Full wwPDB X-ray Structure Validation Report ⓘ

Nov 24, 2025 – 08:18 PM JST

PDB ID	:	8ZRO / pdb_00008zro
Title	:	Arabidopsis Carboxylesterase CXE15
Authors	:	Arold, S.T.; Hameed, U.F.S.
Deposited on	:	2024-06-05
Resolution	:	3.09 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
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
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)	:	2.46

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 3.09 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.
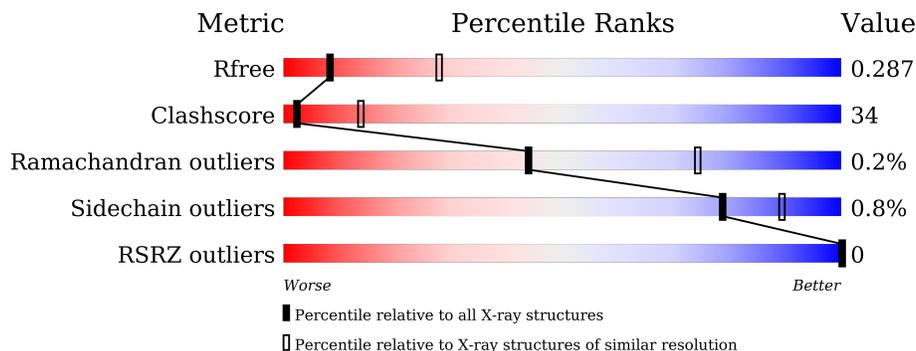
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	1351 (3.10-3.10)
Clashscore	180529	1454 (3.10-3.10)
Ramachandran outliers	177936	1391 (3.10-3.10)
Sidechain outliers	177891	1391 (3.10-3.10)
RSRZ outliers	164620	1351 (3.10-3.10)

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 <=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	321	47% 45% · ·
1	B	321	42% 53% · ·

2 Entry composition ⓘ

There is only 1 type of molecule in this entry. The entry contains 4870 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 Strigolactones hydrolase CXE15.

| Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	308	Total	C	N	O	S	0	0	0
			2421	1539	419	454	9			
1	B	311	Total	C	N	O	S	0	0	0
			2449	1561	424	455	9			

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: Strigolactones hydrolase CXE15

Chain A:

• Molecule 1: Strigolactones hydrolase CXE15

Chain B:
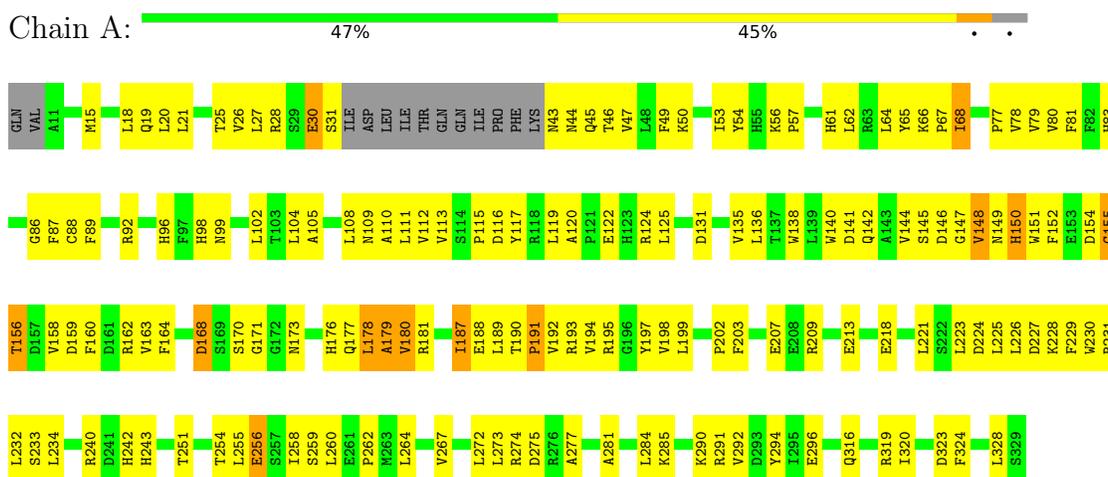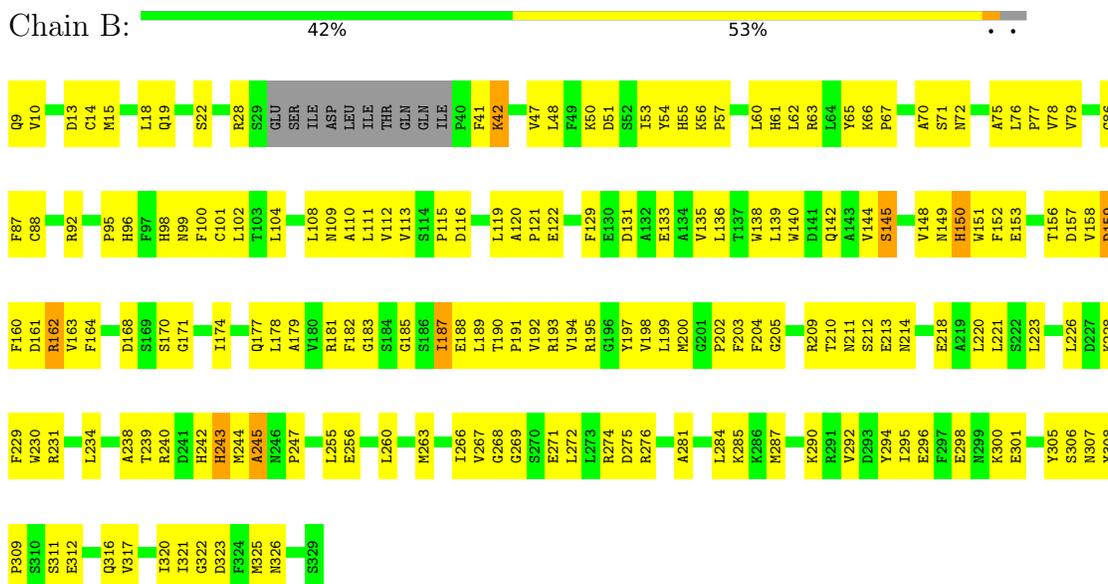
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α, β, γ	99.40Å 99.40Å 114.16Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	49.75 – 3.09 49.75 – 3.09	Depositor EDS
% Data completeness (in resolution range)	70.2 (49.75-3.09) 70.2 (49.75-3.09)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.31 (at 3.07Å)	Xtriage
Refinement program	REFMAC 5.8.0430	Depositor
R, R_{free}	0.233 , 0.284 0.241 , 0.287	Depositor DCC
R_{free} test set	867 reflections (7.02%)	wwPDB-VP
Wilson B-factor (Å^2)	93.6	Xtriage
Anisotropy	0.276	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 89.7	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.037 for -h,-k,l	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	4870	wwPDB-VP
Average B, all atoms (Å^2)	119.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.82% of the height of the origin peak. No significant pseudotranslation is detected.*

