



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2018 – 02:33 pm GMT

PDB ID : 4KTV
Title : Structural insights of MAT enzymes: MATa2b complexed with adenosine and pyrophosphate
Authors : Murray, B.; Antonyuk, S.V.; Marina, A.; Lu, S.C.; Mato, J.M.; Hasnain, S.S.; Rojas, A.L.
Deposited on : 2013-05-21
Resolution : 3.30 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

<https://www.wwpdb.org/validation/2017/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 : 1.7.3 (157068), CSD as539be (2018)
Xtriage (Phenix) : 1.13
EDS : trunk30967
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)
Refmac : 5.8.0158
CCP4 : 7.0 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk30967

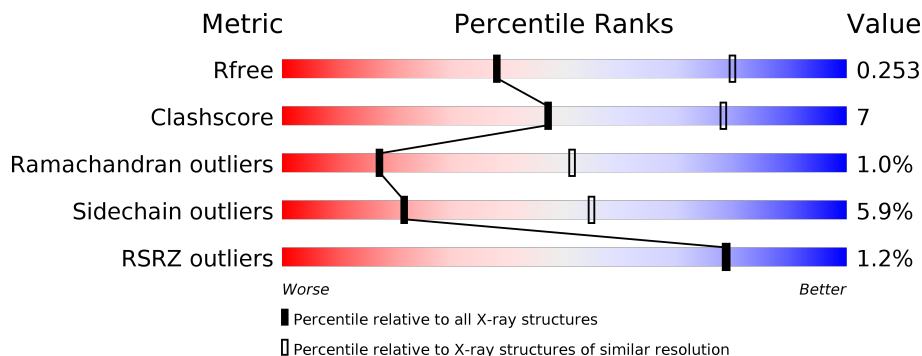
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.30 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}	111664	1168 (3.36-3.24)
Clashscore	122126	1022 (3.34-3.26)
Ramachandran outliers	120053	1004 (3.34-3.26)
Sidechain outliers	120020	1003 (3.34-3.26)
RSRZ outliers	108989	1133 (3.36-3.24)

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	396	
1	B	396	
1	C	396	
1	D	396	
2	E	327	
2	F	327	

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 criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	EDO	C	402	-	-	-	X

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 16508 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 S-adenosylmethionine synthase isoform type-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	362	2822	1790	492	529	11	0	0	0
1	B	381	2963	1872	518	562	11	0	0	0
1	C	361	2815	1785	491	528	11	0	0	0
1	D	381	2963	1872	518	562	11	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	SER	-	EXPRESSION TAG	UNP P31153
B	0	SER	-	EXPRESSION TAG	UNP P31153
C	0	SER	-	EXPRESSION TAG	UNP P31153
D	0	SER	-	EXPRESSION TAG	UNP P31153

- Molecule 2 is a protein called Methionine adenosyltransferase 2 subunit beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	E	309	2448	1546	446	446	10	0	0	0
2	F	295	2359	1493	431	425	10	0	1	0

There are 8 discrepancies between the modelled and reference sequences:

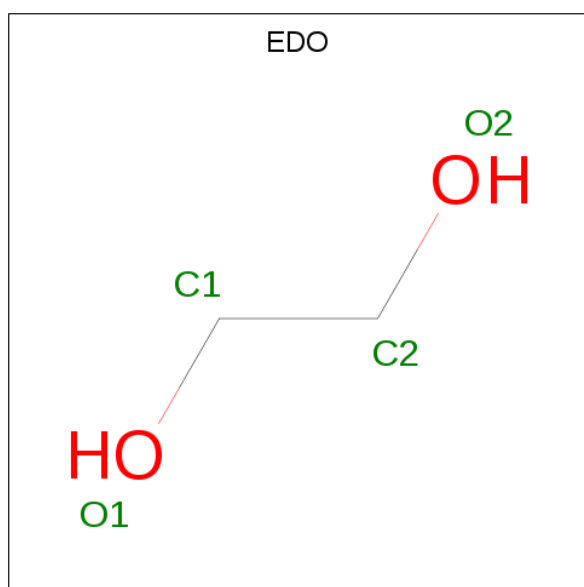
Chain	Residue	Modelled	Actual	Comment	Reference
E	-3	GLY	-	EXPRESSION TAG	UNP Q9NZL9
E	-2	SER	-	EXPRESSION TAG	UNP Q9NZL9
E	-1	HIS	-	EXPRESSION TAG	UNP Q9NZL9
E	0	MET	-	EXPRESSION TAG	UNP Q9NZL9

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Chain	Residue	Modelled	Actual	Comment	Reference
F	-3	GLY	-	EXPRESSION TAG	UNP Q9NZL9
F	-2	SER	-	EXPRESSION TAG	UNP Q9NZL9
F	-1	HIS	-	EXPRESSION TAG	UNP Q9NZL9
F	0	MET	-	EXPRESSION TAG	UNP Q9NZL9

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



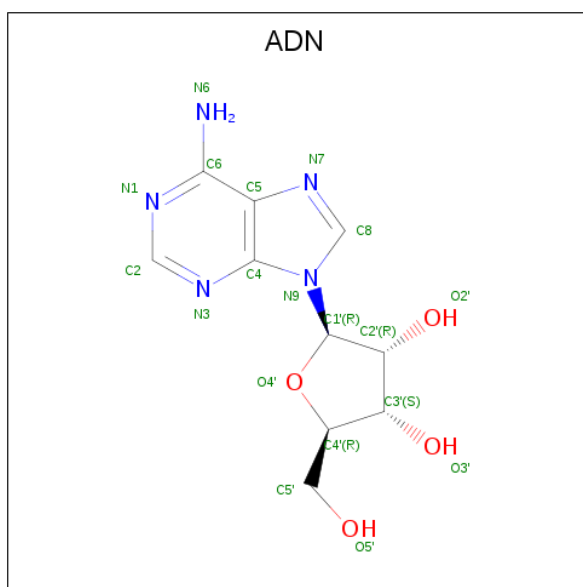
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0

