Full wwPDB X-ray Structure Validation Report (i)

Feb 1, 2016 – 03:06 PM GMT

PDB ID	:	4BJM
Title	:	Crystal structure of the flax-rust effector avrM
Authors	:	Ve, T.; Williams, S.J.; Kobe, B.
Deposited on	:	2013-04-19
Resolution	:	2.60 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at
http://wwpdb.org/validation/2016/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The following versions of software and data (see references (1)) were used in the production of this report:

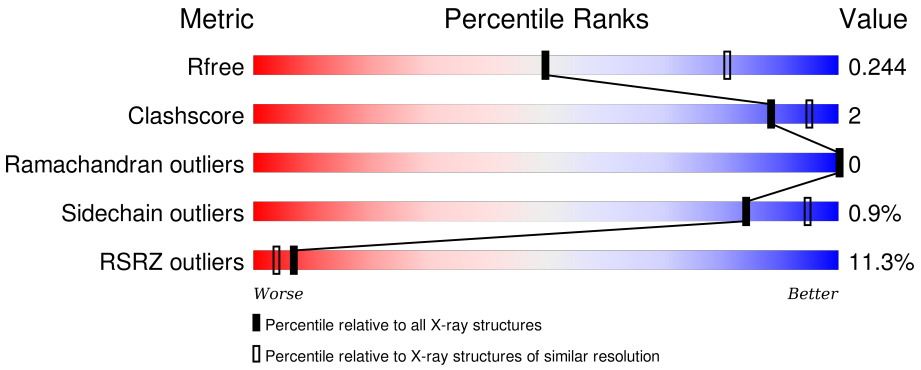
MolProbity	:	4.02b-467
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20026688
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	trunk26865

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	91344	2328 (2.60-2.60)
Clashscore	102246	2679 (2.60-2.60)
Ramachandran outliers	100387	2635 (2.60-2.60)
Sidechain outliers	100360	2635 (2.60-2.60)
RSRZ outliers	91569	2334 (2.60-2.60)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	238	2% 91% · 5%
1	B	238	9% 87% 6% 7%
1	C	238	8% 83% 7% 10%
1	D	238	22% 82% 6% 12%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 7219 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called AVRM.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	226	Total	C	N	O	S	0	0	0
			1835	1153	321	357	4			
1	B	222	Total	C	N	O	S	0	0	0
			1802	1128	317	354	3			
1	C	215	Total	C	N	O	S	0	0	0
			1746	1094	304	345	3			
1	D	210	Total	C	N	O	S	0	0	0
			1709	1074	298	334	3			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	43	SER	-	EXPRESSION TAG	UNP Q2MV46
A	44	ASN	-	EXPRESSION TAG	UNP Q2MV46
A	45	ALA	-	EXPRESSION TAG	UNP Q2MV46
B	43	SER	-	EXPRESSION TAG	UNP Q2MV46
B	44	ASN	-	EXPRESSION TAG	UNP Q2MV46
B	45	ALA	-	EXPRESSION TAG	UNP Q2MV46
C	43	SER	-	EXPRESSION TAG	UNP Q2MV46
C	44	ASN	-	EXPRESSION TAG	UNP Q2MV46
C	45	ALA	-	EXPRESSION TAG	UNP Q2MV46
D	43	SER	-	EXPRESSION TAG	UNP Q2MV46
D	44	ASN	-	EXPRESSION TAG	UNP Q2MV46
D	45	ALA	-	EXPRESSION TAG	UNP Q2MV46

- Molecule 2 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total	Cl	0	0
			1	1		

- Molecule 3 is water.

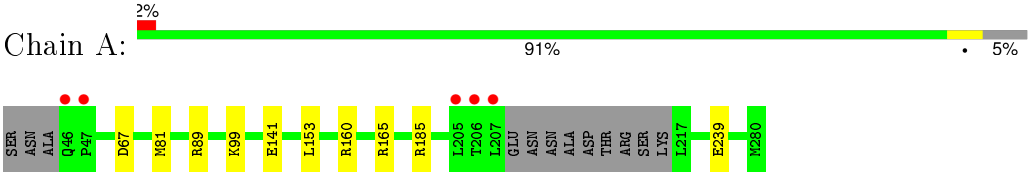
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	66	Total O 66 66	0	0
3	B	35	Total O 35 35	0	0
3	C	18	Total O 18 18	0	0
3	D	7	Total O 7 7	0	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

