



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 12:22 PM UTC

PDB ID : 2XMO / pdb_00002xmo
Title : The crystal structure of Lmo2642
Authors : Jeong, J.H.; Kim, Y.G.
Deposited on : 2010-07-28
Resolution : 1.70 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

<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)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

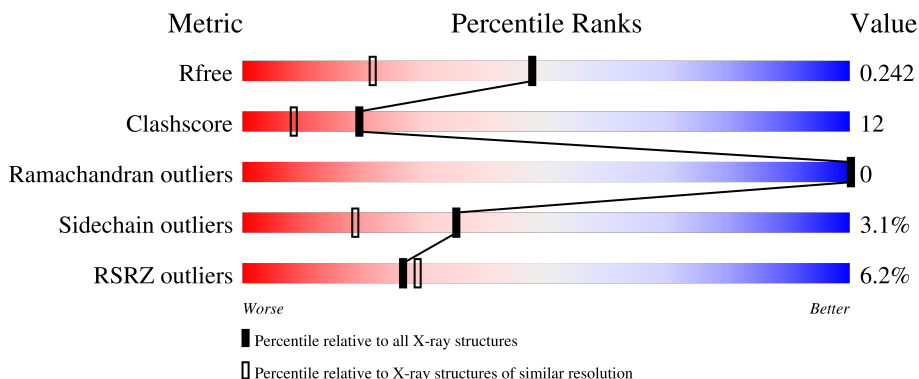
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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}	180053	5551 (1.70-1.70)
Clashscore	190562	5924 (1.70-1.70)
Ramachandran outliers	187476	5846 (1.70-1.70)
Sidechain outliers	187428	5846 (1.70-1.70)
RSRZ outliers	180081	5554 (1.70-1.70)

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 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 $\leq 5\%$. 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	443	6% 72% 18% • 8%
1	B	443	5% 73% 18% • 8%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 6942 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 LMO2642 PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	409	Total	C	N	O	S	0	0	0
			3202	2016	518	656	12			
1	B	409	Total	C	N	O	S	0	0	0
			3194	2009	519	654	12			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	166	SER	GLY	conflict	UNP Q8Y432
B	166	SER	GLY	conflict	UNP Q8Y432

- Molecule 2 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Mn	0	0
			1	1		
2	B	1	Total	Mn	0	0
			1	1		

- Molecule 3 is FE (III) ION (CCD ID: FE) (formula: Fe).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Fe	0	0
			1	1		
3	B	1	Total	Fe	0	0
			1	1		

- Molecule 4 is CALCIUM ION (CCD ID: CA) (formula: Ca).

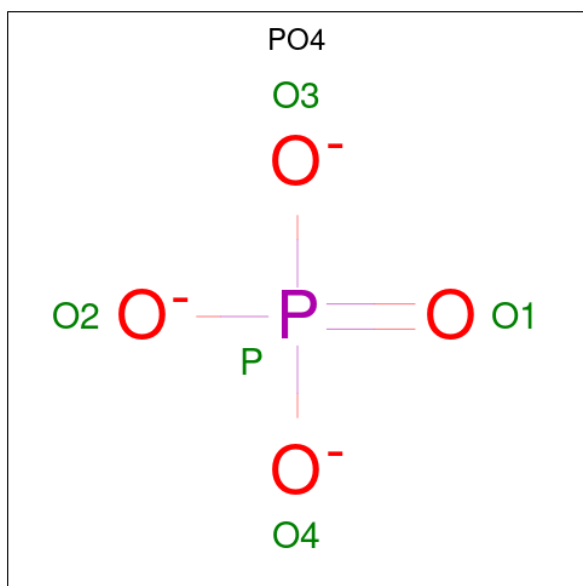
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Ca	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Ca	0	0
			1	1		

- Molecule 5 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).



