



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 09:35 PM UTC

PDB ID : 1O90 / pdb_00001o90
Title : Methionine Adenosyltransferase complexed with a L-methionine analogue
Authors : Gonzalez, B.; Pajares, M.A.; Hermoso, J.A.; Sanz-Aparicio, J.
Deposited on : 2002-12-10
Resolution : 3.10 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 types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

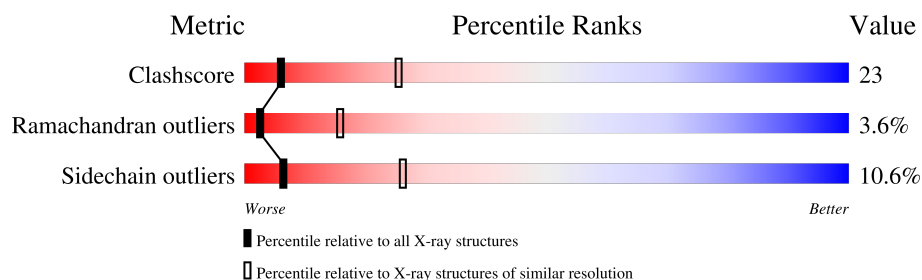
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.10 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))
Clashscore	190562	1539 (3.10-3.10)
Ramachandran outliers	187476	1467 (3.10-3.10)
Sidechain outliers	187428	1467 (3.10-3.10)

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 of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. 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 $\leq 5\%$

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	396	
1	B	396	

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	PO4	A	1398	-	X	-	-
3	PO4	A	1400	-	X	-	-
3	PO4	B	1399	-	X	X	-

2 Entry composition [i](#)

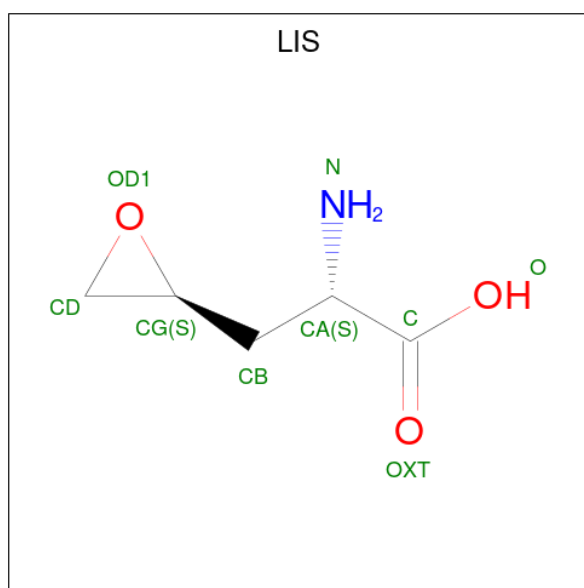
There are 6 unique types of molecules in this entry. The entry contains 5897 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 SYNTHETASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	368	Total	C	N	O	S	0	0	0
			2846	1803	491	536	16			
1	B	368	Total	C	N	O	S	0	0	0
			2846	1803	491	536	16			

- Molecule 2 is (2S,4S)-2-AMINO-4,5-EPOXIPENTANOIC ACID (CCD ID: LIS) (formula: C₅H₉NO₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			9	5	1	3		

- Molecule 3 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).



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

- Molecule 4 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	3	Total	Mg	0	0
			3	3		

- Molecule 5 is POTASSIUM ION (CCD ID: K) (formula: K).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	K	0	0
			1	1		
5	B	1	Total	K	0	0
			1	1		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	92	Total	O	0	0
			92	92		

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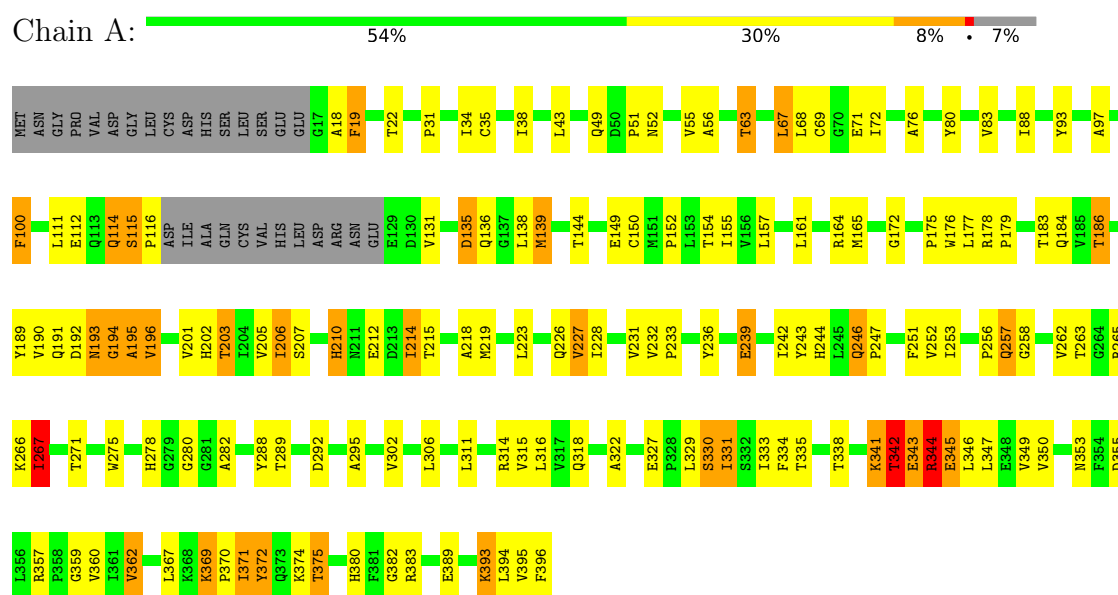
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	B	84	Total	O	0	0
			84	84		

