



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 13, 2017 – 08:51 pm GMT

PDB ID : 3FHM
Title : Crystal structure of the CBS-domain containing protein ATU1752 from *Agrobacterium tumefaciens*
Authors : Singer, A.U.; Xu, X.; Zhang, R.; Cui, H.; Kudritsdka, M.; Edwards, A.M.; Joachimiak, A.; Yakunin, A.F.; Savchenko, A.; Midwest Center for Structural Genomics (MCSG)
Deposited on : 2008-12-09
Resolution : 2.70 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 ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix) : 1.9-1692
EDS : trunk28620
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
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) : recalc28949

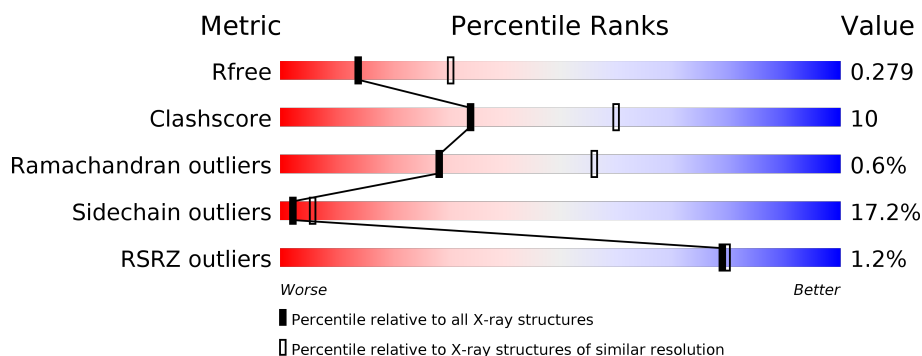
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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}	100719	2259 (2.70-2.70)
Clashscore	112137	2590 (2.70-2.70)
Ramachandran outliers	110173	2550 (2.70-2.70)
Sidechain outliers	110143	2550 (2.70-2.70)
RSRZ outliers	101464	2275 (2.70-2.70)

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 $\leq 5\%$. 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	165	<div> <div>61%</div> <div>17%</div> <div>• •</div> <div>18%</div> </div>
1	B	165	<div> <div>%</div> <div>54%</div> <div>19%</div> <div>• •</div> <div>24%</div> </div>
1	C	165	<div> <div>%</div> <div>61%</div> <div>16%</div> <div>•</div> <div>19%</div> </div>
1	D	165	<div> <div>2%</div> <div>58%</div> <div>13%</div> <div>•</div> <div>24%</div> </div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	SO4	C	145	-	-	X	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 4164 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 uncharacterized protein ATU1752.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	136	Total	C	N	O	S	0	0	0
			995	620	182	188	5			
1	B	126	Total	C	N	O	S	0	0	0
			928	575	172	177	4			
1	C	134	Total	C	N	O	S	0	0	0
			990	617	181	187	5			
1	D	125	Total	C	N	O	S	0	0	0
			916	569	170	173	4			

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	MET	-	expression tag	UNP A9CIP4
A	-19	GLY	-	expression tag	UNP A9CIP4
A	-18	SER	-	expression tag	UNP A9CIP4
A	-17	SER	-	expression tag	UNP A9CIP4
A	-16	HIS	-	expression tag	UNP A9CIP4
A	-15	HIS	-	expression tag	UNP A9CIP4
A	-14	HIS	-	expression tag	UNP A9CIP4
A	-13	HIS	-	expression tag	UNP A9CIP4
A	-12	HIS	-	expression tag	UNP A9CIP4
A	-11	HIS	-	expression tag	UNP A9CIP4
A	-10	SER	-	expression tag	UNP A9CIP4
A	-9	SER	-	expression tag	UNP A9CIP4
A	-8	GLY	-	expression tag	UNP A9CIP4
A	-7	ARG	-	expression tag	UNP A9CIP4
A	-6	GLU	-	expression tag	UNP A9CIP4
A	-5	ASN	-	expression tag	UNP A9CIP4
A	-4	LEU	-	expression tag	UNP A9CIP4
A	-3	TYR	-	expression tag	UNP A9CIP4
A	-2	PHE	-	expression tag	UNP A9CIP4
A	-1	GLN	-	expression tag	UNP A9CIP4
A	0	GLY	-	expression tag	UNP A9CIP4

