



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 08:21 PM UTC

PDB ID : 3SPE / pdb_00003spe
Title : Crystal structure of the tail sheath protein protease resistant fragment from bacteriophage phiKZ
Authors : Aksyuk, A.A.; Kurochkina, L.P.; Fokine, A.; Mesyanzhinov, V.V.; Rossmann, M.G.
Deposited on : 2011-07-01
Resolution : 2.40 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

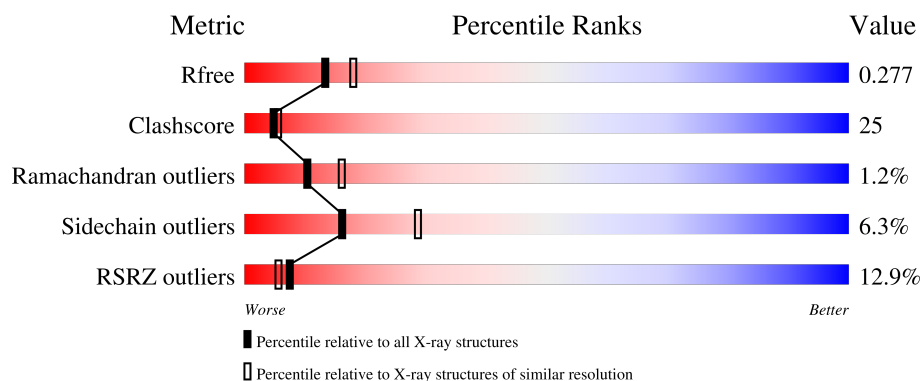
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

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	295	11% 55% 27% • 15%
1	B	295	11% 52% 28% 5% • 14%

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
2	PO4	A	1	-	-	X	-
2	PO4	A	3	-	-	X	-

2 Entry composition [i](#)

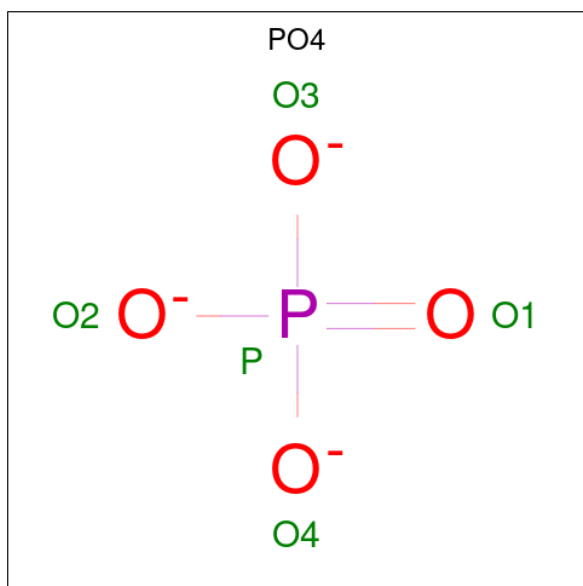
There are 4 unique types of molecules in this entry. The entry contains 4010 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 PHIKZ029.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	252	Total	C	N	O	Se	0	0	0
			1941	1234	309	393	5			
1	B	254	Total	C	N	O	Se	0	0	0
			1954	1242	311	396	5			

- Molecule 2 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).