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

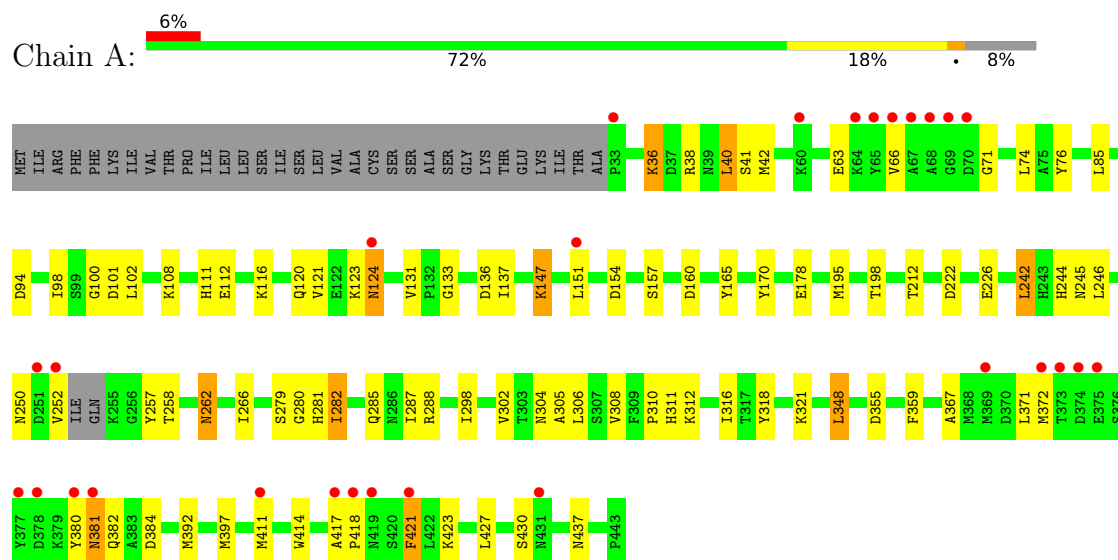
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	288	Total	O	0	0
			288	288		
6	B	242	Total	O	0	0
			242	242		

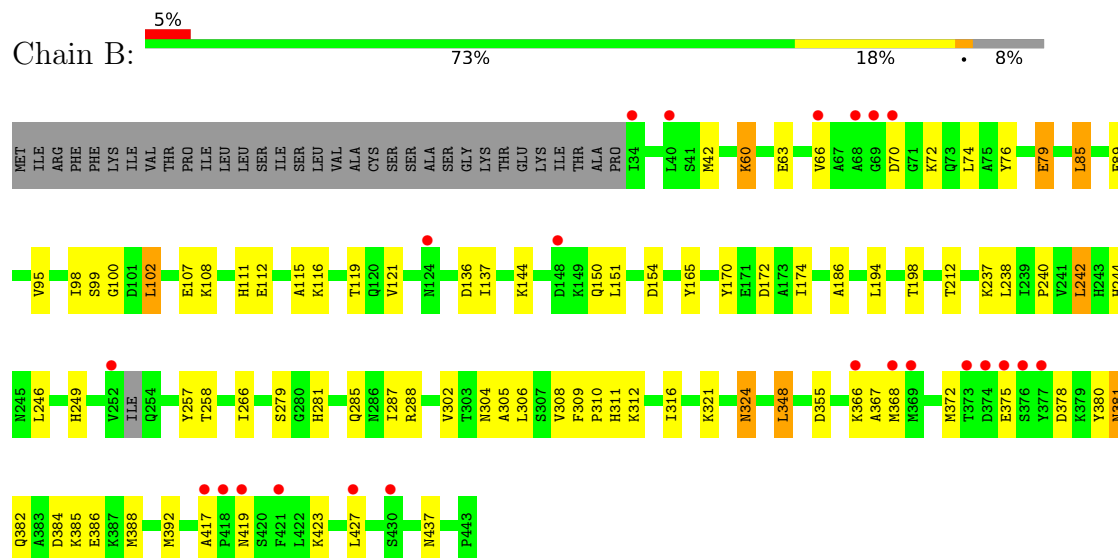
3 Residue-property plots [i](#)

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 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: LMO2642 PROTEIN



