapatti	CP Mg	99.8% Mg	В	0.2	20, 200 h	P_{W}	18	56
2017	Court and the	CD M. I UDI CD	00.80/ M-	D	0.2	20, 200 h	n	7	51
2017	Caraiapatti	CP Mg + HRLSP	99.8% Mg	в	0.2	20, 200 n	PW	1	20
2017	Liu	Mg1Y	0.72Y-<0.001Fe-bal Mg	R	0.7	6. 300 h	P_H	0.55	57
2017	T. San	MalV	0.70V <0.001E + 1.1M	D	0.7	6 400 -	- n	0.27	57
2017	Liu	MgTY	0.72 Y -<- 0.001Fe-bal Mg	В	0.7	6, 400 s	P_1	0.27	57
2017	Liu	Mg5Y, cast (ac)	4.72Y-<0.001Fe-bal Mg	B	4.7	6. 300 h	P_H	4.1	57
2017	1.	M 51	4.70X -0.001E 1.1M	D	4.7	6,000 1	- 11	0.4	67
2017	Liu	Mg5Y, cast (ac)	4.72Y-<0.001Fe-bal Mg	В	4.7	6, 400 s	P _i	0.4	57
2017	Lin	Mg-5Y ac \pm sht	4 72Y-<0 001Fe-bal Mg	R	47	6 300 h	P_H	0.4	57
2017	210		1.121 Storie Burning	n n	1.7	0,000 1	× //	0.1.7	
2017	Niu	Mg2.8Nd-02Zn0.4Zr	Mg2.8Nd0.2Zn0.4Zr	В	3.4	22, 1.5 y	PVolume	0.15	- 58
2017	Choi	AZ91 cast	8 54A10 19Mn0 74Zn0 0009Fe	B	95	6 21 d	P_{W}	1.2	59
2017	01	17017	0.51410.2634.1.127.0.0011E	- D	0.0	6.01.1	- n	0.0	50
2017	Choi	AZ9111, cast	8.51Al0.20Min1.15Zn0.0011Fe	K	9.9	0, 21 d	PW	0.8	39
	Mingo	M=0.41	12 7A10 0155Ec0 0045Mp	D	10 5	aa a 1	D		60
2017	101112/01	W199AT	112.7 A 10.01.5.3FC0.009.3WH	B - B	12.7	23.3 d	P_H	54	60
2017	Wingo	Mg9Al	12.7Al0.0135Fe0.0045Mil	В	12.7	23, 3 d	P_H	54	60
2017 2017	Mingo	Mg9Al0.5Mn	7.3Al0.0110Fe0.4240Mn	R	7.7	23, 3 d 23, 3 d	P_H P_H	0.8	60
2017 2017 2017	Mingo Mingo	Mg9Al0.5Mn Mg9Al0.25Nd	7.3Al0.0130Fe0.4240Mn 7.0Al0.0190Fe0.0030Mn0.25Nd	R B	7.7	23, 3 d 23, 3 d 23, 3 d	P_H P_H P_H	54 0.8 48	60 60
2017 2017 2017	Mingo Mingo	Mg9Al Mg9Al0.5Mn Mg9Al0.25Nd	7.3A10.0110Fe0.4240Mn 7.0A10.0190Fe0.0030Mn0.25Nd	R B	7.7 7.3	23, 3 d 23, 3 d 23, 3 d	P_H P_H P_H	54 0.8 48	60 60
2017 2017 2017 2017	Mingo Mingo Mingo	Mg9Al Mg9Al0.5Mn Mg9Al0.25Nd Mg9Al0.5Ca	7.3Al0.0110Fe0.0043Min 7.3Al0.0110Fe0.4240Mn 7.0Al0.0190Fe0.0030Mn0.25Nd 8.7Al0.0020Fe0.0235Mn0.31Ca	R B B	7.7 7.3 9.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d	P_H P_H P_H P_H	54 0.8 48 4.8	60 60 60
2017 2017 2017 2017 2017	Mingo Mingo Mingo Mingo	Mg9Al Mg9Al0.5Mn Mg9Al0.25Nd Mg9Al0.5Ca Mg9Al0.5Y	7.3Al0.0135Fe0.0043Mii 7.3Al0.0110Fe0.4240Mii 7.0Al0.0190Fe0.0030Min0.25Nd 8.7Al0.0020Fe0.0235Min0.31Ca 7.4Al0.0071Fe0.0102Min0.45Y	R B B B	12.7 7.7 7.3 9.0 8.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d	P_H P_H P_H P_H P_H	54 0.8 48 4.8 7.6	60 60 60 60
2017 2017 2017 2017 2017 2017	Mingo Mingo Mingo Mingo	Mg9Al0.5Mn Mg9Al0.25Nd Mg9Al0.25Nd Mg9Al0.5Ca Mg9Al0.5Y	12.740.0157F0.0045Mi 7.3410.0119Fe0.4240Mn 7.0A10.0190Fe0.0030Mn0.25Nd 8.7A10.0020Fe0.0235Mn0.31Ca 7.4A10.0071Fe0.0102Mn0.45Y 0.2416.027E 0.0200M.0.45Y	R B B B	7.7 7.3 9.0 8.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d	P_H P_H P_H P_H P_H P_H	54 0.8 48 4.8 7.6	60 60 60 60
2017 2017 2017 2017 2017 2017 2017	Mingo Mingo Mingo Mingo Mingo	Mg9Al0.5Mn Mg9Al0.25Nd Mg9Al0.25Nd Mg9Al0.5Ca Mg9Al0.5Y Mg9Al0.5Sn	12.7A10.013Fe0.4240Mn 7.0A10.0190Fe0.4240Mn 8.7A10.0020Fe0.0235Mn0.31Ca 7.4A10.0071Fe0.0102Mn0.45Y 8.2A10.0077Fe0.0300Mn0.38Sn	R B B B B	12.7 7.7 7.3 9.0 8.0 8.6	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d	P_H P_H P_H P_H P_H P_H	54 0.8 48 4.8 7.6 38	60 60 60 60 60
2017 2017 2017 2017 2017 2017 2017 2016	Mingo Mingo Mingo Mingo Mingo Iavarai	Mg9Al0.5Mn Mg9Al0.25Nd Mg9Al0.25Nd Mg9Al0.5Ca Mg9Al0.5Y Mg9Al0.5Sn AZ31	12.7A0.0157E0.045MH 7.0A10.0190Fe0.0430Mh 7.0A10.0190Fe0.0030Mn0.25Nd 8.7A10.0020Fe0.0235Mn0.31Ca 7.4A10.0071Fe0.0102Mn0.45Y 8.2A10.0077Fe0.0300Mn0.388n Mo2 3&A410.887zn 11Mn0.002Fe	B R B B B B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9	23, 3 d 23, 3 d 24, 5 d	P_H P_H P_H P_H P_H P_H P_H P_H	54 0.8 48 4.8 7.6 38 6.3	60 60 60 60 60 60 61
2017 2017 2017 2017 2017 2017 2017 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj	Mg9Al0.5Mn Mg9Al0.25Nd Mg9Al0.25Nd Mg9Al0.5Ca Mg9Al0.5Y Mg9Al0.5Sn AZ31	12.7A10.013Fe0.4240Mn 7.0A10.0190Fe0.4240Mn 8.7A10.0020Fe0.0235Mn0.31Ca 7.4A10.0071Fe0.0102Mn0.45Y 8.2A10.0077Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe	B R B B B B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d	P_H P_H P_H P_H P_H P_H P_H P_W	54 0.8 48 4.8 7.6 38 6.3	60 60 60 60 60 60 61
2017 2017 2017 2017 2017 2017 2017 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj	Mg9Al0.5Mn Mg9Al0.5Nd Mg9Al0.5Nd Mg9Al0.5Ca Mg9Al0.5Y Mg9Al0.5Sn AZ31 AZ31	12.7A0.013Fe0.4240Mn 7.0A10.0190Fe0.0030Mn0.2SNd 8.7A10.0020Fe0.0033Mn0.2SNd 8.7A10.0021Fe0.0102Mn0.4SY 8.2A10.0077Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe	B B B B B B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 3.9	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 25 m	$\begin{array}{c} P_{H} \\ P_{W} \\ P_{i} \end{array}$	54 0.8 48 4.8 7.6 38 6.3 3.2	60 60 60 60 60 61 61
2017 2017 2017 2017 2017 2017 2017 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang	Mg9Al0.5Mn Mg9Al0.5Nd Mg9Al0.5Ca Mg9Al0.5Y Mg9Al0.5Sn AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac	12.7A10.013Fe0.4240Mn 7.0A10.0190Fe0.4240Mn 8.7A10.0020Fe0.0235Mn0.31Ca 7.4A10.0071Fe0.0102Mn0.45Y 8.2A10.0077Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe	R B B B B B B B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 3.9 6.9	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 25 m 25, 120 b	P_H P_H P_H P_H P_H P_H P_W P_i P_w	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45	60 60 60 60 60 61 61 61 62
2017 2017 2017 2017 2017 2017 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang	Mg9Al0.5Mn Mg9Al0.2SNd Mg9Al0.2SNd Mg9Al0.5Ca Mg9Al0.5SN AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac	12.7A0.010Fe0.043MI 7.0A10.0190Fe0.0030Mn0.2SNd 8.7A10.0020Fe0.0033Mn0.2SNd 8.7A10.0020Fe0.0235Mn0.31Ca 7.AA10.0071Fe0.0102Mn0.4SY 8.2A10.0077Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe	B B B B B B B B B B C	12.7 7.7 7.3 9.0 8.0 8.6 3.9 3.9 6.9	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 25 m 25, 120 h	$\begin{array}{c} P_{H} \\ P_{W} \\ P_{i} \\ P_{W} \\ P_{i} \\ P_{W} \\ P_{i} \end{array}$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45	60 60 60 60 60 61 61 61 62 62
2017 2017 2017 2017 2017 2017 2017 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang	Mg9A10.5Mn Mg9A10.25Nd Mg9A10.5Ca Mg9A10.5Cy Mg9A10.5Y Mg9A10.5Sn AZ31 AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac, sht Mg6Gd0.5Zn0.4Zr, ac, sht	12.7A10.013Fe0.4240Mn 7.0A10.0190Fe0.4240Mn 7.0A10.0190Fe0.4235Mn0.25Nd 8.7A10.0020Fe0.0235Mn0.31Ca 7.4A10.0071Fe0.0102Mn0.45Y 8.2A10.0077Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe	B R B B B B B B B B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 3.9 6.9 6.9	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 25 m 25, 120 h 25, 120 h	$\begin{array}{c} P_{H} \\ P_{W} \\ P_{W} \\ P_{W} \\ P_{W} \end{array}$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50	60 60 60 60 60 60 60 60 60 60 60 60 60 60 61 62 62
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang	Mg9A10.5Mn Mg9A10.2SNd Mg9A10.2SNd Mg9A10.5Ca Mg9A10.5Sn AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht S35 C for 1.2 h	12.7A0.013Fe0.4240Mn 7.0A10.0190Fe0.4030Mn0.2SNd 8.7A10.0020Fe0.0033Mn0.2SNd 8.7A10.0020Fe0.0235Mn0.31Ca 7.A410.0071Fe0.0102Mn0.4SY 8.2A10.0077Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe	B R B B B B B B B B B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 25 m 25, 120 h	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\ P_{i} \\ P_{W} \\ P_{W} \\ P_{W} \end{array}$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50	60 60 60 60 60 60 60 60 61 61 62 62
2017 2017 2017 2017 2017 2017 2017 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang	MgyAl0.5Mn MgyAl0.25Nd MgyAl0.5Ca MgyAl0.5Ca AgyAl0.5Sn AZ31 AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht S35 C for 12 h	12.7A0.0110Fe0.4240Mn 7.0A10.0190Fe0.0030Mn0.2SNd 8.7A10.0020Fe0.0033Mn0.2SNd 8.7A10.0021Fe0.0102Mn0.4SY 8.2A10.0071Fe0.0300Mn0.38sn Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe	B B B B B B B B B B B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 25 m 25, 120 h	$\begin{array}{c} P_{H} \\ P_{W} \\ P_{i} \\ P_{W} \\ P_{W} \\ \end{array}$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50	60 60 60 60 60 60 60 61 61 62 62 62
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang Baek	Mg9A10.5Mn Mg9A10.2SNd Mg9A10.2SNd Mg9A10.5Ca Mg9A10.5SN Ag9A10.5SN AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht S35 C for 12 h AZ61	12.1740.0153Fe0.0450M1 7.3A10.0119Fe0.04240Mn 7.0A10.0190Fe0.00330Mn0.25Nd 8.7A10.0020Fe0.0235Mn0.31Ca 7.4A10.0071Fe0.0102Mn0.45Y 8.2A10.0077Fe0.0300Mn0.45Y 8.2A10.097Fe0.0300Mn0.45Y 8.2A10.097Fe0.0300Mn0.045Y 8.2A10.097Fe0.0300Mn0.045Y 8.2A10.097Fe0.0300Mn0.045Y 8.2A10.097Fe0.0300Mn0.045Y Mg2.84A10.98Zn0.11Mn0.002Fe Mg5.53A10.67Zn0.29Mn0.0021Fe	B R B B B B B B B B B R	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.3	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 25 m 25, 120 h 25, 120 h	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\ P_{W} \\ P_{W} \\ P_{W} \\ \end{array}$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33	60 60 60 60 60 60 60 60 61 61 62 62 63 63
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang Baek Esmaily	MgyAl0.5Mn MgyAl0.25Nd MgyAl0.25Nd MgyAl0.5Ca MgyAl0.5Sn AZ31 AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 335 C for 12 h AZ61 Pure Mø	12.7A0.015Fe0.4240Mn 7.0A10.0110Fe0.4240Mn 7.0A10.0110Fe0.4240Mn 8.7A10.0020Fe0.0033Mn0.2SMd 8.7A10.0021Fe0.0102Mn0.4SY 8.2A10.0077Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg5.53A10.67Zn0.29Mn0.0021Fe	B R B B B B B B B B B C	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.3 0.01	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 25 m 25, 120 h 25, 120 h 5, 72 h 26, 504	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \end{array}$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20	60 60 60 60 60 60 60 60 61 61 62 62 63 64
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang Back Esmaily	Mg9A10.5Mn Mg9A10.25Nd Mg9A10.25Nd Mg9A10.5Ca Mg9A10.5Sn AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 335 C for 12 h AZ61 Pure Mg b420	12.1740.0157Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.0110Fc0.4230Mn0.25Nd 8.7A10.0020Fc0.0235Mn0.31Ca 7.4A10.0071Fc0.0102Mn0.45Y 8.2A10.0077Fc0.0300Mn0.45Y 8.2A10.0077Fc0.0300Mn0.45Y 8.2A10.098Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg5.53A10.67Zn0.29Mn0.0021Fe	B B B B B B B B B B C	7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.3 0.01	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 25, 120 h 25, 120 h 5, 72 h 26, 504	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20	60 60 60 60 60 60 60 60 61 61 62 62 63 64
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang Back Esmaily Esmaily	MgyAlo.5Mn MgyAlo.25Nd MgyAlo.5Ca MgyAlo.5Ca MgyAlo.5Sn AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 35 C for 12 h AZ61 Pure Mg AM20	12.7A0.013Fec.043MI 7.3A10.0110Fe0.043MIn 7.0A10.0110Fe0.023SMn0.25Nd 8.7A10.0020Fe0.0235Mn0.31Ca 7.4A10.0071Fe0.0102Mn0.45Y 8.2A10.0077Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg5.53A10.67Zn0.29Mn0.0021Fe	B R B B B B B B B B B C G	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.3 0.01 2.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 25 m 25, 120 h 5, 72 h 26, 504	$\begin{array}{c} P_{H} \\ P_{W} \end{array}$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.048	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang Baek Esmaily Esmaily	MgyAl0.5Mn Mg9Al0.5Nd Mg9Al0.5Ca Mg9Al0.5Ca Ag9Al0.5Sn AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac, sht 535 C for 12 h AZ61 Pure Mg AM20 AZ31	Mail Mail Mail Mail 7.0A10.0110Fe0.4240Mn 7.0A10.0110Fe0.4240Mn 7.0A10.0110Fe0.0233Mn0.25Nd 8.7A10.0020Fe0.0233Mn0.31Ca 7.4A10.0071Fe0.0300Mn0.31Ca 7.4A10.007Fe0.0300Mn0.31Ca 8.2A10.0027Fe0.0300Mn0.38Sn Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg5.53A10.67Zn0.29Mn0.0021Fe	B R B B B B B B B B B C G G	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.3 0.01 2.0 4.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 25, 120 h 25, 120 h 5, 72 h 26, 504 26, 504	$\begin{array}{c} P_{H} \\ P_{W} \end{array}$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.048 0.042	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang Baek Esmaily Esmaily Esmaily	MgyAl0.5Mn MgyAl0.2SNd MgyAl0.2SNd MgyAl0.5SN AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 355 C for 12 h AZ61 Pure Mg AM20 AZ31 back	12.1740.0157Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 8.7A10.0020Fc0.0033Mn0.25Nd 8.7A10.0020Fc0.0102Mn0.45Y 8.2A10.0077Fc0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg5.53A10.67Zn0.29Mn0.0021Fe	B R B B B B B B B B B C G G G	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.3 0.01 2.0 4.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 25 m 25, 120 h 5, 72 h 26, 504 26, 504 26, 504	P_H P_H P_H P_H P_H P_W	54 0.8 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.048 0.042 0.022	60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64
2017 2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang Baek Esmaily Esmaily Esmaily	MgyAl0.5Mn MgyAl0.5Nd MgyAl0.5Ca MgyAl0.5Ca AgyAl0.5Sn AZ31 AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 535 C for 12 h AZ61 Pure Mg AM20 AZ31 AM60	12.7A0.010Fe0.4240Mn 7.0A10.0110Fe0.4240Mn 7.0A10.0110Fe0.4240Mn 8.7A10.0020Fe0.0033Mn0.2SMd 8.7A10.0021Fe0.0102Mn0.4SY 8.2A10.0071Fe0.0300Mn0.388n Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg5.53A10.67Zn0.29Mn0.0021Fe	B R B B B B B B B B B B C G G G G	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.3 0.01 2.0 4.0 6.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 25 m 25, 120 h 5, 72 h 26, 504 26, 504	$\begin{array}{c} P_{H} \\ P_{W} \end{array}$	54 0.8 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.048 0.042 0.026	60 60 60 60 60 60 60 61 61 62 63 64 64 64
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang Esmaily Esmaily Esmaily Esmaily Esmaily	Mg9Al0.5Mn Mg9Al0.2SNd Mg9Al0.2SNd Mg9Al0.5SN AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 355 C for 12 h AZ61 Pure Mg AM20 AZ31 AM60 AZ91	12.1740.0157Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 8.7A10.0020Fc0.00330Mn0.25Nd 8.7A10.0020Fc0.0102Mn0.45Y 8.2A10.007TFc0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg5.53A10.67Zn0.29Mn0.0021Fe	B R B B B B B B B B B C G G G G G	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.3 0.01 2.0 4.0 6.0 10	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 26, 504 26, 504 26, 504	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.048 0.026 0.020	60 60 60 60 60 60 60 61 61 62 63 64 64 64 64 64