---

[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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 ⓘ

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	0.62	1/2484 (0.0%)	1.09	17/3368 (0.5%)
1	B	0.56	0/2514	1.06	15/3408 (0.4%)
All	All	0.59	1/4998 (0.0%)	1.07	32/6776 (0.5%)

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
1	B	0	1
All	All	0	2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	191	PRO	N-CD	-12.04	1.30	1.47

All (32) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	188	GLU	N-CA-C	-14.06	80.84	110.80
1	A	188	GLU	N-CA-CB	12.06	130.88	110.49
1	B	161	ASP	N-CA-C	-11.96	85.33	110.80
1	B	161	ASP	CB-CA-C	8.97	128.28	110.42
1	A	150	HIS	N-CA-C	-8.68	102.70	113.38
1	B	72	ASN	N-CA-C	-8.68	102.70	113.38
1	B	157	ASP	N-CA-C	8.09	120.82	111.11
1	A	187	ILE	N-CA-C	-8.09	92.52	109.34
1	B	71	SER	N-CA-C	-7.76	96.21	108.63
1	B	145	SER	N-CA-C	-7.45	100.56	110.24
1	A	148	VAL	N-CA-C	-7.41	97.67	108.71

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	162	ARG	N-CA-C	-7.40	94.06	107.60
1	A	44	ASN	N-CA-C	-7.08	104.45	113.23
1	B	188	GLU	N-CA-C	-7.05	104.42	113.16
1	B	42	LYS	N-CA-CB	-6.52	98.93	110.14
1	B	245	ALA	N-CA-C	-6.43	104.48	112.72
1	A	96	HIS	N-CA-C	-6.21	105.53	113.23
1	A	178	LEU	CB-CA-C	-6.15	98.19	110.42
1	A	323	ASP	CA-CB-CG	5.80	118.40	112.60
1	B	159	ASP	N-CA-C	-5.62	101.05	109.15
1	B	96	HIS	N-CA-C	-5.61	105.94	112.89
1	A	45	GLN	CB-CA-C	-5.58	109.15	115.79
1	A	156	THR	N-CA-CB	5.57	119.89	110.49
1	A	149	ASN	CB-CA-C	-5.50	102.27	111.23
1	A	168	ASP	CA-CB-CG	5.35	117.95	112.60
1	A	256	GLU	N-CA-C	-5.34	105.03	112.45
1	A	155	GLY	N-CA-C	-5.23	100.78	113.18
1	B	187	ILE	N-CA-C	-5.23	98.46	109.34
1	A	30	GLU	N-CA-C	5.21	121.91	110.80
1	B	145	SER	CB-CA-C	5.12	118.70	109.64
1	B	243	HIS	CA-C-O	-5.09	116.27	121.87
1	A	179	ALA	N-CA-C	-5.05	100.04	110.80

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	193	ARG	Sidechain
1	B	193	ARG	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	2421	0	2333	138	1
1	B	2449	0	2369	197	1
All	All	4870	0	4702	330	1