• Molecule 1: LMO2642 PROTEIN



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	62.96Å 103.27Å 73.77Å 90.00° 102.80° 90.00°	Depositor
Resolution (Å)	30.00 – 1.70 30.00 – 1.70	Depositor EDS
% Data completeness (in resolution range)	93.1 (30.00-1.70) 93.1 (30.00-1.70)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.49 (at 1.70Å)	Xtriage
Refinement program	CNS 1.2	Depositor
R, R_{free}	0.212 , 0.242 0.212 , 0.242	Depositor DCC
R_{free} test set	4717 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	14.3	Xtriage
Anisotropy	0.361	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 39.4	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	0.95	EDS
Total number of atoms	6942	wwPDB-VP
Average B, all atoms (Å ²)	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.11% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CA, FE, MN, PO4

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	0.36	0/3273	0.86	9/4438 (0.2%)
1	B	0.36	0/3263	0.86	9/4424 (0.2%)
All	All	0.36	0/6536	0.86	18/8862 (0.2%)

There are no bond length outliers.

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	136	ASP	N-CA-C	8.20	122.56	112.23
1	A	170	TYR	N-CA-C	7.25	118.87	110.97
1	A	136	ASP	N-CA-C	7.08	122.18	112.90
1	A	258	THR	N-CA-C	-6.41	100.79	110.28
1	B	258	THR	N-CA-C	-6.32	100.48	109.96
1	B	170	TYR	N-CA-C	6.16	117.79	111.14
1	A	147	LYS	CB-CA-C	-5.89	109.22	117.23
1	B	99	SER	N-CA-C	5.89	118.86	110.68
1	A	71	GLY	N-CA-C	5.81	121.61	114.69
1	A	100	GLY	N-CA-C	5.64	119.16	112.33
1	A	178	GLU	N-CA-C	5.44	117.01	111.14
1	B	100	GLY	N-CA-C	5.37	119.44	112.68
1	B	137	ILE	N-CA-C	5.30	116.11	108.48
1	B	285	GLN	N-CA-C	-5.24	101.60	109.15
1	A	285	GLN	N-CA-C	-5.20	101.66	109.15
1	A	137	ILE	N-CA-C	5.20	115.97	108.48
1	B	237	LYS	N-CA-C	-5.01	103.91	110.53
1	B	144	LYS	N-CA-C	-5.01	101.94	109.85

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	3202	0	3046	80	0
1	B	3194	0	3040	66	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
5	A	5	0	0	0	0
5	B	5	0	0	0	0
6	A	288	0	0	3	0
6	B	242	0	0	4	0
All	All	6942	0	6086	146	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 12.