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang Baek Esmaily Esmaily Esmaily Esmaily Esmaily	MgyAlo.5Mn MgyAlo.5Nd MgyAlo.5Ca MgyAlo.5Ca MgyAlo.5Sn AZ31 AZ31 AZ31 MgGGd0.5Zn0.4Zr, ac, sht 535 C for 12 h AZ61 Pure Mg AM20 AZ31 AM60 AZ31 AM60 AZ31 AM60 AZ31 AM60 AZ31 AM60	Mail Mail Mail Mail T.OAIO.0110Fe0.0230Mn0.25Nd Mail S.7AIO.0010Fe0.0235Mn0.31Ca Mail T.AAIO.0071Fe0.0300Mn0.25Nd Mail S.7AIO.0071Fe0.0300Mn0.38Sn Mg2.84AI0.98Zn0.11Mn0.002Fe Mg2.84AI0.98Zn0.11Mn0.002Fe Mg5.53AI0.67Zn0.29Mn0.0021Fe	B R B B B B B B B B B B C G G G G G G G G G	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.3 0.01 2.0 4.0 6.0 10	23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 m 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\$	54 0.8 0.8 4.8 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.048 0.042 0.026 0.020 4.0	60 60 60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 64
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Zhang Zhang Baek Esmaily Esmaily Esmaily Esmaily Saikrishna	Mg9A10.5Mn Mg9A10.2SNd Mg9A10.2SNd Mg9A10.5Ca Mg9A10.5Sn AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 355 C for 12 h AZ61 Pure Mg AM20 AZ31 AM60 AZ91 AZ31, e	Mg2.75Al0.015Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 8.7Al0.0020Fe0.00335Mn0.25Nd 8.7Al0.0020Fe0.0102Mn0.45Y 8.2Al0.0077Fe0.0300Mn0.45Y 8.2Al0.0077Fe0.0300Mn0.45Y 8.2Al0.0077Fe0.0300Mn0.45Y 8.2Al0.097Fe0.0300Mn0.45Y 8.2Al0.097Fe0.0300Mn0.45Y 8.2Al0.097Fe0.0300Mn0.045Y 8.2Al0.097Zn0.11Mn0.002Fe Mg2.84Al0.98Zn0.11Mn0.002Fe Mg5.53Al0.67Zn0.29Mn0.0021Fe Mg2.75Al0.91Zn0.001Fe	B R B B B B B B B B B B G G G G G G G G G G G G G	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.3 0.01 2.0 4.0 6.0 10 3.7	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 25 m 25, 120 h 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\$	54 0.8 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.50 0.33 0.20 0.048 0.042 0.020 4.0	60 60 60 60 60 60 60 61 61 62 62 62 63 64 64 64 64 64 64 64
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Zhang Zhang Zhang Zhang Esmaily Esmaily Esmaily Esmaily Esmaily Saikrishna Saikrishna	MgyAl0.5Mn MgyAl0.5Nd MgyAl0.5SA MgyAl0.5SA MgyAl0.5Sn AZ31 AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 35 C for 12 Purc Mg AZ61 Purc Mg AM20 AZ31 AM20 AZ31 AM20 AZ31 AM60 AZ31 e AZ31 e	Mg2.75Al0.91DFc0.4240Mn 7.0Al0.0110Fc0.4240Mn 7.0Al0.0110Fc0.4240Mn 7.0Al0.0017Fc0.0030Mn0.25Nd 8.7Al0.0020Fc0.0102Mn0.45Y 8.2Al0.0077Fc0.0300Mn0.38Sn Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.84Al0.98Zn0.11Mn0.002Fe Mg5.53Al0.67Zn0.29Mn0.0021Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe	B R B B B B B B B B B B B C G G G G G B B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.3 0.01 2.0 4.0 6.0 10 3.7 3.7	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 25 m 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 1 h	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\$	54 0.8 0.8 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.048 0.042 0.026 0.020 0.020 4.0	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 65 65 65
2017 2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang Zhang Zhang Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily	MgyAl0.5Mn MgyAl0.5Nd MgyAl0.5Ca MgyAl0.5Ca AgyAl0.5Sa Az31 AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac, sht 535 C for 12 h AZ61 Purc Mg AZ61 Purc Mg AZ0 AZ1 AM60 AZ91 AZ31, e AZ31, e AZ31, e AZ31, e	Mg2.75Al0.9127c0.001Fe Mg2.75Al0.9110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 7.0Al0.0110Fe0.0235Mn0.31Ca 7.4Al0.0071Fe0.0102Mn0.45Y 8.2Al0.0077Fe0.0300Mn0.388n Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.553Al0.67Zn0.29Mn0.0021Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe	B R B B B B B B B B B B C G G G G B B B B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.3 0.01 2.0 4.0 6.0 10 3.7 3.7	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 25 m 25, 120 h 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 27, 24	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\$	54 0.8 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.048 0.042 0.026 0.020 4.0 0.64.6 4.6	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 64 64 64 65 65
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Zhang Zhang Zhang Esmaily Esmaily Esmaily Esmaily Esmaily Saikrishna Saikrishna	Mg9A10.5Mn Mg9A10.5SA Mg9A10.5SA Mg9A10.5SA AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 35 C for 12 h AZ61 Pure Mg AM20 AZ31 AM60 AZ91 AZ91 AZ31, e AZ31, e AZ31, fsp	Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Dre0.0235Mn0.31Ca 7.A810.0107Fe0.0235Mn0.31Ca 7.A810.0071Fe0.0102Mn0.45Y 8.2A10.0077Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe	B B	$\begin{array}{c} 12.7\\ 7.7\\ 7.3\\ 9.0\\ 8.0\\ 8.6\\ 3.9\\ 6.9\\ 6.9\\ 6.9\\ 6.9\\ 6.9\\ 6.9\\ 6.9\\ 10\\ 3.7\\ 3.7\\ 3.7\end{array}$	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 25 m 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\$	54 0.8 48 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.048 0.042 0.026 0.026 0.026 0.66 4.6	60 60 60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 65 65
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Zhang Zhang Zhang Baek Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Saikrishna Saikrishna Saikrishna	MgyAl0.5Mn MgyAl0.5Nd MgyAl0.5Ca MgyAl0.5Ca AgyAl0.5Ca MgyAl0.5Sn AZ31 AZ31 AZ31 AZ31 MgGGd0.5Zn0.4Zr, ac, sht 535 C for 12 h AZ61 Purc Mg AZ61 Purc Mg AM20 AZ31 AM60 AZ31 AZ31 AZ31 AZ31, e AZ31, fsp AZ31, fsp AZ31, fsp	Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Dre0.0233Mn0.25Nd 8.7Al0.0010Fe0.0233Mn0.31Ca 7.4Al0.0071Fe0.030Mn0.25Nd 8.7Al0.0021Fe0.0102Mn0.45Y 8.2Al0.0077Fe0.0300Mn0.38sn Mg2.8Al0.98Zn0.11Mn0.002Fe Mg2.8Al0.98Zn0.11Mn0.002Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe	B B B B B B B B B B B B B B B B B B G G G G G G G G G G G B B B B B B	12.7 7.3 9.0 8.0 8.6 3.9 6.9 6.3 0.01 2.0 4.0 6.0 10 3.7 3.7 3.7	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 25 m 25, 120 h 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 27, 1 h 27, 1 d	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\$	54 0.8 48 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.048 0.026 0.020 4.0 0.620 4.0 0.20	60 60 60 60 60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 65 65 65
2017 2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Zhang Zhang Zhang Zhang Esmaily Esmaily Esmaily Esmaily Esmaily Saikrishna Saikrishna Saikrishna	MgyAl0.5Mn MgyAl0.5Nd MgyAl0.2SNd MgyAl0.5SN AgyAl0.5Sn AZ31 MgGGd0.5Zn0.4Zr, ac MgGGd0.5Zn0.4Zr, ac, sht 355 C for 12 h AZ61 Pure Mg AM20 AZ31 AM60 AZ31 AM60 AZ31, e AZ31, e AZ31, e AZ31, e AZ31, fsp MeSYZGLNJ40 57-	Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.9110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 8.7Al0.0020Fe0.0033Mn0.25Nd 8.7Al0.0020Fe0.0235Mn0.31Ca 7.4Al0.0071Fe0.0102Mn0.45Y 8.2Al0.0077Fe0.0300Mn0.38Sn Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.84Al0.98Zn0.11Mn0.002Fe Mg5.53Al0.67Zn0.29Mn0.0021Fe Mg2.75Al0.91Zn0.001Fe	B R B	$\begin{array}{c} 12.7\\ 7.7\\ 7.3\\ 9.0\\ 8.0\\ 8.6\\ 3.9\\ 6.9\\ 6.9\\ 6.9\\ 6.3\\ 0.01\\ 2.0\\ 4.0\\ 6.0\\ 10\\ 3.7\\ 3.7\\ 3.7\\ 3.7\\ 3.7\end{array}$	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 25 m 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 27, 3 d	$\begin{array}{c} P_{H} \\ P_{W} \\ P_{H} \\$	54 0.8 0.8 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.048 0.042 0.020 4.0 0.66 4.6 2.0 1000	60 60 60 60 60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 65 65 65 65 65
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Zhang Zhang Zhang Zhang Zhang Esmaily Esmaily Esmaily Esmaily Saikrishna Saikrishna Saikrishna Liu	MgyAl0.5Mn MgyAl0.5Nd MgyAl0.5Sa MgyAl0.5Sa AgyAl0.5Sn AZ31 AZ31 MgGGd0.5Zn0.4Zr, ac, sht 535 C for 12 h AZ61 Pure Mg AM20 AZ31 AZ61 Pure Mg AM20 AZ31 AM60 AZ31 AX31 AX50 AZ31 AX51 AX51 AX51 AX51 AX51 AX51 AX51 AX5	Mg2.75Al0.91Zr0.001Fe Mg2.75Al0.91DFe0.4240Mn 7.0Al0.0110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 7.0Al0.0021Fe0.0102Mn0.45Nd 8.7Al0.0021Fe0.0102Mn0.45Y 8.2Al0.0077Fe0.0300Mn0.38Sn Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.75Al0.91Zn0.001Fe	B B B B B B B B B B B B B B B B B G G G G G G G G G G G G B B B B B B B	12.7 7.3 9.0 8.0 8.6 3.9 6.9 6.3 0.01 2.0 4.0 6.0 10 3.7 3.7 3.7	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 3 d 27, 3 d 27, 3 d	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\$	54 0.8 48 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.042 0.026 0.020 4.0 0.6 4.0 0.6 2.0	60 60 60 60 60 60 60 60 60 60 61 62 62 62 63 64 64 64 64 64 64 65 65 65 65 66
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Zhang Baek Esmaily Esmai	Mg9Al0.5Mn Mg9Al0.5Nd Mg9Al0.5SN Mg9Al0.5SN AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 35 C for 12 h AZ61 Pure Mg AM20 AZ31 AM20 AZ31 AM20 AZ31, e AZ31, e AZ31, fsp AZ31, fsp AZ63 Mg6YJCM1Nd0.5Zr AZ63	Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91DFe0.4240Mn 7.0Al0.010Fe0.4240Mn 8.7Al0.0020Fe0.0033Mn0.25Nd 8.7Al0.0020Fe0.0033Mn0.25Nd 8.7Al0.0020Fe0.0102Mn0.45Y 8.2Al0.0077Fe0.0300Mn0.38Sn Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.84Al0.98Zn0.11Mn0.002Fe Mg5.53Al0.67Zn0.29Mn0.0021Fe Mg2.75Al0.91Zn0.001Fe	B B	$\begin{array}{c} 12.7\\ 7.7\\ 7.3\\ 9.0\\ 8.0\\ 8.6\\ 3.9\\ 6.9\\ 6.9\\ 6.9\\ 6.9\\ 6.9\\ 6.9\\ 6.0\\ 10\\ 2.0\\ 4.0\\ 6.0\\ 10\\ 3.7\\ 3.7\\ 3.7\\ 3.7\\ 3.7\end{array}$	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 25 m 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 27, 1 h	$\begin{array}{c} P_{H} \\ P_{W} \\ P_{i} \\ P_{i} \\ \end{array}$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.033 0.20 0.048 0.020 0.020 0.044 0.020 0.020 0.06 4.0 2.0	60 60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 65 65 65 65 66 67 67
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Zhang Zhang Zhang Zhang Zhang Baek Esmaily Esmaily Esmaily Esmaily Esmaily Saikrishna Saikrishna Saikrishna Saikrishna	MgyAl0.5Mn MgyAl0.5Nd MgyAl0.5Sa MgyAl0.5Sa AgyAl0.5Sn AZ31 AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 335 C for 12 h AZ61 Pure Mg AM20 AZ31 AZ31 AZ31 AZ31 AZ31 AZ31 AZ31 AZ31	Mg2.75Al0.912re0.4240Mn 7.0Al0.0110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 8.7Al0.0020Fe0.0033Mn0.25Nd 8.7Al0.0021Fe0.0102Mn0.45Y 8.2Al0.0077Fe0.0300Mn0.38Sn Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg7.04Gd4.531.29Nd0.49Zr Mg7.04Gd4.531.29Nd0.49Zr	B B	12.7 7.7 7.3 9.0 8.0 8.0 3.9 6.9 6.3 0.01 2.0 4.0 6.0 10 3.7 3.7 3.7 3.7	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 25 d 24, 25 m 25, 120 h 25, 120 h 25, 120 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 1 h 27, 3 d 27, 1 h	$\begin{array}{c} P_{H} \\ P_{W} \\$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.045 0.048 0.0042 0.0026 0.0020 4.0 0.020 4.0 0.050	60 60 60 60 60 60 60 60 60 61 61 61 62 62 63 64 64 64 64 64 64 65 65 65 65 66 67 62
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Zhang Zhang Baek Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Saikrishna Saikrishna Saikrishna Jakirishna Jakirishna Jakirishna Jakirishna Jakirishna Jakirishna Jakirishna	Mg9A10.5Mn Mg9A10.5Nd Mg9A10.5Ca Mg9A10.5Ca Ag9A10.5Ca Mg9A10.5Sn AZ31 AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac, sht 535 C for 12 h AZ61 Purc Mg AZ61 Purc Mg AZ0 AZ31 AM60 AZ31 AM60 AZ31, e AZ31, fsp AZ31,	Mail Mail M.O. 1016;e0.4240Mn 7.0A10.01101;e0.4240Mn 7.0A10.01101;e0.4240Mn 2.0A10.25Md S.7A10.02016;e0.0235Mn0.31Ca 7.4A10.0071;e0.0102Mn0.45Y S.2A10.0077;e0.0300Mn0.388n Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.35A10.67Zn0.29Mn0.0021Fe Mg5.53A10.67Zn0.29Mn0.0021Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe	B B	12.7 7.7 9.0 8.0 8.0 8.0 8.0 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 0.01 2.0 4.0 6.0 10 3.7 3.7 3.7 3.7	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 3 d 26, 504 26, 504 26, 504 27, 3 d 27, 10 h 27, 10 h	$\begin{array}{c} P_{H} \\ P_{W} \\$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.045 0.020 0.048 0.020 0.020 4.0 0.020 0.6 4.6 2.0	60 60 60 60 60 60 60 60 61 62 62 63 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 65 65 65 66 66 66 67 68
2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Zhang Zhang Zhang Zhang Baek Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Saikrishna Saikrishna Saikrishna Saikrishna Saikrishna Saikrishna Saikrishna	Mg9Al0.5Mn Mg9Al0.5Nd Mg9Al0.5SA Mg9Al0.5SA Mg9Al0.5Sn AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 35 C for 12 h AZ61 Pure Mg AM20 AZ31 AM20 AZ31 AM20 AZ31 e AZ31, e AZ31, fsp Mg5YZ01Nd0.5Zr Mg5YZ01Nd0.5Zr AZ3, fsp Mg5YZ01Nd0.5Zr AZ3, fsp Mg5YZ02N, fsp Mg5	Mg2.75Al0.912re0.4240Mn 7.0Al0.0110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 8.7Al0.0020Fe0.0033Mn0.25Nd 8.7Al0.0020Fe0.0102Mn0.45Y 8.2Al0.0077Fe0.0300Mn0.38Sn Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg7.04Gd4.531.29Nd0.49Zr Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca	B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 25 d 24, 25 m 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 1 h 27, 3 d 27, 1 h 17, 7 d	$\begin{array}{c} P_{H} \\ P_{W} \\$	54 0.8 48 4.8 7.6 6.3 3.2 0.45 0.50 0.045 0.045 0.045 0.042 0.020 0.000 0.0200 0.0200 0.0200 0.0200000000	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 64 65 65 65 65 66 67 68 68
2017 2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Zhang Zhang Zhang Zhang Zhang Zhang Zhang Zhang Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Saikrishna Saikrishna Saikrishna Liu Jafari Johnston Johnston	MgyAl0.5Mn MgyAl0.5Nd MgyAl0.5Nd MgyAl0.5Na AgyAl0.5Na AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac, sht S35 C for 12 h AZ61 Purc Mg AZ61 Purc Mg AZ61 AX60 AZ31 AM60 AZ31 AZ31 AM60 AZ31 AZ31 AM60 AZ31 AZ31 AM60 AZ31	Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.0110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 8.7Al0.0020Fe0.0033Mn0.25Nd 8.7Al0.0021Fe0.0102Mn0.45Y 8.2Al0.0077Fe0.0300Mn0.38sn Mg2.8Al0.98Zn0.11Mn0.002Fe Mg2.8Al0.98Zn0.11Mn0.002Fe Mg2.75Al0.91Zn0.001Fe Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca	B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 5, 72 h 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 27, 3 d 27, 1 h 17, 7 d 17, 7 d	P_{H} P_{H} P_{H} P_{H} P_{H} P_{H} P_{W} P	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.045 0.020 0.048 0.020 0.020 4.0 0.020 4.0 0.020 0.6 4.6 2.0	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 65 65 65 65 66 66 67 68 60
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Zhang Zhang Zhang Zhang Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Saikrishna Saikrishna Saikrishna Saikrishna Jafari Johnston Johnston	Mg9Al0.5Mn Mg9Al0.5Nd Mg9Al0.5Nd Mg9Al0.5Sn AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 35 C for 12 h AZ61 Pure Mg AM20 AZ21 AM20 AZ21 AM20 AZ21 AZ23 AZ21 AZ23 AZ23 AZ24 A	Mg0.45Zn0.45Ca Mg2.75Al0.0110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 8.7Al0.0020Fe0.0033Mn0.25Nd 8.7Al0.0020Fe0.0102Mn0.45Y 8.2Al0.0077Fe0.0300Mn0.38Sn Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.007Fe	B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.3 0.01 2.0 4.0 6.3 0.01 2.0 4.0 10 3.7 3.7 3.7 3.7 0.9 0.9 0.9 0.9 0.9	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 25 m 25, 120 h 25, 120 h 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 77, 3 d 77, 7 d 17, 7 d 17, 166 h	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\$	54 0.8 48 4.8 7.6 6.3 3.2 0.45 0.33 0.20 0.045 0.33 0.20 0.045 0.020 0.048 0.020 0.5 0.5 0.5 0.5	60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 65 65 66 67 68 68 69 69