3 Residue-property plots

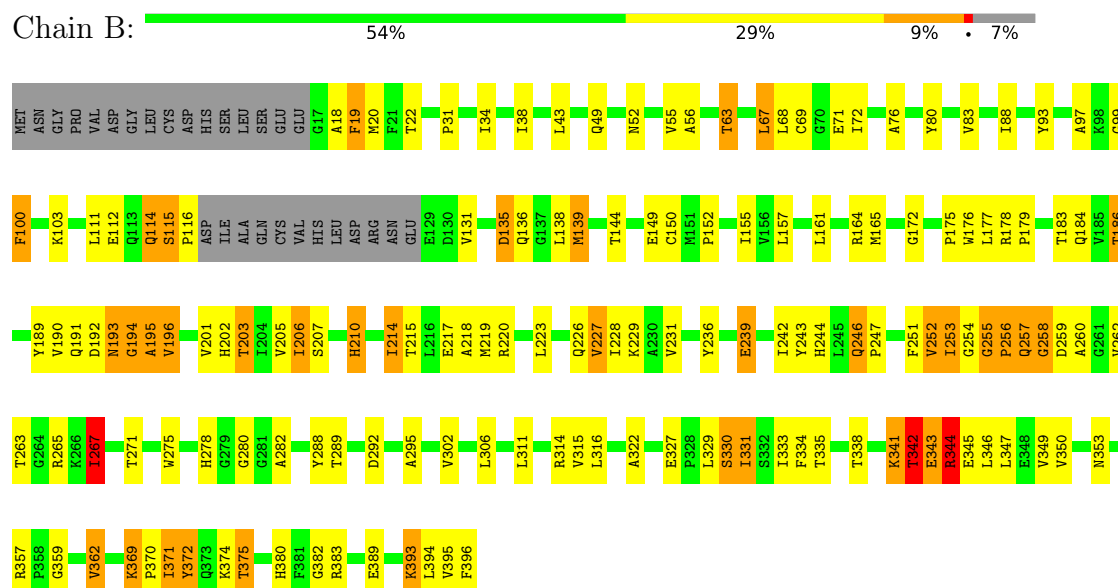
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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. 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.

Note EDS was not executed.

• Molecule 1: S-ADENOSYLMETHIONINE SYNTHETASE



• Molecule 1: S-ADENOSYLMETHIONINE SYNTHETASE



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 41 2 2	Depositor
Cell constants a, b, c, α , β , γ	114.89Å 114.89Å 161.08Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.00 – 3.10	Depositor
% Data completeness (in resolution range)	94.1 (8.00-3.10)	Depositor
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.843	Depositor
R, R_{free}	0.244 , 0.286	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	5897	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: PO4, LIS, MG, K

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	0.49	0/2901	1.05	14/3926 (0.4%)
1	B	0.49	0/2901	1.05	12/3926 (0.3%)
All	All	0.49	0/5802	1.05	26/7852 (0.3%)

There are no bond length outliers.

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	195	ALA	O-C-N	7.80	132.97	122.59
1	B	267	ILE	N-CA-C	7.59	118.37	110.62
1	A	267	ILE	N-CA-C	7.57	118.34	110.62
1	A	246	GLN	CA-C-N	7.44	127.31	119.05
1	A	246	GLN	C-N-CA	7.44	127.31	119.05
1	B	195	ALA	O-C-N	7.41	132.44	122.59
1	B	246	GLN	CA-C-N	7.38	127.25	119.05
1	B	246	GLN	C-N-CA	7.38	127.25	119.05
1	B	372	TYR	N-CA-C	6.39	119.05	111.71
1	A	372	TYR	N-CA-C	6.21	118.85	111.71
1	A	239	GLU	N-CA-C	-6.08	105.86	113.28
1	A	271	THR	N-CA-C	6.00	117.65	108.30
1	B	271	THR	N-CA-C	5.93	117.56	108.30
1	B	239	GLU	N-CA-C	-5.90	106.09	113.28
1	A	195	ALA	CA-C-N	5.73	132.28	121.97
1	A	195	ALA	C-N-CA	5.73	132.28	121.97
1	A	196	VAL	N-CA-C	5.53	120.85	109.34
1	B	255	GLY	CA-C-N	5.53	126.76	119.84
1	B	255	GLY	C-N-CA	5.53	126.76	119.84
1	B	226	GLN	N-CA-C	5.43	119.62	112.89
1	A	226	GLN	N-CA-C	5.27	119.42	112.89
1	B	341	LYS	N-CA-C	5.25	117.00	111.28

