



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 03:03 AM UTC

PDB ID : 2ZYS / pdb_00002zys
Title : A. Fulgidus lipase with fatty acid fragment and chloride
Authors : Chen, C.K.; Ko, T.P.; Guo, R.T.; Wang, A.H.
Deposited on : 2009-01-29
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)	:	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

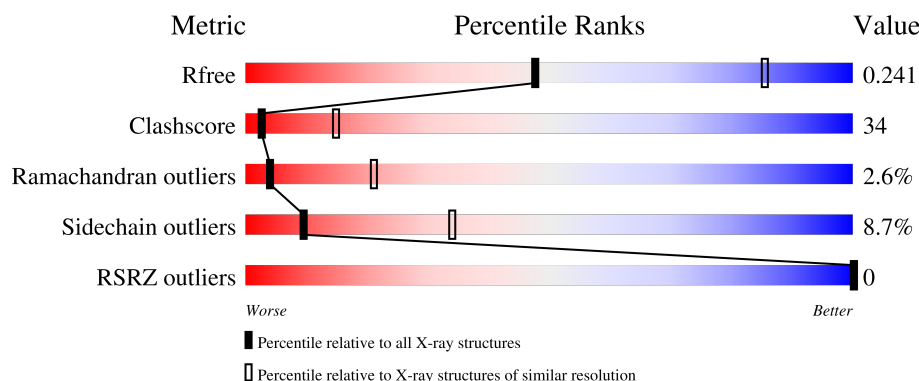
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

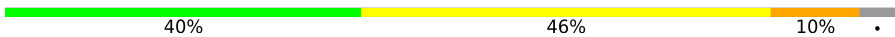
The reported resolution of this entry is 3.10 Å.

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))
R_{free}	180053	1456 (3.10-3.10)
Clashscore	190562	1539 (3.10-3.10)
Ramachandran outliers	187476	1467 (3.10-3.10)
Sidechain outliers	187428	1467 (3.10-3.10)
RSRZ outliers	180081	1456 (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 $\leq 5\%$. 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	479	

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 3860 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.

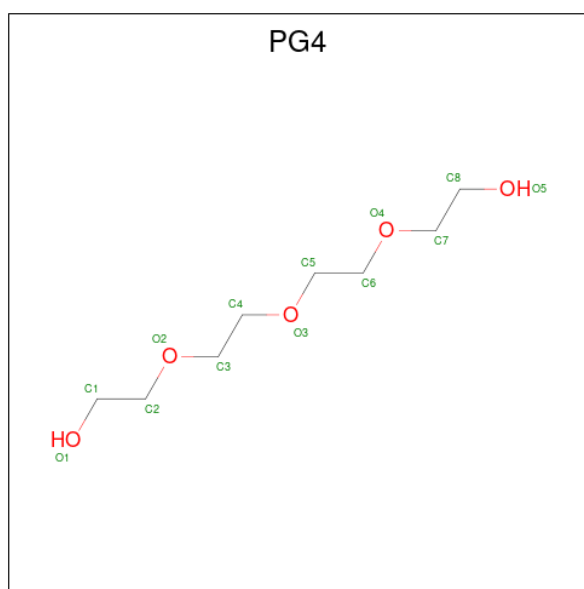
- Molecule 1 is a protein called Lipase, putative.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	460	3632	2339	600	681	12	0	0	0

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	475	VAL	-	expression tag	UNP O28511
A	476	ASP	-	expression tag	UNP O28511
A	477	LYS	-	expression tag	UNP O28511
A	478	LEU	-	expression tag	UNP O28511
A	479	ALA	-	expression tag	UNP O28511

- Molecule 2 is TETRAETHYLENE GLYCOL (CCD ID: PG4) (formula: C₈H₁₈O₅).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
2	A	1	13	8	5	0	0

- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total 1	Cl 1	0	0

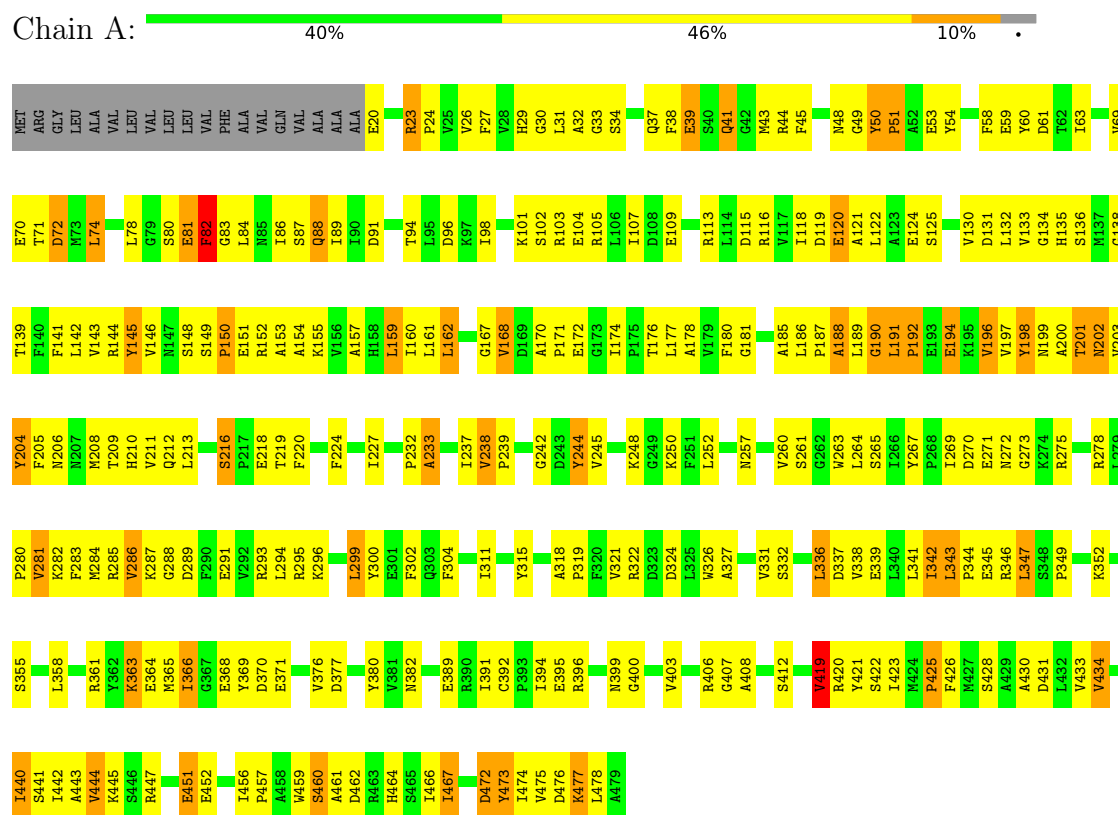
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	214	Total 214	O 214	0	0

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 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: Lipase, putative



4 Data and refinement statistics

Property	Value	Source
Space group	P 43	Depositor
Cell constants a, b, c, α , β , γ	99.55Å 99.55Å 59.02Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 3.10 50.00 – 3.11	Depositor EDS
% Data completeness (in resolution range)	96.4 (50.00-3.10) 97.3 (50.00-3.11)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.94 (at 3.12Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.184 , 0.252 0.181 , 0.241	Depositor DCC
R_{free} test set	542 reflections (5.27%)	wwPDB-VP
Wilson B-factor (Å ²)	78.2	Xtriage
Anisotropy	0.389	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.27 , 51.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.042 for h,-k,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	3860	wwPDB-VP
Average B, all atoms (Å ²)	66.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.47% 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: CL, PG4

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	0.85	2/3719 (0.1%)	1.28	46/5048 (0.9%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	200	ALA	CA-C	-5.94	1.44	1.52
1	A	201	THR	N-CA	-5.62	1.39	1.46

All (46) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	238	VAL	N-CA-C	11.81	119.68	107.76
1	A	423	ILE	N-CA-C	7.68	118.47	110.72
1	A	190	GLY	N-CA-C	7.08	129.95	113.18
1	A	475	VAL	N-CA-C	6.93	119.12	109.55
1	A	82	PHE	N-CA-C	6.75	119.64	111.82
1	A	139	THR	N-CA-C	-6.70	103.90	111.14
1	A	96	ASP	N-CA-C	-6.54	104.07	111.07
1	A	71	THR	N-CA-C	-6.35	105.48	112.72
1	A	419	VAL	N-CA-C	6.29	118.95	111.09
1	A	244	TYR	N-CA-C	6.28	118.64	108.34
1	A	216	SER	CA-C-N	6.25	125.67	118.85