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

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	C	O	0	0
			6	3	3		

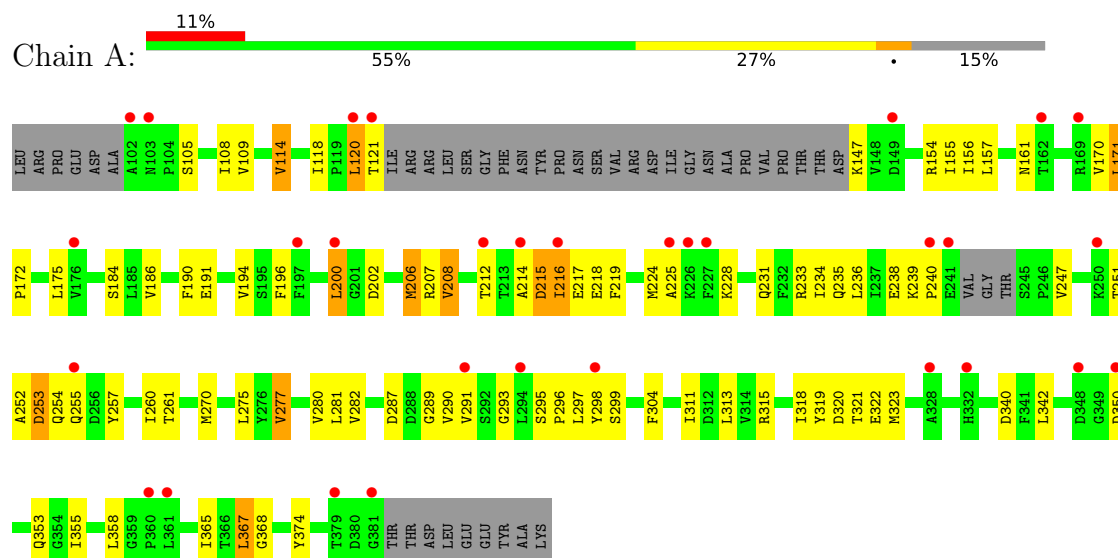
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	44	Total	O	0	0
			44	44		
4	B	55	Total	O	0	0
			55	55		

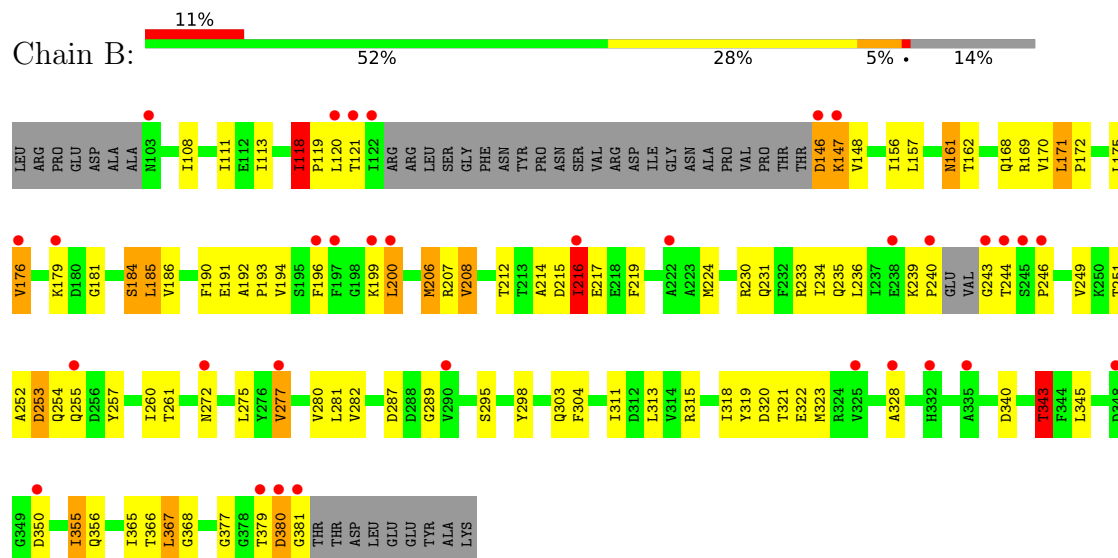
3 Residue-property plots [i](#)

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: PHIKZ029



• Molecule 1: PHIKZ029



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	70.89Å 156.72Å 61.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	28.42 – 2.40 28.42 – 2.40	Depositor EDS
% Data completeness (in resolution range)	98.2 (28.42-2.40) 98.3 (28.42-2.40)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	6.82 (at 2.39Å)	Xtriage
Refinement program	PHENIX 1.7_650	Depositor
R, R_{free}	0.256 , 0.286 0.248 , 0.277	Depositor DCC
R_{free} test set	1345 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	41.0	Xtriage
Anisotropy	0.520	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 49.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	4010	wwPDB-VP
Average B, all atoms (Å ²)	44.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 14.20% 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: PO4, GOL

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	0.66	0/1973	1.20	8/2674 (0.3%)
1	B	0.67	0/1986	1.16	18/2692 (0.7%)
All	All	0.67	0/3959	1.18	26/5366 (0.5%)

There are no bond length outliers.