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	341	LYS	N-CA-C	5.10	116.84	111.28
1	A	196	VAL	CB-CA-C	-5.08	102.95	111.29
1	B	210	HIS	N-CA-C	5.06	115.98	108.60
1	A	210	HIS	N-CA-C	5.01	115.91	108.60

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	2846	0	2852	127	0
1	B	2846	0	2852	138	0
2	A	9	0	7	0	0
3	A	10	0	0	1	0
3	B	5	0	0	3	0
4	A	3	0	0	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
6	A	92	0	0	1	0
6	B	84	0	0	4	0
All	All	5897	0	5711	259	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 23.

All (259) 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:B:19:PHE:CE1	1:B:189:TYR:HB2	1.95	1.01
1:B:267:ILE:HD11	1:B:282:ALA:HA	1.45	0.98
1:A:267:ILE:HD11	1:A:282:ALA:HA	1.46	0.96
1:A:19:PHE:CE1	1:A:189:TYR:HB2	2.05	0.92
1:A:262:VAL:HG11	1:B:262:VAL:HG11	1.52	0.92
1:A:19:PHE:HD1	1:A:19:PHE:C	1.82	0.87

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:203:THR:HB	1:A:242:ILE:HB	1.58	0.86
1:B:203:THR:HB	1:B:242:ILE:HB	1.58	0.86
1:B:19:PHE:CE1	1:B:189:TYR:CB	2.58	0.85
1:B:278:HIS:HD2	1:B:280:GLY:H	1.24	0.85
1:A:100:PHE:CD2	1:A:256:PRO:HG2	2.12	0.85
1:A:100:PHE:HD2	1:A:256:PRO:HG2	1.42	0.84
1:A:278:HIS:HD2	1:A:280:GLY:H	1.24	0.83
1:B:205:VAL:HG22	1:B:244:HIS:HB2	1.60	0.83
1:A:19:PHE:C	1:A:19:PHE:CD1	2.56	0.81
1:A:205:VAL:HG22	1:A:244:HIS:HB2	1.62	0.80
1:B:100:PHE:HD2	1:B:256:PRO:HG2	1.45	0.80
1:B:100:PHE:CD2	1:B:256:PRO:HG2	2.17	0.79
1:B:19:PHE:HE1	1:B:189:TYR:CB	1.93	0.78
1:B:72:ILE:HG12	1:B:111:LEU:HD11	1.67	0.77
1:A:138:LEU:HD22	1:B:22:THR:H	1.51	0.76
1:A:72:ILE:HG12	1:A:111:LEU:HD11	1.69	0.74
1:B:210:HIS:CE1	1:B:251:PHE:H	2.06	0.74
1:B:19:PHE:HE1	1:B:189:TYR:HB3	1.53	0.72
1:A:322:ALA:HB2	1:A:329:LEU:HD22	1.73	0.70
1:B:55:VAL:HA	1:B:72:ILE:HG22	1.73	0.70
1:A:19:PHE:HD1	1:A:19:PHE:O	1.76	0.69
1:B:322:ALA:HB2	1:B:329:LEU:HD22	1.74	0.69
1:A:353:ASN:HD22	1:A:394:LEU:HD22	1.59	0.68
1:A:55:VAL:HA	1:A:72:ILE:HG22	1.74	0.68
1:A:31:PRO:HG3	1:A:256:PRO:HA	1.76	0.68
1:B:353:ASN:HD22	1:B:394:LEU:HD22	1.59	0.67
1:B:267:ILE:HG23	1:B:278:HIS:CE1	2.29	0.67
1:A:267:ILE:HG23	1:A:278:HIS:CE1	2.29	0.67
1:A:186:THR:CG2	1:A:203:THR:HG23	2.25	0.67
1:A:194:GLY:O	1:A:195:ALA:HB2	1.95	0.67
1:A:342:THR:O	1:A:345:GLU:HB2	1.95	0.66
1:B:194:GLY:O	1:B:195:ALA:HB2	1.95	0.66
1:B:186:THR:CG2	1:B:203:THR:HG23	2.26	0.66
1:B:31:PRO:HG3	1:B:256:PRO:HA	1.77	0.65
1:B:19:PHE:CD1	1:B:189:TYR:HB2	2.32	0.64