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	216	SER	C-N-CA	6.25	125.67	118.85
1	A	23	ARG	CA-C-N	6.08	126.09	119.89
1	A	23	ARG	C-N-CA	6.08	126.09	119.89
1	A	200	ALA	CA-C-N	-6.05	114.97	122.84
1	A	200	ALA	C-N-CA	-6.05	114.97	122.84
1	A	162	LEU	N-CA-C	6.05	118.50	109.25
1	A	98	ILE	N-CA-C	5.86	115.98	110.30
1	A	366	ILE	N-CA-C	5.79	116.91	108.58
1	A	284	MET	N-CA-C	5.75	117.58	108.79
1	A	347	LEU	N-CA-C	5.72	120.32	113.23
1	A	198	TYR	N-CA-C	5.69	118.73	110.42
1	A	172	GLU	N-CA-C	5.58	118.27	109.96
1	A	32	ALA	CA-C-N	-5.51	117.52	122.43
1	A	32	ALA	C-N-CA	-5.51	117.52	122.43
1	A	400	GLY	N-CA-C	-5.47	101.36	111.04
1	A	50	TYR	CA-C-N	-5.45	114.31	119.76
1	A	50	TYR	C-N-CA	-5.45	114.31	119.76
1	A	51	PRO	N-CA-C	-5.33	102.82	111.19
1	A	434	VAL	CA-C-N	5.30	125.60	119.93
1	A	434	VAL	C-N-CA	5.30	125.60	119.93
1	A	265	SER	N-CA-C	-5.19	100.44	108.90
1	A	318	ALA	CA-C-N	5.18	125.47	119.92
1	A	318	ALA	C-N-CA	5.18	125.47	119.92
1	A	216	SER	N-CA-C	5.18	116.41	109.83
1	A	91	ASP	CA-C-N	5.13	124.58	119.24
1	A	91	ASP	C-N-CA	5.13	124.58	119.24
1	A	257	ASN	N-CA-C	5.12	118.65	111.90
1	A	399	ASN	CA-C-N	-5.09	118.61	122.33
1	A	399	ASN	C-N-CA	-5.09	118.61	122.33
1	A	283	PHE	N-CA-C	-5.08	99.69	108.69
1	A	69	VAL	N-CA-C	5.08	116.25	111.48
1	A	343	LEU	N-CA-C	5.07	119.84	113.25
1	A	281	VAL	N-CA-C	-5.06	106.14	113.07
1	A	145	TYR	N-CA-C	5.05	116.64	111.03
1	A	104	GLU	N-CA-C	5.02	116.56	111.14

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	473	TYR	Sidechain

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	3632	0	3587	244	0
2	A	13	0	18	3	0
3	A	1	0	0	1	0
4	A	214	0	0	2	0
All	All	3860	0	3605	244	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 34.