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 (330) 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:221:LEU:CD1	1:B:226:LEU:HD21	1.38	1.49
1:A:255:LEU:HD23	1:A:258:ILE:HD11	1.22	1.19
1:B:221:LEU:CD1	1:B:226:LEU:CD2	2.24	1.15
1:B:218:GLU:OE2	1:B:221:LEU:HD23	1.51	1.10
1:B:221:LEU:HD11	1:B:226:LEU:HD21	1.09	1.08
1:B:221:LEU:HD12	1:B:226:LEU:HD21	1.34	1.05
1:B:221:LEU:HD12	1:B:226:LEU:CD2	1.87	1.04
1:B:255:LEU:HD12	1:B:290:LYS:NZ	1.73	1.02
1:B:221:LEU:HD11	1:B:226:LEU:CD2	1.89	1.00
1:B:260:LEU:HG	1:B:290:LYS:HE2	1.04	1.00
1:B:260:LEU:CG	1:B:290:LYS:HE2	1.94	0.96
1:B:255:LEU:HD12	1:B:290:LYS:HZ3	1.32	0.95
1:B:260:LEU:HG	1:B:290:LYS:CE	1.97	0.92
1:B:284:LEU:HD12	1:B:290:LYS:HD3	1.54	0.89
1:B:256:GLU:HG2	1:B:287:MET:HG3	1.54	0.89
1:B:221:LEU:HG	1:B:272:LEU:HD13	1.56	0.88
1:B:190:THR:OG1	1:B:191:PRO:HD3	1.74	0.88
1:A:47:VAL:HG22	1:A:67:PRO:HA	1.60	0.83
1:B:205:GLY:O	1:B:276:ARG:NH2	2.12	0.83
1:B:209:ARG:HE	1:B:223:LEU:HD11	1.43	0.81
1:A:209:ARG:NH2	1:A:227:ASP:OD1	2.12	0.81
1:B:189:LEU:HB3	1:B:192:VAL:HB	1.63	0.81
1:B:200:MET:CE	1:B:305:TYR:CG	2.64	0.80
1:B:220:LEU:HG	1:B:220:LEU:O	1.82	0.79
1:B:210:THR:OG1	1:B:213:GLU:OE1	2.00	0.78
1:B:260:LEU:HD12	1:B:290:LYS:HD3	1.65	0.78
1:B:323:ASP:HA	1:B:326:ASN:ND2	2.00	0.76
1:A:147:GLY:O	1:A:151:TRP:CE2	2.39	0.76
1:B:218:GLU:HB2	1:B:221:LEU:HB3	1.68	0.75
1:A:177:GLN:O	1:A:178:LEU:HB2	1.87	0.74
1:B:70:ALA:HA	1:B:109:ASN:HD21	1.51	0.74
1:B:284:LEU:HD12	1:B:290:LYS:CD	2.18	0.74
1:B:200:MET:HE1	1:B:305:TYR:CG	2.23	0.73
1:A:140:TRP:HE1	1:A:191:PRO:HD2	1.53	0.73
1:B:98:HIS:HD2	1:B:102:LEU:HD11	1.52	0.73
1:A:199:LEU:HB3	1:A:202:PRO:HG3	1.70	0.73
1:A:194:VAL:HG11	1:A:197:TYR:OH	1.89	0.72