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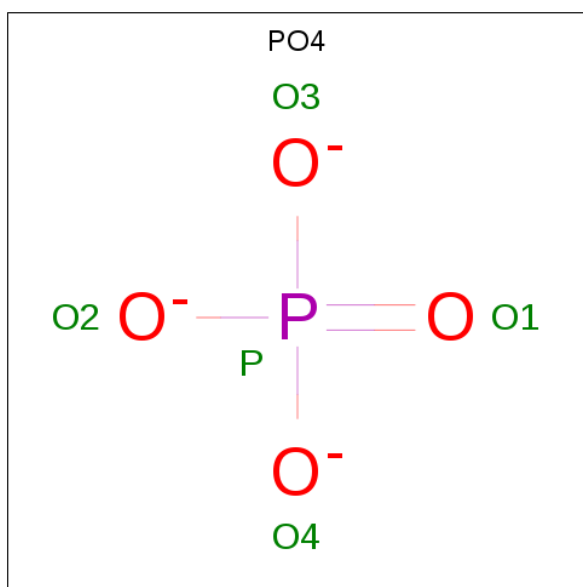
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	D	1	Total	C	O	0	0
			4	2	2		
3	D	1	Total	C	O	0	0
			4	2	2		
3	E	1	Total	C	O	0	0
			4	2	2		

- Molecule 4 is ADENOSINE (three-letter code: ADN) (formula: C₁₀H₁₃N₅O₄).



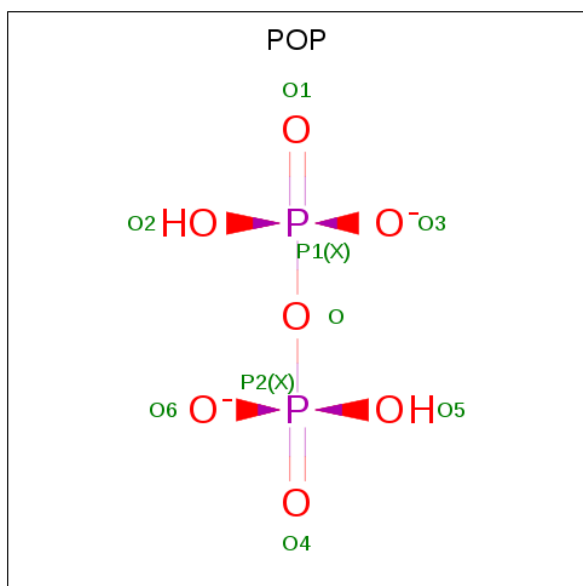
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			19	10	5	4		
4	C	1	Total	C	N	O	0	0
			19	10	5	4		

- Molecule 5 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	O	P	0	0
			5	4	1		

- Molecule 6 is PYROPHOSPHATE 2- (three-letter code: POP) (formula: H₂O₇P₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	C	1	Total	O	P	0	0
			9	7	2		

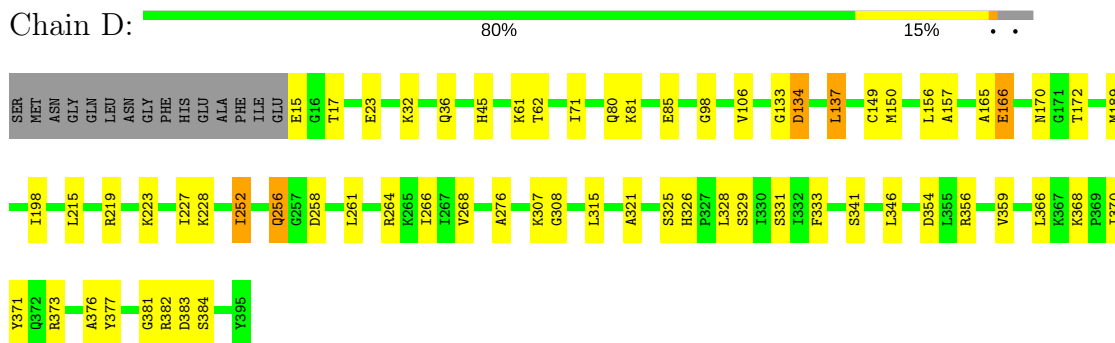
- Molecule 7 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	D	1	Total Mg 1 1	0	0

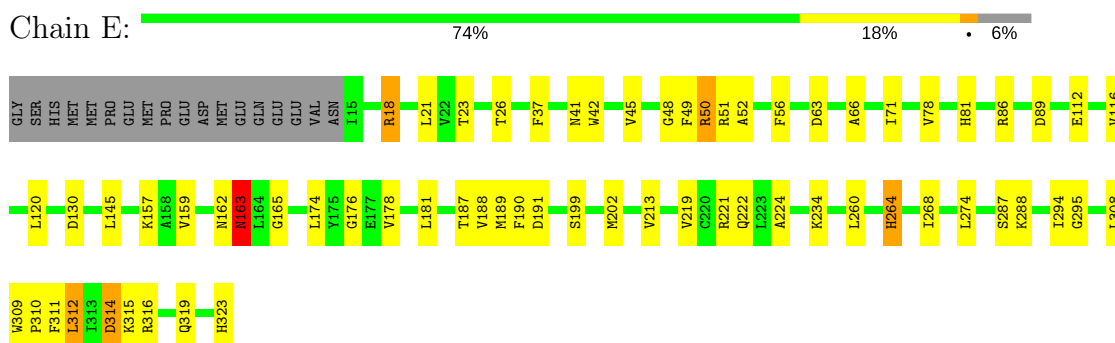
- Molecule 8 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	7	Total O 7 7	0	0
8	B	8	Total O 8 8	0	0
8	C	4	Total O 4 4	0	0
8	D	13	Total O 13 13	0	0
8	E	3	Total O 3 3	0	0
8	F	2	Total O 2 2	0	0