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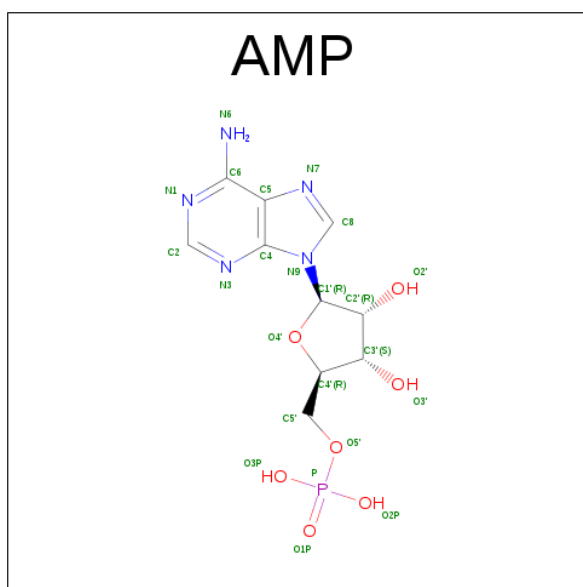
Chain	Residue	Modelled	Actual	Comment	Reference
B	-20	MET	-	expression tag	UNP A9CIP4
B	-19	GLY	-	expression tag	UNP A9CIP4
B	-18	SER	-	expression tag	UNP A9CIP4
B	-17	SER	-	expression tag	UNP A9CIP4
B	-16	HIS	-	expression tag	UNP A9CIP4
B	-15	HIS	-	expression tag	UNP A9CIP4
B	-14	HIS	-	expression tag	UNP A9CIP4
B	-13	HIS	-	expression tag	UNP A9CIP4
B	-12	HIS	-	expression tag	UNP A9CIP4
B	-11	HIS	-	expression tag	UNP A9CIP4
B	-10	SER	-	expression tag	UNP A9CIP4
B	-9	SER	-	expression tag	UNP A9CIP4
B	-8	GLY	-	expression tag	UNP A9CIP4
B	-7	ARG	-	expression tag	UNP A9CIP4
B	-6	GLU	-	expression tag	UNP A9CIP4
B	-5	ASN	-	expression tag	UNP A9CIP4
B	-4	LEU	-	expression tag	UNP A9CIP4
B	-3	TYR	-	expression tag	UNP A9CIP4
B	-2	PHE	-	expression tag	UNP A9CIP4
B	-1	GLN	-	expression tag	UNP A9CIP4
B	0	GLY	-	expression tag	UNP A9CIP4
C	-20	MET	-	expression tag	UNP A9CIP4
C	-19	GLY	-	expression tag	UNP A9CIP4
C	-18	SER	-	expression tag	UNP A9CIP4
C	-17	SER	-	expression tag	UNP A9CIP4
C	-16	HIS	-	expression tag	UNP A9CIP4
C	-15	HIS	-	expression tag	UNP A9CIP4
C	-14	HIS	-	expression tag	UNP A9CIP4
C	-13	HIS	-	expression tag	UNP A9CIP4
C	-12	HIS	-	expression tag	UNP A9CIP4
C	-11	HIS	-	expression tag	UNP A9CIP4
C	-10	SER	-	expression tag	UNP A9CIP4
C	-9	SER	-	expression tag	UNP A9CIP4
C	-8	GLY	-	expression tag	UNP A9CIP4
C	-7	ARG	-	expression tag	UNP A9CIP4
C	-6	GLU	-	expression tag	UNP A9CIP4
C	-5	ASN	-	expression tag	UNP A9CIP4
C	-4	LEU	-	expression tag	UNP A9CIP4
C	-3	TYR	-	expression tag	UNP A9CIP4
C	-2	PHE	-	expression tag	UNP A9CIP4
C	-1	GLN	-	expression tag	UNP A9CIP4
C	0	GLY	-	expression tag	UNP A9CIP4

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-20	MET	-	expression tag	UNP A9CIP4
D	-19	GLY	-	expression tag	UNP A9CIP4
D	-18	SER	-	expression tag	UNP A9CIP4
D	-17	SER	-	expression tag	UNP A9CIP4
D	-16	HIS	-	expression tag	UNP A9CIP4
D	-15	HIS	-	expression tag	UNP A9CIP4
D	-14	HIS	-	expression tag	UNP A9CIP4
D	-13	HIS	-	expression tag	UNP A9CIP4
D	-12	HIS	-	expression tag	UNP A9CIP4
D	-11	HIS	-	expression tag	UNP A9CIP4
D	-10	SER	-	expression tag	UNP A9CIP4
D	-9	SER	-	expression tag	UNP A9CIP4
D	-8	GLY	-	expression tag	UNP A9CIP4
D	-7	ARG	-	expression tag	UNP A9CIP4
D	-6	GLU	-	expression tag	UNP A9CIP4
D	-5	ASN	-	expression tag	UNP A9CIP4
D	-4	LEU	-	expression tag	UNP A9CIP4
D	-3	TYR	-	expression tag	UNP A9CIP4
D	-2	PHE	-	expression tag	UNP A9CIP4
D	-1	GLN	-	expression tag	UNP A9CIP4
D	0	GLY	-	expression tag	UNP A9CIP4

- Molecule 2 is ADENOSINE MONOPHOSPHATE (three-letter code: AMP) (formula: C₁₀H₁₄N₅O₇P).



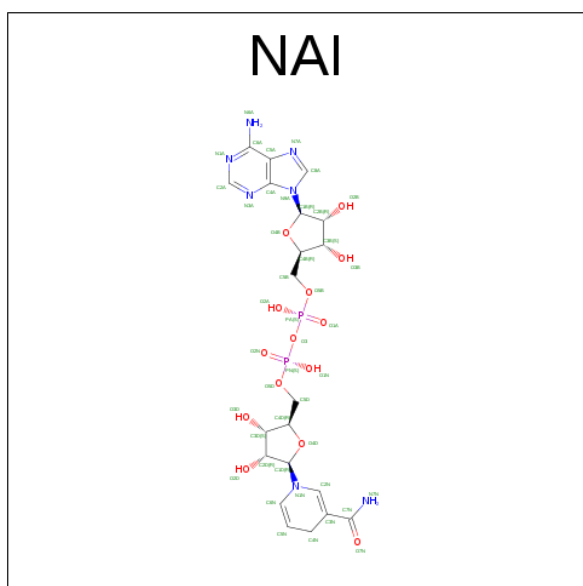
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			23	10	5	7	1		