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	291	VAL	N-CA-C	-20.73	93.00	112.90
1	A	290	VAL	N-CA-C	19.94	130.97	110.23
1	A	215	ASP	N-CA-C	15.94	132.07	110.55
1	A	291	VAL	N-CA-CB	-15.11	92.77	112.26
1	B	184	SER	CB-CA-C	-13.94	87.49	110.77
1	B	184	SER	N-CA-C	10.54	125.01	108.67
1	B	216	ILE	CB-CA-C	-9.45	99.66	112.04
1	B	148	VAL	N-CA-CB	-8.79	100.21	112.52
1	B	185	LEU	N-CA-C	8.54	121.97	110.35
1	B	368	GLY	N-CA-C	-7.92	99.74	110.43
1	A	215	ASP	N-CA-CB	-7.24	99.45	110.45
1	B	216	ILE	N-CA-C	6.94	118.53	110.62
1	B	147	LYS	N-CA-C	-6.50	100.28	110.36
1	B	208	VAL	CB-CA-C	-6.22	102.22	111.80
1	B	343	THR	CB-CA-C	6.16	120.35	109.75
1	A	208	VAL	CB-CA-C	-6.16	102.32	111.80
1	B	147	LYS	CB-CA-C	-6.15	98.25	111.78
1	B	355	ILE	N-CA-C	6.11	116.67	107.75
1	B	179	LYS	N-CA-C	5.87	121.05	111.37
1	B	206	MSE	N-CA-C	5.61	116.49	108.74
1	B	118	ILE	CA-C-N	-5.55	114.08	119.90
1	B	118	ILE	C-N-CA	-5.55	114.08	119.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	206	MSE	N-CA-C	5.36	116.94	108.96
1	A	105	SER	N-CA-C	-5.31	103.88	110.41
1	B	249	VAL	CB-CA-C	-5.27	105.54	111.23
1	B	343	THR	N-CA-CB	-5.22	103.43	110.95

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	1941	0	1885	88	0
1	B	1954	0	1899	112	0
2	A	10	0	0	4	0
3	B	6	0	8	0	0
4	A	44	0	0	11	0
4	B	55	0	0	18	0
All	All	4010	0	3792	196	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 25.

All (196) 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:224:MSE:CE	1:B:230:ARG:C	2.01	1.31
1:B:224:MSE:CE	1:B:231:GLN:N	1.90	1.31
1:B:224:MSE:HE2	1:B:231:GLN:CA	1.60	1.30
1:B:224:MSE:HE3	1:B:230:ARG:C	1.56	1.29
1:B:304:PHE:HB3	4:B:29:HOH:O	1.05	1.23
1:B:170:VAL:HG23	4:B:82:HOH:O	1.40	1.22
1:B:224:MSE:HE2	1:B:231:GLN:CB	1.70	1.21
1:B:185:LEU:HB2	4:B:26:HOH:O	1.01	1.18
1:A:120:LEU:HD22	1:A:120:LEU:O	1.48	1.13
1:B:224:MSE:HE2	1:B:231:GLN:HB2	1.32	1.10