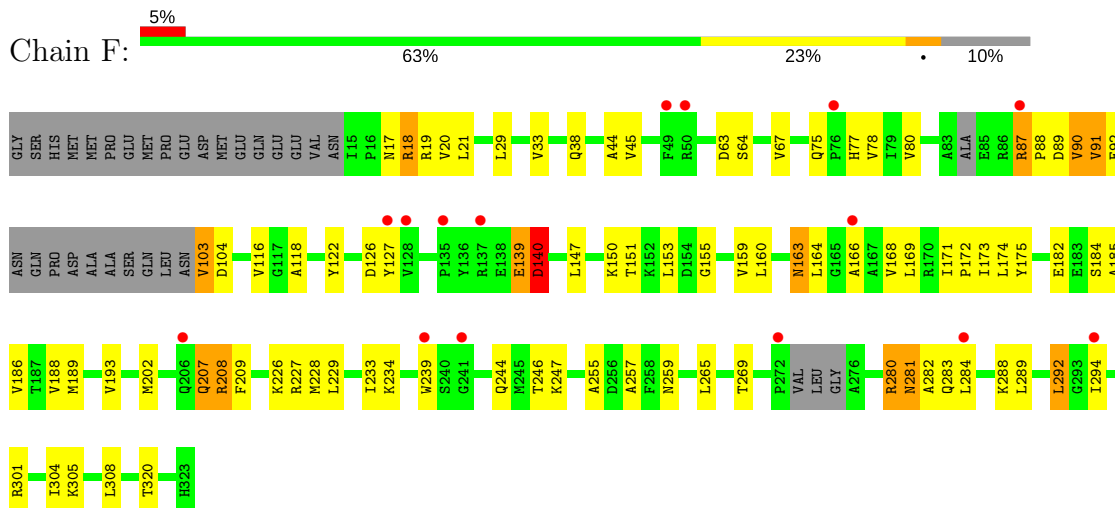
• Molecule 1: S-adenosylmethionine synthase isoform type-2



• Molecule 2: Methionine adenosyltransferase 2 subunit beta



• Molecule 2: Methionine adenosyltransferase 2 subunit beta



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	72.09Å 116.57Å 299.48Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	108.87 – 3.30 108.63 – 3.30	Depositor EDS
% Data completeness (in resolution range)	99.8 (108.87-3.30) 99.8 (108.63-3.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.54 (at 3.33Å)	Xtrriage
Refinement program	PHENIX, REFMAC 5.7.0029	Depositor
R, R_{free}	0.176 , 0.260 0.181 , 0.253	Depositor DCC
R_{free} test set	1949 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	69.3	Xtrriage
Anisotropy	0.045	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 74.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	16508	wwPDB-VP
Average B, all atoms (Å ²)	70.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.40% 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: ADN, MG, PO4, POP, EDO

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	0.41	0/2879	0.63	0/3893
1	B	0.42	0/3022	0.64	0/4088
1	C	0.40	0/2871	0.63	0/3881
1	D	0.43	0/3022	0.64	0/4088
2	E	0.40	0/2507	0.62	0/3401
2	F	0.40	0/2417	0.63	0/3271
All	All	0.41	0/16718	0.63	0/22622

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 [i](#)

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	2822	0	2832	41	0
1	B	2963	0	2956	38	0
1	C	2815	0	2825	28	0
1	D	2963	0	2956	35	0
2	E	2448	0	2418	34	0
2	F	2359	0	2335	55	0
3	A	8	0	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	16	0	24	1	0
3	C	8	0	12	0	0
3	D	12	0	18	2	0
3	E	4	0	6	0	0
4	A	19	0	13	2	0
4	C	19	0	13	0	0
5	A	5	0	0	0	0
6	C	9	0	0	0	0
7	D	1	0	0	0	0
8	A	7	0	0	0	0
8	B	8	0	0	0	0
8	C	4	0	0	0	0
8	D	13	0	0	0	0
8	E	3	0	0	0	0
8	F	2	0	0	0	0
All	All	16508	0	16420	220	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 7.