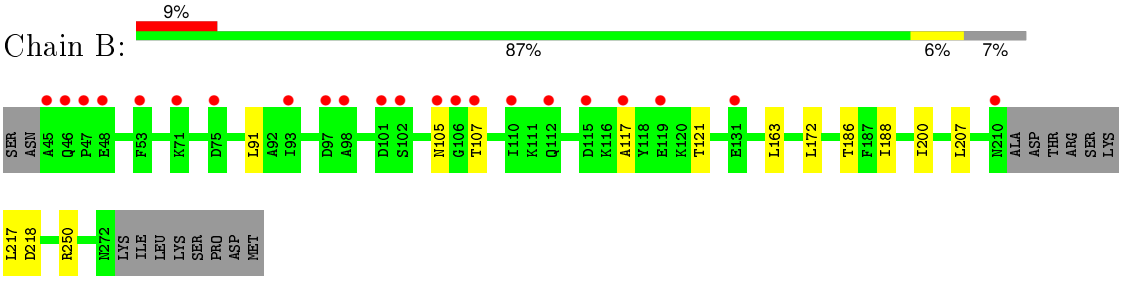
- Molecule 1: AVRM

Chain A:



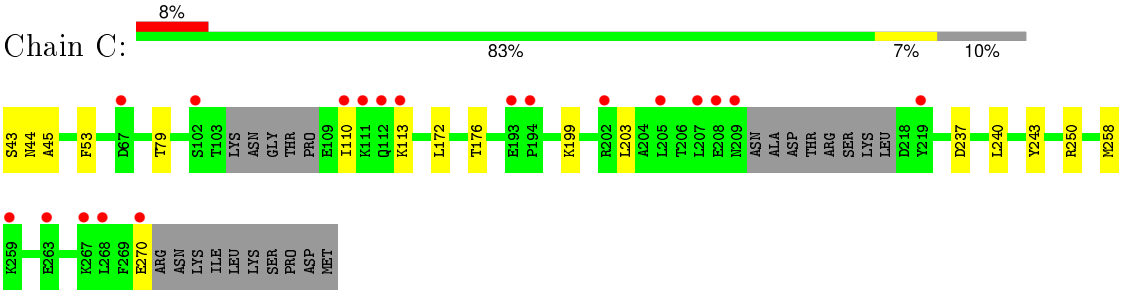
- Molecule 1: AVRM

Chain B:



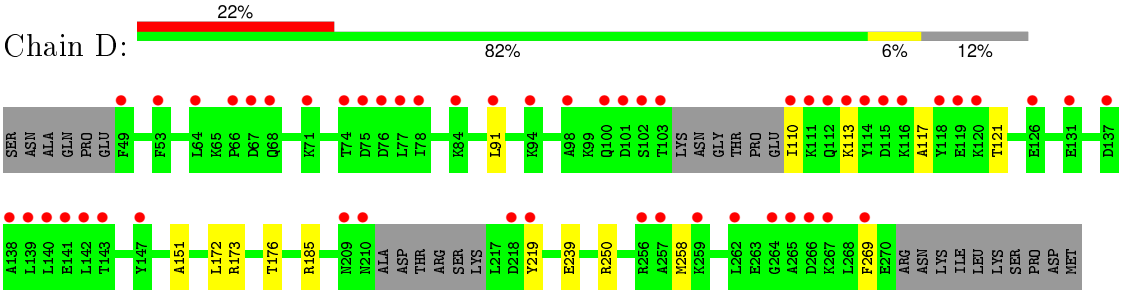
- Molecule 1: AVRM

Chain C:



- Molecule 1: AVRM

Chain D:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	88.47Å 125.61Å 128.86Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	26.14 – 2.60 26.14 – 2.60	Depositor EDS
% Data completeness (in resolution range)	100.0 (26.14-2.60) 100.0 (26.14-2.60)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.87 (at 2.60Å)	Xtriage
Refinement program	BUSTER 2.10.0	Depositor
R, R_{free}	0.209 , 0.233 0.222 , 0.244	Depositor DCC
R_{free} test set	2259 reflections (5.31%)	DCC
Wilson B-factor (Å^2)	63.2	Xtriage
Anisotropy	0.288	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 64.7	EDS
Estimated twinning fraction	0.021 for -h,l,k	Xtriage
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Outliers	1 of 44794 reflections (0.002%)	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	7219	wwPDB-VP
Average B, all atoms (Å^2)	98.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.02% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CL

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| > 5$	RMSZ	$\#\|Z\| > 5$
1	A	0.53	0/1858	0.65	0/2492
1	B	0.50	0/1824	0.61	0/2448
1	C	0.48	0/1766	0.62	0/2368
1	D	0.46	0/1728	0.60	0/2316
All	All	0.49	0/7176	0.62	0/9624

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1835	0	1863	9	0
1	B	1802	0	1813	14	0
1	C	1746	0	1751	12	0
1	D	1709	0	1725	8	0
2	B	1	0	0	0	0
3	A	66	0	0	2	0
3	B	35	0	0	0	0
3	C	18	0	0	0	0
3	D	7	0	0	0	0
All	All	7219	0	7152	35	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 2.