1:A:266:LYS:NZ	3:A:1398:PO4:O1	2.31	0.64
1:A:335:THR:HG22	1:A:338:THR:H	1.62	0.64
1:A:329:LEU:O	1:A:330:SER:HB3	1.98	0.63
1:B:335:THR:HG22	1:B:338:THR:H	1.62	0.63
1:A:184:GLN:OE1	1:B:136:GLN:HB2	1.99	0.63
1:A:333:ILE:O	1:A:343:GLU:HG2	2.00	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:22:THR:H	1:B:138:LEU:HD22	1.63	0.62
1:B:333:ILE:O	1:B:343:GLU:HG2	1.99	0.62
1:A:210:HIS:CE1	1:A:251:PHE:H	2.18	0.62
1:B:223:LEU:O	1:B:227:VAL:HG22	2.01	0.61
1:A:19:PHE:CD1	1:A:19:PHE:O	2.53	0.61
1:A:186:THR:HG23	1:A:203:THR:HG23	1.83	0.60
1:B:186:THR:HG23	1:B:203:THR:HG23	1.84	0.60
1:A:19:PHE:CE1	1:A:189:TYR:CB	2.82	0.60
1:A:223:LEU:O	1:A:227:VAL:HG22	2.02	0.60
1:B:329:LEU:O	1:B:330:SER:HB3	2.00	0.59
1:B:246:GLN:N	1:B:247:PRO:HD3	2.17	0.59
1:B:56:ALA:H	1:B:72:ILE:HG22	1.68	0.58
1:B:99:GLY:HA3	1:B:255:GLY:HA3	1.85	0.58
1:A:19:PHE:CD1	1:A:189:TYR:HB2	2.38	0.58
1:A:56:ALA:H	1:A:72:ILE:HG22	1.68	0.58
1:B:114:GLN:HE21	1:B:114:GLN:N	2.02	0.58
1:A:246:GLN:N	1:A:247:PRO:HD3	2.18	0.58
1:A:207:SER:HA	1:A:246:GLN:OE1	2.04	0.58
1:B:228:ILE:HG21	1:B:243:TYR:HE2	1.69	0.57
1:A:345:GLU:O	1:A:349:VAL:HG23	2.04	0.57
1:A:114:GLN:HE21	1:A:114:GLN:N	2.01	0.57
1:B:344:ARG:NE	1:B:347:LEU:HD23	2.20	0.57
1:B:176:TRP:CZ3	1:B:219:MET:HE3	2.40	0.57
1:B:207:SER:HA	1:B:246:GLN:OE1	2.05	0.57
1:A:344:ARG:NE	1:A:347:LEU:HD23	2.19	0.56
1:A:176:TRP:CZ3	1:A:219:MET:HE3	2.41	0.56
1:B:369:LYS:O	1:B:371:ILE:HD13	2.05	0.56
1:B:72:ILE:CG1	1:B:111:LEU:HD11	2.35	0.56
1:A:93:TYR:CZ	1:A:256:PRO:HG3	2.41	0.56
1:A:228:ILE:HG21	1:A:243:TYR:HE2	1.70	0.56
1:B:220:ARG:HD2	6:B:2045:HOH:O	2.04	0.56
1:B:383:ARG:O	1:B:389:GLU:HG3	2.06	0.55
1:B:345:GLU:O	1:B:349:VAL:HG23	2.05	0.55
1:A:369:LYS:O	1:A:371:ILE:HD13	2.07	0.55
1:A:22:THR:OG1	1:A:186:THR:HB	2.07	0.54
1:B:172:GLY:O	1:B:175:PRO:HD3	2.06	0.54
1:A:393:LYS:H	1:A:393:LYS:HD2	1.72	0.54
1:B:93:TYR:OH	1:B:256:PRO:HD3	2.07	0.53
1:B:393:LYS:H	1:B:393:LYS:HD2	1.72	0.53
1:A:136:GLN:NE2	1:A:322:ALA:HA	2.22	0.53
1:A:383:ARG:O	1:A:389:GLU:HG3	2.08	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:165:MET:SD	1:B:206:ILE:HD11	2.49	0.53
1:B:22:THR:OG1	1:B:186:THR:HB	2.07	0.53
1:A:371:ILE:HB	1:A:374:LYS:HE2	1.91	0.53
1:B:275:TRP:HE1	1:B:314:ARG:HH21	1.56	0.53
1:B:302:VAL:O	1:B:306:LEU:HD13	2.08	0.53
1:A:353:ASN:ND2	1:A:394:LEU:HA	2.24	0.53
1:B:72:ILE:HD11	1:B:80:TYR:OH	2.09	0.53
1:A:275:TRP:HE1	1:A:314:ARG:HH21	1.56	0.53