All (220) 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:A:189:MET:HB2	1:A:198:ILE:HD11	1.66	0.77
1:D:189:MET:HB2	1:D:198:ILE:HD11	1.67	0.77
1:A:25:VAL:HG12	1:A:181:LYS:HG2	1.64	0.77
1:C:200:VAL:HG23	1:C:235:TYR:HB3	1.72	0.72
1:C:48:GLN:HB2	1:C:75:ALA:HB2	1.72	0.71
2:F:168:VAL:HG12	2:F:168:VAL:O	1.92	0.70
1:A:156:LEU:HD22	1:A:231:VAL:HG22	1.77	0.65
1:A:45:HIS:CD2	1:A:77:VAL:HG21	2.32	0.65
2:F:126:ASP:HB3	2:F:284:LEU:HD21	1.79	0.65
1:D:321:ALA:HB2	1:D:328:LEU:HD11	1.78	0.64
2:E:78:VAL:HG21	2:E:224:ALA:HB1	1.79	0.64
1:C:45:HIS:CD2	1:C:77:VAL:HG21	2.32	0.64
2:F:88:PRO:HA	2:F:89:ASP:C	2.19	0.64
2:E:174:LEU:HD13	2:E:213:VAL:HG12	1.79	0.63
2:F:103:VAL:N	2:F:104:ASP:HA	2.14	0.63
2:F:226:LYS:O	2:F:226:LYS:HD3	1.99	0.62
1:A:59:VAL:HG21	1:B:59:VAL:HG21	1.83	0.61
1:A:373:ARG:O	1:A:382:ARG:NH2	2.34	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:109:ALA:HB1	1:B:61:LYS:HE2	1.83	0.59
2:F:19:ARG:NH1	2:F:75:GLN:O	2.35	0.59
1:B:200:VAL:O	1:B:240:THR:HG23	2.04	0.57
2:F:184:SER:O	2:F:188:VAL:HG13	2.03	0.57
1:A:370:ILE:HB	1:A:373:ARG:HE	1.69	0.57
1:B:376:ALA:O	1:B:382:ARG:NH2	2.37	0.57
1:A:261:LEU:HD11	1:B:57:GLU:HB3	1.87	0.57
1:C:261:LEU:HB3	1:D:261:LEU:HD13	1.87	0.57
1:B:334:HIS:CD2	1:B:342:GLU:HG3	2.39	0.57
1:C:267:ILE:HG22	1:C:272:GLY:HA2	1.87	0.57
1:A:352:ASN:O	1:A:391:LYS:HE3	2.05	0.56
1:A:137:LEU:HD11	1:A:317:GLN:CG	2.36	0.56
2:E:116:VAL:HG12	2:E:116:VAL:O	2.06	0.56
2:E:176:GLY:O	2:E:178:VAL:HG13	2.06	0.55
2:E:219:VAL:HG22	2:E:295:GLY:HA2	1.88	0.55
1:D:252:ILE:O	1:D:252:ILE:HG23	2.07	0.55
2:E:18:ARG:NH1	2:E:41:ASN:O	2.40	0.55
2:F:173:ILE:HD11	2:F:185:ALA:HB3	1.89	0.55
2:F:207:GLN:HA	2:F:246:THR:HG22	1.87	0.55
1:B:189:MET:HB2	1:B:198:ILE:HD11	1.88	0.54
2:F:63:ASP:O	2:F:67:VAL:HG23	2.07	0.54
1:A:137:LEU:HD11	1:A:317:GLN:HG2	1.89	0.54
1:D:98:GLY:O	1:D:256:GLN:HG2	2.07	0.54
1:B:48:GLN:HB2	1:B:75:ALA:HB2	1.88	0.54
1:A:59:VAL:HG22	1:A:261:LEU:HD22	1.89	0.54
1:B:345:LEU:O	1:B:349:VAL:HG23	2.08	0.54
2:F:257:ALA:HB1	2:F:305:LYS:HD2	1.90	0.53
1:D:346:LEU:HD22	3:D:403:EDO:H12	1.89	0.53
2:F:20:VAL:HA	2:F:78:VAL:O	2.08	0.53
2:F:116:VAL:HG12	2:F:116:VAL:O	2.09	0.53
2:F:87:ARG:O	2:F:89:ASP:HB3	2.09	0.52
2:F:292:LEU:N	2:F:292:LEU:HD22	2.24	0.52
2:E:37:PHE:CZ	2:E:221:ARG:HA	2.44	0.52
2:E:23:THR:OG1	2:E:81:HIS:HA	2.10	0.52
1:B:94:ASP:OD2	1:B:96:SER:HB2	2.10	0.52
2:F:182:GLU:HA	2:F:188:VAL:HG12	1.91	0.52
1:C:45:HIS:CE1	1:C:71:ILE:HG21	2.45	0.51
1:B:74:ARG:CZ	1:B:74:ARG:HB2	2.40	0.51
1:C:143:THR:O	1:C:149:CYS:HA	2.11	0.51
2:F:155:GLY:O	2:F:159:VAL:HG23	2.09	0.51
1:A:59:VAL:HG22	1:A:261:LEU:CD2	2.41	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:262:THR:O	1:D:264:ARG:NH1	2.44	0.51
1:B:151:PRO:O	1:B:155:VAL:HG23	2.11	0.51
1:D:346:LEU:HD22	3:D:403:EDO:C1	2.41	0.51
1:B:88:LYS:HG3	1:B:101:TYR:CE1	2.45	0.51
2:F:226:LYS:CD	2:F:226:LYS:O	2.60	0.50
1:A:200:VAL:HG11	1:A:203:ILE:HD11	1.93	0.50
1:C:311:CYS:HB3	1:C:338:SER:HB2	1.93	0.50
1:A:143:THR:O	1:A:149:CYS:HA	2.12	0.50
2:F:122:TYR:CD1	2:F:159:VAL:HG21	2.46	0.50
1:C:226:VAL:O	1:C:230:VAL:HG23	2.11	0.50
1:D:45:HIS:CE1	1:D:71:ILE:HG21	2.46	0.50
2:E:71:ILE:HG22	2:E:116:VAL:HG21	1.94	0.50
1:A:160:LEU:HD23	1:A:230:VAL:HG21	1.94	0.50
2:F:163:ASN:ND2	2:F:166:ALA:HB2	2.27	0.50
1:B:331:SER:HA	3:B:401:EDO:C2	2.42	0.49
2:F:21:LEU:HD12	2:F:45:VAL:O	2.12	0.49