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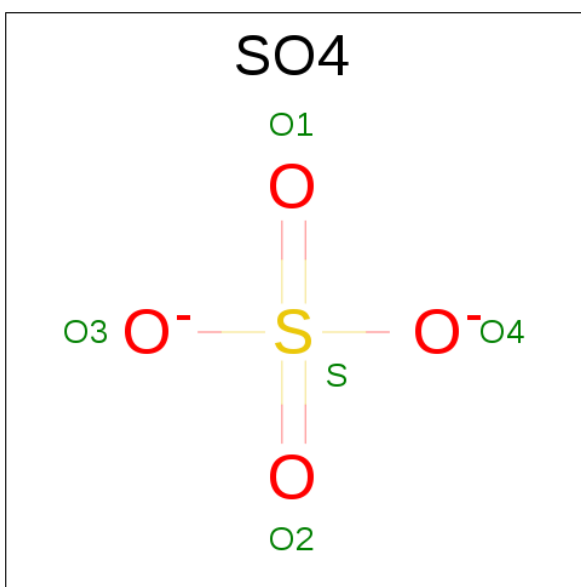
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	B	1	Total	C	N	O	P	0	0
			23	10	5	7	1		
2	C	1	Total	C	N	O	P	0	0
			23	10	5	7	1		
2	D	1	Total	C	N	O	P	0	0
			23	10	5	7	1		

- Molecule 3 is 1,4-DIHYDRONICOTINAMIDE ADENINE DINUCLEOTIDE (three-letter code: NAI) (formula: C₂₁H₂₉N₇O₁₄P₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
3	B	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
3	C	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
3	D	1	Total	C	N	O	P	0	0
			44	21	7	14	2		

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		
4	C	1	Total	O	S	0	0
			5	4	1		
4	D	1	Total	O	S	0	0
			5	4	1		

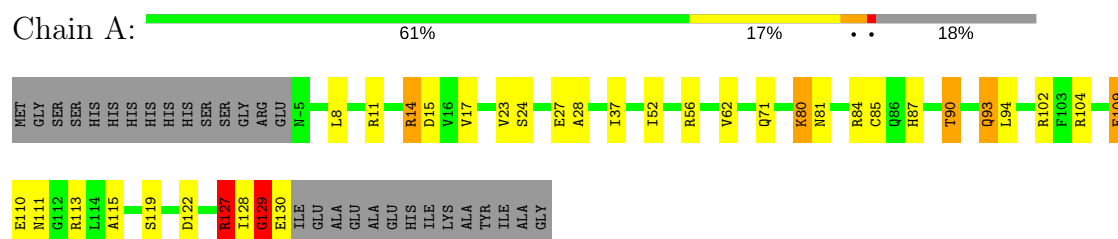
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	9	Total	O	0	0
			9	9		
5	B	13	Total	O	0	0
			13	13		
5	C	12	Total	O	0	0
			12	12		
5	D	13	Total	O	0	0
			13	13		

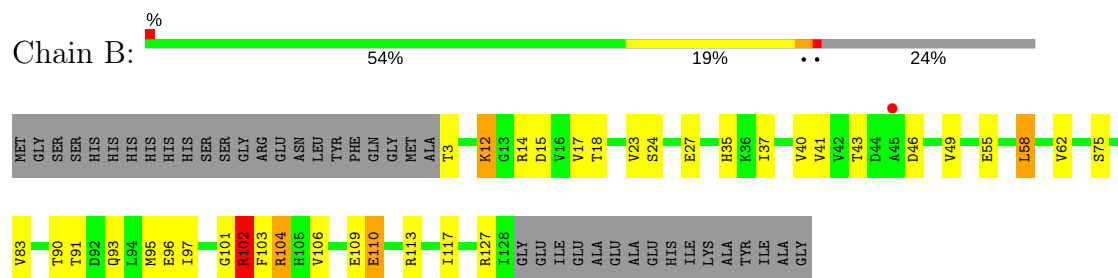
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes 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.

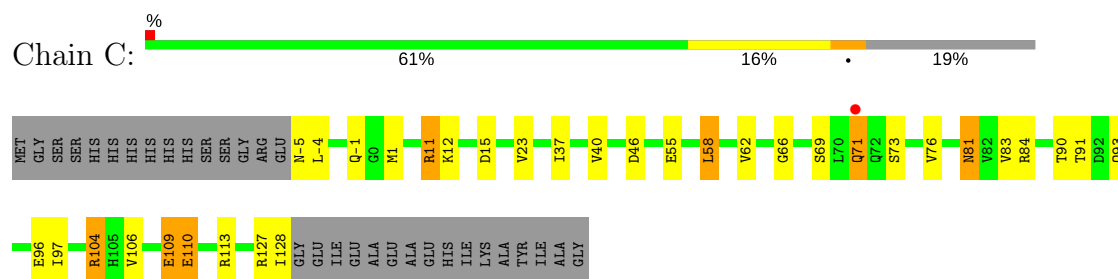
• Molecule 1: uncharacterized protein ATU1752