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Zhang Zhang Zhang Zhang Zhang Zhang Zhang Zhang Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Saikrishna Saikrishna Saikrishna Johnston Johnston Johnston	MgyAlo.5Mn MgyAlo.5Nd MgyAlo.5Nd MgyAlo.5Nd MgyAlo.5Sn AZ31 AZ31 MgGdd0.5Zn0.4Zr, ac, sht 335 C for 12 h AZ61 Pure Mg AM20 AZ31 AZ61 Pure Mg AM20 AZ31 AZ61 Pure Mg AM20 AZ31 AZ61 Pure Mg AZ31, e AZ31, e AZ31, e AZ31, e AZ31, e AZ31, e AZ31, e AZ31, fsp AZ31, fsp AZ	Mg2.75Al0.912r604240Mn 7.0Al0.0110Fc0.4240Mn 7.0Al0.0110Fc0.4240Mn 7.0Al0.0110Fc0.4240Mn 8.7Al0.0020Fc0.0030Mn0.25Nd 8.7Al0.0021Fc0.0102Mn0.45Y 8.2Al0.0077Fc0.0300Mn0.388n Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.0464.331.29Nd0.49Zr Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.407Fe Mg1.541.0.64Zn0.15Mn0.005Fe	B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 17, 7 d 17, 7 d 17, 166 h	$\begin{array}{c} P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{W}\\ P_$	34 0.8 48 4.8 7.6 33 6.3 38 6.3 38 6.3 38 6.3 38 6.3 38 6.3 0.45 0.50 0.048 0.042 0.020 0.6 4.6 2.0 0.5 0.4 0.5 0.4 0.5 0.4 0.5 0.4	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 65 65 65 65 66 66 67 68 69 69 69
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Zhang Baek Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Isakrishna Saikrishna Saikrishna Jafari Johnston Johnston Johnston	Mg9Al0.5Mn Mg9Al0.5Nd Mg9Al0.5Ca Mg9Al0.5Ca Mg9Al0.5Ca Mg9Al0.5Sn AZ31 AZ31 AZ31 AZ31 AZ31 AGGd0.5Zn0.4Zr, ac, sht 535 C for 12 h AZ61 Pure Mg AM20 AZ31 AM60 AZ31 AM60 AZ31, e AZ31, e AZ31, e AZ31, e AZ31, e AZ31, e AZ31, e AZ31, e AZ31, e AZ31, g AZ31, g AZ31	12.740.0157Fc04240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 8.7A10.0020Fc0.0235Mn0.31Ca 7.7A10.0107Fc0.030Mn0.2SNd 8.2A10.0077Fc0.0300Mn0.31Ca 7.4A10.0071Fc0.0300Mn0.31Ca 7.4A10.007Fc0.0300Mn0.31Ca 7.4A10.002Fc Mg2.8A10.98Zn0.11Mn0.002Fc Mg2.553A10.67Zn0.29Mn0.0021Fc Mg2.75A10.91Zn0.001Fc Mg0.45Zn0.45Ca Mg0.07Fc Mg1.45Zn0.45Ca Mg0.007Fc Mg2.65D1.91Zn0.005Fc	в В В В В В В В В В В В В В	12.7 7.7 7.3 9.0 8.0 8.6 8.6 3.9 6.9 6.9 6.9 6.9 6.9 6.0 10 3.7 3.7 3.7 3.7 3.7 3.7 8.7 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 25 m 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 27, 3 d 27, 1 d 17, 7 d 17, 7 d 17, 166 h 17, 166 h	$\begin{array}{c} P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{W}\\ P_$	54 0.8 48 4.8 7.6 6.3 38 6.3 3.2 0.45 0.45 0.45 0.042 0.026 0.042 0.026 0.042 0.026 0.042 0.020 0.6 4.0 0.5 0.4 0.5 0.4 0.4 0.5 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	60 60 60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 64 65 65 65 65 66 67 68 68 69 69 69 69
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Zhang	Mg9Al0.5Mn Mg9Al0.5Nd Mg9Al0.5Sa Mg9Al0.5Sa Ag9Al0.5Sn AZ31 AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 335 C for 12 h AZ61 Pure Mg AM20 AZ31 AZ31 AZ31 AZ31 AZ31 AZ31 AZ31 AZ31	Mg0.4570.0015Fe0.0430Mn 7.0A10.0110Fe0.04240Mn 7.0A10.0110Fe0.0203Mn0.25Nd 8.7A10.0020Fe0.0030Mn0.25Nd 8.7A10.0020Fe0.0102Mn0.45Y 8.2A10.0077Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg7.04Gd4.531.29Nd0.49Zr Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.100Fe Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.100Fe Mg1.5A1-0.64Zn0.15Mn0.005Fe Mg4.59Zn1.06Ce0.006Fe0.13Y0.48La0.13	B R B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 25 m 25, 120 h 25, 120 h 25, 120 h 25, 120 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 1 h 27, 3 d 27, 1 h 17, 7 d 17, 7 d 17, 166 h 17, 166 h	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\$	34 0.8 48 4.8 7.6 33 6.3 38 6.3 38 6.3 38 6.3 38 6.3 38 6.3 0.45 0.50 0.048 0.042 0.020 0.6 4.6 2.0 0.5 0.4 0.5 0.4 0.5 0.3 3.4	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 64 64 64 65 65 65 65 66 67 68 68 69 69 69 69
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Zhang Baek Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Jakrishna Saikrishna Saikrishna Jakirishna Johnston Johnston Johnston	Mg9A10.5Mn Mg9A10.5Nd Mg9A10.5Ca Mg9A10.5Ca Ag9A10.5Sa AZ31 AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac, sht 535 C for 12 h AZ61 Purc Mg AZ61 Purc Mg AZ61 AZ61 AZ61 AZ61 AZ61 AZ61 AZ61 AZ61	12.740.0157E0.4240Mn 7.0A10.0110Fe0.4240Mn 7.0A10.0110Fe0.4240Mn 7.0A10.0110Fe0.4240Mn 8.7A10.0020Fe0.0235Mn0.31Ca 7.4A10.0071Fe0.0102Mn0.45Y 8.2A10.0027Fe0.0300Mn0.388n Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg0.45Zn0.45Ca Mg0.007Fe Mg3.15A1-0.64Zn0.15Mn0.005Fe Mg4.59Zn1.106Ce0.006Fe0.13Y0.48La0.13 Mg4.59Zn1.06Ce2.006Fe0.13Y0.48La0.13	B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.0 10 0.01 2.0 0.01 2.0 0.9 0.9 0.9 0.9 0.007 8.9 6.5	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 27, 3 d 27, 1 h 27, 1 d 17, 7 d 17, 7 d 17, 166 h	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\$	54 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.33 0.20 0.042 0.020 0.042 0.020 0.6 4.0 0.5 0.4 0.5 0.3 3.4	60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 64 65 65 65 66 66 68 68 69 69
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Zhang Zhan	Mg9Al0.5Mn Mg9Al0.5Mn Mg9Al0.5SA Mg9Al0.5SA Mg9Al0.5SA Mg9Al0.5SA AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac. Mg6Gd0.5Zn0.4Zr, ac. S35 C for 12 h AZ61 Pure Mg AM20 AZ31 AM20 AZ31 AM20 AZ31 AM20 AZ31 AM20 AZ31 AM20 AZ31 AM20 AZ31 QUIP ZX00, c UHP ZX00	12.7A0.015FC0.4240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 8.7A10.0020Fc0.0033Mn0.25Nd 8.7A10.0020Fc0.0102Mn0.45Y 8.2A10.0077Fc0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.007Fe Mg4.59Zn1.06Cc0.006Fe0.13Y0.48La0.13 Pr0.1Nd Mg4.59Zn1.04Cc2.20 L0.0277	B R B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6	23, 3 d 23, 3 d 24, 25 m 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 27, 1 h 7, 7 d 17, 7 d 17, 166 h 17, 166 h 17, 166 h	$\begin{array}{c} P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{W}\\ P_$	34 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.30 0.31 0.20 0.042 0.020 0.042 0.020 0.04 0.05 0.4 0.5 0.4 0.5 0.3 3.4 0.70	60 60 60 60 60 60 60 61 61 62 63 64 64 64 64 64 64 65 65 65 65 65 66 67 68 69 69 69 70 70
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Zhang Zh	Mg9A10.5Mn Mg9A10.5Nd Mg9A10.5Ca Mg9A10.5Ca Mg9A10.5Sn AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac, sht 335 C for 12 h AZ61 Pure Mg AZ61 Pure Mg AZ91 AZ91 AZ31 AM60 AZ31, ca AZ31, ca	II. ArAoo15 Feedward II. ArAoo15 Area II. ArAoo15 Area II. ArAoo15 Area II. ArAoo15 Area II. ArAo015 Area II. Arao III. Arao IIII. Arao IIIIII. Arao IIIIIIIIIIIIIIIIIIIIIIIII	B B	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.0 10 0.01 2.0 0.01 2.0 0.0 10 3.7 3.7 3.7 3.7 3.7 6.5 6.5	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 17, 7 d 17, 7 d 17, 166 h 17, 166 h 1, 180 h	$\begin{array}{c} P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{W}\\ P_$	34	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 65 65 66 67 68 68 69 69 69 70 70
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Zhang Baek Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Jakrishna Saikrishna Saikrishna Saikrishna Saikrishna Chuston Johnston Johnston Chu	Mg9A10.5Mn Mg9A10.5Nd Mg9A10.5SA Mg9A10.5SA Mg9A10.5SA AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac. Mg6Gd0.5Zn0.4Zr, ac. s35 C for 1 2 h AZ61 Pure Mg AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ23 AZ21 AZ	12.7A0.013Fe0.4240Mn 7.0A10.0110Fe0.4240Mn 7.0A10.0110Fe0.4240Mn 8.7A10.0020Fe0.0033Mn0.25Nd 8.7A10.0020Fe0.0102Mn0.45Y 8.2A10.0077Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.46Ca.000Fe Mg4.59Zn1.06Ce0.006Fe0.13Y0.48La0.13 Pr0.1Nd Mg3.74Y2.10Nd0.45Zr0.52Gd<0.005Fe	B R B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B R R R	12.7 7.7 7.3 9.0 8.0 8.6 3.9 6.9 6.3 0.01 2.0 6.3 0.01 2.0 6.3 0.01 2.0 6.3 0.01 2.0 6.3 7.7 3.7 3.7 3.7 3.7 3.7 6.5 6.5 6.8	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 25 m 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 27, 1 h 77, 7 d 17, 7 d 17, 166 h 1, 180 h	PH PH PH PH PH PH PH PH PW PW PAH PAH	34 34 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.045 0.33 0.20 0.026 0.024 0.024 0.024 0.025 0.33 0.6 4.6 2.0 0.4 0.5 0.3 3.4 0.70	60 60 60 60 60 60 60 61 61 62 63 64 64 64 64 64 64 64 64 65 65 65 66 67 68 69 69 69 70 70
2017 2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Zhang Johnston Johnston Chu Chu Chu Chu Chu Chu Chu Chu Chu Chu	MgyAlo Shn MgyAlo Shn MgyAlo 25Nd MgyAlo 25Nd MgyAlo 25Nd MgyAlo 25Nd MgyAlo Sn AZ31 AZ31 MgGd0 5Zn0.4Zr, ac MgGd0 5Zn0.4Zr, ac AZ31	Mg0.45Zn0.015Fe.04240Mn 7.0A10.0110Fe0.4240Mn 7.0A10.0110Fe0.4240Mn 7.0A10.0110Fe0.4240Mn 8.7A10.0020Fe0.0033Mn0.25Nd 8.7A10.0021Fe0.0102Mn0.45Y 8.2A10.0077Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg1.04G44.531.29Nd0.49Zr Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg3.74Y2.10A00.45Zr0.52Gd<0.005Fe	B B B B	12.7 7.7 7.3 9.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 6.3 9.0 6.3 0.01 10 3.7 3.7 3.7 3.7 3.7 0.9 0.09 0.9 0.9 6.5 6.8 6.8	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 17, 7 d 17, 7 d 17, 166 h 1, 180 h 1, 180 h	Рн Рн Рн Рн Рн Рн Рн Рн Рw Рw Pw Pw	34 34 0.8 48 4.8 7.6 38 6.3 3.2 2 0.45 0.50 0.33 0.20 0.045 0.50 0.020 0.046 0.020 0.048 0.021 4.0 0.05 0.3 0.6 4.6 2.0 0.5 0.3 3.4 0.70 0.29	60 60 60 60 60 60 60 60 60 60 60 60 61 62 63 64 64 64 64 64 64 64 64 64 65 65 65 65 66 67 68 69 69 69 70 70
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Zhang Zhang Baek Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Esmaily Saikrishna Saikrishna Saikrishna Saikrishna Saikrishna Chuston Johnston Johnston Johnston Chu Chu	Mg9A10.5Mn Mg9A10.5Ca Mg9A10.5Ca Mg9A10.5Ca Ag9A10.5Ca Mg9A10.5Ca Mg9A10.5Ca Mg9A10.5Ca AZ31 AZ31 AZ31 AZ31 Parc Mg AZ41 AM60 AZ41 AM60 AZ31, e AZ31,	I.2. /A0.013 Fec.04240Mn 7.0A10.0110Fe0.4240Mn 7.0A10.0110Fe0.4240Mn 7.0A10.0190Fe0.0233Mn0.2SNd 8.7A10.02020Fe0.0235Mn0.31Ca 7.4A10.0071Fe0.0102Mn0.4SY 8.2A10.098Zn0.11Mn0.002Fe Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg3.74V2.10A0.45Ca Mg0.045Fe Mg4.53Zn0.45Ca Mg0.03Fe Mg4.53Zn0.45Ca Mg4.03Zn0.45Ca Mg4.04Zzn0.45Ca Mg4.04Zzn0.45Zzn0.52Gd<0.005Fe Mg3.74Y2.10Nd0.45Zzn0.52Gd<0.005Fe Mg3.74Y2.10Nd0.45Zzn0.52Gd<0.005Fe Mg4.3Zzn0.45Zzn0.45Zzn0.52Gd<0.005Fe Mg4.3Zzn0.45Zzn0.52Gd<0.005Fe Mg4.3Zzn0.45Zzn0.52Gd<0	B R B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B R R	12.7 7.7 7.3 9.0 8.6 3.9 6.3 6.9 6.3 0.01 10 3.7 3.7 3.7 3.7 3.7 6.5 6.5 6.8	23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 3 d 27, 1 h 27, 3 d 27, 3 d 27, 1 d 17, 7 d 17, 7 d 17, 166 h 1, 180 h 1, 180 h	Рн Рн Рн Рн Рн Рн Рн Рн Рw Р Рw Рw Pw Pw Pan Pw	34 34 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.50 0.33 0.20 0.045 0.026 0.020 0.024 0.024 0.024 0.024 0.025 0.33 0.6 4.6 2.0 3.4 0.5 0.3 3.4 0.70 0.38 8.4	60 60 60 60 60 60 60 60 60 60 60 60 61 62 62 62 63 64 64 64 64 64 65 65 65 65 66 69 69 69 70 70
2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jaya Jayaraj Jaya Jaya Jayaraj Jaya Jaya Jaya Jaya Jaya Jaya Jaya Ja	Mg9A10.5Mn Mg9A10.5Mn Mg9A10.5SA Mg9A10.5SA Mg9A10.5SA AZ31 AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac Mg6Gd0.5Zn0.4Zr, ac, sht 335 C for 12 h AZ61 Pure Mg AM20 AZ31 AZ31 AZ31 AZ31 AZ31 AZ31 AZ31 AZ31	Mg0.452n0.452n0 Mg2.75Al0.0110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 7.0Al0.0110Fe0.4240Mn 8.7Al0.0020Fe0.0033Mn0.25Nd 8.7Al0.0021Fe0.0102Mn0.45Y 8.2Al0.0077Fe0.0300Mn0.38Sn Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.84Al0.98Zn0.11Mn0.002Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg2.75Al0.91Zn0.001Fe Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg3.74Y2.10Nd0.45Zr0.52Gd<0.005Fe	B R B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B R R	12.7 7.7 7.3 9.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 6.3 9.0 6.3 0.01 2.0 4.0 6.0 10 3.7 3.7 3.7 3.7 3.7 6.5 6.5 6.5 6.8	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 25 d 24, 25 m 25, 120 h 25, 120 h 25, 120 h 25, 120 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 1 h 27, 3 d 27, 1 h 17, 7 d 17, 166 h 17, 166 h 17, 166 h 1, 180 h 1, 180 h	Рн Рн Рн Рн Рн Рн Ри Ри Рw Рw Рw Рw Pw Pw Pw Pw Pw Pw Pw Pw Pw Pw Pw Pw Pw P Pw Pw Pw Pw Pw Pw Paw Pw Paw Pw Paw Pw Paw Pw Paw Pw	34 34 0.8 48 4.8 4.8 4.8 3.2 0.33 3.2 0.50 0.45 0.33 0.20 0.045 0.50 0.042 0.042 0.042 0.042 0.042 0.042 0.040 0.042 0.05 0.044 0.045 0.042 0.05 0.44 0.05 0.4 0.33 3.4 0.70 0.38	60 60 60 60 60 60 60 60 60 61 61 62 63 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 65 65 66 67 68 68 69 69 69 70 70
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Zhang Johnston Johnston Chu Chu Chu Lu Chu Lu Chu Lu Zhang Zha	Mg9A10.5Mn Mg9A10.5Mn Mg9A10.5Ca Mg9A10.5Ca Mg9A10.5Ca Mg9A10.5Ca Mg9A10.5Ca Mg9A10.5Y Mg9A10.5Y Mg9A10.5Y Mg9A10.5Xn AZ31 AZ31 AZ31 AZ4 Mg6G40.5Zn0.4Zr, ac, sht 355 C for 12 h AZ61 Pure Mg AZ61 Pure Mg AZ31	II.7.A00.015FC.04240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.0010Fc0.0030Mn0.2SNd 8.7A10.0020Fe0.0030Mn0.2SNd 8.7A10.0021Fc0.0102Mn0.4SY 8.2A10.0027Fc0.0300Mn0.388n Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg3.74V2.10A04.45Zn 0.52Gd<0.005Fe Mg4.374V2.10Nd0.45Zr0.52Gd<0.005Fe Mg3.74Y2.10Nd0.45Zr0.52Gd<0.005Fe Mg3.74Y2.10Nd0.45Zr0.5	B R B B	12.7 7.7 7.3 9.0 8.6 3.9 6.9 6.3 0.01 2.0 4.0 6.9 6.3 0.01 3.7 3.7 3.7 3.7 6.5 6.5 6.8 6.8 6.8	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 27, 3 d 27, 1 h 17, 7 d 17, 7 d 17, 166 h 17, 166 h 1, 180 h 1, 180 h 6, 4 d	Рн Рн Рн Рн Рн Рн Ри Рн Рw Рw Pw Pw Pw Pw Pw Pw Pw Pw Pw Pi Pw Pw Paw Pw Pow Pw	34 34 0.8 48 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 3.8 6.3 0.33 3.2 0.45 0.50 0.33 0.20 0.020 4.0 0.042 0.020 4.0 0.020 0.5 0.3 0.4.6 2.0 0.5 0.3 0.70 0.38 4.9 0.38	60 60 60 60 60 60 60 60 60 60 61 62 62 62 63 64 64 64 64 64 64 65 65 65 65 65 69 69 70 70
2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Zhang Zakrishna Saikrishna Saikrishna Johnston Johnston Chu Chu Chu Liao Chu Liao Chu Liao Chu Zhang Zha	Mg9A10.5Mn Mg9A10.5Mn Mg9A10.5SA Mg9A10.5SA Mg9A10.5SA Ag9A10.5SA Mg9A10.5SA AZ31 AZ31 AZ31 AZ31 AZ31 AZ31 AZ4 Pare Mg AZ4 AZ50 Pare Mg AZ4 AZ50 Pare Mg AZ31 AZ50 Pare Mg AZ31 AZ51 Pare Mg AZ31 AZ51 Pare Mg AZ31 AZ31 AZ31 AZ31 AZ52 Pare Mg AZ31 AZ AZ AZ AZ AZ AZ AZ AZ AZ AZ	12.7A0.0157Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 8.7A10.0020Fc0.0033Mn0.25Nd 8.7A10.0020Fc0.0102Mn0.45Y 8.2A10.0077Fc0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg3.74Y2.10Nd0.45Zr0.52Gd<0.005Fe	B R B B	12.7 7.7 7.3 9.0 8.6 8.9 3.9 6.9 6.3 6.9 6.3 0.01 2.0 4.0 6.0 10 3.7 3.7 3.7 3.7 6.5 6.8 6.8 6.8 9.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 25 m 25, 120 h 25, 120 h 25, 120 h 25, 120 h 26, 504 26, 504 26, 504 26, 504 27, 1 h 27, 3 d 27, 1 h 17, 7 d 17, 166 h 1, 180 h 1, 180 h 6, 4 d	Рн Рн Рн Рн Рн Рн Рн Рн Рw Ри Рw Рw Pw Pw	34 34 0.8 4.8 4.8 7.6 38 6.3 3.2 0.45 0.50 0.45 0.50 0.33 0.20 0.048 0.026 0.0226 0.45 0.50 0.6 4.0 0.5 0.4 0.05 0.33 3.4 0.33 4.8 4.8	60 60 60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 65 65 65 66 67 68 68 69 69 70 70 71 71