All (35) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:172:LEU:O	1:C:176:THR:HG23	1.80	0.81
1:B:207:LEU:HG	1:B:217:LEU:HD23	1.64	0.79
1:B:188:ILE:HD11	1:C:45:ALA:HB2	1.65	0.78
1:A:81:MET:HE1	1:A:153:LEU:HD22	1.71	0.71
1:B:91:LEU:HB3	1:B:121:THR:HG22	1.72	0.69
1:B:188:ILE:CD1	1:C:45:ALA:HB2	2.24	0.67
1:B:200:ILE:HG21	1:C:43:SER:HB3	1.76	0.67
1:D:173:ARG:O	1:D:176:THR:HG22	1.98	0.62
1:C:199:LYS:O	1:C:203:LEU:HD13	2.01	0.61
1:A:160:ARG:NH1	3:A:2047:HOH:O	2.32	0.61
1:A:81:MET:CE	1:A:153:LEU:HD22	2.33	0.59
1:A:89:ARG:NH1	1:B:186:THR:HG22	2.18	0.58
1:D:173:ARG:HG2	1:D:219:TYR:HB2	1.90	0.53
1:D:91:LEU:HB3	1:D:121:THR:HG22	1.89	0.53
1:A:89:ARG:HH12	1:B:186:THR:HG22	1.75	0.52
1:C:176:THR:HG22	1:C:243:TYR:OH	2.10	0.52
1:B:188:ILE:CD1	1:C:45:ALA:CB	2.91	0.49
1:A:81:MET:CE	1:A:81:MET:HA	2.42	0.49
1:C:110:ILE:HG13	1:C:113:LYS:HD2	1.96	0.48
1:D:110:ILE:HG13	1:D:113:LYS:HD2	1.96	0.47
1:C:53:PHE:HD1	1:C:79:THR:HG23	1.80	0.46
1:B:117:ALA:O	1:B:121:THR:HG23	2.17	0.45
1:D:172:LEU:HG	1:D:250:ARG:HG2	1.99	0.45
1:C:172:LEU:HG	1:C:250:ARG:HG2	1.99	0.44
1:B:217:LEU:HG	1:B:218:ASP:N	2.33	0.44
1:A:99:LYS:HD2	3:A:2002:HOH:O	2.18	0.43
1:B:105:ASN:OD1	1:B:107:THR:HG23	2.18	0.43
1:B:172:LEU:HG	1:B:250:ARG:HG2	2.00	0.43
1:A:185:ARG:HH12	1:D:185:ARG:HH11	1.65	0.43
1:A:239:GLU:HG3	1:B:163:LEU:HD21	2.01	0.43
1:C:237:ASP:OD2	1:C:240:LEU:HD13	2.18	0.42
1:C:43:SER:OG	1:C:44:ASN:N	2.50	0.42
1:B:217:LEU:HG	1:B:218:ASP:H	1.83	0.42
1:D:117:ALA:O	1:D:121:THR:HG23	2.21	0.41
1:D:151:ALA:HB2	1:D:269:PHE:HE2	1.85	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	222/238 (93%)	220 (99%)	2 (1%)	0	100	100
1	B	218/238 (92%)	216 (99%)	2 (1%)	0	100	100
1	C	209/238 (88%)	207 (99%)	2 (1%)	0	100	100
1	D	204/238 (86%)	203 (100%)	1 (0%)	0	100	100
All	All	853/952 (90%)	846 (99%)	7 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	194/204 (95%)	191 (98%)	3 (2%)	72	90
1	B	189/204 (93%)	189 (100%)	0	100	100
1	C	183/204 (90%)	181 (99%)	2 (1%)	80	93
1	D	179/204 (88%)	177 (99%)	2 (1%)	80	93
All	All	745/816 (91%)	738 (99%)	7 (1%)	84	95

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	67	ASP
1	A	141	GLU

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Mol	Chain	Res	Type
1	A	165	ARG
1	C	258	MET
1	C	270	GLU
1	D	239	GLU
1	D	258	MET

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

There are no carbohydrates in this entry.