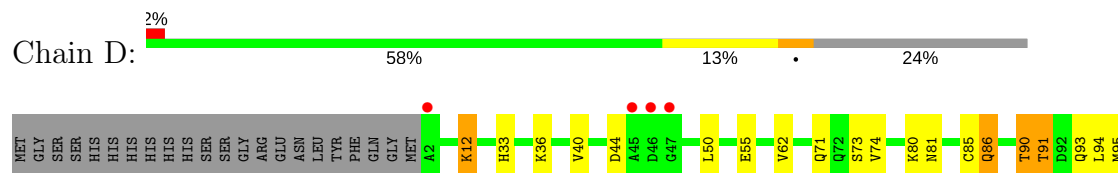
• Molecule 1: uncharacterized protein ATU1752



• Molecule 1: uncharacterized protein ATU1752



• Molecule 1: uncharacterized protein ATU1752



H98	R102	F103	V106	P107	V108	E109	GLU	ASN	G112	I117	G121	R127	I128	GLY	GLU	ILE	GLU	ALA	GLU	ALA	GLU	HIS	ILE	LYS	ALA	TYR	ILE	ALA	GLY
-----	------	------	------	------	------	------	-----	-----	------	------	------	------	------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	53.25Å 58.08Å 59.06Å 115.21° 106.15° 94.94°	Depositor
Resolution (Å)	30.37 – 2.70 30.37 – 2.70	Depositor EDS
% Data completeness (in resolution range)	91.6 (30.37-2.70) 75.8 (30.37-2.70)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.41 (at 2.68Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.195 , 0.262 0.222 , 0.279	Depositor DCC
R_{free} test set	782 reflections (5.21%)	DCC
Wilson B-factor (Å ²)	54.1	Xtriage
Anisotropy	0.139	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 35.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	4164	wwPDB-VP
Average B, all atoms (Å ²)	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.86% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: AMP, NAI, SO4

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	1.10	3/1005 (0.3%)	0.97	2/1358 (0.1%)
1	B	1.01	3/936 (0.3%)	0.98	1/1265 (0.1%)
1	C	0.95	2/1000 (0.2%)	0.95	1/1351 (0.1%)
1	D	0.88	0/923	0.97	0/1246
All	All	0.99	8/3864 (0.2%)	0.97	4/5220 (0.1%)

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	96	GLU	CD-OE2	8.74	1.35	1.25
1	A	85	CYS	CB-SG	-6.22	1.71	1.82
1	A	129	GLY	N-CA	6.18	1.55	1.46
1	C	96	GLU	CD-OE1	5.92	1.32	1.25
1	B	15	ASP	CB-CG	5.88	1.64	1.51
1	B	103	PHE	CE1-CZ	5.46	1.47	1.37
1	A	28	ALA	CA-CB	-5.35	1.41	1.52
1	B	96	GLU	CG-CD	5.14	1.59	1.51

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	104	ARG	NE-CZ-NH1	-6.28	117.16	120.30
1	A	122	ASP	CB-CG-OD1	5.96	123.67	118.30
1	A	127	ARG	NE-CZ-NH2	5.58	123.09	120.30
1	B	104	ARG	NE-CZ-NH2	-5.24	117.68	120.30

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	995	0	1015	19	0
1	B	928	0	957	15	0
1	C	990	0	1016	21	0
1	D	916	0	949	26	0
2	A	23	0	12	1	0
2	B	23	0	12	1	0
2	C	23	0	12	0	0
2	D	23	0	12	0	0
3	A	44	0	27	2	0
3	B	44	0	27	0	0
3	C	44	0	27	1	0
3	D	44	0	27	6	0
4	A	5	0	0	1	0
4	B	5	0	0	0	0
4	C	5	0	0	2	0
4	D	5	0	0	1	0
5	A	9	0	0	0	0
5	B	13	0	0	0	0
5	C	12	0	0	1	0
5	D	13	0	0	0	0
All	All	4164	0	4093	79	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 10.

All (79) 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:D:102:ARG:HH21	1:D:102:ARG:HG3	1.08	1.06
1:D:102:ARG:NH2	1:D:102:ARG:HG3	1.74	0.93
1:C:90:THR:H	1:C:93:GLN:NE2	1.67	0.91
1:C:71:GLN:HE21	1:C:71:GLN:HA	1.34	0.91
1:D:102:ARG:HH21	1:D:102:ARG:CG	1.87	0.88
1:D:33:HIS:O	1:D:36:LYS:HE3	1.74	0.85
1:C:-5:ASN:HA	5:C:155:HOH:O	1.78	0.84