2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Sakarisha Saikrishna Saikrishna Saikrishna Saikrishna Saikrishna Johnston Johnston Johnston Johnston Chu Chu Liao	Mg9A10.5Mn Mg9A10.5Mn Mg9A10.5Ca Mg9A10.5Ca Mg9A10.5Ca Ag9A10.5Sn AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac, sht S35 C for 12 h AZ61 Pure Mg AM20 AZ31 AZ61 Pure Mg AM20 AZ31 AZ31 AX60 AZ31 AZ31 AX60 AZ31, ca AZ31, fsp AZ31, fsp	Mg2.75Al0.015F0.4240Mn 7.0Al0.0110Fc0.4240Mn 7.0Al0.0110Fc0.4240Mn 7.0Al0.0110Fc0.4240Mn 7.0Al0.0110Fc0.4240Mn 8.7Al0.0020Fc0.0102Mn0.45Y 8.2Al0.0027Fc0.0300Mn0.388n Mg2.8Al0.98Zn0.11Mn0.002Fc Mg2.8Al0.98Zn0.11Mn0.002Fc Mg2.8Al0.98Zn0.11Mn0.002Fc Mg2.75Al0.91Zn0.001Fc Mg2.75Al0.91Zn0.045Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg3.74Y2.10Nd0.45Zr0.52Gd<0.005Fc	B R B B B B B B B B B B B B B B B B B B B B B B B B B B R R B B B B	12.7 7.7 7.3 9.0 8.0 8.0 8.0 8.0 8.0 9.9 6.9 6.3 3.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 0.01 2.0 4.0 10 3.7 3.7 3.7 3.7 3.7 8.9 0.9 0.09 0.09 6.5 6.5 6.8 8.9 0.9 0.9 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 17, 7 d 17, 7 d 17, 166 h 1, 180 h 6, 4 d 6, 9	Рн Рн Рн Рн Рн Рн Ри Рн Рw Рw Pw Pw Patt Patt	34 34 0.8 4.8 4.8 4.8 4.8 3.2 0.45 0.50 0.33 0.20 0.050 0.045 0.042 0.020 0.05 0.33 0.05 0.33 0.70 0.33 0.70 0.38 4.8 2.9	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 64 64 65 65 65 66 67 68 69 69 69 70 70 71 71
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Zhang Baek Esmaily Esmai	Mg9Al0.5Mn Mg9Al0.5Nn Mg9Al0.5Ca Mg9Al0.5Ca Mg9Al0.5Ca Mg9Al0.5Sc Az31 Az31 Az31 Az31 Az31 Az31 Ag6Gd0.5Zn0.4Zr, ac, sht 535 C for 12 h Az61 Pure Mg AZ0 AZ1 AM60 Az31, e Az31, e Az30, e (f) Az80, forged	12.740.0157/code3041 12.7A10.01107c0.4240Mn 7.0A10.01107c0.4240Mn 7.0A10.01107c0.4240Mn 7.0A10.01107c0.030Mn0.25Nd 8.7A10.00207fc0.0330Mn0.31Ca 7.4A10.0071Fc0.0300Mn0.31Ca 7.4A10.0071Fc0.0300Mn0.31Ca 7.4A10.0071Fc0.0300Mn0.31Ca 7.4A10.0071Fc0.0300Mn0.31Ca Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg3.745Ca Mg0.45Zn0.45Ca Mg0.05Fe Mg3.74Y2.10A06.45Zr0.52Gd<0.005Fe	B R B B B B B B B B B B B B B B B B B B B B B B B B B B R R B B B B	12.7 7.7 7.3 9.0 8.0 8.0 8.0 8.0 8.0 8.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9	23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 27, 3 d 27, 1 d 17, 7 d 17, 7 d 17, 166 h 1, 180 h 1, 180 h 6, 4 d 6, ? 6, ? 4, 3 d 2, 504 2, 504 2, 7, 3 d 2, 7, 1 h 2, 10 h 1, 16 h 1, 16 h 1, 180 h 6, 4 d 6, 2 2, 2 1, 10 h 2, 2, 10 h 2, 2, 10 h 2, 10 h 1,	Рн Рн Рн Рн Рн Рн Рн Рн Рw Рi Рw Рw Pw Pw Pw Pw Pw Pw Pw Pi Pw Pw Pw Pw Pw Pw Pw Pw Pw Pw PAH Pw	34 34 0.8 4.8 4.8 7.6 38 6.3 0.45 0.45 0.45 0.50 0.33 0.20 0.048 0.042 0.020 0.06 4.6 2.0 0.5 0.3 0.70 0.38 4.8 2.9 0.70 0.38	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 65 65 65 66 67 68 69 69 69 70 71 71 71
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Sahara Esmaily Saikrishna Saikrishna Saikrishna Saikrishna Saikrishna Chu Chu Chu Liao Liao	MgyAi SMn MgyAi0.5Mn MgyAi0.5Sn MgyAi0.5Sn AZ31 AZ31 AZ31 MgGd0.5Zn0.4Zr, ac MgGd0.5Zn0.4Zr, ac MgGd0.5Zn0.4Zr, ac MgGd0.5Zn0.4Zr, ac MgGd0.5Zn0.4Zr, ac MgGd0.5Zn0.4Zr, ac MgGd0.5Zn0.4Zr, ac MgGd0.5Zn0.4Zr, ac MagGd0.5Zn0.4Zr, ac MgG0.7Zn1 AZ31 AZ31 AZ31 AZ31 AZ31 AZ31 AZ31 AZ3	12.7A0.015FC.04240Mn 7.3A10.0110Fc0.4240Mn 7.3A10.0110Fc0.4240Mn 7.3A10.0110Fc0.4240Mn 7.A10.0021Fc0.0102Mn0.45V 8.7A10.0021Fc0.0102Mn0.45Y 8.2A10.0077Fc0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.04G4.531.29Nd0.49Zr Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg3.74V2.10Nd0.45Zr0.52Gd<0.005Fe	B R B B B B B B B B B B B B B B B B B B B B B B B B B B B R R B B B	12.7 7.7 7.3 9.0 8.0 8.0 8.0 8.0 8.0 9.9 6.9 6.3 9.0 9.0 9.0 9.0 9.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 1 h 17, 7 d 17, 7 d 17, 166 h 1, 180 h 1, 180 h 6, 4 d 6, ? 6, 4 d	$\begin{array}{c} P_{H} \\ P_{W} \\$	34	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 64 64 65 65 65 66 67 70 70 70 71 71 71
2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Sakarisha Saikrishna Saikrishna Saikrishna Saikrishna Saikrishna Saikrishna Saikrishna Chu Johnston Johnston Johnston Chu Chu Liao Liao	Mg9A10.5Mn Mg9A10.5Mn Mg9A10.5Ca Mg9A10.5Ca Mg9A10.5Ca Mg9A10.5Ca Mg9A10.5Sn AZ31 AZ31 AZ31 AZ31 AZ31 AZ31 AZ4 AM20 AZ4 AZ4 AZ4 AM20 AZ41 AM400 AZ21 AZ2	12.740.0157Fc04240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 8.7A10.0020Fc0.0235Mn0.31Ca 7.4A10.0071Fc0.0102Mn0.45Y 8.2A10.0077Fc0.0300Mn0.388n Mg2.8A10.98Zn0.11Mn0.002Fe Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.8A410.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg3.74V2.045Ca Mg0.045Zn0.45Ca Mg0.007Fe Mg3.74Y2.10AC0.05Fe Mg3.74Y2.10AC0.45Zr0.52Gd<0.005Fe	B R B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B R R R B R R	12.7 7.7 7.3 9.0 8.6 3.9 6.3 3.9 6.3 9.0 6.3 0.01 2.0 4.0 6.0 10 2.0 4.0 6.0 10 3.7 3.7 3.7 3.7 3.7 3.7 3.7 6.5 6.8 6.8 9.0 9.0 9.0 9.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 27, 3 d 27, 1 h 17, 7 d 17, 7 d 17, 166 h 1, 180 h 1, 180 h 6, 4 d 6, 2 6, 4 d	$\begin{array}{c} P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{W}\\ P_{H}\\ P_{W}\\ P_$	34 34 0.8 0.8 48 7.6 38 6.3 3.2 0.45 0.33 0.20 0.0042 0.0042 0.042 0.0042 0.6 4.0 0.5 0.3 0.40 0.5 0.33 3.4 4.8 2.9 0.9 9.9	60 60 60 60 60 60 60 61 61 62 63 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 65 65 66 68 69 69 70 70 71 71
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jaya Jayaraj Jaya Jaya Jayaraj Jaya Jaya Jaya Jaya Jayaj	MgyAlo,Shn MgyAlo,Shn MgyAlo,Shn MgyAlo,Shn MgyAlo,Shn MgyAlo,Shn Az31 Az32 Az	12.740.0157/code3041 12.73410.01107e0.4240Mn 7.03410.01107e0.4240Mn 7.03410.01107e0.4240Mn 8.7A10.0020Fe0.0033Mn0.25Nd 8.7A10.0020Fe0.0102Mn0.45Y 8.2A10.0077Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.53A10.67Zn0.29Mn0.0021Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg3.74Y2.10Nd0.45Zr0.52Gd<0.005Fe	B R B B B B B B B B B B B B G G G G G G G G G B B B B B B B R R B R	12.7 7.7 7.3 9.0 8.0 8.0 8.0 8.0 8.0 8.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9	23, 3 d 23, 3 d 24, 25 m 25, 120 h 25, 120 h 25, 120 h 25, 120 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 1 h 27, 3 d 27, 1 h 17, 7 d 17, 166 h 17, 166 h 1, 180 h 6, 2 h 6, 2 h 1, 180 h	Рн Рн Рн Рн Рн Рн Рн Рн Ри Ри Ри Ри Ри Ри Ри Ри Ри Ри	34	60 60 60 60 60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 65 65 65 66 67 68 69 69 69 70 70 71 71 71 71
2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj	Mg9A10.5Mn Mg9A10.5Nn Mg9A10.5Ca Mg9A10.5Ca Mg9A10.5Ca Ag9A10.5Ca Mg9A10.5Sn AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac, sht S35 C for 12 h AZ61 Pure Mg AZ61 Pure Mg AZ1 AX60 AZ31, ca AZ31, ca AZ30, c	12.7A0.015FC.04240Mn 7.0A10.0110Fc0.0230Mn0.25Nd 8.7A10.0020Fc0.0030Mn0.25Nd 8.7A10.0020Fc0.0030Mn0.25Nd 8.7A10.0021Fc0.0102Mn0.45Y 8.2A10.0077Fc0.0300Mn0.38sn Mg2.8A10.98Zn0.11Mn0.002Fc Mg2.8A10.98Zn0.11Mn0.002Fc Mg2.8A10.98Zn0.11Mn0.002Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.005Fe Mg3.140.64Zn0.45Ca Mg0.007Fe Mg3.74Y2.10Nd0.45Zr0.52Gd<	B R B B B B B B B B B B B B B B B B B B B B B B B B B B B R R R B B B B	12.7 7.7 7.3 9.0 8.0 8.0 8.0 8.0 8.0 8.0 9.0 9.0 9.0 9.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 17, 7 d 17, 7 d 17, 7 d 17, 166 h 17, 166 h 1, 180 h 1, 180 h 1, 180 h 6, 4 d 6, ?	$\begin{array}{c} P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{H}\\ P_{W}\\ P_$	34	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 64 64 64 65 66 67 68 68 69 69 69 70 70 71 71 71 71
2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Zhang Baek Esmaily Esmai	Mg9A10.5Mn Mg9A10.5Sn Mg9A10.5Sn Mg9A10.5Sn Ag9A10.5Sn AZ31 AZ31 Mg6G10.5Zn0.4Zr, ac Mg6G10.5Zn0.4Zr, ac, sht S35 C for 12 h AZ61 Pure Mg AZ0 AZ1 AM60 AZ31, e AZ31, g AZ31, g AZ31, g AZ31, g AZ31, g AZ31, g AZ31, g AZ31, g AZ31, c AZ31, c AZ30, c	12.7A0.0110Fe0.4240Mn 7.0A10.0190Fe0.0233Mn0.2SNd 8.7A10.002016Fe0.0233Mn0.3ICa 7.4A10.0071Fe0.030Mn0.3ICa 7.4A10.0071Fe0.0300Mn0.3ICa 7.4A10.0071Fe0.0300Mn0.03Fe Mg2.8A10.98Zn0.11Mn0.002Fe Mg2.8A10.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg3.74X1.03Zn0.001Fe Mg3.74Y2.10Nd0.45Zr0 Mg0.07Fe Mg3.74Y2.10Nd0.45Zr0.52Gd<0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe	B R B B B B B B B B B B B B B B B B B B B B B B B B B B B R R B B B B B	12.7 7.7 7.3 9.0 8.6 3.9 6.3 6.3 6.9 6.3 6.9 6.3 0.01 2.0 4.0 6.0 10 3.7 3.7 3.7 3.7 6.5 6.8 6.8 9.0 9.0 9.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 25 m 25, 120 h 25, 120 h 25, 120 h 25, 120 h 26, 504 26, 504 26, 504 26, 504 26, 504 27, 1 h 17, 7 d 17, 166 h 17, 166 h 1, 180 h 1, 180 h 1, 180 h 2, 180 h 1, 180 h 3,	$\begin{array}{c} P_{H} \\ P_{W} \\ P_{H} \\ P_{W} \\ P_{H} \\$	34	60 60 60 60 60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 65 65 66 67 68 69 69 70 70 71 71 71 71
2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Mingo Jayaraj Jahaston Johnston Johnston Johnston Liao Liao Liao Liao Liao Liao Liao Liao	Mg9A10.5Mn Mg9A10.5Mn Mg9A10.5SA Mg9A10.5SA Mg9A10.5SA AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac, sht 335 C for 12 h AZ61 Pure Mg AM20 AZ31 AZ61 Pure Mg AM20 AZ31, ac AZ31, ac AZ31	12.7A0.015FC04240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.0110Fc0.4240Mn 7.0A10.001Fc0.0030Mn0.25Nd 8.7A10.0020Fc0.0102Mn0.45Y 8.2A10.0020Fc0.0102Mn0.45Y 8.2A10.007Fc0.0300Mn0.388n Mg2.84A10.98Zn0.11Mn0.002Fc Mg2.84A10.98Zn0.11Mn0.002Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fc Mg2.045Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg3.74Y2.10Nd0.45Zr0.52Gd<0.005Fc	B R B B B B B B B1 B B1 B B G G G G G G G G G B B B B B B B R R R B B B B	12.7 7.7 7.3 9.0 8.0 8.0 8.0 8.0 8.0 9.9 6.9 6.3 3.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 25 m 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 17, 7 d 17, 7 d 17, 166 h 17, 166 h 1, 180 h 6, 9 6, 4 d 6, ? 6, 4 d 6, 8, 2 6, 4 d 6, 8,	Рн Рн Рн Рн Рн Рн Ри Ри Рw Рw Рw Рw Рw Рw Рw Рw Рw Рw	34	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 64 64 65 65 65 66 67 70 70 70 71 71 71
2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Zhang Esmaily Esma	Mg9A10.5Mn Mg9A10.5Mn Mg9A10.5SA Mg9A10.5SA Mg9A10.5SA AZ31 AZ31 AZ31 AZ31 Mg6Gd0.5Zn0.4Zr, ac, sht 535 C for 12 h AZ61 Pure Mg AM20 AZ61 Pure Mg AM20 AZ31, e AZ31, fsp AZ31, fsp AZ41, fsp AZ4	12.7A0.0110Fe0.4240Mn 7.0A10.0190Fe0.0233Mn0.2SNd 8.7A10.0203Fe0.0235Mn0.31Ca 7.4A10.0071Fe0.0102Mn0.4SY 8.2A10.0098Zn0.11Mn0.002Fe Mg2.8A10.98Zn0.11Mn0.002Fe Mg2.8A10.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg3.74A10.45Ca Mg0.45Zn0.45Ca Mg0.45Zn0.45Ca Mg0.05Fe Mg4.39Zn1.06Ce0.006Fe0.13Y0.48La0.13 Pr0.1Nd Mg3.74Y2.10Nd0.45Zr0.52Gd<0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe Mg3.3A10.46Zn0.22Mn<0.1Si0.005Fe	B R B R R B	12.7 7.7 7.3 9.0 8.0 8.0 8.0 8.0 8.0 8.0 9.0 9.0 9.0 9.0 9.0 9.0	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 27, 3 d 27, 1 h 27, 3 d 27, 1 h 17, 166 h 1, 180 h	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\$	34 0.8 48 7.6 38 6.3 3.2 0.45 0.33 0.20 0.33 0.020 0.042 0.020 0.042 0.020 0.04 0.020 0.04 0.020 0.04 0.020 0.042 0.05 0.33 0.5 0.33 4.0 0.5 0.33 0.70 0.38 4.8 2.9 0.9 0.6 1 to 3	60 60 60 60 60 60 60 61 61 62 63 64 64 64 64 64 64 64 64 65 65 65 66 67 70 70 71 71 71 71 72 72
2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Mingo Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Jayaraj Sakara Sakara Sakarishna Saikrishna Saikrishna Saikrishna Saikrishna Saikrishna Saikrishna Saikrishna Saikrishna Chu Johnston Joh	MgyAi MgyAiO.Shn MgyAiO.Shn MgyAiO.Shn MgyAiO.Shn AgyAiO.Shn Az31 Az31 MgGd0.SnO.4Zr, ac MgGd0.SnO.4Zr, ac MgGd0.SnO.4Zr, ac MgGd0.SnO.4Zr, ac MgGd0.SnO.4Zr, ac MgGd0.SnO.4Zr, ac MgGd0.SnO.4Zr, ac MgGd0.SnO.4Zr, ac MgGd0.SnO.4Zr, ac MgGd0.SnO.4Zr, ac MgG0.Az Az31 Az31 Az31 Az31 Az31 e Az31, e Az31, e	12.7A0.0110Fe0.4240Mn 7.0A10.0190Fe0.0233Mn0.25Nd 8.7A10.0020Fe0.0033Mn0.25Nd 8.7A10.0020Fe0.0102Mn0.45Y 8.2A10.0027Fe0.0300Mn0.38Sn Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.84A10.98Zn0.11Mn0.002Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fe Mg3.74V2.10Nd0.45Zr0.52Gd<0.005Fe Mg3.74V2.10Nd0.45Zr0.52Gd<0.005Fe Mg3.74V2.10Nd0.45Zr0.52Gd<0.005Fe Mg3.74V2.10Nd0.45Zr0.52Gd<0.005Fe Mg3.74V2.10Nd0.45Zr0.52Gd<0.005Fe Mg3.74V2.10Nd0.45Zr0.52Gd<0.005Fe Mg3.74V2.10Nd0.45Zr0.52Gd<0.005Fe Mg3.74V2.10Nd0.45Zr0.52Gd<0.005Fe Mg3.74V2.10Nd0.45Zr0.52Gd<0.005Fe Mg3.74U.46Zn0.22Mn<0.1Si0.005Fe Mg3.74U.46Zn0.22Mn<0.1Si0.005Fe Mg3.74U.46Zn0.22Mn<0.1Si0.005Fe Mg3.74U.46Zn0.22Mn<0.1Si0.005Fe Mg3.74U.46Zn0.22Mn<0.1Si0.005Fe Mg3.74U.46Zn0.22Mn<0.1Si0.005Fe Mg3.74U.46Zn0.22Mn<0.1Si0.005Fe Mg3.74U.46Zn0.22Mn<0.1Si0.005Fe Mg3.74U.46Zn0.22Mn<0.1Si0.005Fe Mg3.74U.46Zn0.22Mn<0.1Si0.005Fe Mg15 ppmFe16 ppmSi180 ppmMn Mg18 ppmFe35ppmSi176 ppmMn	B R B B B B B B B1 B B1 B B G G G G G G G B B B B B B B R R B B B	12.7 7.7 7.3 9.0 9.0 8.0 8.0 8.0 8.0 8.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 26, 504 27, 1 h 17, 7 d 17, 7 d 17, 166 h 1, 180 h 1, 180 h 6, 4 d 6, ? 6, 48 h 6, 48 h	$\begin{array}{c} P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{H} \\ P_{W} \\ P_{H} \\ P_{W} \\$	34 0.8 48 4.8 7.6 38 6.3 3.2 0.45 0.30 0.45 0.33 0.20 0.045 0.020 0.046 0.020 0.04 0.05 0.3 0.4 0.5 0.3 3.4 2.9 0.6 1 to 3 5.5 to	60 60 60 60 60 60 60 60 61 61 62 62 63 64 64 64 64 64 64 64 64 65 65 65 66 67 70 70 70 71 71 71 71 72
2017 2017 2017 2017 2017 2017 2016 2016 2016 2016 2016 2016 2016 2016	Mingo Mingo Mingo Mingo Mingo Jayaraj Jahaston Johnston Johnston Johnston Johnston Jahas	Mg9A10.5Mn Mg9A10.5Mn Mg9A10.5SA Mg9A10.5SCa Mg9A10.5SCa Ag9A10.5SCa Mg9A10.5SCa AZ31 AZ31 AZ31 AZ31 AZ31 AZ4 AZ4 AZ4 AZ4 AZ4 AZ4 AZ4 AZ4	12.7A0.015FC.04240Mn 7.0A10.0110Fc0.0230Mn0.25Nd 8.7A10.0020Fc0.0030Mn0.25Nd 8.7A10.0020Fc0.0030Mn0.25Nd 8.7A10.0021Fc0.0102Mn0.45Y 8.2A10.007Fc0.0300Mn0.38sn Mg2.8A10.98Zn0.11Mn0.002Fc Mg2.8A10.98Zn0.11Mn0.002Fc Mg2.8A10.98Zn0.11Mn0.002Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fe Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fc Mg2.75A10.91Zn0.001Fc Mg3.74V2.10A0C0.006Fc0.13Y0.48La0.13 Pro1 Nd Mg3.74Y2.10Nd0.45Zr0.52Gd<0.005Fc	B R B B	12.7 7.7 7.3 9.0 8.0 8.0 8.0 8.0 8.0 8.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9	23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 23, 3 d 24, 5 d 24, 5 d 24, 5 d 25, 120 h 5, 72 h 26, 504 26, 504 26, 504 26, 504 27, 3 d 27, 1 h 27, 3 d 27, 1 h 17, 7 d 17, 7 d 17, 7 d 17, 166 h 17, 166 h 1, 180 h 1, 180 h 1, 180 h 1, 180 h 1, 180 h 6, 4 d 6, ? 6, 48 h 6, 48 h	$\begin{array}{c} P_{H} \\ P_{W} \\$	34	60 60 60 60 60 60 60 61 61 62 63 64 64 64 64 64 64 64 64 65 66 65 66 66 70 70 70 70 71 71 71 72