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:340:ASP:OD2	1:B:343:THR:HG22	1.50	1.09
1:B:224:MSE:CE	1:B:231:GLN:CA	2.31	1.06
1:B:224:MSE:HE2	1:B:231:GLN:N	1.59	1.05
1:A:367:LEU:O	4:A:391:HOH:O	1.75	1.05
1:A:367:LEU:C	4:A:391:HOH:O	2.00	1.03
1:B:162:THR:N	4:B:31:HOH:O	1.94	1.01
1:A:202:ASP:O	4:A:60:HOH:O	1.79	1.00
1:B:350:ASP:OD2	4:B:57:HOH:O	1.80	0.99
1:A:367:LEU:HB3	4:A:88:HOH:O	1.62	0.96
1:B:161:ASN:N	4:B:31:HOH:O	1.89	0.94
1:B:224:MSE:HE1	1:B:230:ARG:C	1.93	0.90
1:B:224:MSE:HE3	1:B:231:GLN:N	1.71	0.90
1:B:184:SER:O	1:B:184:SER:OG	1.86	0.85
1:B:170:VAL:N	4:B:82:HOH:O	1.91	0.84
1:A:118:ILE:O	1:A:147:LYS:HB3	1.78	0.84
1:B:224:MSE:HE1	1:B:230:ARG:O	1.77	0.83
1:B:224:MSE:HE3	1:B:230:ARG:CA	2.07	0.83
1:B:251:THR:HG22	1:B:255:GLN:H	1.43	0.82
1:A:238:GLU:OE1	4:A:79:HOH:O	1.97	0.82
1:A:247:VAL:HG21	1:B:381:GLY:HA3	1.62	0.82
1:A:120:LEU:O	1:A:120:LEU:CD2	2.30	0.79
1:B:212:THR:HG22	1:B:214:ALA:H	1.47	0.78
1:B:108:ILE:HG12	1:B:191:GLU:HG3	1.66	0.77
1:A:216:ILE:HG12	1:A:217:GLU:H	1.49	0.77
1:A:120:LEU:CD2	1:A:120:LEU:C	2.55	0.77
1:B:379:THR:O	1:B:380:ASP:HB2	1.84	0.76
1:A:251:THR:HG22	1:A:255:GLN:H	1.51	0.75
1:B:224:MSE:CE	1:B:231:GLN:HB2	2.16	0.75
1:B:304:PHE:CB	4:B:29:HOH:O	1.79	0.74
1:B:224:MSE:CE	1:B:231:GLN:HA	2.18	0.73
1:B:175:LEU:HB3	1:B:184:SER:HB3	1.71	0.72
1:B:171:LEU:HD13	1:B:172:PRO:HD2	1.71	0.72
1:A:215:ASP:HB3	2:A:3:PO4:O4	1.91	0.70
1:A:207:ARG:HD2	1:A:235:GLN:HE21	1.56	0.70
1:A:200:LEU:HD12	1:A:200:LEU:C	2.17	0.70
1:B:260:ILE:HB	1:B:277:VAL:HG22	1.74	0.69
1:A:260:ILE:HB	1:A:277:VAL:HG22	1.74	0.68
1:B:111:ILE:HG23	1:B:113:ILE:HD11	1.74	0.68
1:A:175:LEU:HB3	1:A:184:SER:HB3	1.75	0.68
1:B:176:VAL:HG13	4:B:67:HOH:O	1.92	0.68
1:B:200:LEU:HD12	1:B:200:LEU:C	2.19	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:304:PHE:CA	4:B:29:HOH:O	2.28	0.67
1:A:171:LEU:HD13	1:A:172:PRO:HD2	1.75	0.67
1:B:181:GLY:HA2	4:B:67:HOH:O	1.95	0.66
1:A:120:LEU:HD22	1:A:120:LEU:C	2.12	0.66
1:B:161:ASN:CA	4:B:31:HOH:O	2.37	0.66
1:A:108:ILE:HG12	1:A:191:GLU:HG3	1.78	0.65