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:58:LEU:HD13	1:C:58:LEU:HD13	1.65	0.77
1:B:110:GLU:HG3	1:B:110:GLU:O	1.86	0.74
1:A:90:THR:H	1:A:93:GLN:NE2	1.90	0.69
1:A:127:ARG:HH21	1:A:127:ARG:HB3	1.58	0.68
1:C:90:THR:H	1:C:93:GLN:HE21	1.39	0.68
1:D:12:LYS:HE3	1:D:117:ILE:O	1.94	0.68
1:D:44:ASP:HB3	1:D:50:LEU:HD11	1.78	0.65
1:A:90:THR:HG23	1:A:93:GLN:HE22	1.63	0.63
1:B:104:ARG:HD3	2:B:200:AMP:O3P	1.98	0.62
1:C:109:GLU:HG2	1:C:110:GLU:N	2.13	0.61
1:D:12:LYS:HE2	3:D:211:NAI:O2B	2.03	0.59
1:A:110:GLU:O	1:A:110:GLU:HG3	2.02	0.58
1:C:66:GLY:O	1:C:69:SER:OG	2.19	0.57
1:C:91:THR:CG2	1:C:127:ARG:HH11	2.19	0.56
1:B:95:MET:HE3	1:B:127:ARG:HD3	1.87	0.56
3:C:211:NAI:H8A	3:C:211:NAI:O2A	2.06	0.56
1:D:85:CYS:C	1:D:86:GLN:NE2	2.60	0.55
1:D:86:GLN:N	1:D:86:GLN:NE2	2.55	0.55
1:A:128:ILE:O	1:A:130:GLU:N	2.40	0.54
1:B:55:GLU:HG3	1:C:55:GLU:HG3	1.88	0.54
1:C:71:GLN:HE21	1:C:71:GLN:CA	2.12	0.54
1:B:18:THR:HG22	1:B:41:VAL:HB	1.90	0.54
1:D:85:CYS:HA	1:D:86:GLN:NE2	2.22	0.54
1:C:91:THR:HG22	1:C:127:ARG:HH11	1.73	0.54
1:D:86:GLN:HE21	1:D:86:GLN:N	2.06	0.54
1:A:14:ARG:HG2	1:A:115:ALA:O	2.08	0.53
1:D:121:GLY:N	3:D:211:NAI:O2N	2.41	0.53
1:B:17:VAL:HG11	1:B:35:HIS:HD2	1.73	0.53
1:C:-4:LEU:N	1:C:-4:LEU:HD12	2.22	0.53
1:C:91:THR:HG21	1:C:127:ARG:HD3	1.90	0.52
1:C:71:GLN:NE2	1:C:71:GLN:HA	2.14	0.51
1:C:93:GLN:O	1:C:97:ILE:HD13	2.10	0.50
1:A:109:GLU:HG2	1:A:110:GLU:N	2.27	0.50
1:B:90:THR:OG1	1:B:93:GLN:HG3	2.12	0.50
1:B:12:LYS:NZ	1:B:117:ILE:O	2.28	0.49
1:D:71:GLN:NE2	1:D:71:GLN:HA	2.28	0.48
1:B:101:GLY:O	1:B:102:ARG:HB2	2.13	0.48
1:B:24:SER:OG	1:B:27:GLU:HG3	2.14	0.48
1:A:24:SER:OG	1:A:27:GLU:HG3	2.13	0.48
1:D:98:MET:HG2	1:D:103:PHE:O	2.15	0.46
1:D:121:GLY:HA3	3:D:211:NAI:O2N	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:95:MET:CE	1:B:127:ARG:HD3	2.45	0.46
1:A:14:ARG:HH11	1:A:87:HIS:HE1	1.63	0.46
1:C:81:ASN:N	4:C:145:SO4:O2	2.38	0.46
1:B:104:ARG:NH2	1:C:104:ARG:CZ	2.78	0.46
1:A:80:LYS:HB2	4:A:145:SO4:O3	2.16	0.46
1:A:90:THR:HG23	1:A:93:GLN:NE2	2.28	0.45
3:D:211:NAI:H3B	3:D:211:NAI:H5N	1.99	0.45
1:B:90:THR:H	1:B:93:GLN:HE21	1.66	0.44
1:A:56:ARG:HB3	2:A:200:AMP:H5'2	1.99	0.44
1:A:110:GLU:O	1:A:111:ASN:HB2	2.17	0.44
1:D:33:HIS:O	1:D:36:LYS:CE	2.55	0.44
1:D:85:CYS:CA	1:D:86:GLN:NE2	2.80	0.43
1:A:90:THR:H	1:A:93:GLN:HE22	1.63	0.43
1:C:109:GLU:HA	1:C:113:ARG:O	2.19	0.43
1:A:104:ARG:NH2	3:D:211:NAI:O1N	2.52	0.43
1:C:73:SER:O	1:C:76:VAL:HG22	2.19	0.43
1:C:81:ASN:HB2	4:C:145:SO4:O2	2.19	0.43
1:D:36:LYS:HA	1:D:36:LYS:HD3	1.86	0.42
1:D:91:THR:O	1:D:95:MET:HG3	2.19	0.42
1:A:127:ARG:HH22	1:D:127:ARG:HE	1.68	0.42
1:D:90:THR:H	1:D:93:GLN:HE21	1.68	0.42
1:D:106:VAL:HA	1:D:107:PRO:HD3	1.86	0.41
3:A:211:NAI:H1D	1:D:102:ARG:HG2	2.01	0.41
1:A:129:GLY:O	1:A:130:GLU:CB	2.68	0.41
1:A:17:VAL:HG23	3:A:211:NAI:N1A	2.36	0.41
1:D:121:GLY:CA	3:D:211:NAI:O2N	2.69	0.41
1:B:43:THR:HG22	1:B:49:VAL:HA	2.02	0.40
1:D:85:CYS:HA	1:D:86:GLN:HE22	1.86	0.40
1:A:52:ILE:HD13	1:A:52:ILE:HG21	1.69	0.40
1:C:11:ARG:HG3	1:C:11:ARG:O	2.21	0.40
1:D:80:LYS:N	4:D:145:SO4:O1	2.54	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	134/165 (81%)	124 (92%)	9 (7%)	1 (1%)	25	53
1	B	124/165 (75%)	118 (95%)	5 (4%)	1 (1%)	22	49
1	C	132/165 (80%)	126 (96%)	6 (4%)	0	100	100
1	D	121/165 (73%)	117 (97%)	3 (2%)	1 (1%)	22	49
All	All	511/660 (77%)	485 (95%)	23 (4%)	3 (1%)	28	56