(continued on next page)

has a chloride concentration similar to that of Hanks' solution); and Shi and Atrens [96] measured $P_W = 0.4 \text{ mm/y}$ for immersion in 3.5 wt% NaCl saturated with Mg(OH)₂ for 3 to 20 days. Taltavull et al. [77] showed that the high-purity Mg corrosion rate is nearly independent of chloride concentration, provided that there is no micro-galvanic corrosion.

In this context it is worth repeating that the high-purity Mg that shows the intrinsic corrosion rate in chloride solutions as measured by weight loss of 0.3 mm/y contains no second phase particles and is typically in ingot form. Heat treatment of ingot Mg can cause precipitation of Fe-rich particles and much higher corrosion rates [98]. Heat treatments

2015	Yang	Pure Mg	Mg25 ppmFe123 ppmSi216ppm Mn	В	0.04	6, 48 h	$P_{\rm W}$	87 to	72
2015	Gaon	AZ91D diecast	Mg9 0410 687p0 24Mp	R	9.9	28 14-18 d	P_W	0.21	73
2015	Gaon	MRI 153M diecast	Mg8.0A11.0Ca0.28Sr	R	9.4	28, 14-18 d	Pw	0.73	73
2015	Gaon	MRI 2018 diecast	Mg3.06Nd2.00Y0.41Zr	B	5.5	28, 14-18 d	Pw	1.46	73
2015	Vim	Mg-5Sn-1Zn (TZ51) e	Mg4 56Sn1 06Zn0 0021Si0 0010Fe	B	5.6	6.3.d	Pw	3.2	74
2015	Vim	Mg-5Sn-3Zn (TZ53) e	Mg4 69Sn3 15Zn0 0021Si0 0017Fe	B	7.8	6.3.d	Pw	4.0	74
2015	Choi	ZK60 e sht rolled	Mg5 23Zn0 53Zr0 019Mn<0 0002Fe	B	5.8	12.1.d	P _W	2.5	75
2015	Choi	ZK60, e, sht, rolled	Mg5.23Zn0.53Zr0.019Mn<0.0002Fe	B	5.8	12, 1 d	D _w	2.5	75
2015	Chor	annealed 1 h	Wig5.25210.55210.019Wil1~0.00021 C	Б	5.0	12,10	1 W	1.1	15
2015	Saha	Pure Ma	nd	B	0.03	12 16 d	Due	62	76
2015	Saha	Pure Mg	ud	D	0.03	12, 10 u	F W D.	1.6	76
2015	Saha	Ma0 257r	ud	D	0.03	12, 5 m	Г 1 D	1.0	76
2015	Saha	Mg0.25Zr Mg0.25Zr	ud	D	0.25	12, 10 u	T W	0.2	76
2015	Saha	Mg0.2321 Mg1.07r	ud	D	1.0	12, 5 m	D ₁	1.6	76
2015	Salia	Mg1.0Zr	ud	D	1.0	12, 10 0	FW D	1.0	76
2015	Salia	Nig1.0Zi		D	1.0	12, 3 11	Г1 Р	10	/0
2015	Wu	Pure Mg	ua	B	0.04	4, 24 n	PW	10	11
2015	Wu	Pure Mg	ud	B	0.04	4, ud	Pi	4.6	11
2015	wu	Mg11L13AI0.2Zr0.6Y,	Mg10.95L13.29A10.19Zr0.59Y	K	15	4, 24 n	P_{W}	0.8	11
2015	Wu	Mg11Li3Al0.2Zr0.6Y,	Mg10.95Li3.29Al0.19Zr0.59Y	В	15	4, ud	Pi	0.2	11
2014	Tatavull	Pure Mg	Mg0 02Zn0 02Mn0 007Ee	B	0.05	17 7 d	P_{W}	1.6	77
2014	Tatavull	Pure Mg	Mg0 02Zn0 02Mn0 007Fe	B	0.05	29.7.4	Pw Pw	1.0	77
2014	Tatavull	Pure Mg	Ma0.02Zn0.02Mn0.007Fe	B	0.05	22, 7 u 30, 7 d	I W Pw	1.0	77
2014	1 atavull Totour:11	T UIC Mg	Mg0.02210.021010.00/FC	D	0.05	17.7.4	1 W	1.0	77
2014	r atavull Totowill	ZE41 ZE41	Mg4.7Zn0.4RE0.000F8	B	5.1	20.7.4	<i>P</i> W	2.0	11
2014	ratavull Tatav-11	ZE41	Mg4.7Za0.4RE0.000FC	B	5.1	29,70	F W	4.0	//
2014	1 atavull	A 701	NIG4.7200.4KE0.000F6	B	3.1	30, / d	PW	11	//
2014	1 atavull	AZ91	IVIG8.2A10.6Zn0.2Mn0.005Fe	B	8.8	17,7 d	PW	5.5	//
2014	1 atavull	AZ91	Mg8.2A10.6Zn0.2Mn0.005Fe	B	8.8	29,7 d	P_W	9.7	77
2014	Tatavull	AZ91	Mg8.2Al0.6Zn0.2Mn0.005Fe	B	8.8	30, 7 d	P_W	12	77
2014	Ha	Mg2Sn (12)	Mg1.96Sn	B	2.0	5, 72 h	P_W	2.5	78
2014	Ha	Mg4Sn (T4)	Mg4.10Sn	В	4.1	5, 72 h	P_{W}	6.0	78
2014	Ha	Mg6Sn (T6)	Mg6.20Sn	В	6.2	5, 72 h	P_{W}	12	78
2014	На	Mg8Sn (T8)	Mg8.05Sn	B	8.1	5, 72 h	P_{W}	17	78
2014	Ha	Mg5Sn1Zn (TZ51)	Mg4.56Sn1.06Sn	В	5.6	5, 25 d	P_{W}	1.9	79
2014	На	Mg5Sn2Zn (TZ52)	Mg4.43Sn1.95Sn	R	6.4	5, 25 d	P_{W}	0.8	79
2014	На	Mg5Sn3Zn (TZ53)	Mg4.69Sn3.15Sn	В	7.9	5, 25 d	P_{W}	1.7	79
2014	На	Mg5Sn4Zn (TZ54)	Mg4.59Sn96Sn	В	8.6	5, 25 d	P_{W}	2.9	79
2014	Zhang	Mg5Gd1Zn0.6Zr	Mg4.88Gd0.82Zn0.45Zr	Bl	6.2	25, 5 d	P_{W}	0.8	80
	_	(GZ51K), cast	-				1		
2014	Zhang	Mg5Gd1Zn0.6Zr (GZ51K), T6	Mg4.88Gd0.82Zn0.45Zr	В	6.2	25, 5 d	P_{W}	1.9	80
2014	Wang	AZ31, static	Undisclosed (ud)	В	4	31, 7 d	P_{g}	0.4	81
2014	Wang	AZ31, dynamic, FISS =	Ud	В	4	31, 7 d	P_{g}	1.2	81
	-	0.05 Pa					-		
2014	Schulter	HP Mg		Р	0.01	1, 7 d	P_{W}	0.66	82
2014	Schulter	Mg5.7Y, SP		R	5.7	1, 2 d	P_{W}	0.35	82
2014	Schulter	Mg-10.8Y, SP		R	10.8	1, 2 d	P_W	0.52	82
2014	Schulter	Mg-19.6Y, SP		R	19.6	1, 2 d	P_{W}	0.85	82
2014	Schulter	Mg-51.3Y, SP		R	51.3	1.2 d	Pw	0.53	82
2014	Schulter	Mg-4.7Gd, SP		R	4.7	1.2 d	Pw	0.79	82
2014	Schulter	Mg-9.0Gd, SP		R	9.0	1.2 d	Pw	0.78	82
2014	Schulter	Mg-19.4Gd, SP		R	19.4	1.2 d	Pw	0.40	82
2013	Zainal	HP Mg. cast	Mg0 007Ee	Bl	0.007	17. 7-14 d	Pw	0.9	83
	Abidin				01007			015	00
2013	Zainal	HP Mg, cast	Mg0.007Fe	В	0.007	32, 60 d	P_{W}	0.7	83
	Abidin	-	-						
2013	Zainal Abidin	WZ21, fge	Mg1.65Y-0.85Zn0.00451Fe	Bl	2.5	17, 7 - 14 d	P_{W}	1.0	83
2013	Zainal	WZ21, fge	Mg1.65Y0.85Zn0.00451Fe	В	2.5	32, 60 d	$P_{\rm W}$	1.0	83
2012	Abidin Zainal	4.701 anat	M-9 15 410 647-0 00465	P	0.0	17 7 14 1	D		07
2013	Abidin	rxz.91, cast	wigo.15A10.04210.0040Fe	в	0.8	17, 7-14 d	ΓW	v	60
2013	Zainal	4701 cast	Mg8 15A10 647n0 0046Ee	D	0.0	22 (0.1	P	0.7	83
2013	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		CONTRACT A 125 DI LINE 2 COLLING DE COLLECT			57 60 4	p	U./	00
1	Abidin	rizon, cast	ingonormolo installo o ror e	D	0.0	32, 60 d	P_{W}		
2013	Abidin	HP Mg_cast	mgo.ioi noi naioi o toi e	p	0.0	32, 60 d	P_W	0.7	16
2013	Abidin Shi	HP Mg, cast	Mr3 10410 817n0 30Mr0 02500 0047	P C	0.002	32, 60 d	Pw Pw P	0.7	16
2013 2013 2013	Abidin Shi Cui Kim	HP Mg, cast AZ31 sheet	Mg3.19Al0.81Zn0.30Mn0.025Si0.006Fe	P G P	0.002 4.3	1, 7 d 33, 2 y 4 168 b	P_W P_W P_W	0.7	16 84 85
2013 2013 2013 2013	Abidin Shi Cui Kim	HP Mg, cast AZ31 sheet AZ61 ars	Mg3.19Al0.81Zn0.30Mn0.025Si0.006Fe	P G R	0.002 4.3 7	1, 7 d 33, 2 y 4 168 h	P_W P_W P_W P_W	0.7 0.013 0.8	16 84 85
2013 2013 2013 2013 2013	Abidin Shi Cui Kim Kim	HP Mg, cast AZ31 sheet AZ61 ars AZ61 dr, gs = 0.002 mm AZ61 rollad $\pm 320 \text{ C}$	Mg3.19Al0.81Zn0.30Mn0.025Si0.006Fe	P G R R	0.002 4.3 7 7 7	1, 7 d 33, 2 y 4 168 h 4, 168 h	P_W P_W P_W P_W P_W P_W	0.7 0.013 0.8 0.5	16 84 85 85
2013 2013 2013 2013 2013 2013	Abidin Shi Cui Kim Kim Kim	HP Mg, cast AZ31 sheet AZ61 ars AZ61 dr, $gs = 0.002 \text{ mm}$ AZ61 rolled + 320 C anneal	Mg3.19Al0.81Zn0.30Mn0.025Si0.006Fe	P G R R R	0.002 4.3 7 7 7 7	1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h	P_W P_W P_W P_W P_W	0.7 0.013 0.8 0.5 0.4	16 84 85 85 85
2013 2013 2013 2013 2013 2013	Abidin Shi Cui Kim Kim Kim	HP Mg, cast AZ31 sheet AZ61 ars AZ61 dr, gs = 0.002 mm AZ61 rolled + 320 C anneal AZ31 ars as as = 0.020 mm	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe	P G R R R	0.002 4.3 7 7 7	1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h	P_W P_W P_W P_W P_W P_W	0.7 0.013 0.8 0.5 0.4	16 84 85 85 85
2013 2013 2013 2013 2013 2013 2013 2013	Abidin Shi Cui Kim Kim Kim	HP Mg, cast HP Mg, cast AZ31 sheet AZ51 ars AZ61 ars AZ61 dr, gs = 0.002 mm AZ61 rolled + 320 C anneal AZ31 dr, gs = 0.020 mm AZ31 dr, gs = 0.020 mm	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe	P G R R R B	0.002 4.3 7 7 7 4	1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h	P_W P_W P_W P_W P_W P_W P_W	0.7 0.013 0.8 0.5 0.4 3.8	16 84 85 85 85 85 86
2013 2013 2013 2013 2013 2013 2013 2013	Abidin Shi Cui Kim Kim Kim Kim	HP Mg, cast AZ31 sheet AZ61 ars = 0.002 mm AZ61 or, gs = 0.002 mm AZ61 rolled + 320 C anneal AZ31, ars, gs = 0.020 mm AZ31, dsr + WQ, gs = 0.0006 mp	Mg3.19Al0.81Zn0.30Mn0.025Si0.006Fe	P G R R B Bl	0.002 4.3 7 7 7 7 4 4	32, 60 d 1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h 8, 144 h	P_W P_W P_W P_W P_W P_W P_W	0.7 0.013 0.8 0.5 0.4 3.8 0.25	16 84 85 85 85 85 85 86 86
2013 2013 2013 2013 2013 2013 2013 2013	Abidin Shi Cui Kim Kim Kim Kim	HP Mg, cast AZ31 sheet AZ61 ars AZ61 ars AZ61 rolled + 320 C anneal AZ31, ars, gs = 0.020 mm AZ31, dsr + WQ, gs = 0.0006 mm	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe	P G R R B Bl	0.002 4.3 7 7 7 7 4 4	32, 60 d 1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h 8, 144 h	P_W P_W P_W P_W P_W P_W P_W P_W	0.7 0.013 0.8 0.5 0.4 3.8 0.25	16 84 85 85 85 86 86 86
2013 2013 2013 2013 2013 2013 2013 2013	Abidin Shi Cui Kim Kim Kim Kim Liao	HP Mg, cast AZ31 sheet AZ61 ars AZ61 ars AZ61 dr, gs = 0.002 mm AZ61 rolled + 320 C anneal AZ31, dsr + WQ, gs = 0.0006 mm AZ31B UUD M-	Mg3.19A10.05Zn0.39Mn0.003Fe	P G R R B Bl G G	0.002 4.3 7 7 7 4 4 4 4 0.002	32, 60 d 1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h 8, 144 h 34, 1 y	P_W P_W P_W P_W P_W P_W P_W P_W P_W P_W	0.7 0.013 0.8 0.5 0.4 3.8 0.25 0.03	16 84 85 85 85 85 86 86 86 87
2013 2013 2013 2013 2013 2013 2013 2013	Abidin Shi Cui Kim Kim Kim Kim Liao Cao	HP Mg, cast AZ31 sheet AZ61 ars AZ61 ars AZ61 rolled + 320 C anneal AZ31, dsr, gs = 0.020 mm AZ31, dsr + WQ, gs = 0.0006 mm AZ31B UHP-Mg	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe Mg3.19A11.05Zn0.39Mn0.003Fe ppm: 28A1, 48Zn, 1.3Mn, 1.6Fe, 0.34Cu,	P G R R R B Bl G P	0.002 4.3 7 7 7 7 4 4 4 4 0.008	32, 60 d 1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h 8, 144 h 34, 1 y 1, 14 d	$\begin{array}{c} P_{W} \\ \hline \end{array}$	0.7 0.013 0.8 0.5 0.4 3.8 0.25 0.03 0.25	16 84 85 85 85 86 86 87 8