1:A:67:LEU:HD22	1:A:69:CYS:SG	2.49	0.52
1:B:67:LEU:HD22	1:B:69:CYS:SG	2.50	0.52
1:A:186:THR:HG21	1:A:203:THR:HG23	1.92	0.52
1:A:111:LEU:HD13	1:A:112:GLU:N	2.23	0.52
1:A:375:THR:HG23	1:A:380:HIS:NE2	2.25	0.52
1:A:72:ILE:HD11	1:A:80:TYR:OH	2.09	0.52
1:A:72:ILE:CG1	1:A:111:LEU:HD11	2.38	0.52
1:A:316:LEU:HB3	1:A:334:PHE:HB2	1.92	0.51
1:B:375:THR:HG23	1:B:380:HIS:NE2	2.25	0.51
1:B:282:ALA:N	3:B:1399:PO4:O3	2.39	0.51
1:B:353:ASN:ND2	1:B:394:LEU:HA	2.26	0.51
1:A:172:GLY:O	1:A:175:PRO:HD3	2.10	0.51
1:B:192:ASP:O	1:B:194:GLY:N	2.44	0.51
1:B:372:TYR:O	1:B:375:THR:HG22	2.10	0.51
1:B:186:THR:HG21	1:B:203:THR:HG23	1.93	0.51
1:A:97:ALA:O	1:A:253:ILE:HG23	2.10	0.51
1:B:34:ILE:O	1:B:38:ILE:HG13	2.11	0.51
1:B:316:LEU:HB3	1:B:334:PHE:HB2	1.92	0.51
1:A:144:THR:O	1:A:150:CYS:HA	2.11	0.50
1:A:165:MET:SD	1:A:206:ILE:HD11	2.50	0.50
1:B:371:ILE:HB	1:B:374:LYS:HE2	1.92	0.50
1:A:302:VAL:O	1:A:306:LEU:HD13	2.09	0.50
1:B:227:VAL:O	1:B:231:VAL:HG22	2.12	0.50
1:B:52:ASN:HA	1:B:288:TYR:OH	2.12	0.50
1:A:372:TYR:O	1:A:375:THR:HG22	2.11	0.50
1:B:111:LEU:HD13	1:B:112:GLU:N	2.27	0.50
1:B:219:MET:CE	1:B:246:GLN:HE21	2.25	0.50
1:B:192:ASP:O	1:B:193:ASN:C	2.55	0.50
1:B:214:ILE:HD12	1:B:219:MET:CG	2.42	0.50
1:A:34:ILE:O	1:A:38:ILE:HG13	2.11	0.49
1:A:161:LEU:HD23	1:A:183:THR:HG23	1.95	0.49
1:A:201:VAL:HG23	1:A:236:TYR:HB3	1.94	0.49
1:B:161:LEU:HD23	1:B:183:THR:HG23	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:52:ASN:HA	1:B:288:TYR:HH	1.78	0.49
1:B:144:THR:O	1:B:150:CYS:HA	2.12	0.49
1:A:192:ASP:O	1:A:193:ASN:C	2.55	0.49
1:B:97:ALA:O	1:B:253:ILE:HG23	2.12	0.49
1:B:371:ILE:HD13	1:B:371:ILE:H	1.78	0.49
1:A:51:PRO:HG3	6:A:2083:HOH:O	2.12	0.49
1:A:219:MET:CE	1:A:246:GLN:HE21	2.26	0.49
1:A:227:VAL:O	1:A:231:VAL:HG22	2.12	0.49
1:A:395:VAL:HG12	1:A:395:VAL:O	2.13	0.49
1:B:43:LEU:HD13	1:B:55:VAL:HB	1.95	0.49
1:A:52:ASN:HA	1:A:288:TYR:OH	2.13	0.48
1:A:192:ASP:O	1:A:194:GLY:N	2.46	0.48
1:A:395:VAL:O	1:A:396:PHE:HB2	2.13	0.48
1:B:103:LYS:NZ	6:B:2024:HOH:O	2.45	0.48
1:B:201:VAL:HG23	1:B:236:TYR:HB3	1.95	0.48
1:B:257:GLN:C	1:B:259:ASP:N	2.70	0.48
1:A:202:HIS:ND1	1:A:203:THR:HG22	2.29	0.48
1:A:371:ILE:HD13	1:A:371:ILE:H	1.79	0.48
1:B:282:ALA:CB	3:B:1399:PO4:O3	2.61	0.48
1:A:331:ILE:HG23	1:A:347:LEU:HD11	1.95	0.48
1:A:214:ILE:HD12	1:A:219:MET:CG	2.43	0.48
1:B:136:GLN:NE2	1:B:322:ALA:HA	2.28	0.48
1:B:395:VAL:O	1:B:395:VAL:HG12	2.13	0.48
1:B:331:ILE:HG23	1:B:347:LEU:HD11	1.95	0.48