1:B:161:ASN:OD1	1:B:377:GLY:HA3	1.96	0.65
1:B:212:THR:HG22	1:B:214:ALA:N	2.11	0.64
1:B:207:ARG:HD2	1:B:235:GLN:HE21	1.62	0.63
1:A:216:ILE:HG12	1:A:217:GLU:N	2.12	0.63
1:B:318:ILE:HG23	1:B:355:ILE:HD11	1.80	0.63
1:B:251:THR:CG2	1:B:255:GLN:H	2.08	0.63
1:A:251:THR:CG2	1:A:255:GLN:H	2.12	0.63
1:A:217:GLU:HA	1:A:217:GLU:OE1	1.99	0.62
1:B:212:THR:HB	1:B:215:ASP:OD1	2.00	0.62
1:A:120:LEU:HD21	1:A:353:GLN:HG2	1.82	0.61
1:A:239:LYS:HB3	1:A:240:PRO:HA	1.82	0.61
1:B:311:ILE:HG22	1:B:315:ARG:HD2	1.84	0.60
1:A:287:ASP:HB3	1:A:297:LEU:HB3	1.84	0.59
1:B:240:PRO:HB2	1:B:243:GLY:HA3	1.84	0.58
1:B:161:ASN:C	4:B:31:HOH:O	2.31	0.58
1:A:114:VAL:HG22	1:A:184:SER:HB3	1.84	0.58
1:A:311:ILE:HG22	1:A:315:ARG:HD2	1.86	0.57
1:B:118:ILE:O	1:B:147:LYS:HB3	2.04	0.57
1:B:224:MSE:HE1	1:B:231:GLN:HA	1.86	0.57
1:B:304:PHE:O	4:B:29:HOH:O	2.17	0.57
1:B:343:THR:HG23	1:B:345:LEU:HG	1.86	0.57
1:A:212:THR:HG22	1:A:214:ALA:N	2.21	0.56
1:B:168:GLN:HG2	4:B:4:HOH:O	2.04	0.56
1:B:190:PHE:CD1	1:B:304:PHE:CZ	2.93	0.56
1:A:298:TYR:HB3	1:B:298:TYR:CD1	2.41	0.56
1:B:207:ARG:CD	1:B:235:GLN:HE21	2.18	0.56
1:A:190:PHE:CD1	1:A:304:PHE:CZ	2.94	0.56
1:B:207:ARG:HH11	1:B:235:GLN:NE2	2.04	0.55
1:B:240:PRO:HB2	1:B:243:GLY:CA	2.36	0.55
1:A:207:ARG:HH11	1:A:235:GLN:NE2	2.03	0.55
1:B:233:ARG:HG2	1:B:257:TYR:CD2	2.42	0.55
1:A:299:SER:O	4:A:42:HOH:O	2.18	0.55
1:A:233:ARG:HG2	1:A:257:TYR:CD2	2.43	0.54
1:A:224:MSE:HB2	2:A:1:PO4:O3	2.08	0.54
1:B:157:LEU:HG	1:B:365:ILE:CD1	2.38	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:199:LYS:HB2	1:B:381:GLY:C	2.33	0.53
1:B:216:ILE:HG13	1:B:217:GLU:H	1.74	0.53
1:A:114:VAL:CG2	1:A:175:LEU:HD23	2.39	0.53
1:B:240:PRO:CG	1:B:244:THR:HA	2.39	0.53
1:A:154:ARG:HB3	1:A:358:LEU:HB2	1.91	0.53
1:B:251:THR:HG22	1:B:255:GLN:N	2.17	0.53
1:B:318:ILE:CG2	1:B:355:ILE:HD11	2.38	0.53
1:B:200:LEU:HD12	1:B:200:LEU:O	2.09	0.52
1:B:156:ILE:HD11	1:B:186:VAL:HG13	1.90	0.52
1:A:200:LEU:HD12	1:A:200:LEU:O	2.10	0.52
1:A:216:ILE:CG1	1:A:217:GLU:N	2.73	0.52
1:B:340:ASP:OD1	1:B:340:ASP:C	2.52	0.52