All (146) 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:304:ASN:HD22	1:A:312:LYS:H	1.23	0.86
1:B:304:ASN:HD22	1:B:312:LYS:H	1.27	0.83
1:A:245:ASN:HD21	1:A:282:ILE:HG23	1.47	0.80
1:B:305:ALA:HB3	1:B:308:VAL:HG12	1.63	0.79
1:A:282:ILE:H	1:A:282:ILE:HD13	1.48	0.78
1:A:305:ALA:HB3	1:A:308:VAL:HG12	1.65	0.77
1:B:174:ILE:HD11	1:B:186:ALA:HB2	1.64	0.77
1:A:282:ILE:HD11	1:A:302:VAL:HG11	1.66	0.77
1:A:36:LYS:HE3	1:A:36:LYS:HA	1.68	0.75
1:A:287:ILE:H	1:A:437:ASN:HD22	1.35	0.72
1:A:245:ASN:HD21	1:A:282:ILE:HD12	1.53	0.72
1:A:411:MET:HE2	1:A:430:SER:HB2	1.72	0.71
1:B:287:ILE:H	1:B:437:ASN:HD22	1.35	0.70
1:B:242:LEU:HD13	1:B:279:SER:HB3	1.72	0.70
1:B:306:LEU:O	1:B:311:HIS:HD2	1.75	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:381:ASN:HD22	1:A:381:ASN:C	2.00	0.69
1:A:245:ASN:ND2	1:A:282:ILE:HD12	2.07	0.68
1:A:306:LEU:O	1:A:311:HIS:HD2	1.78	0.66
1:B:172:ASP:OD2	6:B:2087:HOH:O	2.13	0.66
1:B:115:ALA:O	1:B:119:THR:HG23	1.95	0.66
1:A:42:MET:HE3	1:A:316:ILE:HG22	1.78	0.65
1:A:280:GLY:O	1:A:282:ILE:HD13	1.97	0.65
1:B:381:ASN:C	1:B:381:ASN:HD22	2.03	0.65
1:A:262:ASN:HD22	1:A:262:ASN:H	1.46	0.64
1:B:174:ILE:HD11	1:B:186:ALA:CB	2.28	0.64
1:B:381:ASN:ND2	1:B:384:ASP:H	1.97	0.61
1:A:421:PHE:H	1:A:421:PHE:HD1	1.48	0.61
1:A:414:TRP:O	1:A:423:LYS:HE3	2.01	0.61
1:B:257:TYR:HA	1:B:281:HIS:CD2	2.36	0.60
1:B:212:THR:O	1:B:244:HIS:HE1	1.83	0.60
1:A:250:ASN:HD21	1:A:252:VAL:HB	1.66	0.60
1:B:324:ASN:C	1:B:324:ASN:HD22	2.08	0.60
1:A:311:HIS:HE1	1:A:355:ASP:OD1	1.84	0.59
1:B:72:LYS:HE3	1:B:74:LEU:HD13	1.84	0.59
1:A:121:VAL:O	1:A:124:ASN:OD1	2.21	0.59
1:A:381:ASN:ND2	1:A:384:ASP:H	2.00	0.59
1:A:287:ILE:H	1:A:437:ASN:ND2	1.99	0.59
1:B:384:ASP:O	1:B:388:MET:HG3	2.03	0.59
1:A:212:THR:O	1:A:244:HIS:HE1	1.87	0.58
1:A:282:ILE:HD11	1:A:302:VAL:HG21	1.86	0.58
1:A:281:HIS:HA	6:A:2284:HOH:O	2.04	0.57
1:B:242:LEU:HD12	1:B:242:LEU:N	2.19	0.57
1:B:382:GLN:O	1:B:386:GLU:HG3	2.04	0.57
1:B:311:HIS:HE1	1:B:355:ASP:OD1	1.87	0.56
1:A:282:ILE:HD11	1:A:302:VAL:CG1	2.37	0.54
1:A:372:MET:CE	1:A:382:GLN:HE22	2.21	0.54
1:A:381:ASN:HD21	1:A:384:ASP:CG	2.16	0.54
1:B:112:GLU:O	1:B:116:LYS:HG3	2.08	0.54
1:A:372:MET:HE3	1:A:382:GLN:HE22	1.72	0.53
1:A:282:ILE:CD1	1:A:302:VAL:HG11	2.36	0.53