1:B:161:LEU:O	1:B:165:MET:HG3	2.15	0.47
1:A:43:LEU:HD13	1:A:55:VAL:HB	1.95	0.47
1:B:165:MET:CE	1:B:206:ILE:HD11	2.45	0.47
1:B:202:HIS:ND1	1:B:203:THR:HG22	2.29	0.47
1:B:346:LEU:O	1:B:350:VAL:HG23	2.15	0.47
1:B:395:VAL:O	1:B:396:PHE:HB2	2.15	0.47
1:B:359:GLY:O	1:B:362:VAL:HG22	2.14	0.47
1:A:165:MET:CE	1:A:206:ILE:HD11	2.44	0.47
1:A:382:GLY:H	1:A:389:GLU:CD	2.23	0.47
1:A:80:TYR:HA	1:A:83:VAL:HG22	1.96	0.47
1:A:311:LEU:HD22	1:A:341:LYS:HD2	1.96	0.47
1:A:115:SER:H	1:A:116:PRO:HD2	1.80	0.46
1:A:210:HIS:ND1	1:A:219:MET:HE1	2.30	0.46
1:B:135:ASP:O	1:B:136:GLN:C	2.58	0.46
1:B:210:HIS:HE1	1:B:251:PHE:H	1.60	0.46
1:A:318:GLN:NE2	1:B:20:MET:O	2.49	0.46
1:B:80:TYR:HA	1:B:83:VAL:HG22	1.96	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:257:GLN:O	1:B:258:GLY:C	2.59	0.46
1:B:344:ARG:HD2	1:B:344:ARG:HA	1.64	0.46
1:B:252:VAL:HG12	1:B:253:ILE:HD13	1.97	0.46
1:A:161:LEU:O	1:A:165:MET:HG3	2.15	0.46
1:B:262:VAL:CG1	1:B:263:THR:N	2.79	0.46
1:B:152:PRO:HB2	1:B:155:ILE:HG22	1.96	0.46
1:A:152:PRO:HB2	1:A:155:ILE:HG22	1.98	0.46
1:B:252:VAL:C	1:B:254:GLY:H	2.22	0.46
1:B:210:HIS:ND1	1:B:219:MET:HE1	2.30	0.45
1:B:259:ASP:O	1:B:260:ALA:HB3	2.16	0.45
1:B:382:GLY:H	1:B:389:GLU:CD	2.24	0.45
1:B:194:GLY:O	1:B:195:ALA:CB	2.62	0.45
1:B:311:LEU:HD22	1:B:341:LYS:HD2	1.97	0.45
1:B:115:SER:H	1:B:116:PRO:HD2	1.81	0.45
1:A:346:LEU:O	1:A:350:VAL:HG23	2.15	0.45
1:A:139:MET:HG2	1:A:295:ALA:HB3	1.99	0.44
1:A:135:ASP:O	1:A:136:GLN:C	2.60	0.44
1:A:344:ARG:HD2	1:A:344:ARG:HA	1.62	0.44
1:B:369:LYS:HG3	1:B:370:PRO:HD2	1.99	0.44
1:A:262:VAL:CG1	1:A:263:THR:N	2.80	0.44
1:B:227:VAL:CG2	1:B:228:ILE:N	2.80	0.44
1:A:72:ILE:HD11	1:A:80:TYR:HH	1.83	0.44
1:A:214:ILE:HD12	1:A:219:MET:HG2	2.00	0.44
1:A:31:PRO:HG3	1:A:256:PRO:CA	2.47	0.44
1:B:214:ILE:HD12	1:B:219:MET:HG2	1.99	0.44
1:A:371:ILE:O	1:A:374:LYS:HG2	2.18	0.44
1:B:100:PHE:HD2	1:B:256:PRO:CG	2.25	0.44
1:A:227:VAL:CG2	1:A:228:ILE:N	2.80	0.44
1:B:165:MET:HE2	1:B:177:LEU:HD11	2.00	0.43
1:A:49:GLN:HB2	1:A:76:ALA:HB1	2.00	0.43
1:B:88:ILE:HG22	1:B:93:TYR:HB2	1.99	0.43
1:B:139:MET:HG2	1:B:295:ALA:HB3	1.99	0.43
1:B:262:VAL:HG12	1:B:263:THR:N	2.32	0.43
1:B:215:THR:O	1:B:219:MET:HG3	2.18	0.43
1:B:342:THR:O	1:B:345:GLU:HB2	2.18	0.43
1:A:359:GLY:O	1:A:362:VAL:HG22	2.18	0.43
1:A:369:LYS:HG3	1:A:370:PRO:HD2	2.00	0.43
1:B:178:ARG:HB3	1:B:179:PRO:HD2	2.00	0.43
1:B:229:LYS:HE3	6:B:2051:HOH:O	2.19	0.43