2013 2013 2013 2013 2013 2013 2013 2013	Abidin Shi Cui Kim Kim Kim Kim Liao Cao	HP Mg, cast AZ31 sheet AZ61 ars AZ61 ars = 0.002 mm AZ61 rolled + 320 C anneal AZ31, dsr + WQ, gs = 0.0006 mm AZ31, dsr + WQ, gs = 0.0006 mm	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe Mg3.19A11.05Zn0.39Mn0.003Fe ppm: 28A1, 48Zn, 1.3Mn, 1.6Fe, 0.34Cu, 1.4Si	P G R R B Bl G P	0.002 4.3 7 7 7 7 4 4 4 4 0.008	32, 60 d 1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h 8, 144 h 34, 1 y 1, 14 d	P_W P_W P_W P_W P_W P_W P_W P_W P_W P_W	0.7 0.013 0.8 0.5 0.4 3.8 0.25 0.03 0.25	16 84 85 85 85 86 86 87 8
2013 2013 2013 2013 2013 2013 2013 2013	Abidim Shi Cui Kim Kim Kim Kim Liao Cao	HP Mg, cast AZ31 sheet AZ61 ars AZ61 ars AZ61 ars AZ61 rolled + 320 C anneal AZ31, ars, gs = 0.020 mm AZ31, dsr + WQ, gs = 0.0006 mm AZ31B UHP-Mg HP Mg	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe Mg3.19A11.05Zn0.39Mn0.003Fe ppm: 28A1, 48Zn, 1.3Mn, 1.6Fe, 0.34Cu, 1.4Si ppm: 1 Fe, 20Si, 8 Mn	P G R R B Bl G P	0.002 4.3 7 7 7 4 4 4 4 0.008 0.007	32, 60 d 1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h 8, 144 h 34, 1 y 1, 14 d 1, 7 d	P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W}	0.7 0.013 0.8 0.5 0.4 3.8 0.25 0.03 0.25 0.62	16 84 85 85 85 86 86 86 87 8 8
2013 2013 2013 2013 2013 2013 2013 2013	Abidin Shi Cui Kim Kim Kim Kim Liao Cao Cao Cao	HP Mg, cast AZ31 sheet AZ61 ars AZ61 dr, gs = 0.002 mm AZ61 rolled + 320 C anneal AZ31, ars, gs = 0.020 mm AZ31, dsr + WQ, gs = 0.0006 mm AZ31 B UHP-Mg HP Mg HP Mg	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe Mg3.19A11.05Zn0.39Mn0.003Fe ppm: 28A1, 48Zn, 1.3Mn, 1.6Fe, 0.34Cu, 1.48i ppm: 1Fe, 20Si, 8 Mn 1.1%Mn	P G R R B B B B C P P P R	0.002 4.3 7 7 7 4 4 4 4 0.008 0.007 1.1	32, 60 d 1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h 8, 144 h 34, 1 y 1, 14 d 1, 7 d 1, 7 d	P_{W} P	0.7 0.013 0.8 0.5 0.4 3.8 0.25 0.03 0.25 0.62 1.0	16 84 85 85 86 86 87 8 17 17
2013 2013 2013 2013 2013 2013 2013 2013	Abidim Shi Cui Kim Kim Kim Kim Kim Liao Cao Cao Cao Peng	HP Mg, cast AZ31 sheet AZ61 ars AZ61 ars AZ61 rolled + 320 C anneal AZ51, ars, gs = 0.020 mm AZ31, ars, gs = 0.020 mm AZ31, dsr + WQ, gs = 0.0006 mm AZ31B UHP-Mg HP Mg Mg1Mn, sht & WQ Mg1.2RE0.2Zr	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe Mg3.19A11.05Zn0.39Mn0.003Fe ppm: 28A1, 48Zn, 1.3Mn, 1.6Fe, 0.34Cu, 1.4Si ppm: 1Fe, 20Si, 8 Mn 1.1%Mn nd	P G R R B Bl G P R R R	0.002 4.3 7 7 7 4 4 4 4 6 0.008 0.007 1.1 1.4 4	32, 60 d 1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h 8, 144 h 34, 1 y 1, 14 d 1, 7 d 1, 7 d 21, nd	P_W P_W P_W P_W P_W P_W P_W P_W P_W P_W P_W P_W P_W P_W	0.7 0.013 0.8 0.5 0.4 0.25 0.03 0.25 0.62 1.0 1.0	16 84 85 85 85 86 86 86 87 8 8 17 17 17 88
2013 2013 2013 2013 2013 2013 2013 2013	Abidin Shi Cui Kim Kim Kim Kim Kim Liao Cao Cao Cao Cao Peng Peng	HP Mg, cast AZ31 sheet AZ61 ars AZ61 ars AZ61 ars AZ61 rolled + 320 C anneal AZ31, dsr, bg = 0.020 mm AZ31, dsr + WQ, gs = 0.0006 mm AZ31B UHP-Mg HP Mg HP Mg Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe Mg3.19A11.05Zn0.39Mn0.003Fe ppm: 28A1, 48Zn, 1.3Mn, 1.6Fe, 0.34Cu, 1.4Si 1.1%Mn nd nd	P G R R B B B B C P P R R R B	0.002 4.3 7 7 7 4 4 4 4 0.008 0.007 1.1 1.4 1.4	32, 60 d 1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h 8, 144 h 34, 1 y 1, 14 d 1, 7 d 1, 7 d 21, nd	P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W} P_{W}	0.7 0.013 0.8 0.5 0.4 3.8 0.25 0.03 0.25 0.62 1.0 1.0 1.2	16 84 85 85 86 86 87 8 17 17 88 88
2013 2013 2013 2013 2013 2013 2013 2013	Abidin Abidin Abidin Shi Cui Shi Cui Kim Kim Kim Kim Kim Kim Liao Cao Cao Cao Cao Cao Peng Peng Peng Liao Cao Cao Cao Cao Cao Cao Cao Cao Cao C	H2 P, g, cast HP Mg, cast AZ31 sheet AZ61 ars AZ61 rolled + 320 C anneal AZ31, dar, sg, sg = 0.020 mm AZ31, dar + WQ, gs = 0.0006 mm AZ31, dsr + WQ, gs = 0.0006 mm AZ31B UHP-Mg HP Mg Mg1Mn, sht & WQ Mg1.2RE0.2Zn Mg1.2RE0.2Zn AZ31B, e	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe Mg3.19A11.05Zn0.39Mn0.003Fe ppm: 28A1, 48Zn, 1.3Mn, 1.6Fe, 0.34Cu, 1.4Si ppm: 1 Fe, 20Si, 8 Mn 1.1/8Mn nd md Mg3.19A11.05Zn0.39Mn0.003Fe	P G R R B B1 G P P R B R R R R R	0.002 4.3 7 7 7 4 4 4 0.008 0.007 1.1 1.4 1.4 4.6	32, 00 d 1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h 8, 144 h 34, 1 y 1, 7 d 1, 7 d 1, 7 d 1, 7 d 21, nd 4, 90 d	P_{W} P	0.7 0.013 0.8 0.5 0.4 3.8 0.25 0.03 0.25 0.62 1.0 1.0 1.2 0.6	16 84 85 85 85 86 86 87 8 8 17 17 17 88 88 88 88
2013 2013 2013 2013 2013 2013 2013 2013	Abidin Shi Cui Kim Kim Kim Kim Kim Liao Cao Cao Cao Peng Peng Liao Liao	HP Mg, cast AZ31 sheet AZ61 ars AZ61 ars AZ61 ars AZ61 rolled + 320 C anneal AZ31, ars, gs = 0.020 mm AZ31, dsr + WQ, gs = 0.0006 mm AZ31B UHP-Mg HP Mg HP Mg Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr AZ31B, c AM60, c	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe Mg3.19A11.05Zn0.39Mn0.003Fe ppm: 28A1, 48Zn, 1.3Mn, 1.6Fe, 0.34Cu, 1.4Si ppm: 1 Fe, 20Si, 8 Mn 1.1%Mn nd Mg3.19A11.05Zn0.39Mn0.003Fe Mg6.07A10.02Zn0.30Mn0.003Fe	P G R R B BI G P P R R R R R R R R R R R	0.002 4.3 7 7 7 4 4 4 4 0.008 0.007 1.1 1.4 1.4 4.6 6.4	32, 00 d 1, 7 d 33, 2 y 4, 168 h 4, 168 h 4, 168 h 8, 2 h 8, 144 h 34, 1 y 1, 14 d 1, 7 d 1, 7 d 21, nd 4, 90 d	P_{W} P	0.7 0.013 0.8 0.5 0.4 3.8 0.25 0.03 0.25 0.62 1.0 1.2 0.6 0.4	16 84 85 85 85 86 86 87 8 8 17 17 17 88 88 88 88 89 89
2013 2013 2013 2013 2013 2013 2013 2013	Abidin Abidin Abidin Shi Chi Abidin Shi Chi Kim Kim Kim Kim Kim Liao Cao Cao Cao Cao Cao Cao Liao Liao Liao Argade	HP Mg, cast AZ31 sheet AZ61 ars AZ61 ars AZ61 ars AZ61 rolled + 320 C anneal AZ31, dsr, gs = 0.020 mm AZ31, dsr, + WQ, gs = 0.0006 mm AZ31 gs = 0.020 mm AZ31 B UHP-Mg HP Mg Mg1Mn, sht & WQ Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr AZ31B, e AM60, e Mg4Y3Nd, hr, gs 0.07 mm	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe Mg3.19A11.05Zn0.39Mn0.003Fe ppm: 28A1, 48Zn, 1.3Mn, 1.6Fe, 0.34Cu, 1.4Si ppm: 1 Fe, 20Si, 8 Mn 1.1%Mn nd Mg3.19A11.05Zn0.39Mn0.003Fe Mg6.07A10.02Zn0.30Mn0.003Fe nd	P G R R B BI G P P R R R R R R R R R R R R R	0.002 4.3 7 7 7 4 4 4 0.008 0.007 1.1 1.4 4.6 0.007 1.1 1.4 4.6 0.007 7 1.1 1.4 4.6 0.002 7 1.1 1.4 4.6 0.002 7 1.1 1.4 4.6 0.002 7 1.1 1.4 1.4 1.4 1.4 1.4 1.4 1.4	32, 00 d 1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h 8, 144 h 1, 14 d 1, 7 d 1, 7 d 1, 7 d 21, nd 21, nd 4, 90 d 4, 90 d	P_{W} P	0.7 0.013 0.8 0.5 0.4 3.8 0.25 0.03 0.25 0.62 1.0 1.0 1.2 0.6 0.4 0.4	16 84 85 85 86 86 87 8 17 17 88 89 89 90
2013 2013 2013 2013 2013 2013 2013 2013	Abidin Abidin Abidin Shi Cui Kim Kim Kim Kim Kim Kim Kim Cao Cao Cao Cao Cao Cao Cao Argade Argade Argade	H2 F, clast HP Mg, cast AZ31 sheet AZ61 ars AZ61 rolled - 320 C anneal AZ51, ars, gs = 0.020 mm AZ31, dsr + WQ, gs = 0.0006 mm AZ31B UHP-Mg Mg1.ARE0.2Zn0.2Zr AZ31B, dsr, kwQ Mg1.2RE0.2Zn0.2Zr AZ31B, cs. 0.07 mm Mg4Y3Nd, hr, gs 0.07 mm Mg4Y3Nd, FSP, gs 0.0017	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe Mg3.19A11.05Zn0.39Mn0.003Fe ppm: 28A1, 48Zn, 1.3Mn, 1.6Fe, 0.34Cu, 1.4Si ppm: 1Fe, 20Si, 8 Mn 1.1%Mn nd md Mg3.19A11.05Zn0.39Mn0.003Fe Mg6.07A10.02Zn0.30Mn0.001Fe nd	B P G R B B1 G P R B R R R R R R R R R R R R	0.002 4.3 7 7 7 4 4 4 4 6 0.008 0.007 1.1 1.4 1.4 4.6 0.007 7 7 7 7 7 7 7 7 7 7 7 7 7	3.2, 00 d 1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h 8, 2 h 8, 144 h 34, 1 y 1, 14 d 1, 7 d 1, 7 d 21, nd 4, 90 d 4, 90 d 6, 21 d	P_{W} P	$\begin{array}{c} 0.7\\ 0.013\\ 0.8\\ 0.5\\ 0.4\\ \hline 3.8\\ 0.25\\ 0.03\\ 0.25\\ \hline 0.62\\ 1.0\\ 1.0\\ 1.0\\ 1.2\\ 0.6\\ 0.4\\ 0.1\\ \hline \end{array}$	16 84 85 85 86 87 8 17 17 88 89 90 90
2013 2013 2013 2013 2013 2013 2013 2013	Abidin Abidin Abidin Shi Cui Shi Cui Kim Kim Kim Kim Kim Kim Kim Cao Cao Cao Cao Cao Cao Cao Liao Liao Liao Argade Argade	H2 J, edst HP Mg, cast AZ51 sheet AZ61 ars AZ61 ars AZ61 ars AZ61 rolled + 320 C anneal AZ31, dsr + W0, gs = 0.0066 mm AZ31, dsr + W0, gs = 0.0066 mm AZ31B UHP-Mg HP Mg HP Mg Mg1Mn, sht & WQ Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg1.2RE0.2Zr Mg4.23Nd, hr, gs 0.07 mm Mg4.Y3Nd, FSP, gs 0.0017 mm	Mg3.19A10.81Zn0.30Mn0.025Si0.006Fe Mg3.19A10.81Zn0.30Mn0.003Fe ppm: 28A1, 48Zn, 1.3Mn, 1.6Fe, 0.34Cu, 1.4Si ppm: 1 Fe, 20Si, 8 Mn 1.1%Mn nd Mg5.19A11.05Zn0.39Mn0.003Fe Mg5.07A10.02Zn0.30Mn0.001Fe nd nd	P G R R B BI G P R R R R R R R R R R R R R R R	0.002 4.3 7 7 7 7 4 4 4.6 0.008 0.0007 1.1 1.4 4.6 6.4 7 7 7	32, 00 d 1, 7 d 33, 2 y 4 168 h 4, 168 h 4, 168 h 8, 2 h 8, 2 h 8, 144 h 8, 144 h 1, 7 d 1, 7 d 1, 7 d 21, nd 21, nd 4, 90 d 6, 21 d 6, 21 d	P_{W} P	$\begin{array}{c} 0.7\\ 0.013\\ 0.8\\ 0.5\\ 0.4\\ \hline \\ 3.8\\ 0.25\\ \hline \\ 0.03\\ 0.25\\ \hline \\ 0.62\\ 1.0\\ 1.2\\ 0.6\\ \hline \\ 0.4\\ 0.4\\ 0.1\\ \hline \end{array}$	16 84 85 85 86 87 8 17 17 88 89 90 90