1:B:380:ASP:O	1:B:381:GLY:C	2.52	0.52
1:B:157:LEU:HG	1:B:365:ILE:HD11	1.91	0.51
1:B:319:TYR:O	1:B:323:MSE:HG2	2.11	0.51
1:B:212:THR:C	1:B:214:ALA:H	2.18	0.51
1:A:206:MSE:HE2	1:A:236:LEU:HD22	1.93	0.51
1:A:239:LYS:HG3	1:A:374:TYR:CE2	2.46	0.51
1:A:218:GLU:HA	1:A:218:GLU:OE1	2.10	0.50
1:A:120:LEU:CD2	1:A:353:GLN:HG2	2.41	0.50
1:A:207:ARG:CD	1:A:235:GLN:HE21	2.22	0.50
1:B:366:THR:HG22	1:B:367:LEU:O	2.11	0.50
1:A:212:THR:C	1:A:214:ALA:H	2.19	0.50
1:A:251:THR:HG22	1:A:255:GLN:N	2.25	0.49
1:B:224:MSE:HE3	1:B:230:ARG:HA	1.94	0.49
1:A:156:ILE:HD11	1:A:186:VAL:HG13	1.93	0.49
1:A:157:LEU:HG	1:A:365:ILE:CD1	2.43	0.49
1:A:280:VAL:HG12	1:A:280:VAL:O	2.12	0.49
1:A:342:LEU:HB3	1:A:367:LEU:HD23	1.95	0.49
1:B:206:MSE:HE2	1:B:236:LEU:HD22	1.93	0.49
1:A:368:GLY:CA	4:A:391:HOH:O	2.60	0.49
1:A:252:ALA:C	1:A:254:GLN:H	2.21	0.49
1:A:261:THR:O	1:A:277:VAL:HG23	2.13	0.49
1:B:240:PRO:HB2	1:B:243:GLY:N	2.27	0.49
1:A:114:VAL:HG22	1:A:184:SER:CB	2.43	0.48
1:B:219:PHE:HB2	1:B:231:GLN:NE2	2.28	0.48
1:A:215:ASP:HB3	2:A:3:PO4:P	2.53	0.48
1:A:206:MSE:SE	1:A:234:ILE:HD11	2.64	0.48
1:A:239:LYS:HE3	4:A:60:HOH:O	2.13	0.48
1:A:219:PHE:HB2	1:A:231:GLN:NE2	2.29	0.48
1:A:114:VAL:HG13	1:A:184:SER:HA	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:252:ALA:C	1:B:254:GLN:H	2.22	0.48
1:B:118:ILE:HG13	1:B:119:PRO:O	2.14	0.47
1:B:261:THR:O	1:B:277:VAL:HG23	2.15	0.47
1:B:170:VAL:O	1:B:171:LEU:HD22	2.15	0.47
1:B:171:LEU:CD1	1:B:172:PRO:HD2	2.43	0.47
1:B:146:ASP:HB2	4:B:53:HOH:O	2.15	0.46
1:A:109:VAL:HG21	1:A:190:PHE:CZ	2.50	0.46
1:A:319:TYR:O	1:A:323:MSE:HG2	2.15	0.46
1:B:113:ILE:HD12	1:B:113:ILE:N	2.31	0.46
1:A:170:VAL:O	1:A:171:LEU:HD22	2.16	0.46
1:A:200:LEU:C	1:A:200:LEU:CD1	2.87	0.46
1:A:318:ILE:CG2	1:A:355:ILE:HD11	2.46	0.45
1:B:121:THR:HG21	1:B:356:GLN:HA	1.98	0.45
1:A:155:ILE:HG13	1:A:367:LEU:HD22	1.98	0.45
1:A:206:MSE:HE2	1:A:236:LEU:CD2	2.47	0.45
1:A:367:LEU:CB	4:A:88:HOH:O	2.39	0.45
1:B:253:ASP:O	1:B:254:GLN:HB2	2.16	0.45
1:A:340:ASP:OD1	1:A:340:ASP:C	2.60	0.45
1:B:111:ILE:CG2	1:B:113:ILE:HD11	2.43	0.45