All (244) 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:190:GLY:O	1:A:192:PRO:HD3	1.52	1.09
1:A:101:LYS:HD2	1:A:102:SER:H	1.20	1.03
1:A:299:LEU:HD23	1:A:319:PRO:HG3	1.47	0.94
1:A:224:PHE:CD1	1:A:232:PRO:HB3	2.10	0.86
1:A:31:LEU:HD22	1:A:82:PHE:HB3	1.59	0.85
1:A:213:LEU:HD23	1:A:213:LEU:O	1.76	0.84
1:A:54:TYR:HE2	1:A:125:SER:HB2	1.44	0.82
1:A:391:ILE:HD13	1:A:430:ALA:HB2	1.62	0.81
1:A:101:LYS:HD2	1:A:102:SER:N	1.94	0.81
1:A:159:LEU:HD12	1:A:160:ILE:N	1.96	0.81
1:A:41:GLN:OE1	1:A:41:GLN:HA	1.80	0.80
1:A:406:ARG:HD2	1:A:406:ARG:O	1.82	0.79
1:A:191:LEU:O	1:A:191:LEU:HD23	1.83	0.79
1:A:78:LEU:HD11	1:A:189:LEU:HD22	1.65	0.78
1:A:321:VAL:HG23	1:A:322:ARG:HG2	1.65	0.78
1:A:339:GLU:O	1:A:342:ILE:HG22	1.85	0.77
1:A:81:GLU:HG2	1:A:188:ALA:O	1.85	0.77
1:A:412:SER:OG	1:A:433:VAL:HG23	1.85	0.76
1:A:286:VAL:HG11	1:A:304:PHE:HE1	1.51	0.75
1:A:299:LEU:HD23	1:A:319:PRO:CG	2.16	0.74
1:A:286:VAL:CG1	1:A:304:PHE:HE1	2.00	0.74
1:A:204:TYR:N	1:A:204:TYR:CD2	2.55	0.73
1:A:208:MET:HE1	1:A:216:SER:OG	1.88	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:248:LYS:HE2	1:A:291:GLU:CD	2.14	0.73
1:A:54:TYR:CE2	1:A:125:SER:HB2	2.22	0.73
1:A:445:LYS:HE3	1:A:451:GLU:OE1	1.89	0.72
1:A:81:GLU:HA	1:A:84:LEU:HD12	1.73	0.70
1:A:162:LEU:H	1:A:162:LEU:HD12	1.55	0.70
1:A:29:HIS:CE1	1:A:59:GLU:HA	2.27	0.70
1:A:211:VAL:HB	1:A:364:GLU:OE2	1.93	0.69
1:A:180:PHE:HZ	1:A:197:VAL:HG23	1.58	0.69
1:A:269:ILE:HD12	1:A:273:GLY:HA2	1.74	0.68
1:A:204:TYR:N	1:A:204:TYR:HD2	1.92	0.68
1:A:311:ILE:HD11	1:A:346:ARG:HD3	1.77	0.66
1:A:122:LEU:HD21	1:A:130:VAL:HG13	1.78	0.65
1:A:190:GLY:C	1:A:192:PRO:HD3	2.23	0.63
1:A:336:LEU:O	1:A:338:VAL:N	2.31	0.63
1:A:419:VAL:HG23	3:A:800:CL:CL	2.35	0.63
1:A:44:ARG:NH2	1:A:473:TYR:HB3	2.14	0.63
1:A:467:ILE:N	1:A:467:ILE:HD12	2.14	0.62
1:A:286:VAL:HG11	1:A:304:PHE:CE1	2.35	0.62
1:A:185:ALA:HB2	1:A:394:ILE:CG2	2.31	0.61
1:A:252:LEU:HA	1:A:260:VAL:HG23	1.83	0.61
1:A:406:ARG:HB3	1:A:431:ASP:CG	2.26	0.60
1:A:63:ILE:HG13	1:A:336:LEU:HD13	1.83	0.60
1:A:177:LEU:HD12	1:A:178:ALA:N	2.16	0.60
1:A:361:ARG:HB3	1:A:365:MET:HE2	1.83	0.60
1:A:211:VAL:HG21	2:A:500:PG4:H81	1.85	0.59
1:A:51:PRO:HB2	1:A:54:TYR:HD1	1.68	0.59
1:A:51:PRO:HB2	1:A:54:TYR:CD1	2.37	0.59
1:A:78:LEU:HD12	1:A:78:LEU:O	2.02	0.59
1:A:162:LEU:HD12	1:A:162:LEU:N	2.17	0.59
1:A:23:ARG:NH2	4:A:503:HOH:O	2.35	0.58
1:A:80:SER:O	1:A:81:GLU:C	2.46	0.58
1:A:72:ASP:CB	1:A:144:ARG:HH22	2.16	0.58
1:A:74:LEU:O	1:A:74:LEU:HD12	2.03	0.58
1:A:202:ASN:N	1:A:202:ASN:HD22	2.02	0.58
1:A:133:VAL:HG13	1:A:162:LEU:HD11	1.85	0.57
1:A:53:GLU:HG3	1:A:53:GLU:O	2.04	0.57
1:A:80:SER:O	1:A:82:PHE:N	2.37	0.57
1:A:142:LEU:O	1:A:145:TYR:HB3	2.05	0.57