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	129	GLY
1	D	91	THR
1	B	102	ARG

5.3.2 Protein sidechains ⓘ

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	104/129 (81%)	85 (82%)	19 (18%)	2	5
1	B	100/129 (78%)	82 (82%)	18 (18%)	2	5
1	C	105/129 (81%)	86 (82%)	19 (18%)	2	5
1	D	98/129 (76%)	84 (86%)	14 (14%)	4	9
All	All	407/516 (79%)	337 (83%)	70 (17%)	2	6

All (70) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	8	LEU
1	A	11	ARG
1	A	14	ARG
1	A	15	ASP
1	A	23	VAL

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Mol	Chain	Res	Type
1	A	37	ILE
1	A	62	VAL
1	A	71	GLN
1	A	80	LYS
1	A	81	ASN
1	A	84	ARG
1	A	90	THR
1	A	93	GLN
1	A	94	LEU
1	A	102	ARG
1	A	109	GLU
1	A	113	ARG
1	A	119	SER
1	A	127	ARG
1	B	3	THR
1	B	12	LYS
1	B	14	ARG
1	B	23	VAL
1	B	37	ILE
1	B	40	VAL
1	B	46	ASP
1	B	58	LEU
1	B	62	VAL
1	B	75	SER
1	B	83	VAL
1	B	91	THR
1	B	97	ILE
1	B	102	ARG
1	B	106	VAL
1	B	109	GLU
1	B	110	GLU
1	B	113	ARG
1	C	-1	GLN
1	C	1	MET
1	C	11	ARG
1	C	12	LYS
1	C	15	ASP
1	C	23	VAL
1	C	37	ILE
1	C	40	VAL
1	C	46	ASP
1	C	58	LEU

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Mol	Chain	Res	Type
1	C	62	VAL
1	C	71	GLN
1	C	81	ASN
1	C	83	VAL
1	C	84	ARG
1	C	106	VAL
1	C	109	GLU
1	C	110	GLU
1	C	128	ILE
1	D	12	LYS
1	D	40	VAL
1	D	55	GLU
1	D	62	VAL
1	D	73	SER
1	D	74	VAL
1	D	81	ASN
1	D	86	GLN
1	D	90	THR
1	D	94	LEU
1	D	102	ARG
1	D	106	VAL
1	D	109	GLU
1	D	127	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	71	GLN
1	A	86	GLN
1	A	87	HIS
1	A	93	GLN
1	B	35	HIS
1	B	93	GLN
1	C	71	GLN
1	C	72	GLN
1	C	93	GLN
1	D	71	GLN
1	D	72	GLN
1	D	86	GLN
1	D	93	GLN

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 ⓘ

12 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
4	SO4	A	145	-	4,4,4	0.19	0	6,6,6	0.20	0
2	AMP	A	200	-	22,25,25	1.57	4 (18%)	24,38,38	2.22	9 (37%)
3	NAI	A	211	-	40,48,48	1.45	4 (10%)	41,73,73	1.87	10 (24%)
4	SO4	B	145	-	4,4,4	0.39	0	6,6,6	0.49	0
2	AMP	B	200	-	22,25,25	1.75	3 (13%)	24,38,38	2.31	8 (33%)
3	NAI	B	211	-	40,48,48	1.44	5 (12%)	41,73,73	2.05	10 (24%)
4	SO4	C	145	-	4,4,4	0.35	0	6,6,6	0.65	0
2	AMP	C	200	-	22,25,25	1.42	3 (13%)	24,38,38	1.82	7 (29%)
3	NAI	C	211	-	40,48,48	1.34	4 (10%)	41,73,73	2.02	9 (21%)
4	SO4	D	145	-	4,4,4	0.17	0	6,6,6	0.44	0
2	AMP	D	200	-	22,25,25	1.64	3 (13%)	24,38,38	1.77	6 (25%)
3	NAI	D	211	-	40,48,48	1.50	6 (15%)	41,73,73	1.87	11 (26%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means

no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	SO4	A	145	-	-	0/0/0/0	0/0/0/0
2	AMP	A	200	-	-	0/6/26/26	0/3/3/3
3	NAI	A	211	-	-	0/25/72/72	0/5/5/5
4	SO4	B	145	-	-	0/0/0/0	0/0/0/0
2	AMP	B	200	-	-	0/6/26/26	0/3/3/3
3	NAI	B	211	-	-	0/25/72/72	0/5/5/5
4	SO4	C	145	-	-	0/0/0/0	0/0/0/0
2	AMP	C	200	-	-	0/6/26/26	0/3/3/3
3	NAI	C	211	-	-	0/25/72/72	0/5/5/5
4	SO4	D	145	-	-	0/0/0/0	0/0/0/0
2	AMP	D	200	-	-	0/6/26/26	0/3/3/3
3	NAI	D	211	-	-	0/25/72/72	0/5/5/5