(continued on next page)

are associated with processing steps such as extrusion to form rod material. For such heat-treated material, the Fe tolerance limit may be less than $\sim 2 \text{ ppm}$ [98].

Fig. 2 presents data (as green diamonds) for the corrosion rate for atmospheric corrosion or simulated atmospheric corrosion of HP Mg and Mg-Al alloys. There was a significant decrease in the atmospheric corrosion rate with increasing Al content, attributed to a more protective surface film, with increasing Al content. This indicates that stable protective films form during atmospheric corrosion, whereas the films that form on similar Mg alloys during solution exposure are not protective. A key factor seems to be the dry-

2012	Arrabal	AM50	Mg4.9Al0.26Mn	В	5.2	6. 10 d	P_{W}	5	92
2012	Arrabal	AM500.8Nd	Mg4.4Al0.21Mn0.8Nd	R	5.4	6, 10 d	Pw	0.4	92
2012	Arrabal	AM501.5Nd	Mg4.0A10.24Mn1.5Nd	R	5.7	6, 10 d	Pw	0.5	92
2012	Arrabal	AZ91D	Mg8.9Al0.52Zn0.19Mn	В	9.6	6, 10 d	$P_{\rm W}$	1.4	92
2012	Arrabal	AZ91D0.7Nd	Mg8.1Al0.52Zn0.13Mn0.7Nd	R	9.5	6, 10 d	P_{W}	0.2	92
2012	Arrabal	AZ91D1.4Nd	Mg8.1Al0.52Zn0.16Mn1.4Nd	R	10.2	6, 10 d	P_{W}	0.5	92
2012	Liu	MgxY ($x = 2-7$)							93
2012	Qiao	HP Mg	Mg0.1A10.017Mn0.002Fe	Р	0.1	1, 7 d	P_{W}	0.7	94
2012	Qiao	HP Mg	Mg0.1Al0.017Mn0.002Fe	В	0.1	1, 7 d	P_{i}	0.3	94
2012	Qiao	HP Mg	Mg0.1A10.017Mn0.002Fe	В	0.1	1, 7 d	$P_{i/EIS}$	0.2	94
2011	Feliu	AZ31	Mg3.1Al0.73Zn0.25Mn0.005Fe	G	4.1	35, 60 d	$-P_{W}$	0.02	95
2011	Feliu	AZ61	Mg6.2Al0.74Zn0.23Mn0.004Fe	G	7.2	35, 60 d	P_{W}	0.01	95
2011	Shi	HP Mg, cast	Mg0.1Al0.002Fe0.017Zn	Р	0.1	1, 3 to 20 d	P_{W}	0.4	96
2011	Zhang	AZ91, cast	Mg8.51Al0.64Zn0.22Mn	R	9.4	6, 12 h	P_{W}	0.2	97
2011	Zhang	AZ91, e	Mg8.51Al0.64Zn0.22Mn	R	9.4	6, 12 h	P_{W}	0.4	97
2009	Liu	LP Mg, GpM	Mg0.0280Fe0.017Mn	В	0.05	28, 8 h	$P_{\rm H}$	170	98
2009	Liu	HP Mg, cast	Mg0.0045Fe0.0080Mn	Р	0.01	28, 224 h	$P_{\rm H}$	1	- 98
2009	Liu	HP Mg, sht 1 d at 550 C	Mg0.0045Fe0.0080Mn	В	0.01	28, 224 h	$P_{\rm H}$	10	98
2008	Chang	AZ91D	Mg9Al1Zn	R	10	36, 3 d	P_{W}	1.0	- 99
2008	Chang	NZ30K	Mg3Nd0.2Zn0.4Zr	R	2.6	36, 3 d	P_{W}	0.4	99
2008	Zhao	HP Mg, cast	Mg0.0045Fe	Р	0.005	37, 2 d	P_{W}	1	100
2008	Ben-	AZ80, cast	Mg8.33Al0.12Mn0.41Zn0.006Si0.0025Fe	R	8.9	1, 3 d	P_{W}	0.5	101
	Haroush								
2008	Ben-	AZ80, cast + e at 250 C	Mg8.33Al0.12Mn0.41Zn0.006Si0.0025Fe	В	8.9	1, 3 d	P_{W}	7	101
	Haroush						-		101
2008	Ben-	AZ80, cast + e at 300 C	Mg8.33Al0.12Mn0.41Zn0.006Si0.0025Fe	В	8.9	1, 3 d	P_{W}	11	101
2000	Haroush	1700		D	0.0	1.2.1	D	10	101
2008	Ben-	AZ80, cast $+$ e at 350 C	Mg8.33Al0.12Mn0.41Zn0.006Si0.0025Fe	В	8.9	1, 3 d	$P_{\rm W}$	10	101
2007	Haroush	EX721.4	M-2 7N44 2D 1 2C 40 47-0 57-	D	0	674	n	2.0	102
2007	Rzychon	EV3IA	Mg2./Nd4.2R-1.2Gd0.4Zh0.5Zr	В	9	6, 7 d	PW	2.8	102
2007	Rzychon	WE43	Mg4.0 Y 2.4Nd3.3RE0.0ZF	K D	10.5	0, / 0	PW	0.5	102
2005	WU WU	AZ91D	Mg9Al0.5Zn Mg9Al0.5Zn2Ca	D	9.5	36, 3 d	P W D	9	103
2005	W U	AZ91D-2Ca	Mg9Al0.5Zil2Ca	R D	10.5	30, 3 u	T W	0.2	103
2005	w u	AZ91DIRE	Mg9Al0.5Zn1RE	R	10.5	36, 3 0	PW	0.4	103
2005	wu	AZ9IDIKEICa	Mg9Al0.5ZhTRETCa	K	11.5	36, 3 d	PW	0.2	103
1999	Song	LP Mg	Mg0.024Fe	В	0.024	38, 1d	PW	55	104
1999	Song	AZ91D, dex	Mg8.4A10./3Zn0.012Fe0.18Min	В	9.3	38, 1 d	Pw	6	104
1999	Song	HP Mg	Mg0.0017Fe	P	0.002	38, I d	P_W	1	104
1999	Song	AZ91D, dcs= die cast-	Mg8.4A10.73Zn0.012Fe0.18Mn	R	9.3	38, 1 d	P_{W}	0.7	104
10.42	TT	surface	M-0.001E-	D	0.001	20 112 1	D	0.2	7
1942	Hanawalt	UHP Mg	Mg0.001Ni0.2Mr	R	0.001	39, 112 d	Pw	0.3	7
1942	rianawait	UTP Mg	M=0.1C:	K D	0.2	39, 112 d	PW	0.3	7
1942	nanawait	UHP Mg	Mg0.1Cu	K	0.1	39, 112 d	P_{W}	0.5	/

In "Alloy, condition/form", ep = extruded plate; e = extruded; e&cd = extruded and cold drawn; e+ts = extruded plus applied tensile stress; sht=solution heat treated; a+b=alpha+beta; USS=ultra-high-pressure solid solution; a=alpha; CP=commercially pure; fsp=friction stir processing; fb=film breakdown; pm=powder metallurgy production; rd=rolling reduction; ds=directional solidification; mc=mechanically cleaned; SP=sputter deposited; fge=fine grained extrusion; ars=as received sheet; dr=differential rolling, gs=grain size; hr=hot rolled; GpM=Goodfellow pure Mg;, dcx=die cast-section; dcs= die cast-surface.

CR = corrosion rate, mm/y. TA is total alloying content, wt%. Immersion time is in m (minute), h (hour) or d (day); ? indicates undisclosed. M is method of corrosion rate measurement. Exp represents exposure condition and time: 1=3.5 wt% NaCl saturated with Mg(OH)₂; 2=0.4 M Na₂SO₄; 3=0.4 M (NH₄)₂SO₄; 4=0.1 M NaCl; 5=0.6 M NaCl; 6=3.5% NaCl; 7=SBF+TRIS for pH control (pH control was not effective); 8 = PBS; 9 = mSBF + HEPES; 10 = Urine; 11 = Bile; 12 = Hanks' solution, 37C, no buffer; 13 = In vivo, subcutaneous, rats; 14=SBF, details undisclosed; 15=Ringer's solution; 16=5 wt.% NaCl saturated with Mg(OH)_{2:} 17=Nor's solution: Hanks' solution, pH control by bubbling CO₂ through solution, 37 C; 18=Dulbecco's modified eagle medium (DMEM)+10vol.% foetal bovine serum, 100 units/mL penicillin+100 units/mL Streptomycin, at 37 C with 5 vol% CO₂ atmosphere; 19=0.01 M NaCl; 20=Hanks' solution, no buffer, room temperature; 21=0.9 wt. NaCl; 22=In vivo, New Zealand Rabits; 23=0.5 wt.% NaCl; 24=1 wt% NaCl; 25=SBF, 37 C; 26=Simulated atmospheric corrosion: 95%RH, 400 ppm CO₂, 70 μ g/cm² NaCl, 504h, 22 C; 27=0.9% NaCl, 37 C; 28=3% NaCl; 29 Nor's solution with chloride concentration adjusted to 0.3 M NaCl; 30 Nor's solution with chloride concentration adjusted to 1.0 M NaCl; 31=Dulbeco's modified Eagle's medium (DMEM) with 10% foetal bovine serum (FBS), 1% penicillin, pH adjusted to 7.4 at start of test, P_g determined from depth of corrosion products; 32 = Sub-cutaneous in male Wistar rats; 33=Tropical marine atmosphere, XiSha island China; 34=Atmospheric corrosion, marine (Shimizsu City, Japan) and urban (Osaka City, Japan); 35=Continuous condensation chamber, 100% RH, specimen slightly colder so condensation occurs on the specimen; 36 = 5% NaCl; 37 = 1 N NaCl; 38 = 1 N NaCl pH 11; 39 Alternate immersion in 3% NaCl.

The colour (C) in Table 1 and Fig. 2 is as follows: purple (P) indicates high-purity Mg in concentrated chloride solutions; red (R) indicates Mg alloys in concentrated chloride solutions; blue (Bl) indicates corrosion in synthetic body fluids (blue squares for HP Mg alloys with a total alloying less than 0.1 wt%, blue full circles for Mg alloys); green (G) diamonds for atmospheric corrosion or simulated atmospheric corrosion; black (B) for other Mg alloys, for which electrochemical measurements values are in blue.

ing which occurs periodically during atmospheric exposure [105,106].

Fig. 2 shows that Mg alloys typically have corrosion rates in chloride solutions greater than the intrinsic corrosion rate of Mg of 0.3 mm/y, and most corrosion rates are above 1 mm/y, as shown by the full black squares in 2. Mg is the most active engineering metal with a high tendency to corrode, and little protection is provided by corrosion product films. Mg alloys typically have phases in addition to the alpha-Mg matrix. These second phases typically accelerate corrosion by microgalvanic interaction with the matrix, so that the typical corrosion rates in chloride solutions are greater than 1 mm/y [1-5]. With the two exceptions presented below, despite claims to the contrary, there is no Mg alloy with a corrosion rate (measured by weight loss) in a concentrated chloride solution much lower than the intrinsic Mg corrosion rate of 0.3 mm/y in a concentrated chloride solution. This is evidenced by the data presented in Table 1 and Fig. 2.

The two exceptions of Mg alloys with a corrosion rate (measured by weight loss) in a chloride solution much lower than the intrinsic Mg corrosion rate of 0.3 mm/y are the Mg alloys with weight loss corrosion rates of 0.1 mm/y: (i) Mg-1.5Sr [30], and (ii) Mg-4Y-3Nd [90]. Argade, Panigrahi and Mishra [90] reported a corrosion rate of 0.1 mm/y for a Mg-4Y-3Nd alloy with a grain size of 0.0017 mm, see Table 1 and Fig. 1. This corrosion rate below the intrinsic Mg corrosion rate seems to have been produced by a more protective surface film. In addition, this research provided clear evidence of a significant decrease of corrosion rate caused by a decrease in grain size, which could be related to the increased impurity tolerance after grain refinement [107]. Similarly, the Mg-1.5Sr of Dong et al. [30] had a corrosion rate below the intrinsic Mg corrosion rate. Thus, the only successful Mg alloy development strategy relates to Mg alloys that have produced more protective surface films on immersion in solution.

This Mg alloy development strategy was suggested by Song and Atrens [4] in 2003; a stainless Mg alloy might be possible if a Mg alloy could be produced that spontaneously produces a much more protective corrosion product film. This suggestion was based on the analogy with stainless steels which can be considered as Fe-Cr alloys, and which typically spontaneously form a passive surface oxide (approximately Cr_2O_3) for a Cr content greater than 10.5 wt.%.

Fig. 2 does also indicate that there are a significant number of alloys [9,16,17,20,39,41,49,54,82,90,94,96,104], including commercial alloys or modified commercial alloys [22,37,59,63,79,85,89,92,97,99,101–103], with corrosion rates in chloride solutions comparable to the intrinsic corrosion rate of Mg of 0.3 mm/y in a concentrated chloride solution [7–9]. These Mg alloys are plotted in Fig. 2 as red circles for corrosion in chloride solutions, and as full blue circles for corrosion in various synthetic body fluids, (SBFs).

Thus, it is demonstrably not accurate or reasonable to claim that an alloy with a corrosion rate as measured by weight loss above 0.3 mm/y in a concentrated chloride solution has a corrosion rate much lower than any existing Mg

alloy [11]. The lowest corrosion rate of the Mg-Li alloy described by Xu et al. [11] was $P_W = 0.8 \text{ mm/y}$ (see Table 1) and was substantially above the intrinsic corrosion rate as measured by weight loss of Mg of 0.3 mm/y. This Mg alloy was claimed to have a corrosion rate much lower than any existing Mg alloy [11,12]. For example: "Here we design an ultralow density (1.4 g cm⁻³) Mg-Li-based alloy that is strong, ductile, and more corrosion resistant than Mg-based alloys reported so far" [11]; "Ferry and colleagues [11] describe the development of a new alloy with a combined improvement in strength, ductility, and corrosion resistance, compared with other Mg alloys" [12], and "Emergence of "stainless" Mg alloy" as a landmark in the scientific and technical development of magnesium corrosion research [6]. These claims were not supported by the experimental evidence of Table 1 and Fig. 2.