1:C:144:ASP:OD2	1:C:312:ARG:HB3	2.12	0.49
2:E:52:ALA:HB1	2:E:56:PHE:HB2	1.93	0.49
2:E:120:LEU:HD23	2:E:159:VAL:HG13	1.94	0.49
2:F:103:VAL:N	2:F:104:ASP:CA	2.75	0.49
2:F:160:LEU:HD11	2:F:168:VAL:HG21	1.95	0.49
2:E:315:LYS:O	2:E:319:GLN:HG3	2.11	0.49
2:F:168:VAL:CG1	2:F:168:VAL:O	2.60	0.49
2:F:169:LEU:HD11	2:F:239:TRP:HB3	1.95	0.48
2:F:281:ASN:OD1	2:F:282:ALA:N	2.46	0.48
1:B:226:VAL:O	1:B:230:VAL:HG23	2.12	0.48
2:F:288:LYS:O	2:F:292:LEU:HD21	2.13	0.48
1:D:23:GLU:O	1:D:268:VAL:HG22	2.13	0.48
2:E:309:TRP:HA	2:E:312:LEU:HD22	1.94	0.48
1:C:202:THR:HG21	1:D:328:LEU:HD13	1.94	0.48
1:C:334:HIS:O	1:C:337:THR:OG1	2.29	0.48
1:D:307:LYS:O	1:D:308:GLY:C	2.51	0.48
2:F:292:LEU:H	2:F:292:LEU:HD22	1.77	0.48
1:C:265:LYS:HB3	1:C:268:VAL:HB	1.95	0.48
1:B:165:ALA:HB1	1:B:169:ARG:HH21	1.79	0.48
1:D:80:GLN:HE22	1:D:106:VAL:HB	1.78	0.47
2:F:173:ILE:HD12	2:F:208:ARG:NH1	2.29	0.47
1:C:354:ASP:HB3	1:C:359:VAL:HG11	1.95	0.47
1:A:109:ALA:HB1	1:B:61:LYS:CE	2.45	0.47
1:D:354:ASP:HB3	1:D:359:VAL:HG11	1.97	0.47
1:D:366:LEU:O	1:D:371:TYR:OH	2.28	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:193:GLY:O	1:A:313:ARG:NH1	2.48	0.47
1:A:370:ILE:HB	1:A:373:ARG:NE	2.28	0.47
1:B:48:GLN:HB2	1:B:75:ALA:CB	2.45	0.46
1:D:326:HIS:CD2	1:D:356:ARG:HD3	2.50	0.46
1:C:353:PHE:HB3	1:C:355:LEU:HD21	1.96	0.46
2:F:227:ARG:HD3	2:F:233:ILE:HB	1.95	0.46
1:A:180:SER:HB3	1:A:207:VAL:HG23	1.98	0.46
1:D:170:ASN:C	1:D:170:ASN:OD1	2.54	0.46
2:E:130:ASP:HB2	2:E:145:LEU:HD21	1.98	0.46
2:F:33:VAL:HG11	2:F:80:VAL:HG11	1.97	0.46
2:E:18:ARG:HB2	2:E:42:TRP:CE3	2.51	0.46
2:F:139:GLU:O	2:F:140:ASP:O	2.33	0.46
2:F:89:ASP:O	2:F:91:VAL:HG23	2.16	0.46
1:B:299:ARG:HG2	1:B:380:PHE:CD1	2.51	0.46
1:B:54:VAL:O	1:B:285:LYS:HA	2.16	0.46
1:D:215:LEU:HD23	1:D:219:ARG:NH2	2.31	0.46
2:E:49:PHE:O	2:E:50:ARG:C	2.54	0.46
1:B:180:SER:HB3	1:B:207:VAL:HG23	1.98	0.46
1:B:321:ALA:HB2	1:B:328:LEU:HD21	1.98	0.45
1:D:137:LEU:N	1:D:137:LEU:HD23	2.30	0.45
2:F:280:ARG:O	2:F:281:ASN:CB	2.64	0.45
2:E:21:LEU:HD12	2:E:45:VAL:O	2.16	0.45
2:F:18:ARG:HB2	2:F:18:ARG:CZ	2.46	0.45
1:B:215:LEU:HG	1:B:219:ARG:HE	1.81	0.45
1:D:370:ILE:HB	1:D:373:ARG:HD2	1.98	0.45
1:B:165:ALA:HB1	1:B:169:ARG:NH2	2.31	0.45
1:B:381:GLY:H	1:B:388:GLU:CD	2.19	0.45
1:A:247:SER:CB	4:A:403:ADN:N1	2.80	0.45
1:A:74:ARG:CZ	1:A:74:ARG:HB2	2.47	0.45
2:F:202:MET:CE	2:F:265:LEU:HD22	2.47	0.45
2:F:226:LYS:HE2	2:F:292:LEU:HG	1.98	0.45
2:F:88:PRO:HA	2:F:90:VAL:N	2.32	0.45
1:C:175:TRP:HB2	1:C:210:ASP:OD1	2.17	0.45
1:C:48:GLN:HB2	1:C:75:ALA:CB	2.44	0.45
2:E:181:LEU:HD21	2:E:311:PHE:CG	2.52	0.44
1:A:163:LYS:HG2	1:A:226:VAL:HG13	1.99	0.44
2:E:188:VAL:C	2:E:190:PHE:H	2.20	0.44
1:B:143:THR:O	1:B:149:CYS:HA	2.17	0.44
1:C:271:TYR:O	1:C:274:TRP:N	2.48	0.44
1:D:165:ALA:O	1:D:166:GLU:C	2.56	0.44
2:E:48:GLY:O	2:E:52:ALA:HB2	2.17	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:189:MET:O	2:F:193:VAL:HG23	2.18	0.44
1:D:133:GLY:O	1:D:134:ASP:HB2	2.17	0.44
1:D:223:LYS:HA	1:D:227:ILE:HD12	1.99	0.44
2:E:188:VAL:O	2:E:190:PHE:N	2.51	0.44
1:B:176:LEU:C	1:B:177:ARG:HG2	2.38	0.44
1:B:35:ASP:HA	1:B:262:THR:HG23	1.98	0.44
1:C:299:ARG:HG2	1:C:380:PHE:CD1	2.53	0.44
1:A:71:ILE:O	1:A:112:GLN:HA	2.18	0.44
1:C:165:ALA:HB1	1:C:169:ARG:NH2	2.33	0.44
2:E:222:GLN:HB3	2:E:294:ILE:HG23	2.00	0.44
2:F:294:ILE:HG22	2:F:294:ILE:O	2.18	0.44