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:298:GLU:O	1:B:300:LYS:HD2	1.89	0.72
1:A:19:GLN:OE1	1:B:50:LYS:NZ	2.20	0.72
1:B:100:PHE:O	1:B:104:LEU:HD12	1.89	0.72
1:B:200:MET:HE2	1:B:305:TYR:CD1	2.24	0.72
1:A:140:TRP:O	1:A:144:VAL:HG22	1.91	0.71
1:A:53:ILE:HD13	1:A:61:HIS:CD2	2.26	0.70
1:B:234:LEU:HD21	1:B:245:ALA:HB2	1.73	0.70
1:B:221:LEU:CG	1:B:226:LEU:HD21	2.18	0.69
1:B:200:MET:HE2	1:B:305:TYR:CG	2.28	0.69
1:A:154:ASP:O	1:A:156:THR:HG23	1.93	0.69
1:A:77:PRO:HG2	1:A:110:ALA:HB2	1.75	0.68
1:B:10:VAL:HG11	1:B:13:ASP:HB2	1.75	0.68
1:B:323:ASP:HA	1:B:326:ASN:HD21	1.57	0.67
1:B:181:ARG:O	1:B:185:GLY:HA3	1.94	0.67
1:B:194:VAL:HG21	1:B:197:TYR:CZ	2.30	0.67
1:B:255:LEU:CD1	1:B:290:LYS:NZ	2.55	0.66
1:B:221:LEU:HD12	1:B:226:LEU:HD22	1.75	0.66
1:B:47:VAL:CG2	1:B:102:LEU:HD23	2.26	0.66
1:B:136:LEU:HD11	1:B:178:LEU:HD13	1.78	0.64
1:A:86:GLY:HA3	1:A:229:PHE:CD2	2.33	0.64
1:B:221:LEU:HD11	1:B:226:LEU:HD11	1.80	0.63
1:A:147:GLY:O	1:A:151:TRP:CZ2	2.51	0.63
1:B:92:ARG:N	1:B:116:ASP:OD1	2.30	0.63
1:B:55:HIS:HB3	1:B:60:LEU:HB2	1.81	0.63
1:B:75:ALA:HB3	1:B:160:PHE:CD2	2.34	0.62
1:B:182:PHE:O	1:B:187:ILE:HD11	2.00	0.62
1:A:223:LEU:HA	1:A:226:LEU:HD12	1.81	0.62
1:B:190:THR:OG1	1:B:191:PRO:CD	2.47	0.62
1:B:260:LEU:HB2	1:B:290:LYS:HG2	1.81	0.62
1:A:28:ARG:O	1:B:50:LYS:HB2	2.00	0.61
1:B:179:ALA:O	1:B:183:GLY:N	2.33	0.61
1:A:26:VAL:HG21	1:A:122:GLU:HG3	1.81	0.61
1:A:140:TRP:HE1	1:A:191:PRO:CD	2.13	0.61
1:B:295:ILE:HD12	1:B:320:ILE:HD12	1.83	0.61
1:B:98:HIS:CD2	1:B:102:LEU:HD11	2.33	0.61
1:A:260:LEU:H	1:A:290:LYS:HE3	1.65	0.61
1:A:230:TRP:O	1:A:234:LEU:HD12	2.01	0.60
1:B:200:MET:CE	1:B:305:TYR:CD2	2.83	0.60
1:A:15:MET:HE2	1:A:225:LEU:HD11	1.82	0.60
1:B:255:LEU:HD12	1:B:290:LYS:HZ1	1.66	0.60
1:B:50:LYS:HG2	1:B:152:PHE:CZ	2.36	0.60

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:48:LEU:HD13	1:B:152:PHE:CE1	2.36	0.60
1:B:75:ALA:HA	1:B:156:THR:HG21	1.82	0.60
1:B:86:GLY:HA3	1:B:229:PHE:CD2	2.37	0.60
1:A:274:ARG:NH1	1:A:275:ASP:OD1	2.28	0.59
1:B:47:VAL:HG12	1:B:67:PRO:HA	1.84	0.59
1:B:78:VAL:HB	1:B:163:VAL:HG12	1.84	0.59
1:B:212:SER:OG	1:B:275:ASP:OD1	2.19	0.59
1:B:62:LEU:HD21	1:B:138:TRP:CE3	2.37	0.59
1:A:154:ASP:O	1:A:155:GLY:C	2.44	0.59
1:B:218:GLU:OE2	1:B:221:LEU:CD2	2.39	0.59
1:B:221:LEU:CG	1:B:272:LEU:HD13	2.32	0.59
1:A:177:GLN:C	1:A:179:ALA:H	2.11	0.59
1:A:47:VAL:HG21	1:A:105:ALA:HB3	1.85	0.59
1:B:200:MET:HE2	1:B:305:TYR:CE1	2.38	0.58
1:B:170:SER:O	1:B:174:ILE:HD12	2.03	0.58
1:A:125:LEU:HD12	1:A:233:SER:C	2.29	0.58
1:B:104:LEU:O	1:B:108:LEU:HB2	2.03	0.58
1:B:267:VAL:HG11	1:B:274:ARG:HA	1.86	0.58
1:A:125:LEU:HD11	1:A:233:SER:HB2	1.86	0.58
1:B:230:TRP:O	1:B:234:LEU:HD12	2.05	0.57
1:A:140:TRP:CD1	1:A:189:LEU:HA	2.40	0.57
1:B:171:GLY:HA2	1:B:174:ILE:HD13	1.87	0.57
1:A:267:VAL:HG21	1:A:277:ALA:HB3	1.87	0.57
1:A:140:TRP:NE1	1:A:191:PRO:HD2	2.20	0.57
1:A:155:GLY:O	1:A:156:THR:CG2	2.53	0.57
1:A:62:LEU:CD2	1:A:115:PRO:HB3	2.34	0.56
1:A:264:LEU:HD11	1:A:320:ILE:HG22	1.87	0.56
1:B:200:MET:HE2	1:B:305:TYR:CD2	2.40	0.56
1:A:294:TYR:OH	1:A:296:GLU:OE2	2.23	0.56
1:A:148:VAL:HG22	1:A:160:PHE:HE2	1.69	0.56
1:A:160:PHE:O	1:A:163:VAL:HG23	2.06	0.56
1:B:162:ARG:HG2	1:B:195:ARG:HE	1.71	0.56
1:A:242:HIS:HE1	1:A:243:HIS:CE1	2.23	0.56
1:A:124:ARG:NH1	1:A:234:LEU:O	2.39	0.55
1:A:316:GLN:O	1:A:320:ILE:HD12	2.05	0.55
1:A:92:ARG:NH1	1:A:116:ASP:OD2	2.35	0.55
1:B:210:THR:OG1	1:B:275:ASP:OD1	2.24	0.55
1:A:53:ILE:CD1	1:A:61:HIS:NE2	2.69	0.55
1:A:66:LYS:HD2	1:A:152:PHE:HB2	1.87	0.55
1:B:220:LEU:O	1:B:220:LEU:CG	2.53	0.55
1:B:255:LEU:CD1	1:B:290:LYS:HZ1	2.19	0.55