1:A:224:MSE:O	1:A:225:ALA:C	2.60	0.45
1:B:119:PRO:O	1:B:120:LEU:C	2.60	0.44
1:B:318:ILE:HG12	1:B:355:ILE:HD11	1.99	0.44
1:A:318:ILE:HG23	1:A:355:ILE:HD11	1.98	0.44
1:B:243:GLY:HA3	1:B:244:THR:HA	1.60	0.44
1:A:224:MSE:O	1:A:228:LYS:N	2.50	0.44
1:A:270:MSE:HE2	4:A:64:HOH:O	2.16	0.44
1:B:239:LYS:HE3	1:B:239:LYS:HB2	1.86	0.44
1:A:281:LEU:O	1:A:282:VAL:C	2.60	0.44
1:A:253:ASP:O	1:A:254:GLN:HB2	2.18	0.43
1:B:206:MSE:HE2	1:B:236:LEU:CD2	2.47	0.43
1:A:261:THR:HG22	2:A:1:PO4:O1	2.18	0.43
1:B:240:PRO:HG3	1:B:244:THR:HA	2.00	0.43
1:A:320:ASP:O	1:A:321:THR:C	2.62	0.43
1:A:114:VAL:HG23	1:A:175:LEU:HD23	2.01	0.43
1:A:295:SER:O	1:A:296:PRO:C	2.59	0.43
1:B:192:ALA:HA	1:B:193:PRO:HD2	1.93	0.43
1:A:238:GLU:CD	1:B:200:LEU:HD23	2.44	0.42
1:B:121:THR:HG21	1:B:355:ILE:O	2.19	0.42
1:A:257:TYR:CD2	1:A:257:TYR:C	2.97	0.42
1:B:233:ARG:HG2	1:B:257:TYR:CE2	2.55	0.42
1:B:240:PRO:CB	1:B:243:GLY:HA3	2.48	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:304:PHE:N	4:B:29:HOH:O	2.46	0.42
1:A:368:GLY:HA3	4:A:391:HOH:O	2.20	0.42
1:A:289:GLY:O	1:A:293:GLY:N	2.48	0.41
1:B:200:LEU:C	1:B:200:LEU:CD1	2.88	0.41
1:B:281:LEU:O	1:B:282:VAL:C	2.63	0.41
1:A:194:VAL:HG12	1:A:196:PHE:H	1.86	0.41
1:B:252:ALA:C	1:B:254:GLN:N	2.77	0.41
1:A:298:TYR:HB3	1:B:298:TYR:CE1	2.54	0.41
1:B:320:ASP:O	1:B:321:THR:C	2.62	0.41
1:A:280:VAL:O	1:A:280:VAL:CG1	2.68	0.41
1:A:350:ASP:OD1	1:A:350:ASP:N	2.30	0.41
1:B:194:VAL:HG12	1:B:196:PHE:H	1.85	0.41
1:B:206:MSE:SE	1:B:234:ILE:HD11	2.71	0.41
1:B:169:ARG:HE	1:B:169:ARG:HB2	1.42	0.41
1:B:366:THR:C	1:B:367:LEU:O	2.64	0.41
1:A:252:ALA:C	1:A:254:GLN:N	2.78	0.41
1:B:287:ASP:C	1:B:289:GLY:N	2.79	0.41
1:B:193:PRO:HD2	1:B:303:GLN:O	2.21	0.40
1:B:257:TYR:CD2	1:B:257:TYR:C	3.00	0.40
1:B:280:VAL:O	1:B:280:VAL:HG12	2.21	0.40
1:B:328:ALA:C	4:B:51:HOH:O	2.65	0.40
1:A:171:LEU:CD1	1:A:172:PRO:HD2	2.48	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	246/295 (83%)	226 (92%)	19 (8%)	1 (0%)	30	43
1	B	248/295 (84%)	227 (92%)	16 (6%)	5 (2%)	6	7
All	All	494/590 (84%)	453 (92%)	35 (7%)	6 (1%)	10	16