1:A:88:ILE:HG22	1:A:93:TYR:HB2	2.00	0.43
1:A:215:THR:O	1:A:219:MET:HG3	2.19	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:341:LYS:O	1:A:342:THR:HG22	2.19	0.43
1:A:178:ARG:HB3	1:A:179:PRO:HD2	2.00	0.43
1:B:371:ILE:O	1:B:374:LYS:HG2	2.18	0.42
1:A:257:GLN:O	1:A:258:GLY:C	2.62	0.42
1:A:262:VAL:HG12	1:A:263:THR:N	2.32	0.42
1:B:72:ILE:CD1	1:B:111:LEU:HD11	2.50	0.42
1:B:214:ILE:HD12	1:B:219:MET:HG3	2.02	0.42
1:A:93:TYR:CE1	1:A:256:PRO:HD3	2.55	0.42
1:B:184:GLN:HB2	1:B:205:VAL:HB	2.02	0.42
1:B:282:ALA:HB3	3:B:1399:PO4:O3	2.19	0.42
1:A:154:THR:HG23	1:A:155:ILE:N	2.35	0.42
1:B:49:GLN:HB2	1:B:76:ALA:HB1	2.01	0.42
1:B:267:ILE:HA	1:B:267:ILE:HD13	1.72	0.42
1:A:114:GLN:HE21	1:A:114:GLN:H	1.66	0.42
1:A:139:MET:SD	1:A:139:MET:N	2.93	0.42
1:A:355:ASP:OD2	1:A:360:VAL:HG21	2.20	0.42
1:A:93:TYR:CE2	1:A:256:PRO:HG3	2.55	0.42
1:B:176:TRP:CG	1:B:214:ILE:HG13	2.55	0.41
1:B:114:GLN:HE21	1:B:114:GLN:H	1.68	0.41
1:A:136:GLN:CG	1:B:205:VAL:HG21	2.50	0.41
1:A:253:ILE:O	1:A:253:ILE:HG22	2.19	0.41
1:B:189:TYR:CD2	1:B:196:VAL:HG13	2.54	0.41
1:B:257:GLN:O	1:B:260:ALA:N	2.52	0.41
1:A:215:THR:HG23	1:A:218:ALA:H	1.85	0.41
1:A:362:VAL:HA	1:A:367:LEU:HD12	2.03	0.41
1:B:257:GLN:O	1:B:259:ASP:N	2.53	0.41
1:B:253:ILE:C	1:B:255:GLY:H	2.28	0.41
1:B:149:GLU:O	1:B:150:CYS:HB2	2.21	0.41
1:B:215:THR:HG23	1:B:218:ALA:CB	2.50	0.41
1:A:93:TYR:HB3	1:A:100:PHE:HB3	2.02	0.41
1:A:165:MET:HE2	1:A:177:LEU:HD11	2.02	0.41
1:A:212:GLU:CD	1:A:252:VAL:HG11	2.45	0.41
1:A:267:ILE:HD13	1:A:267:ILE:HA	1.74	0.41
1:B:215:THR:HG23	1:B:218:ALA:H	1.86	0.41
1:A:327:GLU:HA	1:A:357:ARG:HG2	2.03	0.41
1:B:327:GLU:HA	1:B:357:ARG:HG2	2.03	0.41
1:B:93:TYR:HB3	1:B:100:PHE:HB3	2.02	0.40
1:B:217:GLU:HA	6:B:2045:HOH:O	2.22	0.40
1:A:139:MET:HE2	1:A:292:ASP:HA	2.03	0.40
1:A:35:CYS:HB3	1:A:263:THR:OG1	2.21	0.40
1:A:149:GLU:O	1:A:150:CYS:HB2	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:161:LEU:HD12	1:A:161:LEU:HA	1.90	0.40
1:B:161:LEU:HD23	1:B:183:THR:CG2	2.52	0.40
1:B:346:LEU:HD23	1:B:346:LEU:HA	1.91	0.40
1:A:232:VAL:HA	1:A:233:PRO:HD3	1.96	0.40
1:B:311:LEU:HB3	1:B:346:LEU:HD21	2.04	0.40
1:B:72:ILE:HD11	1:B:80:TYR:HH	1.86	0.40
1:B:139:MET:HE2	1:B:292:ASP:HA	2.02	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	364/396 (92%)	312 (86%)	41 (11%)	11 (3%)	3	19
1	B	364/396 (92%)	313 (86%)	36 (10%)	15 (4%)	2	13
All	All	728/792 (92%)	625 (86%)	77 (11%)	26 (4%)	2	16