1:A:150:PRO:HD2	1:A:151:GLU:OE2	2.03	0.57
1:A:43:MET:HE3	1:A:237:ILE:HD12	1.87	0.57
1:A:29:HIS:HE1	1:A:59:GLU:HA	1.67	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:51:PRO:HD2	1:A:54:TYR:CD1	2.39	0.56
1:A:119:ASP:C	1:A:121:ALA:H	2.13	0.56
1:A:267:TYR:CG	1:A:275:ARG:HD3	2.40	0.56
1:A:80:SER:O	1:A:83:GLY:N	2.37	0.56
1:A:89:ILE:HG22	1:A:89:ILE:O	2.05	0.56
1:A:269:ILE:CD1	1:A:273:GLY:HA2	2.36	0.56
1:A:159:LEU:HD12	1:A:159:LEU:C	2.30	0.56
1:A:361:ARG:CB	1:A:365:MET:HE2	2.36	0.56
1:A:34:SER:H	1:A:37:GLN:HE22	1.53	0.56
1:A:170:ALA:HB1	1:A:176:THR:OG1	2.06	0.55
1:A:118:ILE:O	1:A:121:ALA:HB3	2.06	0.55
1:A:242:GLY:O	1:A:296:LYS:HE2	2.06	0.55
1:A:27:PHE:CD2	1:A:38:PHE:HB2	2.41	0.55
1:A:105:ARG:O	1:A:109:GLU:HG3	2.06	0.55
1:A:82:PHE:HB2	4:A:510:HOH:O	2.07	0.55
1:A:44:ARG:HB3	1:A:220:PHE:CE2	2.42	0.55
1:A:419:VAL:O	1:A:422:SER:HB2	2.06	0.54
1:A:119:ASP:C	1:A:121:ALA:N	2.63	0.54
1:A:459:TRP:HD1	1:A:466:ILE:HD11	1.73	0.54
1:A:278:ARG:HH11	1:A:278:ARG:HB2	1.72	0.54
1:A:146:VAL:HG21	1:A:171:PRO:HG2	1.89	0.54
1:A:202:ASN:HB3	1:A:204:TYR:CE2	2.42	0.54
1:A:41:GLN:OE1	1:A:41:GLN:CA	2.55	0.54
1:A:45:PHE:O	1:A:50:TYR:HB2	2.08	0.53
1:A:185:ALA:HB2	1:A:394:ILE:HG22	1.90	0.53
1:A:267:TYR:OH	1:A:280:PRO:HD3	2.09	0.53
1:A:33:GLY:CA	1:A:37:GLN:HE22	2.21	0.53
1:A:113:ARG:HA	1:A:116:ARG:HH11	1.74	0.53
1:A:177:LEU:HD12	1:A:178:ALA:H	1.73	0.52
1:A:86:ILE:HG12	1:A:336:LEU:HD21	1.90	0.52
1:A:116:ARG:O	1:A:120:GLU:HG3	2.09	0.52
1:A:26:VAL:HB	1:A:132:LEU:HD22	1.92	0.52
1:A:151:GLU:H	1:A:151:GLU:CD	2.17	0.52
1:A:261:SER:OG	1:A:287:LYS:HG3	2.10	0.52
1:A:368:GLU:HB3	1:A:389:GLU:HG3	1.92	0.52
1:A:477:LYS:NZ	1:A:477:LYS:HB2	2.24	0.52
1:A:49:GLY:O	1:A:50:TYR:C	2.52	0.51
1:A:119:ASP:O	1:A:121:ALA:N	2.43	0.51
1:A:194:GLU:OE1	1:A:196:VAL:HB	2.10	0.51
1:A:302:PHE:HB2	1:A:315:TYR:HB2	1.93	0.51
1:A:391:ILE:HD13	1:A:430:ALA:CB	2.38	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:101:LYS:HE3	1:A:105:ARG:NH1	2.26	0.51
1:A:81:GLU:HG2	1:A:188:ALA:HB1	1.92	0.51
1:A:395:GLU:HG3	1:A:396:ARG:N	2.25	0.51
1:A:421:TYR:O	1:A:422:SER:C	2.53	0.50
1:A:460:SER:HB2	1:A:462:ASP:OD1	2.12	0.50
1:A:58:PHE:HE1	1:A:113:ARG:HG2	1.76	0.50
1:A:264:LEU:HD11	1:A:302:PHE:HD1	1.76	0.50
1:A:81:GLU:CG	1:A:188:ALA:HB1	2.43	0.49
1:A:278:ARG:HB2	1:A:278:ARG:NH1	2.28	0.49
1:A:270:ASP:O	1:A:272:ASN:N	2.45	0.49
1:A:355:SER:OG	1:A:459:TRP:O	2.21	0.49
1:A:130:VAL:HG22	1:A:155:LYS:O	2.12	0.49
1:A:216:SER:OG	1:A:218:GLU:OE2	2.30	0.49
1:A:456:ILE:HB	1:A:457:PRO:CD	2.43	0.49
1:A:26:VAL:HB	1:A:132:LEU:CD2	2.43	0.49
1:A:267:TYR:CZ	1:A:280:PRO:HD3	2.48	0.48
1:A:331:VAL:HG12	1:A:332:SER:N	2.28	0.48