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:255:LEU:CD2	1:A:258:ILE:HD11	2.15	0.55
1:B:100:PHE:CD2	1:B:104:LEU:HD11	2.41	0.55
1:B:200:MET:CE	1:B:305:TYR:CD1	2.88	0.55
1:A:125:LEU:HD12	1:A:233:SER:O	2.06	0.55
1:B:305:TYR:O	1:B:307:ASN:N	2.40	0.55
1:A:262:PRO:HA	1:A:291:ARG:O	2.06	0.54
1:B:269:GLY:O	1:B:274:ARG:HD3	2.07	0.54
1:B:140:TRP:HD1	1:B:191:PRO:HD2	1.73	0.54
1:A:199:LEU:HB3	1:A:202:PRO:CG	2.37	0.54
1:B:41:PHE:CD1	1:B:41:PHE:C	2.85	0.54
1:A:267:VAL:HG11	1:A:274:ARG:HA	1.91	0.53
1:A:53:ILE:CD1	1:A:61:HIS:CD2	2.91	0.53
1:B:210:THR:HG23	1:B:276:ARG:HH11	1.74	0.53
1:A:243:HIS:HB3	1:A:251:THR:HG23	1.90	0.53
1:B:14:CYS:SG	1:B:15:MET:HE2	2.49	0.53
1:B:138:TRP:O	1:B:142:GLN:HG2	2.08	0.53
1:B:213:GLU:HB3	1:B:223:LEU:HD23	1.90	0.53
1:B:211:ASN:N	1:B:275:ASP:OD2	2.42	0.52
1:A:53:ILE:HD11	1:A:61:HIS:NE2	2.25	0.52
1:A:77:PRO:HG2	1:A:110:ALA:CB	2.40	0.52
1:A:77:PRO:HD2	1:A:109:ASN:O	2.10	0.52
1:B:53:ILE:HD13	1:B:56:LYS:HG2	1.92	0.52
1:B:160:PHE:HB3	1:B:162:ARG:HG3	1.91	0.52
1:A:47:VAL:HG22	1:A:67:PRO:CA	2.36	0.52
1:B:221:LEU:HD11	1:B:226:LEU:CD1	2.39	0.52
1:B:203:PHE:CZ	1:B:230:TRP:CE2	2.98	0.52
1:A:88:CYS:SG	1:A:120:ALA:HB3	2.49	0.52
1:B:168:ASP:O	1:B:171:GLY:N	2.43	0.51
1:B:213:GLU:OE2	1:B:276:ARG:HD3	2.10	0.51
1:B:209:ARG:NE	1:B:223:LEU:HD11	2.21	0.51
1:B:148:VAL:HB	1:B:150:HIS:CD2	2.45	0.51
1:A:79:VAL:HA	1:A:164:PHE:O	2.10	0.51
1:B:98:HIS:O	1:B:102:LEU:HD12	2.11	0.51
1:B:129:PHE:CE1	1:B:177:GLN:HG3	2.46	0.51
1:B:160:PHE:O	1:B:162:ARG:N	2.44	0.51
1:A:54:TYR:HA	1:A:138:TRP:CD1	2.45	0.51
1:A:142:GLN:O	1:A:146:ASP:O	2.28	0.51
1:B:65:TYR:HB2	1:B:112:VAL:HB	1.92	0.51
1:A:242:HIS:CE1	1:A:243:HIS:CE1	2.99	0.51
1:A:87:PHE:HZ	1:A:173:ASN:HB3	1.76	0.50
1:A:136:LEU:HD22	1:A:178:LEU:HD22	1.93	0.50