1:B:79:GLU:H	1:B:79:GLU:CD	2.16	0.53
1:B:108:LYS:O	1:B:112:GLU:HG3	2.06	0.53
1:A:124:ASN:ND2	6:A:2076:HOH:O	2.41	0.53
1:B:242:LEU:O	1:B:279:SER:HA	2.09	0.52
1:B:367:ALA:HB2	1:B:392:MET:HG2	1.90	0.52
1:A:262:ASN:HD22	1:A:262:ASN:N	2.06	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:246:LEU:HD21	1:A:298:ILE:HD13	1.92	0.52
1:A:242:LEU:O	1:A:279:SER:HA	2.09	0.52
1:A:417:ALA:HB1	1:A:418:PRO:HD2	1.92	0.52
1:B:242:LEU:CD1	1:B:279:SER:HB3	2.39	0.52
1:A:36:LYS:HE3	1:A:36:LYS:CA	2.38	0.52
1:A:242:LEU:N	1:A:242:LEU:HD23	2.25	0.51
1:A:111:HIS:HD2	1:A:165:TYR:OH	1.93	0.51
1:A:367:ALA:O	1:A:371:LEU:HG	2.10	0.51
1:B:42:MET:HG2	1:B:95:VAL:HB	1.93	0.51
1:A:257:TYR:HA	1:A:281:HIS:CD2	2.46	0.51
1:B:287:ILE:H	1:B:437:ASN:ND2	2.03	0.51
1:B:304:ASN:HD21	1:B:311:HIS:H	1.59	0.51
1:A:63:GLU:O	1:A:66:VAL:HG22	2.11	0.50
1:B:107:GLU:H	1:B:107:GLU:CD	2.19	0.50
1:B:198:THR:OG1	1:B:244:HIS:HD2	1.95	0.50
1:A:421:PHE:CD1	1:A:421:PHE:N	2.79	0.50
1:B:60:LYS:NZ	1:B:60:LYS:HB2	2.27	0.50
1:A:101:ASP:H	1:A:133:GLY:HA3	1.76	0.49
1:B:380:TYR:OH	1:B:417:ALA:HA	2.13	0.49
1:B:423:LYS:O	1:B:427:LEU:HD13	2.13	0.49
1:B:108:LYS:HE3	1:B:154:ASP:HB2	1.95	0.48
1:A:381:ASN:C	1:A:381:ASN:ND2	2.71	0.48
1:A:120:GLN:NE2	1:A:123:LYS:HD2	2.29	0.48
1:B:242:LEU:HD12	1:B:242:LEU:H	1.78	0.48
1:A:108:LYS:O	1:A:112:GLU:HG3	2.14	0.48
1:A:108:LYS:HE3	1:A:154:ASP:HB2	1.96	0.47
1:A:42:MET:HE3	1:A:316:ILE:CG2	2.44	0.47
1:A:66:VAL:HG12	1:A:74:LEU:HD23	1.96	0.47
1:A:250:ASN:HD22	1:A:252:VAL:C	2.23	0.47
1:B:150:GLN:C	1:B:151:LEU:HD22	2.40	0.47
1:B:308:VAL:HG22	1:B:309:PHE:N	2.30	0.47
1:B:85:LEU:HG	1:B:121:VAL:CG2	2.45	0.47
1:A:245:ASN:ND2	1:A:282:ILE:HG23	2.24	0.46
1:B:375:GLU:HB2	1:B:378:ASP:OD2	2.15	0.46
1:A:40:LEU:HB2	1:A:318:TYR:HB3	1.98	0.46
1:B:324:ASN:C	1:B:324:ASN:ND2	2.73	0.46
1:A:250:ASN:ND2	1:A:252:VAL:HB	2.30	0.46
1:B:89:GLU:HA	6:B:2048:HOH:O	2.15	0.46
1:A:198:THR:OG1	1:A:244:HIS:HD2	1.99	0.46
1:B:42:MET:HB2	1:B:316:ILE:HB	1.97	0.46
1:B:76:TYR:CD1	1:B:348:LEU:HD11	2.51	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:174:ILE:CD1	1:B:186:ALA:HB2	2.40	0.45
1:B:381:ASN:HD21	1:B:384:ASP:H	1.64	0.45
1:A:98:ILE:HG21	1:A:102:LEU:HD22	1.98	0.45
1:A:151:LEU:HD22	1:A:151:LEU:N	2.32	0.45