It was also suggested that low corrosion rates in chloride solutions could be produced by decreasing the cathodic partial reaction of hydrogen evolution [41,42,108,109]. In each case $P_{\rm W} \ge 0.8$ mm/y. This corrosion rate was substantially above the intrinsic corrosion rate as measured by weight loss of Mg of 0.3 mm/y, and so this approach has not produced a Mg alloy with a corrosion rate substantially less than the intrinsic corrosion rate as measured by weight loss of Mg of 0.3 mm/y.

4. Conclusions

- 1. A review of the literature confirmed that the intrinsic corrosion rate as measured by weight loss of high-purity Mg is 0.3 mm/y in a concentrated chloride solution.
- 2. Atmospheric corrosion of Mg alloys has produced corrosion rates of Mg-Al alloys an order of magnitude lower than the intrinsic corrosion rate of Mg in a concentrated chloride solution of 0.3 mm/y,
- 3. Two Mg alloys, (namely Mg-1.5Sr, and Mg-4Y-3Nd) were identified with corrosion rates as measured by weight loss less than the intrinsic corrosion rate of high-purity Mg of 0.3 mm/y in a concentrated chloride solution,
- 4. The only successful strategy to produce a Mg alloy with a corrosion rate as measured by weight loss substantially less than the intrinsic corrosion rate as measured by weight loss of Mg of 0.3 mm/y has been to improve the protectiveness of the corrosion product film,
- Corrosion rates for Mg alloys measured by electrochemical methods are typically lower than the steady-state corrosion rates measured by weight loss, often by orders of magnitude,
- 6. The recent claims that new Mg alloys have been produced that are more corrosion resistant than Mg-based alloys reported so far are not supported by the literature.

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Data availability

The data required to reproduce these findings are from the published literature and are available within the paper

References

- [1] A. Atrens, S. Johnston, Z. Shi, M.S. Dargusch, Scr Mater 154 (2018) 92.
- [2] A. Atrens, G.-L. Song, M. Liu, Z. Shi, F. Cao, M.S. Dargusch, Adv Eng Mater 17 (2015) 400–453.
- [3] A. Atrens, G.L. Song, F. Cao, Z. Shi, P.K. Bowen, J Magnes Alloys 1 (2013) 177–200.
- [4] G. Song, A. Atrens, Adv Eng Mater 5 (2003) 837-858.
- [5] G. Song, A. Atrens, Adv Eng Mater 1 (1999) 11–33.
- [6] M. Esmaily, et al., Prog Mater Sci 89 (2017) 92.
- [7] J.D. Hanawalt, C.E. Nelson, J.A. Peloubet, Trans Am Inst Min Metall Eng 147 (1942) 273.
- [8] F. Cao, Z. Shi, J. Hofstetter, P.J. Uggowitzer, G. Song, M. Liu, A. Atrens, Corros Sci 75 (2013) 78–99.
- [9] L. Yang, G. Liu, L. Ma, E. Zhang, X. Zhou, G. Thompson, Corros Sci 139 (2018) 421–429.
- [10] J. Liu, et al., Acta Biomater 102 (2020) 508-528.
- [11] W. Xu, N. Birbilis, G. Sha, Y. Wang, J.E. Daniels, Y. Xiao, M. Ferry, Nat Mater 14 (2015) 1229–1235.
- [12] G.S. Frankel, Nat Mater 14 (2015) 1189.
- [13] Z. Shi, M. Liu, A. Atrens, Corros Sci 52 (2010) 579–588.
- [14] G.L. Song, A. Atrens, D. St.John, Magnes Technol (2001) 255-262.
- [15] Z. Shi, F. Cao, G.-L. Song, A. Atrens, Corros Sci 88 (2014) 434– 443.
- [16] Z. Shi, F. Cao, G.L. Song, M. Liu, A. Atrens, Corros Sci 76 (2013) 98–118.
- [17] F. Cao, Z. Shi, G.L. Song, M. Liu, A. Atrens, Corros Sci 76 (2013) 60–97.
- [18] A. Bahmani, S. Arthanari, K.W. Shin, J Magnes Alloys 7 (2019) 38-46.
- [19] F. Cao, C. Zhao, G.L. Song, D. Zheng, Corros Sci 150 (2019) 161-174.
- [20] P. Gore, T.W. Cain, J. Laird, J.R. Scully, N. Birbilis, V.S. Raja, Corros Sci 151 (2019) 206–218.
- [21] T.W. Cain, C.F. Glover, J.R. Scully, Electrochim. Acta 297 (2019) 564–575.
- [22] Z. Hu, R.L. Liu, S.K. Kary, X. Li, H. Yan, N. Birbilis, Corros Sci 149 (2019) 144–152.
- [23] J.I. Kim, H.N. Nguyen, B.S. You, Y.M. Kim, Scr Mater 162 (2019) 355–360.
- [24] S.A. Abdel-Gawad, M.A. Shoeib, Surf Interfaces 14 (2019) 108–116.
- [25] W. Jiang, J. Wang, W. Zhao, Q. Liu, D. Jiang, S. Guo, J Magnes Alloys 7 (2019) 15–26.
- [26] M. Zuo, W. Wang, H. Wu, L. Yang, J. Yan, J. Ni, S. Zhang, Y. Song, J. Wang, X. Zhang, Mater Lett 240 (2019) 279–283.
- [27] D. Song, C. Li, N. Liang, F. Yang, J. Jiang, J. Sun, G. Wu, A. Ma, X. Ma, Mater Des 166 (2019) 107621.
- [28] Y. Gao, L. Wang, L. Li, X. Gu, K. Zhang, J. Xie, Y. Fan, Acta Biomater 83 (2019) 477–486.
- [29] D. Dvorsky, J. Kubaswk, I. Vonavkova, D. Vojtech, Mater Sci Technol 35 (2019) 520–529.
- [30] J.H. Dong, L.L. Tan, Y.B. Ren, K. Yang, Acta Metall Sin (English Lett) 32 (2019) 305–320.
- [31] J. Zhao, X. Chen, S. Li, R. Zheng, F. Zhang, Z. Wang, J Colloids Interface Sci 547 (2019) 309–317.
- [32] S. Feliu Jr, L. Veleva, F. Garcia-Galvan, Metals (Basel) 9 (1–17) (2019) 591.
- [33] M. Grimm, A. Lohmuller, R.F. Singer, S. Virtanen, Corros Sci 155 (2019) 195–208.
- [34] X. Yan, M.C. Zhao, Y. Yang, L. Tan, Y. Zhao, D. Yin, K. Yang, A. Atrens, Corros Sci 156 (2019) 125–138.

- [35] W. Zhang, L. Tan, D. Ni, J. Chen, Y. Zhao, L. Liu, C. Shui, K. Yang, A. Atrens, M.C. Zhao, J Mater Sci Technol 35 (2019) 777–783.
- [36] S. Johnston, Z. Shi, J. Venezuela, C. Wen, M.S. Dargusch, A. Atrens, JOM 71 (4) (2019) 1406–1413.
- [37] A. Soltan, M.D. Dargusch, Z. Shi, D. Gerrard, A. Atrens, Mater Corros 70 (2019) 1527–1552, doi:10.1002/maco.201910845.
- [38] G. Jia, C. Chen, J. Zhang, Y. Wang, R. Yue, B.J.C. Luthringer-Feyerabend, R. Willumeit-Roemer, H. Zhang, M. Xiong, H. Huang, G. Yuan, F. Feyerabend, Corros Sci 144 (2018) 301–312.
- [39] J. Feng, H. Li, K. Deng, C. Fernandez, Q. Zhang, Q. Peng, Corros Sci 143 (2018) 229–239.
- [40] L. Wu, H. Li, Corros Sci 142 (2018) 238-248.
- [41] R.L. Liu, J.R. Scully, G. Williams, N. Birbilis, Electrochim. Acta 260 (2018) 184–195.
- [42] R.L. Liu, Z.R. Zeng, J.R. Scully, G. Williams, N. Birbilis, Corros Sci 140 (2018) 18–29.
- [43] S.M. Baek, J.S. Kang, J.C. Kim, B. Kim, S.S. Park, H.J. Shin, Corros Sci 141 (2018) 203–210.
- [44] A. Sadeghi, E. Hasanpur, A. Bahmani, K.S. Shin, Corros Sci 141 (2018) 117–126.
- [45] Q. Liu, Q. Ma, G. Chen, X. Gao, S. Zhang, J. Pan, G. Zhang, Q. Shi, Corros Sci 138 (2018) 284–296.
- [46] Y. Zhang, P. Gore, W. Rong, Y. Wu, Y. Yan, R. Zhang, L. Peng, J. Nie, N. Birbilis, Corros Sci 136 (2018) 106–118.
- [47] M.E. Turan, Y. Sun, F. Aydin, H. Zengin, Y. Turen, H. Ahlatci, Mater Chem Phys 218 (2018) 182–188.
- [48] X. Yan, P. Wan, L. Tan, M. Zhao, L. Qin, K. Yang, Mater Sci Eng C 93 (2018) 565–581.
- [49] C.Q. Li, D.K. Xu, X.B. Chen, B.J. Wang, R.Z. Wu, E.H. Han, N. Birbilis, Electrochim Acta 260 (2018) 55–64.
- [50] S. Johnston, et al., J Biomed Mater Res B: Appl Biomater 106B (2018) 1907–1917.
- [51] H. Miao, H. Huang, Y. Shi, H. Zhang, J. Pei, G. Yuan, Corros Sci 122 (2017) 90–99.
- [52] Q. Xiang, B. Jiang, Y. Zhang, X. Chen, J. Song, J. Xu, L. Fang, F. Pan, Corros Sci 119 (2017) 14–22.
- [53] H. Jia, X. Feng, Y. Yang, Corros Sci 120 (2017) 75-81.
- [54] S.M. Baek, J.S. Kang, H.J. Shin, C.D. Yim, B.S. You, H.Y. Ha, S.S. Park, Corros Sci 118 (2017) 227–232.
- [55] M.E. Turan, Y. Sun, Y. Akgul, Y. Turen, H. Achlatci, J Alloys Compd 724 (2017) 14–23.
- [56] V.K. Caralapatti, S. Narayanswamy, Opt Laser Technol 88 (2017) 75–84.
- [57] X. Liu, D. Shan, Y. Song, E.-H. Han, J Magnes Alloys 5 (2017) 26-34.
- [58] J. Niu, M. Xiong, X. Guan, J. Zhang, H. Huang, J. Pei, G. Yuan, Corros Sci 113 (2016) 183–187.
- [59] H.Y. Choi, W.J. Kim, J Alloys Compd 696 (2017) 736-745.
- [60] B. Mingo, R. Arrabal, M. Mohedano, C.L. Mendis, R. del Olmo, E. Matykin, N. Hort, Mater Des 130 (2017) 48–58.
- [61] J. Jayaraj, S.A. Raj, A. Srinivasan, S. Ananthakumar, Corros Sci 113 (2016) 104–115.
- [62] X. Zhang, Z. Ba, Z. Wang, Y. Xue, Corros Sci 105 (2016) 68-77.
- [63] S. Baek, H.J. Kim, H.Y. Jeong, S. Sohn, H.J. Shin, K. Choi, K. Lee, J.G. Lee, G.D. Yim, B.S. You, H.Y. Ha, S.S. Park, Corros Sci 112 (2016) 44–53.
- [64] M. Esmaily, D.B. Blucher, J.E. Svensson, M. Halvarsson, L.G. Johansson, Scr Mater 115 (2016) 91–95.
- [65] N. Saikrishna, G.P.K. Reddy, B. Munirathinam, B.R. Sunil, J Magnes Alloys 4 (2016) 68–76.
- [66] J. Liu, Y. Song, J. Chen, P. Chen, D. Shan, E.H. Han, Electrochim Acta 189 (2016) 190–195.
- [67] H. Jafari, P. Amiryavari, Mater Sci Eng A 654 (2016) 161-168.
- [68] S. Johnston, Z. Shi, M.S. Dargusch, Corros Sci 108 (2016) 66-75.
- [69] S. Johnston, Z. Shi, A. Atrens, Corros Sci 101 (2015) 182-192.
- [70] P.W. Chu, E.A. Marquis, Corros Sci 101 (2015) 94-104.
- [71] H. Liao, X. Zhou, H. Li, M. Deng, X. Liang, R. Liu, Trans Nonferrous Met Soc China 25 (2015) 3921–3927.

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- [72] L. Yang, X. Zhou, S. Liang, R. Schmid-Fetzer, Z. Fan, G. Scamans, J. Robson, G. Thompson, J Alloys Compd 619 (2015) 396–400.
- [73] O. Gaon, G. Dror, O. Davidi, A. Lugovskoy, Corros Sci 93 (2015) 167–171.
- [74] C.D. Yim, J. Yang, S.K. Woo, H.Y. VHa, B.S. You, Corros Sci 90 (2015) 597–605.
- [75] H.Y. Choi, W.J. Kim, J Mech Behav Biomed Mater 51 (2015) 291–301.
- [76] P. Saha, M. Roy, M.K. Data, B. Lee, P.N. Kumta, Mater Sci Eng C 57 (2015) 294–303.
- [77] C. Taltavull, Z. Shi, B. Torres, J. Rams, A. Atrens, J Mater Sci: Mater Med 25 (2014) 329–345.
- [78] H.Y. Ha, J.Y. Kang, S.G. Kim, B. Kim, S.S. Park, C.D. Yim, B.S. You, Corros Sci 82 (2014) 369–379.
- [79] H.Y. Ha, J.Y. BKang, C.D. Yim, J. Yang, B.S. You, Corros Sci 89 (2014) 275–285.
- [80] X. Zhang, Z. Ba, Q. Wang, Y. Wu, Z. Wang, Q. Wang, Corros Sci 88 (2014) 1–5.
- [81] J. Wang, V. Giridharan, V. Shanov, Z. Xu, B. Collins, L. White, Y. Jang, J. Sankar, N. Huang, Y. Yun, Acta Biomater 10 (2014) 5213–5223.
- [82] K. Schlüter, Z. Shi, C. Zamponi, F. Cao, E. Quandt, A. Atrens, Corros Sci 78 (2014) 43–54.
- [83] N.I. Zainal Abidin, B. Rolfe, H. Owen, J. Malisano, D. Martin, J. Hofstetter, P.J. Uggowitzer, A. Atrens, Corros Sci 75 (2013) 354– 366
- [84] Z. Cui, X. Li, K. Xiao, C. Dong, Corros Sci 76 (2013) 243-256.
- [85] H.S. Kim, W.J. Kim, Corros Sci 75 (2013) 228-238.
- [86] H.S. Kim, G.H. Kim, H. Kim, W.J. Kim, Corros Sci 74 (2013) 139–148.
- [87] J. Liao, M. Hotta, S. Motoda, T. Shinohara, Corros Sci 71 (2013) 53–61.
- [88] Q. Peng, Y. Huang, K.U. Kainer, N. Hort, Adv Eng Mater 14 (2012) 178–184.
- [89] J. Liao, M. Hotta, N. Yamamoto, Corros Sci 61 (2012) 208-214.

- [90] G.R. Argade, S.K. Panigrahi, R.S. Mishra, Corros Sci 58 (2012) 145–151.
- [91] Y. Song, E.H. Han, D. Shah, C.D. Yim, B.S. You, Corros Sci 65 (2012) 322–330.
- [92] R. Arrabal, Effect of Nd on the corrosion behaviour of AM50 and AZ91D magnesium alloys in 3.5wt.% NaCl solution, Corros Sci 55 (2012) 301–312.
- [93] M. Liu, P. Schmutz, P.J. Uggowitzer, G. Song, A. Atrens, Corros Sci 52 (2010) 3687–3701.
- [94] Z. Qiao, Z. Shi, N. Hort, N. Zainal Abidin, A. Atrens, Corros Sci 61 (2012) 185–207.
- [95] S. Feliu Jr, C. Maffiotte, J.C. Galvan, V. Barranco, Corros Sci 53 (2011) 1865–1872.
- [96] Z. Shi, A. Atrens, Corros Sci 53 (2011) 226–246.
- [97] T. Zhang, Y. Shao, G. Meng, Z. Cui, F. Wang, Corros Sci 53 (2011) 1960–1968.
- [98] M. Liu, P.J. Uggowitzer, A.V. Nagasekhar, P. Schmutz, M. Easton, G. Song, A. Atrens, Corros Sci 51 (2009) 602–619.
- [99] J.W. Chang, J Appl Electrochem 38 (2008) 207-214.
- [100] M.C. Zhao, M. Liu, G. Song, A. Atrens, Corros Sci 50 (2008) 1939–1953.
- [101] M. Ben-Haroush, et al., Corros Sci 50 (2008) 1766-1778.
- [102] T. Rzychon, J. Michalska, A. Kielbus, J Achiev Mater Manuf Eng 21 (2007) 51–54.
- [103] G. Wu, et al., Mater Sci Eng A 408 (2005) 255–263.
- [104] G.L. Song, A. Atrens, M. Dargusch, Corros Sci 41 (1999) 249-273.
- [105] M.C. Zhao, P. Schmutz, S. Brunner, M. Liu, G. Song, A. Atrens, Corros Sci 51 (2009) 1277–1292.
- [106] G.L. Song, S. Hapugoda, D. StJohn, Corros Sci 49 (2007) 1245–1265.
- [107] G.L. Song, Z. Xu, Corros Sci 54 (2012) 97-105.
- [108] N. Birbilis, G. Williams, K. Gusieva, A. Samaniego, M.A. Gibson, H.N. McMurray, Electrochem Commun 34 (2013) 295–298.
- [109] D. Eaves, G. Williams, H.N. McMurray, Electrochim Acta 79 (2012) 1–7.