1:A:278:ARG:HH11	1:A:278:ARG:CB	2.25	0.48
1:A:153:ALA:HB1	1:A:174:ILE:HD11	1.95	0.48
1:A:382:ASN:ND2	1:A:434:VAL:HG13	2.29	0.48
1:A:294:LEU:HD22	1:A:300:TYR:CZ	2.49	0.47
1:A:459:TRP:HB3	1:A:464:HIS:CD2	2.49	0.47
1:A:201:THR:C	1:A:202:ASN:HD22	2.21	0.47
1:A:462:ASP:OD1	1:A:462:ASP:N	2.45	0.47
1:A:209:THR:HG21	1:A:366:ILE:HD11	1.96	0.47
1:A:369:TYR:CD2	1:A:370:ASP:N	2.83	0.47
1:A:460:SER:CB	1:A:462:ASP:OD1	2.63	0.47
1:A:44:ARG:HB3	1:A:220:PHE:CD2	2.49	0.47
1:A:48:ASN:HD21	1:A:233:ALA:H	1.63	0.47
1:A:250:LYS:HD3	1:A:289:ASP:OD1	2.15	0.47
1:A:380:TYR:O	1:A:442:ILE:HA	2.15	0.47
1:A:211:VAL:O	1:A:212:GLN:C	2.58	0.46
1:A:24:PRO:HG3	1:A:54:TYR:HD2	1.81	0.46
1:A:142:LEU:HD23	1:A:142:LEU:HA	1.69	0.46
1:A:186:LEU:N	1:A:187:PRO:HD3	2.30	0.46
1:A:203:VAL:C	1:A:204:TYR:CD2	2.92	0.46
1:A:213:LEU:HD23	1:A:213:LEU:C	2.41	0.46
1:A:219:THR:HG22	1:A:219:THR:O	2.14	0.46
1:A:44:ARG:HH22	1:A:473:TYR:HB3	1.81	0.46
1:A:281:VAL:HG23	1:A:282:LYS:HG2	1.98	0.46
1:A:345:GLU:C	1:A:347:LEU:N	2.72	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:472:ASP:OD1	1:A:472:ASP:N	2.49	0.46
1:A:324:ASP:OD1	1:A:326:TRP:HE3	1.98	0.46
1:A:45:PHE:CE1	1:A:220:PHE:CE1	3.04	0.46
1:A:34:SER:H	1:A:37:GLN:NE2	2.14	0.45
1:A:403:VAL:O	1:A:403:VAL:HG12	2.15	0.45
1:A:473:TYR:O	1:A:474:ILE:HG13	2.17	0.45
1:A:477:LYS:NZ	1:A:477:LYS:CB	2.80	0.45
1:A:48:ASN:HD21	1:A:233:ALA:N	2.14	0.45
1:A:24:PRO:HG3	1:A:54:TYR:CD2	2.51	0.45
1:A:141:PHE:C	1:A:141:PHE:CD2	2.93	0.45
1:A:244:TYR:CE1	1:A:295:ARG:HG2	2.51	0.45
1:A:89:ILE:O	1:A:89:ILE:CG2	2.64	0.45
1:A:407:GLY:O	1:A:408:ALA:HB3	2.17	0.45
1:A:101:LYS:HE3	1:A:105:ARG:HD3	1.99	0.45
1:A:148:SER:O	1:A:149:SER:HB3	2.17	0.45
1:A:248:LYS:HE2	1:A:291:GLU:OE1	2.16	0.45
1:A:425:PRO:O	1:A:426:PHE:HB2	2.17	0.45
1:A:376:VAL:C	1:A:447:ARG:HB3	2.42	0.45
1:A:27:PHE:CE2	1:A:38:PHE:HB2	2.52	0.45
1:A:45:PHE:CD1	1:A:220:PHE:CE1	3.04	0.45
1:A:167:GLY:O	1:A:168:VAL:HG13	2.17	0.44
1:A:346:ARG:HG3	1:A:461:ALA:O	2.16	0.44
1:A:131:ASP:OD2	1:A:227:ILE:HB	2.18	0.44
1:A:135:HIS:O	1:A:138:GLY:N	2.48	0.44
1:A:29:HIS:CE1	1:A:60:TYR:H	2.35	0.44
1:A:224:PHE:CE1	1:A:232:PRO:HB3	2.50	0.44
1:A:43:MET:HE3	1:A:237:ILE:HG23	2.00	0.44
1:A:143:VAL:O	1:A:144:ARG:C	2.60	0.44
1:A:358:LEU:HD21	2:A:500:PG4:H11	2.00	0.44
1:A:115:ASP:O	1:A:116:ARG:C	2.60	0.44
1:A:61:ASP:OD1	1:A:61:ASP:C	2.61	0.44
1:A:72:ASP:CB	1:A:144:ARG:NH2	2.80	0.44
1:A:311:ILE:CD1	1:A:346:ARG:HD3	2.44	0.44
1:A:349:PRO:O	1:A:352:LYS:HG2	2.18	0.44
1:A:39:GLU:OE1	1:A:327:ALA:HA	2.17	0.43
1:A:136:SER:C	1:A:138:GLY:N	2.75	0.43
1:A:131:ASP:OD1	1:A:157:ALA:HB3	2.18	0.43
1:A:270:ASP:C	1:A:272:ASN:H	2.25	0.43
1:A:34:SER:N	1:A:37:GLN:HE22	2.16	0.43
