Full wwPDB X-ray Structure Validation Report (i)

Oct 17, 2023 – 08:34 PM EDT

PDB ID	:	2E8Y
Title	:	Crystal structure of pullulanase type I from Bacillus subtilis str. 168
Authors	:	Mikami, B.; Malle, D.; Utsumi, S.; Iwamoto, H.; Katsuya, Y.
Deposited on	:	2007-01-24
Resolution	:	2.11 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 (i) 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 (1)) were used in the production of this report:

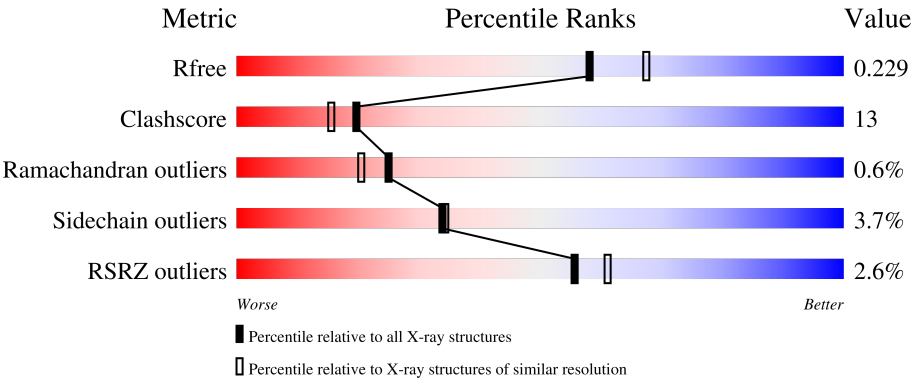
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.11 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}	130704	6241 (2.14-2.10)
Clashscore	141614	6778 (2.14-2.10)
Ramachandran outliers	138981	6705 (2.14-2.10)
Sidechain outliers	138945	6706 (2.14-2.10)
RSRZ outliers	127900	6112 (2.14-2.10)

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	718	3% 75% 23%
1	B	718	2% 78% 20%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	ACT	A	751	-	-	X	-
4	GOL	A	761	-	X	-	-
4	GOL	B	762	-	X	-	-

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 12049 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 AmyX protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	712	Total	C	N	O	S	0	0	0
			5672	3615	975	1060	22			
1	B	712	Total	C	N	O	S	0	0	0
			5672	3615	975	1060	22			

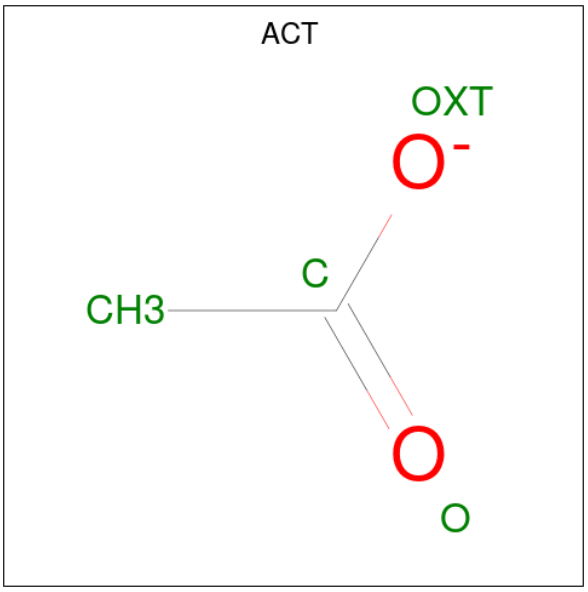
There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	365	LYS	MET	conflict	UNP O34587
B	365	LYS	MET	conflict	UNP O34587