All (26) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	18	ALA
1	A	193	ASN
1	A	196	VAL
1	B	18	ALA
1	B	193	ASN
1	B	196	VAL
1	A	344	ARG
1	B	135	ASP
1	B	258	GLY
1	B	344	ARG
1	A	63	THR

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Mol	Chain	Res	Type
1	A	115	SER
1	A	131	VAL
1	A	135	ASP
1	A	342	THR
1	B	63	THR
1	B	115	SER
1	B	131	VAL
1	B	256	PRO
1	B	342	THR
1	A	330	SER
1	B	253	ILE
1	B	330	SER
1	B	252	VAL
1	B	194	GLY
1	A	194	GLY

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	307/332 (92%)	274 (89%)	33 (11%)	6	25
1	B	307/332 (92%)	275 (90%)	32 (10%)	7	27
All	All	614/664 (92%)	549 (89%)	65 (11%)	6	26

All (65) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	19	PHE
1	A	63	THR
1	A	67	LEU
1	A	68	LEU
1	A	71	GLU
1	A	100	PHE
1	A	114	GLN
1	A	139	MET

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Mol	Chain	Res	Type
1	A	157	LEU
1	A	164	ARG
1	A	186	THR
1	A	190	VAL
1	A	191	GLN
1	A	203	THR
1	A	206	ILE
1	A	214	ILE
1	A	227	VAL
1	A	239	GLU
1	A	257	GLN
1	A	265	ARG
1	A	267	ILE
1	A	289	THR
1	A	315	VAL
1	A	331	ILE
1	A	342	THR
1	A	343	GLU
1	A	344	ARG
1	A	345	GLU
1	A	362	VAL
1	A	369	LYS
1	A	371	ILE
1	A	375	THR
1	A	393	LYS
1	B	19	PHE
1	B	63	THR
1	B	67	LEU
1	B	68	LEU
1	B	71	GLU
1	B	100	PHE
1	B	114	GLN
1	B	139	MET
1	B	157	LEU
1	B	164	ARG
1	B	186	THR
1	B	190	VAL
1	B	191	GLN
1	B	203	THR
1	B	206	ILE
1	B	214	ILE
1	B	227	VAL

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Mol	Chain	Res	Type
1	B	239	GLU
1	B	257	GLN
1	B	265	ARG
1	B	267	ILE
1	B	289	THR
1	B	315	VAL
1	B	331	ILE
1	B	342	THR
1	B	343	GLU
1	B	344	ARG
1	B	362	VAL
1	B	369	LYS
1	B	371	ILE
1	B	375	THR
1	B	393	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (29) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	37	GLN
1	A	52	ASN
1	A	113	GLN
1	A	114	GLN
1	A	136	GLN
1	A	159	HIS
1	A	162	ASN
1	A	191	GLN
1	A	209	GLN
1	A	210	HIS
1	A	244	HIS
1	A	278	HIS
1	A	318	GLN
1	A	353	ASN
1	A	380	HIS
1	B	37	GLN
1	B	52	ASN
1	B	113	GLN
1	B	114	GLN
1	B	136	GLN
1	B	159	HIS
1	B	162	ASN
1	B	184	GLN

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Mol	Chain	Res	Type
1	B	191	GLN
1	B	209	GLN
1	B	210	HIS
1	B	278	HIS
1	B	318	GLN
1	B	380	HIS

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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 9 ligands modelled in this entry, 5 are monoatomic - leaving 4 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	PO4	B	1399	5	4,4,4	5.90	4 (100%)	6,6,6	1.42	1 (16%)
2	LIS	A	1397	4	7,9,9	2.00	1 (14%)	5,12,12	1.21	0
3	PO4	A	1400	4	4,4,4	6.83	4 (100%)	6,6,6	1.56	1 (16%)
3	PO4	A	1398	4	4,4,4	6.24	4 (100%)	6,6,6	1.19	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
2	LIS	A	1397	4	-	6/8/10/10	0/1/1/1

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1400	PO4	P-O1	10.17	1.74	1.50
3	A	1398	PO4	P-O1	9.19	1.71	1.50
3	B	1399	PO4	P-O1	8.56	1.70	1.50
3	A	1400	PO4	P-O3	5.82	1.71	1.54
3	A	1398	PO4	P-O3	5.68	1.71	1.54
3	A	1400	PO4	P-O4	5.66	1.71	1.54
3	B	1399	PO4	P-O4	5.62	1.71	1.54
3	A	1398	PO4	P-O4	5.60	1.70	1.54
3	B	1399	PO4	P-O3	4.95	1.69	1.54
2	A	1397	LIS	OXT-C	4.58	1.35	1.22
3	A	1400	PO4	P-O2	4.17	1.66	1.54
3	B	1399	PO4	P-O2	3.15	1.63	1.54
3	A	1398	PO4	P-O2	2.74	1.62	1.54

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1399	PO4	O3-P-O2	2.13	114.54	107.91
3	A	1400	PO4	O4-P-O2	2.04	114.25	107.91

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1397	LIS	N-CA-CB-CG
2	A	1397	LIS	O-C-CA-N
2	A	1397	LIS	O-C-CA-CB
2	A	1397	LIS	OXT-C-CA-CB
2	A	1397	LIS	C-CA-CB-CG
2	A	1397	LIS	OXT-C-CA-N

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1399	PO4	3	0
3	A	1398	PO4	1	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

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.