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	380	ASP
1	A	253	ASP
1	B	253	ASP
1	B	272	ASN
1	B	367	LEU
1	B	246	PRO

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	213/245 (87%)	200 (94%)	13 (6%)	17	30
1	B	215/245 (88%)	201 (94%)	14 (6%)	15	27
All	All	428/490 (87%)	401 (94%)	27 (6%)	16	29

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	114	VAL
1	A	120	LEU
1	A	121	THR
1	A	161	ASN
1	A	171	LEU
1	A	200	LEU
1	A	208	VAL
1	A	216	ILE
1	A	275	LEU
1	A	277	VAL
1	A	313	LEU
1	A	322	GLU
1	A	367	LEU
1	B	118	ILE
1	B	146	ASP
1	B	161	ASN
1	B	171	LEU

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Mol	Chain	Res	Type
1	B	176	VAL
1	B	200	LEU
1	B	208	VAL
1	B	216	ILE
1	B	275	LEU
1	B	277	VAL
1	B	295	SER
1	B	313	LEU
1	B	322	GLU
1	B	343	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	235	GLN
1	A	254	GLN
1	A	308	HIS
1	B	183	GLN
1	B	235	GLN
1	B	254	GLN
1	B	308	HIS
1	B	326	ASN

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 ⓘ

3 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	$\# Z > 2$
2	PO4	A	1	-	4,4,4	0.92	0	6,6,6	0.63	0
2	PO4	A	3	-	4,4,4	0.98	0	6,6,6	0.41	0
3	GOL	B	1	-	5,5,5	0.33	0	5,5,5	0.74	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	GOL	B	1	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	1	GOL	O1-C1-C2-C3
3	B	1	GOL	O1-C1-C2-O2

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1	PO4	2	0
2	A	3	PO4	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	247/295 (83%)	0.91	31 (12%) 8 6	17, 40, 74, 119	0
1	B	249/295 (84%)	0.95	33 (13%) 7 5	20, 41, 77, 106	0
All	All	496/590 (84%)	0.93	64 (12%) 7 5	17, 41, 76, 119	0

All (64) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	216	ILE	7.2
1	B	381	GLY	6.9
1	A	102	ALA	6.2
1	A	121	THR	5.9
1	B	243	GLY	5.3
1	B	197	PHE	5.1
1	B	240	PRO	4.9
1	A	291	VAL	4.8
1	B	122	ILE	4.7
1	B	146	ASP	4.6
1	B	379	THR	4.6
1	A	197	PHE	4.2
1	B	200	LEU	4.2
1	B	244	THR	4.2
1	A	216	ILE	4.1
1	B	103	ASN	4.0
1	A	255	GLN	3.8
1	A	241	GLU	3.8
1	A	348	ASP	3.5
1	A	294	LEU	3.5
1	A	240	PRO	3.3
1	A	379	THR	3.1
1	B	255	GLN	3.1
1	A	103	ASN	3.1

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Mol	Chain	Res	Type	RSRZ
1	A	149	ASP	3.1
1	B	196	PHE	3.0
1	A	225	ALA	3.0
1	B	325	VAL	2.9
1	B	245	SER	2.9
1	B	348	ASP	2.9
1	B	380	ASP	2.9
1	A	332	HIS	2.8
1	A	350	ASP	2.8
1	A	120	LEU	2.8
1	B	328	ALA	2.8
1	A	169	ARG	2.8
1	A	361	LEU	2.7
1	B	332	HIS	2.7
1	B	120	LEU	2.6
1	A	328	ALA	2.6
1	A	214	ALA	2.5
1	A	227	PHE	2.4
1	B	290	VAL	2.4
1	A	381	GLY	2.4
1	A	162	THR	2.4
1	B	335	ALA	2.3
1	B	238	GLU	2.3
1	B	176	VAL	2.3
1	B	277	VAL	2.2
1	A	212	THR	2.2
1	B	121	THR	2.2
1	A	200	LEU	2.2
1	B	350	ASP	2.2
1	A	226	LYS	2.2
1	B	147	LYS	2.2
1	A	298	TYR	2.1
1	B	272	ASN	2.1
1	B	222	ALA	2.1
1	B	246	PRO	2.1
1	A	250	LYS	2.1
1	B	179	LYS	2.0
1	B	199	LYS	2.0
1	A	176	VAL	2.0
1	A	360	PRO	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
2	PO4	A	3	5/5	0.61	0.34	178,183,187,188	0
3	GOL	B	1	6/6	0.65	0.20	38,56,65,70	0
2	PO4	A	1	5/5	0.71	0.27	83,94,105,123	0

6.5 Other polymers [i](#)

There are no such residues in this entry.