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:290:LYS:N	1:A:290:LYS:HD2	2.26	0.50
1:B:307:ASN:O	1:B:308:TYR:C	2.54	0.50
1:A:290:LYS:HD2	1:A:290:LYS:H	1.77	0.50
1:B:209:ARG:HE	1:B:223:LEU:CD1	2.19	0.50
1:A:104:LEU:HD22	1:A:108:LEU:HD22	1.93	0.50
1:B:159:ASP:O	1:B:160:PHE:C	2.54	0.50
1:B:312:GLU:O	1:B:316:GLN:HG2	2.12	0.50
1:B:281:ALA:O	1:B:285:LYS:HG2	2.12	0.50
1:A:99:ASN:HA	1:A:102:LEU:HD12	1.92	0.50
1:A:18:LEU:HB2	1:A:89:PHE:CZ	2.46	0.49
1:A:83:HIS:O	1:A:117:TYR:OH	2.30	0.49
1:B:88:CYS:C	1:B:119:LEU:HD13	2.37	0.49
1:A:260:LEU:HB2	1:A:290:LYS:CG	2.42	0.49
1:A:316:GLN:HG2	1:A:320:ILE:HD11	1.95	0.49
1:A:187:ILE:HG23	1:A:190:THR:OG1	2.12	0.49
1:A:267:VAL:HG21	1:A:277:ALA:CB	2.42	0.49
1:B:218:GLU:HG3	1:B:272:LEU:HD12	1.94	0.49
1:B:228:LYS:HG2	1:B:231:ARG:NH2	2.27	0.49
1:B:48:LEU:HD11	1:B:66:LYS:HD3	1.94	0.49
1:B:65:TYR:O	1:B:111:LEU:HD12	2.12	0.49
1:B:99:ASN:HA	1:B:102:LEU:CD1	2.43	0.49
1:A:155:GLY:O	1:A:156:THR:HG22	2.12	0.49
1:B:76:LEU:O	1:B:159:ASP:HB3	2.13	0.49
1:B:218:GLU:CD	1:B:221:LEU:HD23	2.34	0.49
1:B:230:TRP:CE3	1:B:234:LEU:HD11	2.48	0.49
1:B:54:TYR:CZ	1:B:60:LEU:HB3	2.48	0.48
1:B:62:LEU:HD13	1:B:113:VAL:HG13	1.95	0.48
1:B:149:ASN:O	1:B:151:TRP:N	2.46	0.48
1:A:187:ILE:HA	1:A:190:THR:OG1	2.13	0.48
1:A:260:LEU:HB2	1:A:290:LYS:HG3	1.96	0.48
1:A:49:PHE:HA	1:A:64:LEU:O	2.12	0.48
1:B:170:SER:HA	1:B:203:PHE:HB3	1.95	0.48
1:A:168:ASP:O	1:A:171:GLY:N	2.47	0.48
1:B:51:ASP:OD1	1:B:63:ARG:NE	2.36	0.48
1:B:255:LEU:HB3	1:B:287:MET:SD	2.53	0.48
1:B:255:LEU:HB3	1:B:290:LYS:NZ	2.28	0.48
1:B:190:THR:HG1	1:B:191:PRO:HD3	1.76	0.48
1:B:199:LEU:HB3	1:B:202:PRO:HG3	1.96	0.48
1:B:200:MET:HE1	1:B:305:TYR:CD2	2.45	0.48
1:B:78:VAL:O	1:B:163:VAL:HA	2.14	0.48
1:B:218:GLU:OE1	1:B:301:GLU:HB3	2.14	0.48

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:189:LEU:O	1:B:190:THR:C	2.57	0.47
1:A:177:GLN:C	1:A:179:ALA:N	2.72	0.47
1:B:210:THR:O	1:B:214:ASN:OD1	2.31	0.47
1:A:221:LEU:HB3	1:A:272:LEU:HD13	1.96	0.47
1:B:53:ILE:HA	1:B:61:HIS:ND1	2.29	0.47
1:B:95:PRO:O	1:B:99:ASN:OD1	2.32	0.47
1:B:316:GLN:O	1:B:320:ILE:HG23	2.15	0.47
1:A:140:TRP:NE1	1:A:191:PRO:HG2	2.30	0.47
1:A:148:VAL:C	1:A:150:HIS:H	2.23	0.47
1:B:47:VAL:HG22	1:B:102:LEU:HD23	1.95	0.47
1:B:256:GLU:HG2	1:B:287:MET:CG	2.37	0.47
1:A:50:LYS:HB2	1:B:28:ARG:O	2.14	0.47
1:B:221:LEU:HD11	1:B:226:LEU:CG	2.44	0.47
1:B:160:PHE:CB	1:B:162:ARG:HG3	2.45	0.47
1:A:207:GLU:HA	1:A:240:ARG:HE	1.80	0.46
1:B:76:LEU:HB2	1:B:159:ASP:CG	2.40	0.46
1:B:149:ASN:HB2	1:B:153:GLU:HA	1.97	0.46
1:A:284:LEU:CB	1:A:292:VAL:HG21	2.45	0.46
1:B:198:VAL:C	1:B:199:LEU:HD22	2.40	0.46
1:A:80:VAL:HG22	1:A:113:VAL:HB	1.98	0.46
1:A:228:LYS:CD	1:A:231:ARG:HH21	2.28	0.46
1:A:203:PHE:CZ	1:A:230:TRP:CE2	3.04	0.46
1:B:260:LEU:HD11	1:B:290:LYS:HZ3	1.81	0.46
1:B:285:LYS:HB3	1:B:292:VAL:CG2	2.46	0.46
1:A:140:TRP:HE1	1:A:191:PRO:HG2	1.80	0.46
1:B:47:VAL:HG12	1:B:67:PRO:CA	2.45	0.46
1:A:81:PHE:O	1:A:115:PRO:HD2	2.15	0.45
1:A:164:PHE:CE1	1:A:195:ARG:HB2	2.50	0.45
1:A:178:LEU:H	1:A:181:ARG:HB3	1.82	0.45
1:B:18:LEU:HD23	1:B:19:GLN:N	2.31	0.45
1:B:120:ALA:HB1	1:B:121:PRO:HA	1.98	0.45
1:A:213:GLU:HB3	1:A:223:LEU:HD23	1.97	0.45
1:A:104:LEU:HA	1:A:104:LEU:HD23	1.64	0.45
1:A:56:LYS:HZ1	1:B:122:GLU:HA	1.81	0.45
1:A:47:VAL:HG21	1:A:105:ALA:CB	2.46	0.44
1:A:140:TRP:HE1	1:A:191:PRO:CG	2.30	0.44
1:A:190:THR:O	1:A:190:THR:HG22	2.16	0.44
1:A:141:ASP:O	1:A:145:SER:OG	2.35	0.44
1:A:151:TRP:HZ3	1:A:158:VAL:HG21	1.82	0.44
1:A:21:LEU:HB2	1:A:25:THR:OG1	2.17	0.44
1:A:65:TYR:O	1:A:111:LEU:HD23	2.16	0.44