5.6 Ligand geometry

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
1	A	226/238 (94%)	-0.04	5 (2%) 65 59	41, 63, 96, 137	0
1	B	222/238 (93%)	0.33	22 (9%) 9 6	42, 86, 176, 217	0
1	C	215/238 (90%)	0.32	19 (8%) 12 8	51, 97, 165, 188	0
1	D	210/238 (88%)	1.28	53 (25%) 1 0	49, 139, 205, 234	0
All	All	873/952 (91%)	0.46	99 (11%) 7 4	41, 86, 188, 234	0

All (99) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	64	LEU	10.7
1	D	137	ASP	10.6
1	D	112	GLN	7.6
1	D	110	ILE	7.2
1	D	116	LYS	6.8
1	B	105	ASN	6.6
1	C	207	LEU	6.6
1	D	100	GLN	6.4
1	D	49	PHE	5.9
1	D	98	ALA	5.6
1	D	75	ASP	5.5
1	D	74	THR	5.5
1	C	102	SER	5.4
1	D	103	THR	4.8
1	D	141	GLU	4.5
1	A	207	LEU	4.4
1	D	67	ASP	4.4
1	D	140	LEU	4.4
1	B	97	ASP	4.3
1	D	269	PHE	4.3
1	C	209	ASN	4.2

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Mol	Chain	Res	Type	RSRZ
1	D	101	ASP	4.2
1	D	142	LEU	4.1
1	D	102	SER	4.1
1	D	147	TYR	4.0
1	D	114	TYR	4.0
1	C	112	GLN	3.9
1	D	209	ASN	3.9
1	A	47	PRO	3.9
1	D	218	ASP	3.9
1	B	98	ALA	3.8
1	C	267	LYS	3.8
1	D	66	PRO	3.8
1	D	118	TYR	3.8
1	D	131	GLU	3.7
1	A	205	LEU	3.7
1	D	111	LYS	3.7
1	D	77	LEU	3.7
1	C	110	ILE	3.7
1	D	119	GLU	3.5
1	D	265	ALA	3.5
1	C	113	LYS	3.5
1	B	112	GLN	3.4
1	B	117	ALA	3.3
1	B	106	GLY	3.3
1	C	194	PRO	3.2
1	D	138	ALA	3.2
1	C	208	GLU	3.2
1	C	111	LYS	3.1
1	D	262	LEU	3.0
1	B	110	ILE	3.0
1	B	102	SER	3.0
1	D	210	ASN	3.0
1	A	46	GLN	2.9
1	B	53	PHE	2.9
1	D	256	ARG	2.9
1	D	219	TYR	2.9
1	D	78	ILE	2.9
1	C	193	GLU	2.8
1	D	68	GLN	2.8
1	B	107	THR	2.8
1	D	76	ASP	2.7
1	B	93	ILE	2.7

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Mol	Chain	Res	Type	RSRZ
1	D	53	PHE	2.7
1	C	259	LYS	2.7
1	D	264	GLY	2.6
1	B	210	ASN	2.6
1	D	115	ASP	2.6
1	D	71	LYS	2.6
1	D	91	LEU	2.6
1	B	45	ALA	2.6
1	C	268	LEU	2.6
1	D	120	LYS	2.6
1	C	202	ARG	2.6
1	B	47	PRO	2.6
1	B	71	LYS	2.6
1	B	115	ASP	2.5
1	B	46	GLN	2.5
1	D	113	LYS	2.5
1	D	259	LYS	2.5
1	D	84	LYS	2.4
1	B	131	GLU	2.4
1	D	139	LEU	2.4
1	C	270	GLU	2.3
1	B	48	GLU	2.3
1	A	206	THR	2.3
1	D	126	GLU	2.3
1	D	257	ALA	2.3
1	C	205	LEU	2.2
1	C	67	ASP	2.2
1	D	143	THR	2.2
1	D	266	ASP	2.2
1	D	94	LYS	2.2
1	B	119	GLU	2.2
1	B	75	ASP	2.1
1	C	219	TYR	2.1
1	C	263	GLU	2.1
1	D	267	LYS	2.0
1	B	101	ASP	2.0

6.2 Non-standard residues in protein, DNA, RNA chains (i)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates (i)

There are no carbohydrates in this entry.

6.4 Ligands (i)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å^2)	Q<0.9
2	CL	B	1273	1/1	0.92	0.15	-0.97	67,67,67,67	0

6.5 Other polymers (i)

There are no such residues in this entry.