1:A:263:TRP:CH2	1:A:285:ARG:HD3	2.53	0.43
1:A:267:TYR:CE1	1:A:280:PRO:HD3	2.54	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:368:GLU:CG	1:A:394:ILE:HG13	2.49	0.43
1:A:406:ARG:HD2	1:A:406:ARG:C	2.41	0.43
1:A:442:ILE:N	1:A:442:ILE:HD12	2.33	0.43
1:A:267:TYR:CE1	1:A:280:PRO:N	2.86	0.43
1:A:54:TYR:HE2	1:A:125:SER:CB	2.23	0.43
1:A:358:LEU:CD2	2:A:500:PG4:H11	2.48	0.43
1:A:103:ARG:O	1:A:107:ILE:HG13	2.19	0.42
1:A:459:TRP:HD1	1:A:466:ILE:CD1	2.31	0.42
1:A:84:LEU:O	1:A:87:SER:OG	2.36	0.42
1:A:86:ILE:HD12	1:A:425:PRO:HG3	2.00	0.42
1:A:370:ASP:O	1:A:371:GLU:C	2.62	0.42
1:A:43:MET:CE	1:A:237:ILE:HD12	2.49	0.42
1:A:159:LEU:HD11	1:A:161:LEU:HD21	2.01	0.42
1:A:160:ILE:C	1:A:161:LEU:HD23	2.44	0.42
1:A:89:ILE:HD11	1:A:341:LEU:HD11	2.01	0.42
1:A:122:LEU:CD2	1:A:130:VAL:HG13	2.48	0.42
1:A:134:GLY:HA3	1:A:142:LEU:HD12	2.02	0.42
1:A:459:TRP:CD1	1:A:466:ILE:HD11	2.52	0.42
1:A:50:TYR:HE1	1:A:224:PHE:HE2	1.68	0.42
1:A:142:LEU:O	1:A:146:VAL:HG22	2.20	0.42
1:A:343:LEU:O	1:A:344:PRO:C	2.62	0.42
1:A:452:GLU:HB2	1:A:474:ILE:CD1	2.50	0.42
1:A:159:LEU:HD11	1:A:161:LEU:CD2	2.50	0.41
1:A:477:LYS:HB2	1:A:477:LYS:HZ2	1.83	0.41
1:A:81:GLU:O	1:A:84:LEU:HB2	2.19	0.41
1:A:152:ARG:C	1:A:154:ALA:N	2.75	0.41
1:A:406:ARG:N	1:A:431:ASP:OD1	2.51	0.41
1:A:209:THR:OG1	1:A:364:GLU:HB2	2.19	0.41
1:A:213:LEU:O	1:A:213:LEU:CD2	2.60	0.41
1:A:476:ASP:C	1:A:478:LEU:H	2.27	0.41
1:A:29:HIS:HE1	1:A:60:TYR:H	1.69	0.41
1:A:219:THR:O	1:A:219:THR:CG2	2.69	0.41
1:A:45:PHE:HD2	1:A:50:TYR:CE1	2.38	0.41
1:A:101:LYS:HE3	1:A:105:ARG:CZ	2.50	0.41
1:A:82:PHE:HE1	1:A:186:LEU:HD11	1.85	0.41
1:A:88:GLN:HE21	1:A:88:GLN:HB3	1.54	0.41
1:A:238:VAL:O	1:A:322:ARG:HD2	2.20	0.41
1:A:248:LYS:HE2	1:A:291:GLU:CG	2.51	0.41
1:A:101:LYS:CD	1:A:102:SER:N	2.74	0.41
1:A:152:ARG:C	1:A:154:ALA:H	2.29	0.41
1:A:29:HIS:HD2	1:A:30:GLY:O	2.04	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:116:ARG:HG3	1:A:116:ARG:NH1	2.36	0.41
1:A:434:VAL:CG1	1:A:440:ILE:HG23	2.51	0.41
1:A:113:ARG:HA	1:A:116:ARG:NH1	2.35	0.40
1:A:361:ARG:NH2	1:A:377:ASP:OD1	2.34	0.40
1:A:191:LEU:O	1:A:191:LEU:CD2	2.64	0.40
1:A:250:LYS:HG3	1:A:288:GLY:C	2.46	0.40
1:A:365:MET:O	1:A:392:CYS:HB3	2.21	0.40
1:A:444:VAL:O	1:A:451:GLU:HA	2.21	0.40
1:A:86:ILE:HD12	1:A:425:PRO:CG	2.51	0.40
1:A:237:ILE:O	1:A:239:PRO:HD3	2.21	0.40
1:A:260:VAL:HG11	1:A:331:VAL:HG11	2.04	0.40
1:A:396:ARG:NH2	1:A:428:SER:HA	2.37	0.40
1:A:72:ASP:HB2	1:A:144:ARG:NH2	2.36	0.40
1:A:181:GLY:HA2	1:A:205:PHE:O	2.21	0.40
1:A:198:TYR:O	1:A:199:ASN:HB2	2.22	0.40
1:A:380:TYR:HB2	1:A:443:ALA:HB3	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	458/479 (96%)	399 (87%)	47 (10%)	12 (3%)	4 21