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:88:CYS:C	1:A:119:LEU:HD13	2.42	0.44
1:A:260:LEU:H	1:A:290:LYS:CE	2.29	0.44
1:B:223:LEU:C	1:B:223:LEU:HD13	2.43	0.44
1:B:263:MET:HB3	1:B:263:MET:HE3	1.69	0.44
1:A:78:VAL:HB	1:A:163:VAL:HG22	1.99	0.44
1:B:70:ALA:HA	1:B:109:ASN:ND2	2.25	0.44
1:A:54:TYR:CD1	1:A:62:LEU:HG	2.52	0.44
1:A:131:ASP:O	1:A:135:VAL:HG23	2.18	0.44
1:A:170:SER:HA	1:A:203:PHE:HB3	1.98	0.44
1:B:321:ILE:HG22	1:B:325:MET:HE3	1.99	0.44
1:B:268:GLY:HA3	1:B:271:GLU:HG3	1.99	0.44
1:B:149:ASN:CB	1:B:153:GLU:HA	2.47	0.44
1:B:238:ALA:HB1	1:B:242:HIS:CD2	2.52	0.43
1:A:20:LEU:HD13	1:A:20:LEU:C	2.43	0.43
1:A:62:LEU:HD23	1:A:115:PRO:HB3	1.99	0.43
1:B:255:LEU:HB3	1:B:290:LYS:HZ2	1.83	0.43
1:A:218:GLU:HG3	1:A:272:LEU:CD1	2.48	0.43
1:B:13:ASP:O	1:B:228:LYS:NZ	2.44	0.43
1:B:65:TYR:HH	1:B:98:HIS:CE1	2.36	0.43
1:B:100:PHE:C	1:B:104:LEU:HD12	2.43	0.43
1:A:65:TYR:HB2	1:A:112:VAL:HB	2.01	0.43
1:B:177:GLN:NE2	1:B:244:MET:HA	2.34	0.43
1:B:200:MET:HE2	1:B:305:TYR:CE2	2.53	0.43
1:B:200:MET:HG2	1:B:266:ILE:HD12	2.01	0.43
1:A:56:LYS:NZ	1:B:122:GLU:O	2.51	0.43
1:B:77:PRO:HG2	1:B:110:ALA:HB2	2.01	0.43
1:B:200:MET:HE2	1:B:305:TYR:CZ	2.53	0.43
1:B:285:LYS:HB3	1:B:292:VAL:HG23	2.00	0.43
1:B:9:GLN:HB2	1:B:22:SER:OG	2.19	0.43
1:B:54:TYR:CD1	1:B:54:TYR:C	2.97	0.43
1:B:234:LEU:HD22	1:B:242:HIS:HB3	2.00	0.43
1:B:204:PHE:CD1	1:B:247:PRO:HD3	2.54	0.43
1:A:316:GLN:HA	1:A:319:ARG:HE	1.84	0.42
1:B:62:LEU:HA	1:B:115:PRO:HA	2.00	0.42
1:A:198:VAL:HG22	1:A:264:LEU:HB3	2.02	0.42
1:B:138:TRP:HE3	1:B:139:LEU:HD22	1.84	0.42
1:B:317:VAL:HA	1:B:320:ILE:HG12	2.01	0.42
1:A:159:ASP:OD2	1:A:162:ARG:NH1	2.52	0.42
1:B:178:LEU:O	1:B:182:PHE:HB2	2.19	0.42
1:B:228:LYS:O	1:B:229:PHE:C	2.61	0.42
1:A:178:LEU:O	1:A:197:TYR:CE2	2.72	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:284:LEU:HB3	1:A:292:VAL:HG21	2.02	0.42
1:A:146:ASP:C	1:A:148:VAL:N	2.77	0.42
1:A:176:HIS:C	1:A:177:GLN:O	2.59	0.42
1:A:98:HIS:CE1	1:A:102:LEU:HD11	2.53	0.42
1:B:78:VAL:HG22	1:B:111:LEU:HD23	2.02	0.42
1:B:101:CYS:HA	1:B:104:LEU:HD13	2.02	0.42
1:A:56:LYS:N	1:A:57:PRO:CD	2.82	0.42
1:B:77:PRO:HG2	1:B:110:ALA:CB	2.49	0.42
1:B:95:PRO:O	1:B:99:ASN:CG	2.61	0.42
1:B:108:LEU:HD11	1:B:322:GLY:HA2	2.01	0.42
1:A:46:THR:HA	1:A:68:ILE:HG12	2.01	0.42
1:A:147:GLY:HA2	1:A:150:HIS:HB2	2.02	0.42
1:A:224:ASP:HA	1:A:227:ASP:OD2	2.19	0.42
1:A:281:ALA:O	1:A:285:LYS:HB2	2.19	0.42
1:B:320:ILE:O	1:B:323:ASP:OD1	2.37	0.42
1:A:30:GLU:O	1:A:31:SER:C	2.63	0.41
1:B:87:PHE:CE1	1:B:174:ILE:HD11	2.55	0.41
1:B:149:ASN:O	1:B:150:HIS:C	2.63	0.41
1:B:131:ASP:O	1:B:135:VAL:HG23	2.20	0.41
1:B:149:ASN:C	1:B:151:TRP:N	2.78	0.41
1:B:133:GLU:OE2	1:B:181:ARG:HD3	2.20	0.41
1:B:138:TRP:CE3	1:B:139:LEU:HD22	2.55	0.41
1:A:254:THR:C	1:A:256:GLU:H	2.29	0.41
1:B:79:VAL:HA	1:B:164:PHE:O	2.20	0.41
1:B:239:THR:HG22	1:B:240:ARG:N	2.35	0.41
1:A:148:VAL:C	1:A:150:HIS:N	2.77	0.41
1:A:226:LEU:HD22	1:A:273:LEU:HD11	2.01	0.41
1:A:260:LEU:HD23	1:A:260:LEU:HA	1.66	0.41
1:B:243:HIS:O	1:B:244:MET:HB2	2.20	0.41
1:B:47:VAL:HG23	1:B:102:LEU:HD23	2.01	0.41
1:B:294:TYR:OH	1:B:296:GLU:HG3	2.21	0.41
1:B:309:PRO:C	1:B:311:SER:H	2.29	0.41
1:B:260:LEU:CG	1:B:290:LYS:CE	2.78	0.41
1:A:18:LEU:HD23	1:A:19:GLN:N	2.36	0.41
1:A:43:ASN:OD1	1:A:43:ASN:O	2.38	0.41
1:A:47:VAL:HG11	1:A:65:TYR:HB3	2.03	0.41
1:B:144:VAL:C	1:B:145:SER:O	2.60	0.41
1:A:87:PHE:CZ	1:A:173:ASN:HB3	2.54	0.40
1:A:228:LYS:O	1:A:232:LEU:HD23	2.21	0.40
1:A:324:PHE:O	1:A:328:LEU:HD23	2.21	0.40
1:B:274:ARG:HD2	1:B:296:GLU:OE2	2.21	0.40