1:B:138:MET:N	1:B:138:MET:SD	2.91	0.44
1:D:150:MET:HG3	1:D:381:GLY:HA3	2.00	0.44
1:A:61:LYS:O	1:A:62:THR:C	2.56	0.44
2:F:92:GLU:HB3	2:F:147:LEU:HD12	2.00	0.44
2:E:199:SER:HA	2:E:264:HIS:HB2	2.00	0.43
2:F:104:ASP:C	2:F:104:ASP:OD2	2.57	0.43
1:A:201:HIS:ND1	1:A:202:THR:OG1	2.44	0.43
2:F:38:GLN:HB2	2:F:44:ALA:HB3	2.01	0.43
2:E:287:SER:O	2:E:288:LYS:C	2.57	0.43
2:E:314:ASP:OD2	2:E:314:ASP:N	2.46	0.43
2:F:304:ILE:HG13	2:F:308:LEU:HD12	1.99	0.43
2:F:175:TYR:HB3	2:F:186:VAL:HG21	2.00	0.43
1:A:190:GLN:HE21	1:A:191:ASP:N	2.17	0.43
1:C:391:LYS:O	1:C:393:LEU:HD22	2.18	0.43
1:D:376:ALA:O	1:D:377:TYR:HB2	2.18	0.43
1:A:46:LEU:HA	1:A:49:ASP:O	2.18	0.43
1:C:165:ALA:HB1	1:C:169:ARG:HH21	1.84	0.43
1:C:352:ASN:HD21	1:C:394:LYS:H	1.66	0.43
1:D:81:LYS:O	1:D:85:GLU:HG2	2.18	0.43
1:A:208:GLN:HA	1:A:250:PHE:O	2.19	0.42
1:C:15:GLU:N	1:C:15:GLU:CD	2.72	0.42
2:F:87:ARG:HD3	2:F:184:SER:HA	2.00	0.42
1:D:383:ASP:O	1:D:384:SER:HB2	2.19	0.42
2:E:165:GLY:HA2	2:E:234:LYS:HB2	2.00	0.42
2:E:309:TRP:N	2:E:310:PRO:CD	2.82	0.42
1:A:25:VAL:HG12	1:A:181:LYS:CG	2.43	0.42
1:B:222:LEU:O	1:B:226:VAL:HB	2.20	0.42
1:B:170:ASN:OD1	1:B:172:THR:HG22	2.19	0.42
1:B:66:LEU:O	1:B:66:LEU:HD23	2.19	0.42
1:D:150:MET:HE2	1:D:150:MET:HA	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:156:LEU:O	1:D:157:ALA:C	2.58	0.42
1:D:276:ALA:HB2	2:E:323:HIS:CE1	2.54	0.42
1:A:357:PRO:O	1:A:361:VAL:HG13	2.20	0.42
1:A:261:LEU:HD12	1:A:264:ARG:HH11	1.85	0.42
2:F:29:LEU:O	2:F:33:VAL:HG23	2.20	0.42
1:A:92:TYR:HB3	1:A:99:PHE:HB3	2.03	0.41
1:B:66:LEU:C	1:B:66:LEU:HD23	2.41	0.41
1:C:27:GLU:OE2	1:C:169:ARG:NH2	2.44	0.41
1:D:150:MET:CE	1:D:150:MET:HA	2.50	0.41
2:E:162:ASN:O	2:E:163:ASN:HB2	2.20	0.41
2:F:289:LEU:HD11	2:F:294:ILE:HG21	2.03	0.41
2:E:130:ASP:CB	2:E:145:LEU:HD21	2.50	0.41
2:E:191:ASP:OD1	2:E:316:ARG:NH2	2.41	0.41
2:F:126:ASP:CB	2:F:284:LEU:HD21	2.49	0.41
1:A:80:GLN:HG3	1:A:84:ARG:HE	1.85	0.41
1:B:19:LEU:HD22	1:B:185:THR:HG22	2.02	0.41
1:C:88:LYS:HG3	1:C:101:TYR:CE1	2.55	0.41
2:E:163:ASN:HD22	2:E:163:ASN:C	2.23	0.41
1:A:103:THR:O	1:D:62:THR:HG22	2.21	0.41
1:A:17:THR:HG21	1:A:187:GLN:HE21	1.86	0.41
1:A:29:HIS:CD2	4:A:403:ADN:O2'	2.73	0.41
1:B:94:ASP:OD2	1:B:96:SER:CB	2.69	0.41
2:F:171:ILE:CD1	2:F:174:LEU:HD11	2.50	0.41
2:E:63:ASP:OD2	2:E:66:ALA:HB2	2.21	0.41
1:B:173:LEU:HD22	1:B:175:TRP:CZ2	2.56	0.41
1:A:263:GLY:O	1:B:264:ARG:HD3	2.20	0.41
2:F:207:GLN:HG2	2:F:244:GLN:HE21	1.86	0.41
1:B:139:PHE:CD1	1:B:315:LEU:HD11	2.56	0.41
1:C:266:ILE:HD11	1:D:266:ILE:HD11	2.03	0.41
1:D:315:LEU:HB3	1:D:333:PHE:HB2	2.02	0.41
1:D:36:GLN:HE21	1:D:36:GLN:HB2	1.71	0.41
2:F:77:HIS:O	2:F:118:ALA:HA	2.21	0.40
2:F:89:ASP:O	2:F:90:VAL:C	2.59	0.40
2:F:288:LYS:O	2:F:292:LEU:CD2	2.68	0.40
1:A:315:LEU:HD23	1:A:333:PHE:HD2	1.86	0.40
1:A:71:ILE:HD12	1:A:110:LEU:HD13	2.03	0.40
2:F:255:ALA:O	2:F:259:ASN:N	2.55	0.40
2:E:187:THR:HG22	2:E:308:LEU:HD21	2.04	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	358/396 (90%)	330 (92%)	26 (7%)	2 (1%)	27	61
1	B	379/396 (96%)	349 (92%)	29 (8%)	1 (0%)	43	74
1	C	357/396 (90%)	322 (90%)	33 (9%)	2 (1%)	27	61
1	D	379/396 (96%)	343 (90%)	33 (9%)	3 (1%)	21	55
2	E	307/327 (94%)	281 (92%)	22 (7%)	4 (1%)	13	45
2	F	288/327 (88%)	238 (83%)	42 (15%)	8 (3%)	5	29
All	All	2068/2238 (92%)	1863 (90%)	185 (9%)	20 (1%)	17	51