All (32) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	211	NAI	C4N-C5N	-4.61	1.39	1.49
3	D	211	NAI	C4N-C5N	-4.22	1.39	1.49
3	C	211	NAI	C4N-C5N	-3.92	1.40	1.49
2	A	200	AMP	C2'-C1'	-3.90	1.47	1.53
3	A	211	NAI	C4N-C5N	-3.30	1.41	1.49
3	A	211	NAI	C2B-C1B	-2.92	1.49	1.53
3	D	211	NAI	C2B-C1B	-2.23	1.50	1.53
2	A	200	AMP	C5-N7	-2.18	1.32	1.39
2	A	200	AMP	C2'-C3'	-2.11	1.47	1.53
3	C	211	NAI	C2A-N3A	2.04	1.35	1.32
3	D	211	NAI	O4B-C1B	2.14	1.44	1.41
3	B	211	NAI	O4B-C1B	2.16	1.44	1.41
3	A	211	NAI	C2N-C3N	2.35	1.41	1.34
3	B	211	NAI	C2N-C3N	2.49	1.42	1.34
2	B	200	AMP	C2-N3	2.63	1.36	1.32
2	B	200	AMP	C5-C4	2.67	1.46	1.40
2	C	200	AMP	C2-N1	2.75	1.39	1.33
3	D	211	NAI	C2N-C3N	2.82	1.42	1.34
2	C	200	AMP	C2-N3	2.86	1.36	1.32
2	D	200	AMP	O4'-C1'	3.10	1.45	1.41
3	C	211	NAI	C6N-C5N	3.16	1.39	1.33
2	D	200	AMP	C2-N3	3.23	1.37	1.32
3	B	211	NAI	C5A-C4A	3.34	1.48	1.40
3	D	211	NAI	C5A-C4A	3.37	1.48	1.40
3	B	211	NAI	C6N-C5N	3.47	1.39	1.33
3	C	211	NAI	C5A-C4A	3.47	1.48	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	200	AMP	C5-C4	3.64	1.48	1.40
2	A	200	AMP	C5-C4	3.84	1.49	1.40
2	D	200	AMP	C5-C4	4.23	1.50	1.40
3	D	211	NAI	C6N-C5N	4.51	1.41	1.33
3	A	211	NAI	C6N-C5N	5.66	1.43	1.33
2	B	200	AMP	O4'-C1'	6.26	1.49	1.41

All (70) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	211	NAI	N3A-C2A-N1A	-8.58	121.39	128.86
3	A	211	NAI	N3A-C2A-N1A	-7.51	122.32	128.86
3	D	211	NAI	N3A-C2A-N1A	-6.73	122.99	128.86
3	B	211	NAI	C4A-C5A-N7A	-5.95	103.67	109.41
3	B	211	NAI	N3A-C2A-N1A	-5.53	124.04	128.86
2	A	200	AMP	N3-C2-N1	-5.06	124.45	128.86
2	A	200	AMP	O5'-P-O1P	-4.86	92.84	106.47
2	C	200	AMP	N3-C2-N1	-4.77	124.70	128.86
3	B	211	NAI	O3D-C3D-C4D	-4.19	98.84	111.09
2	B	200	AMP	C4-C5-N7	-4.08	105.47	109.41
2	B	200	AMP	N3-C2-N1	-4.06	125.33	128.86
2	B	200	AMP	O4'-C4'-C3'	-3.76	97.69	105.17
3	B	211	NAI	O5B-PA-O1A	-3.63	94.60	109.25
3	C	211	NAI	C1B-N9A-C4A	-3.57	120.47	126.64
3	D	211	NAI	C4A-C5A-N7A	-3.46	106.07	109.41
3	C	211	NAI	C4A-C5A-N7A	-3.34	106.19	109.41
2	D	200	AMP	N3-C2-N1	-3.33	125.96	128.86
3	A	211	NAI	O2B-C2B-C1B	-3.08	101.98	111.61
2	B	200	AMP	O3P-P-O5'	-3.07	98.57	106.73
3	A	211	NAI	C1D-N1N-C2N	-2.96	116.06	121.09
3	D	211	NAI	O2B-C2B-C1B	-2.91	102.51	111.61
3	A	211	NAI	C4A-C5A-N7A	-2.88	106.62	109.41
3	A	211	NAI	O3B-C3B-C4B	-2.73	103.12	111.09
2	A	200	AMP	O3'-C3'-C2'	-2.62	103.45	111.83
2	D	200	AMP	C4-C5-N7	-2.51	106.99	109.41
3	C	211	NAI	O4B-C4B-C5B	-2.46	101.09	109.40
2	C	200	AMP	O5'-P-O1P	-2.37	99.81	106.47
3	B	211	NAI	O5D-PN-O2N	-2.34	99.80	109.25
2	C	200	AMP	O3'-C3'-C4'	-2.30	104.36	111.09
2	C	200	AMP	C1'-N9-C4	-2.26	122.74	126.64
3	A	211	NAI	O2B-C2B-C3B	-2.25	104.62	111.83
3	A	211	NAI	C5B-C4B-C3B	-2.20	106.91	115.29