All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	81	GLU
1	A	210	HIS
1	A	271	GLU
1	A	337	ASP
1	A	191	LEU

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Mol	Chain	Res	Type
1	A	188	ALA
1	A	192	PRO
1	A	363	LYS
1	A	120	GLU
1	A	70	GLU
1	A	233	ALA
1	A	150	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	391/404 (97%)	357 (91%)	34 (9%)	9	34

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	20	GLU
1	A	39	GLU
1	A	41	GLN
1	A	72	ASP
1	A	74	LEU
1	A	82	PHE
1	A	88	GLN
1	A	94	THR
1	A	124	GLU
1	A	159	LEU
1	A	168	VAL
1	A	194	GLU
1	A	196	VAL
1	A	202	ASN
1	A	204	TYR
1	A	206	ASN
1	A	245	VAL
1	A	286	VAL
1	A	293	ARG

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Mol	Chain	Res	Type
1	A	299	LEU
1	A	336	LEU
1	A	342	ILE
1	A	363	LYS
1	A	419	VAL
1	A	420	ARG
1	A	425	PRO
1	A	440	ILE
1	A	441	SER
1	A	444	VAL
1	A	451	GLU
1	A	460	SER
1	A	467	ILE
1	A	472	ASP
1	A	477	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	29	HIS
1	A	37	GLN
1	A	48	ASN
1	A	85	ASN
1	A	88	GLN
1	A	147	ASN
1	A	199	ASN
1	A	272	ASN
1	A	303	GLN
1	A	382	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

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 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	$\# Z > 2$
2	PG4	A	500	-	12,12,12	0.95	0	11,11,11	0.42	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	PG4	A	500	-	-	2/10/10/10	-

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
2	A	500	PG4	O3-C5-C6-O4
2	A	500	PG4	C1-C2-O2-C3

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	500	PG4	3	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

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

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

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	460/479 (96%)	-0.86	0 100 100	29, 63, 101, 145	0

There are no RSRZ outliers to report.

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(Å ²)	Q<0.9
2	PG4	A	500	13/13	0.97	0.08	41,51,67,69	0
3	CL	A	800	1/1	0.97	0.11	46,46,46,46	0

6.5 Other polymers [i](#)

There are no such residues in this entry.