All (20) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	272	GLY
2	E	50	ARG
2	E	163	ASN
2	F	140	ASP
1	A	335	TYR
1	C	62	THR
1	D	134	ASP
2	F	281	ASN
1	A	62	THR
1	D	172	THR
2	E	189	MET
2	F	234	LYS
2	F	283	GLN
2	F	127	TYR
1	D	252	ILE
2	E	264	HIS
2	F	90	VAL
2	F	172	PRO
1	B	252	ILE
2	F	91	VAL

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	302/328 (92%)	289 (96%)	13 (4%)	32	65
1	B	316/328 (96%)	295 (93%)	21 (7%)	18	51
1	C	301/328 (92%)	284 (94%)	17 (6%)	23	57
1	D	316/328 (96%)	300 (95%)	16 (5%)	26	60
2	E	262/279 (94%)	248 (95%)	14 (5%)	25	58
2	F	253/279 (91%)	230 (91%)	23 (9%)	10	35
All	All	1750/1870 (94%)	1646 (94%)	104 (6%)	21	55

All (104) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	17	THR
1	A	80	GLN
1	A	81	LYS
1	A	114	SER
1	A	135	GLN
1	A	190	GLN
1	A	196	LEU
1	A	250	PHE
1	A	313	ARG
1	A	319	SER
1	A	331	SER
1	A	368	LYS
1	A	383	ASP
1	B	61	LYS
1	B	66	LEU
1	B	127	GLU
1	B	128	GLU
1	B	129	ASP
1	B	137	LEU
1	B	147	GLU
1	B	177	ARG
1	B	206	SER

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Mol	Chain	Res	Type
1	B	212	GLU
1	B	214	CYS
1	B	222	LEU
1	B	228	LYS
1	B	244	LEU
1	B	249	ARG
1	B	256	GLN
1	B	290	VAL
1	B	331	SER
1	B	342	GLU
1	B	365	ASP
1	B	384	SER
1	C	15	GLU
1	C	61	LYS
1	C	81	LYS
1	C	113	GLN
1	C	138	MET
1	C	148	GLU
1	C	149	CYS
1	C	191	ASP
1	C	206	SER
1	C	228	LYS
1	C	250	PHE
1	C	326	HIS
1	C	328	LEU
1	C	339	GLN
1	C	347	GLU
1	C	382	ARG
1	C	384	SER
1	D	15	GLU
1	D	17	THR
1	D	32	LYS
1	D	61	LYS
1	D	137	LEU
1	D	149	CYS
1	D	166	GLU
1	D	228	LYS
1	D	256	GLN
1	D	258	ASP
1	D	325	SER
1	D	329	SER
1	D	331	SER

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Mol	Chain	Res	Type
1	D	341	SER
1	D	368	LYS
1	D	382	ARG
2	E	18	ARG
2	E	26	THR
2	E	51	ARG
2	E	86	ARG
2	E	89	ASP
2	E	112	GLU
2	E	157	LYS
2	E	163	ASN
2	E	202	MET
2	E	260	LEU
2	E	268	ILE
2	E	274	LEU
2	E	312	LEU
2	E	314	ASP
2	F	17	ASN
2	F	18	ARG
2	F	64	SER
2	F	87	ARG
2	F	103	VAL
2	F	139	GLU
2	F	140	ASP
2	F	150	LYS
2	F	151	THR
2	F	153	LEU
2	F	163	ASN
2	F	164	LEU
2	F	207	GLN
2	F	208	ARG
2	F	209	PHE
2	F	228	MET
2	F	229	LEU
2	F	247	LYS
2	F	269	THR
2	F	280	ARG
2	F	292	LEU
2	F	301	ARG
2	F	320	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	80	GLN
1	A	161	ASN
1	A	170	ASN
1	A	190	GLN
1	B	113	GLN
1	B	190	GLN
1	B	317	GLN
1	C	45	HIS
1	C	48	GLN
1	C	89	HIS
1	C	113	GLN
1	C	339	GLN
1	C	352	ASN
1	D	36	GLN
1	D	113	GLN
1	D	256	GLN
2	E	41	ASN
2	E	65	ASN
2	E	100	GLN
2	E	163	ASN
2	F	40	ASN
2	F	108	ASN
2	F	163	ASN
2	F	244	GLN
2	F	264	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 17 ligands modelled in this entry, 1 is monoatomic - leaving 16 for Mogul analysis.

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
3	EDO	A	401	-	3,3,3	0.50	0	2,2,2	0.24	0
3	EDO	A	402	-	3,3,3	0.56	0	2,2,2	0.13	0
4	ADN	A	403	-	18,21,21	1.14	2 (11%)	16,31,31	2.37	3 (18%)
5	PO4	A	404	-	4,4,4	0.66	0	6,6,6	0.52	0
3	EDO	B	401	-	3,3,3	0.47	0	2,2,2	0.56	0
3	EDO	B	402	-	3,3,3	0.45	0	2,2,2	0.34	0
3	EDO	B	403	-	3,3,3	0.41	0	2,2,2	0.43	0
3	EDO	B	404	-	3,3,3	0.50	0	2,2,2	0.26	0
3	EDO	C	401	-	3,3,3	0.39	0	2,2,2	0.40	0
3	EDO	C	402	-	3,3,3	0.58	0	2,2,2	0.25	0
4	ADN	C	403	-	18,21,21	1.20	3 (16%)	16,31,31	2.07	3 (18%)
6	POP	C	404	7	8,8,8	1.12	0	9,13,13	1.25	0
3	EDO	D	401	-	3,3,3	0.50	0	2,2,2	0.38	0
3	EDO	D	402	-	3,3,3	0.60	0	2,2,2	0.18	0
3	EDO	D	403	-	3,3,3	0.42	0	2,2,2	0.55	0
3	EDO	E	401	-	3,3,3	0.45	0	2,2,2	0.38	0