1:A:131:VAL:HG13	1:A:195:MET:HE3	1.99	0.45
1:A:288:ARG:HH12	1:A:437:ASN:HD21	1.64	0.45
1:A:310:PRO:HG2	1:A:312:LYS:HG3	1.99	0.45
1:B:151:LEU:HD22	1:B:151:LEU:N	2.32	0.45
1:A:304:ASN:HD21	1:A:311:HIS:H	1.65	0.44
1:A:367:ALA:HB2	1:A:392:MET:HG2	2.00	0.44
1:A:250:ASN:C	1:A:252:VAL:H	2.25	0.44
1:B:42:MET:HE3	1:B:316:ILE:HG22	1.99	0.44
1:B:194:LEU:HB3	1:B:240:PRO:HA	2.00	0.44
1:A:311:HIS:HE1	1:A:355:ASP:CG	2.25	0.43
1:B:111:HIS:HD2	1:B:165:TYR:OH	2.00	0.43
1:B:249:HIS:CE1	1:B:302:VAL:HG23	2.52	0.43
1:A:380:TYR:OH	1:A:417:ALA:HA	2.18	0.43
1:B:98:ILE:HG21	1:B:102:LEU:HD22	2.00	0.43
1:B:310:PRO:HG2	1:B:312:LYS:HG3	2.00	0.43
1:A:112:GLU:O	1:A:116:LYS:HG3	2.18	0.43
1:A:245:ASN:HD21	1:A:282:ILE:CG2	2.25	0.43
1:A:257:TYR:CD1	1:A:282:ILE:HG22	2.53	0.43
1:B:63:GLU:O	1:B:66:VAL:HG22	2.19	0.43
1:A:222:ASP:O	1:A:226:GLU:HG3	2.19	0.43
1:A:85:LEU:HD22	1:A:121:VAL:HG21	2.00	0.42
1:A:305:ALA:HB3	1:A:308:VAL:CG1	2.43	0.42
1:B:76:TYR:CE1	1:B:348:LEU:HD11	2.54	0.42
1:B:381:ASN:C	1:B:381:ASN:ND2	2.71	0.42
1:B:368:MET:O	1:B:372:MET:HG2	2.20	0.42
1:B:385:LYS:HA	1:B:388:MET:HE3	2.01	0.42
1:A:38:ARG:O	1:A:40:LEU:HD13	2.20	0.42
1:A:76:TYR:CD1	1:A:348:LEU:HD11	2.55	0.42
1:B:288:ARG:HH12	1:B:437:ASN:HD21	1.66	0.42
1:B:311:HIS:HE1	1:B:355:ASP:CG	2.27	0.42
1:A:359:PHE:HE2	1:A:397:MET:HA	1.85	0.42
1:A:372:MET:HE1	1:A:382:GLN:OE1	2.20	0.41
1:A:423:LYS:O	1:A:427:LEU:HD13	2.21	0.41
1:B:98:ILE:CG2	1:B:102:LEU:HD22	2.50	0.41
1:B:321:LYS:HG3	6:B:2003:HOH:O	2.20	0.41
1:A:250:ASN:ND2	1:A:252:VAL:H	2.18	0.41
1:B:60:LYS:HB2	1:B:60:LYS:HZ2	1.85	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:257:TYR:HA	1:B:281:HIS:HD2	1.84	0.41
1:A:157:SER:O	1:A:160:ASP:HB2	2.21	0.41
1:B:116:LYS:O	1:B:119:THR:OG1	2.38	0.41
1:A:246:LEU:HG	1:A:266:ILE:HG12	2.03	0.40
1:B:281:HIS:HA	6:B:2240:HOH:O	2.22	0.40
1:A:41:SER:O	1:A:94:ASP:HB2	2.21	0.40
1:A:321:LYS:NZ	6:A:2229:HOH:O	2.54	0.40
1:B:246:LEU:HG	1:B:266:ILE:HG12	2.04	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	405/443 (91%)	393 (97%)	12 (3%)	0	100	100
1	B	405/443 (91%)	394 (97%)	11 (3%)	0	100	100
All	All	810/886 (91%)	787 (97%)	23 (3%)	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	352/384 (92%)	342 (97%)	10 (3%)	38	21