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:27:LEU:N	1:A:27:LEU:HD22	2.36	0.40
1:A:259:SER:HA	1:A:290:LYS:CE	2.51	0.40
1:B:100:PHE:CD1	1:B:306:SER:HA	2.56	0.40
1:A:177:GLN:HA	1:A:180:VAL:HB	2.04	0.40
1:B:56:LYS:N	1:B:57:PRO:CD	2.84	0.40
1:B:218:GLU:HA	1:B:301:GLU:OE2	2.21	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:30:GLU:O	1:B:42:LYS:O[5_554]	2.19	0.01

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	304/321 (95%)	271 (89%)	33 (11%)	0	100	100
1	B	307/321 (96%)	279 (91%)	27 (9%)	1 (0%)	37	68
All	All	611/642 (95%)	550 (90%)	60 (10%)	1 (0%)	44	74

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	150	HIS

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	262/275 (95%)	259 (99%)	3 (1%)	70	84
1	B	265/275 (96%)	264 (100%)	1 (0%)	89	94
All	All	527/550 (96%)	523 (99%)	4 (1%)	79	89

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	68	ILE
1	A	180	VAL
1	A	192	VAL
1	B	158	VAL

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	59	ASN
1	A	109	ASN
1	A	149	ASN
1	A	176	HIS
1	A	236	ASN
1	A	242	HIS
1	A	243	HIS
1	A	327	ASN
1	B	43	ASN
1	B	109	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 ⓘ

There are no ligands in this entry.

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	308/321 (95%)	-0.58	0	100	100	62, 110, 153, 209	0
1	B	311/321 (96%)	-0.39	0	100	100	69, 123, 193, 250	0
All	All	619/642 (96%)	-0.48	0	100	100	62, 116, 183, 250	0

There are no RSRZ outliers to report.

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

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

6.3 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.