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
3	EDO	A	401	-	-	0/1/1/1	0/0/0/0
3	EDO	A	402	-	-	0/1/1/1	0/0/0/0
4	ADN	A	403	-	-	0/2/22/22	0/3/3/3
5	PO4	A	404	-	-	0/0/0/0	0/0/0/0
3	EDO	B	401	-	-	0/1/1/1	0/0/0/0
3	EDO	B	402	-	-	0/1/1/1	0/0/0/0
3	EDO	B	403	-	-	0/1/1/1	0/0/0/0
3	EDO	B	404	-	-	0/1/1/1	0/0/0/0
3	EDO	C	401	-	-	0/1/1/1	0/0/0/0
3	EDO	C	402	-	-	0/1/1/1	0/0/0/0
4	ADN	C	403	-	-	0/2/22/22	0/3/3/3
6	POP	C	404	7	-	0/6/6/6	0/0/0/0

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	D	401	-	-	0/1/1/1	0/0/0/0
3	EDO	D	402	-	-	0/1/1/1	0/0/0/0
3	EDO	D	403	-	-	0/1/1/1	0/0/0/0
3	EDO	E	401	-	-	0/1/1/1	0/0/0/0

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	403	ADN	C2-N3	2.00	1.35	1.32
4	A	403	ADN	O4'-C1'	2.00	1.44	1.41
4	C	403	ADN	O4'-C1'	2.16	1.44	1.41
4	C	403	ADN	C5-C4	3.19	1.47	1.40
4	A	403	ADN	C5-C4	3.31	1.48	1.40

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	403	ADN	N3-C2-N1	-7.66	122.31	128.86
4	C	403	ADN	N3-C2-N1	-6.34	123.44	128.86
4	A	403	ADN	C1'-N9-C4	-2.50	122.32	126.64
4	C	403	ADN	C4'-O4'-C1'	2.13	112.05	109.83
4	C	403	ADN	N6-C6-N1	2.17	123.07	118.57
4	A	403	ADN	C2-N1-C6	2.94	123.74	118.75

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	403	ADN	2	0
3	B	401	EDO	1	0
3	D	403	EDO	2	0

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, 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	362/396 (91%)	-0.03	0 100 100	41, 59, 85, 110	0
1	B	381/396 (96%)	0.07	10 (2%) 56 54	45, 61, 103, 159	0
1	C	361/396 (91%)	0.10	1 (0%) 93 94	42, 67, 96, 133	0
1	D	381/396 (96%)	-0.04	0 100 100	41, 55, 83, 116	0
2	E	309/327 (94%)	0.13	0 100 100	45, 67, 93, 118	0
2	F	295/327 (90%)	0.63	15 (5%) 28 27	47, 100, 132, 151	0
All	All	2089/2238 (93%)	0.13	26 (1%) 79 78	41, 65, 111, 159	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	122	HIS	7.2
1	B	123	LEU	6.9
1	C	323	GLY	4.9
1	B	121	VAL	3.6
1	B	117	ILE	3.6
1	B	118	ALA	3.5
2	F	272	PRO	3.4
1	B	124	ASP	3.3
2	F	294	ILE	3.2
2	F	239	TRP	3.2
1	B	114	SER	3.0
1	B	116	ASP	2.9
2	F	137	ARG	2.9
2	F	284	LEU	2.9
1	B	115	PRO	2.8
2	F	76	PRO	2.7
2	F	127	TYR	2.6
2	F	87	ARG	2.5
2	F	135	PRO	2.5

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Mol	Chain	Res	Type	RSRZ
2	F	206	GLN	2.4
2	F	49	PHE	2.4
2	F	50	ARG	2.4
2	F	241	GLY	2.3
2	F	166	ALA	2.1
2	F	128	VAL	2.1
1	B	113	GLN	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. 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	B-factors(Å ²)	Q<0.9
3	EDO	C	402	4/4	0.33	0.44	90,98,98,99	0
7	MG	D	404	1/1	0.49	0.22	49,49,49,49	0
3	EDO	A	402	4/4	0.74	0.32	71,74,75,76	0
5	PO4	A	404	5/5	0.74	0.22	119,125,132,133	0
3	EDO	B	404	4/4	0.81	0.50	85,87,90,93	0
6	POP	C	404	9/9	0.84	0.28	111,113,140,146	0
3	EDO	D	401	4/4	0.86	0.47	68,68,68,68	0
3	EDO	B	401	4/4	0.89	0.28	54,57,60,64	0
4	ADN	A	403	19/19	0.89	0.45	97,127,138,138	0
3	EDO	A	401	4/4	0.91	0.35	69,69,71,71	0
3	EDO	B	403	4/4	0.94	0.37	81,81,82,85	0
3	EDO	E	401	4/4	0.94	0.15	43,47,49,53	0
3	EDO	B	402	4/4	0.94	0.26	58,58,58,59	0
3	EDO	D	403	4/4	0.95	0.43	62,64,64,64	0
4	ADN	C	403	19/19	0.96	0.29	51,67,71,71	0
3	EDO	D	402	4/4	0.96	0.34	67,68,68,71	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	EDO	C	401	4/4	0.98	0.37	65,67,68,74	0

6.5 Other polymers [i](#)

There are no such residues in this entry.