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	350/384 (91%)	338 (97%)	12 (3%)	32	16
All	All	702/768 (91%)	680 (97%)	22 (3%)	35	18

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	36	LYS
1	A	40	LEU
1	A	124	ASN
1	A	147	LYS
1	A	242	LEU
1	A	262	ASN
1	A	282	ILE
1	A	348	LEU
1	A	381	ASN
1	A	421	PHE
1	B	60	LYS
1	B	70	ASP
1	B	79	GLU
1	B	85	LEU
1	B	102	LEU
1	B	238	LEU
1	B	242	LEU
1	B	324	ASN
1	B	348	LEU
1	B	366	LYS
1	B	381	ASN
1	B	419	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (31) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	58	ASN
1	A	111	HIS
1	A	120	GLN
1	A	150	GLN
1	A	207	GLN
1	A	234	ASN
1	A	244	HIS
1	A	245	ASN
1	A	250	ASN

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Mol	Chain	Res	Type
1	A	262	ASN
1	A	263	GLN
1	A	304	ASN
1	A	311	HIS
1	A	322	ASN
1	A	353	GLN
1	A	381	ASN
1	A	382	GLN
1	A	437	ASN
1	B	111	HIS
1	B	150	GLN
1	B	244	HIS
1	B	245	ASN
1	B	250	ASN
1	B	263	GLN
1	B	304	ASN
1	B	311	HIS
1	B	315	ASN
1	B	324	ASN
1	B	341	GLN
1	B	381	ASN
1	B	437	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 8 ligands modelled in this entry, 6 are monoatomic - leaving 2 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	$\# Z > 2$
5	PO4	A	1444	2,3	4,4,4	1.70	0	6,6,6	0.47	0
5	PO4	B	1444	2,3	4,4,4	1.70	0	6,6,6	0.49	0

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 [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

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	409/443 (92%)	0.20	28 (6%) 23 25	10, 18, 43, 65	0
1	B	409/443 (92%)	0.32	23 (5%) 30 33	11, 22, 40, 52	0
All	All	818/886 (92%)	0.26	51 (6%) 26 29	10, 20, 42, 65	0

All (51) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	421	PHE	6.3
1	A	377	TYR	5.0
1	B	252	VAL	4.8
1	A	252	VAL	4.2
1	A	378	ASP	3.9
1	B	34	ILE	3.5
1	A	375	GLU	3.5
1	A	411	MET	3.4
1	A	68	ALA	3.2
1	A	373	THR	3.2
1	A	33	PRO	3.1
1	A	66	VAL	3.0
1	B	369	MET	3.0
1	B	418	PRO	3.0
1	A	417	ALA	2.9
1	B	40	LEU	2.8
1	B	124	ASN	2.7
1	B	373	THR	2.7
1	A	67	ALA	2.7
1	A	381	ASN	2.7
1	A	69	GLY	2.6
1	A	124	ASN	2.6
1	A	60	LYS	2.5
1	A	64	LYS	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	380	TYR	2.5
1	A	418	PRO	2.5
1	A	372	MET	2.5
1	A	70	ASP	2.4
1	B	68	ALA	2.4
1	B	377	TYR	2.4
1	B	148	ASP	2.4
1	B	368	MET	2.4
1	A	251	ASP	2.3
1	A	374	ASP	2.3
1	A	369	MET	2.3
1	B	417	ALA	2.3
1	B	69	GLY	2.3
1	B	70	ASP	2.3
1	B	374	ASP	2.2
1	A	151	LEU	2.2
1	B	419	ASN	2.2
1	B	421	PHE	2.2
1	B	375	GLU	2.1
1	B	427	LEU	2.1
1	A	419	ASN	2.1
1	B	66	VAL	2.1
1	B	366	LYS	2.1
1	A	431	ASN	2.1
1	B	430	SER	2.1
1	A	65	TYR	2.1
1	B	376	SER	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 oligosaccharides 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($\text{\AA}^2$)	Q<0.9
4	CA	B	600	1/1	0.88	0.14	49,49,49,49	0
4	CA	A	600	1/1	0.95	0.08	40,40,40,40	0
5	PO4	B	1444	5/5	0.98	0.05	14,17,18,18	0
5	PO4	A	1444	5/5	0.99	0.05	16,16,18,19	0
2	MN	A	555	1/1	1.00	0.01	13,13,13,13	0
2	MN	B	555	1/1	1.00	0.02	14,14,14,14	0
3	FE	A	556	1/1	1.00	0.02	13,13,13,13	0
3	FE	B	556	1/1	1.00	0.02	14,14,14,14	0

6.5 Other polymers [i](#)

There are no such residues in this entry.