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	211	NAI	C5D-C4D-C3D	-2.19	106.95	115.29
2	A	200	AMP	C1'-N9-C4	-2.18	122.87	126.64
3	D	211	NAI	O3B-C3B-C4B	-2.13	104.85	111.09
2	D	200	AMP	C1'-N9-C4	-2.12	122.98	126.64
2	B	200	AMP	O3'-C3'-C4'	-2.10	104.96	111.09
3	B	211	NAI	O3B-C3B-C4B	-2.09	104.98	111.09
3	C	211	NAI	C3N-C2N-N1N	-2.09	120.05	123.08
3	D	211	NAI	O5B-C5B-C4B	-2.06	101.71	109.00
3	D	211	NAI	O4D-C1D-N1N	-2.02	103.99	108.07
3	D	211	NAI	O2A-PA-O1A	2.10	123.13	112.28
3	A	211	NAI	O2D-C2D-C1D	2.10	117.05	109.96
2	A	200	AMP	N6-C6-N1	2.12	122.97	118.77
3	C	211	NAI	C2D-C3D-C4D	2.16	106.83	102.62
2	C	200	AMP	P-O5'-C5'	2.16	124.26	118.30
3	B	211	NAI	O4D-C1D-N1N	2.17	112.44	108.07
2	B	200	AMP	O2P-P-O5'	2.25	112.73	106.73
3	A	211	NAI	C2D-C3D-C4D	2.27	107.04	102.62
3	A	211	NAI	O2A-PA-O1A	2.28	124.08	112.28
3	B	211	NAI	C2A-N1A-C6A	2.30	122.79	118.77
3	C	211	NAI	C2A-N1A-C6A	2.34	122.86	118.77
3	C	211	NAI	O5D-C5D-C4D	2.39	117.48	109.00
2	A	200	AMP	O3P-P-O2P	2.43	117.41	107.61
2	A	200	AMP	O3P-P-O5'	2.50	113.39	106.73
3	D	211	NAI	C2D-C3D-C4D	2.50	107.49	102.62
3	B	211	NAI	C4B-O4B-C1B	2.59	112.53	109.77
3	B	211	NAI	C5A-C6A-N6A	2.71	126.00	120.47
2	A	200	AMP	C2-N1-C6	2.79	123.66	118.77
2	C	200	AMP	O2'-C2'-C3'	2.79	120.78	111.83
2	D	200	AMP	C2'-C3'-C4'	2.81	108.10	102.62
3	D	211	NAI	C4D-O4D-C1D	2.85	115.84	109.47
2	D	200	AMP	P-O5'-C5'	2.94	126.39	118.30
2	C	200	AMP	N6-C6-N1	3.03	124.77	118.77
3	D	211	NAI	C4B-O4B-C1B	3.05	113.01	109.77
2	B	200	AMP	O3P-P-O1P	3.06	122.46	110.50
3	C	211	NAI	O4D-C1D-N1N	3.52	115.16	108.07
2	D	200	AMP	C4'-O4'-C1'	3.83	113.85	109.77
2	A	200	AMP	P-O5'-C5'	4.11	129.60	118.30
2	B	200	AMP	C4'-O4'-C1'	5.93	116.08	109.77

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

8 monomers are involved in 15 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	145	SO4	1	0
2	A	200	AMP	1	0
3	A	211	NAI	2	0
2	B	200	AMP	1	0
4	C	145	SO4	2	0
3	C	211	NAI	1	0
4	D	145	SO4	1	0
3	D	211	NAI	6	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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, 95th 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	136/165 (82%)	-0.24	0 100 100	9, 33, 45, 50	0
1	B	126/165 (76%)	-0.22	1 (0%) 86 86	9, 34, 45, 50	0
1	C	134/165 (81%)	-0.26	1 (0%) 87 88	8, 35, 45, 50	0
1	D	125/165 (75%)	-0.10	4 (3%) 48 48	8, 34, 44, 50	0
All	All	521/660 (78%)	-0.21	6 (1%) 79 80	8, 34, 45, 50	0

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	45	ALA	3.4
1	D	45	ALA	3.2
1	D	2	ALA	2.9
1	C	71	GLN	2.7
1	D	46	ASP	2.7
1	D	47	GLY	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, 95th 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	AMP	B	200	23/23	0.96	0.19	0.40	22,25,26,26	0
3	NAI	B	211	44/44	0.95	0.17	0.01	21,28,39,43	0
3	NAI	C	211	44/44	0.97	0.18	-0.11	20,28,39,43	0
3	NAI	A	211	44/44	0.97	0.17	-0.24	19,28,39,44	0
3	NAI	D	211	44/44	0.95	0.16	-0.28	20,28,39,43	0
2	AMP	D	200	23/23	0.97	0.15	-0.39	23,25,26,26	0
2	AMP	A	200	23/23	0.96	0.15	-0.40	22,24,26,27	0
2	AMP	C	200	23/23	0.97	0.13	-0.63	22,25,26,27	0
4	SO4	B	145	5/5	0.98	0.10	-2.00	44,44,46,48	0
4	SO4	C	145	5/5	0.89	0.12	-	73,74,77,78	0
4	SO4	D	145	5/5	0.86	0.21	-	118,118,119,120	0
4	SO4	A	145	5/5	0.89	0.10	-	107,108,108,108	0

6.5 Other polymers ⓘ

There are no such residues in this entry.