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

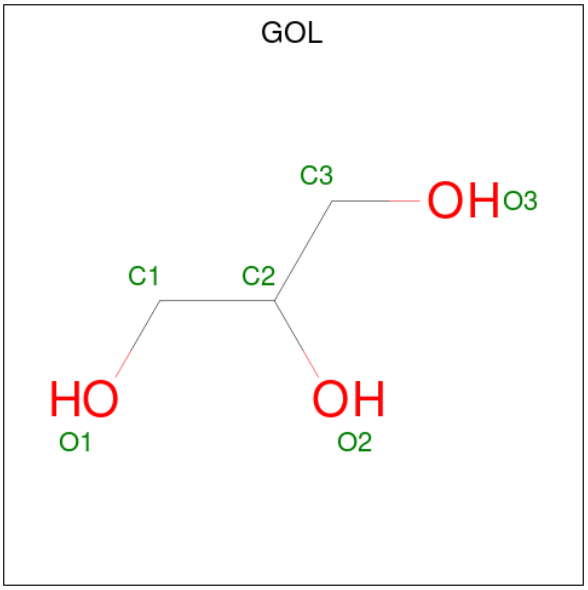
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Ca	0	0
			1	1		
2	B	1	Total	Ca	0	0
			1	1		

- Molecule 3 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 5 is water.

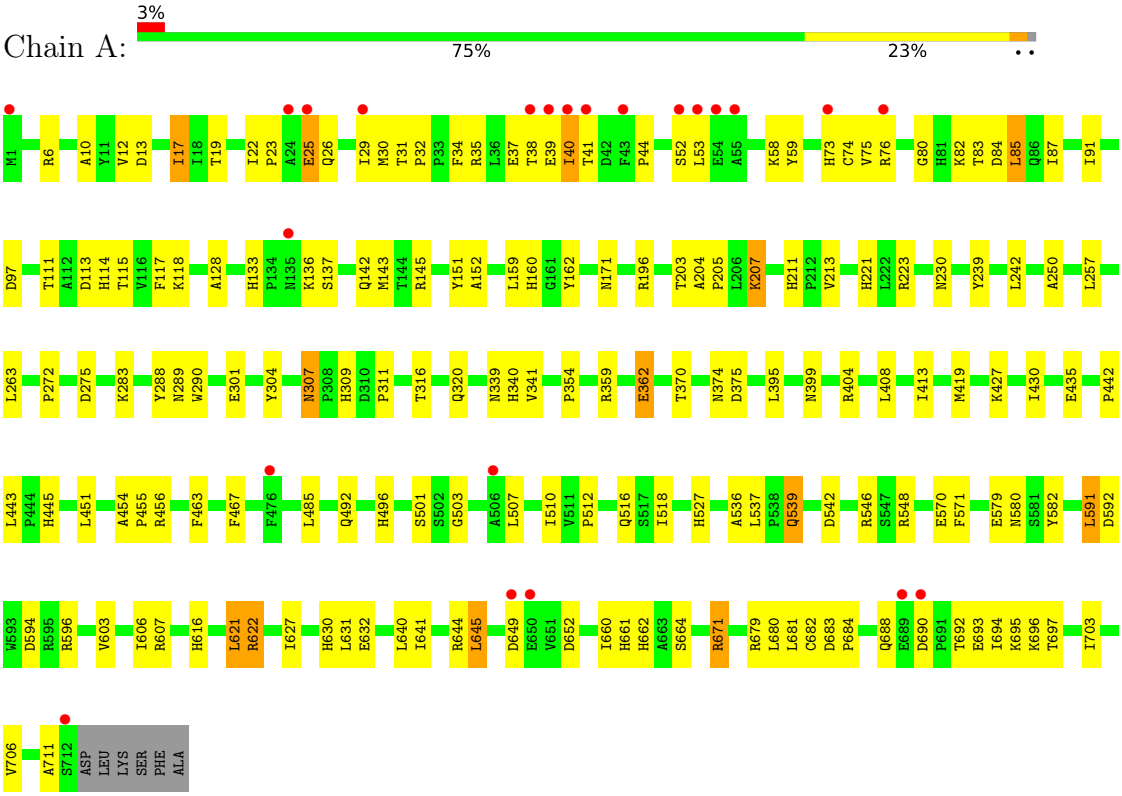
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	333	Total O 333 333	0	0
5	B	350	Total O 350 350	0	0

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.

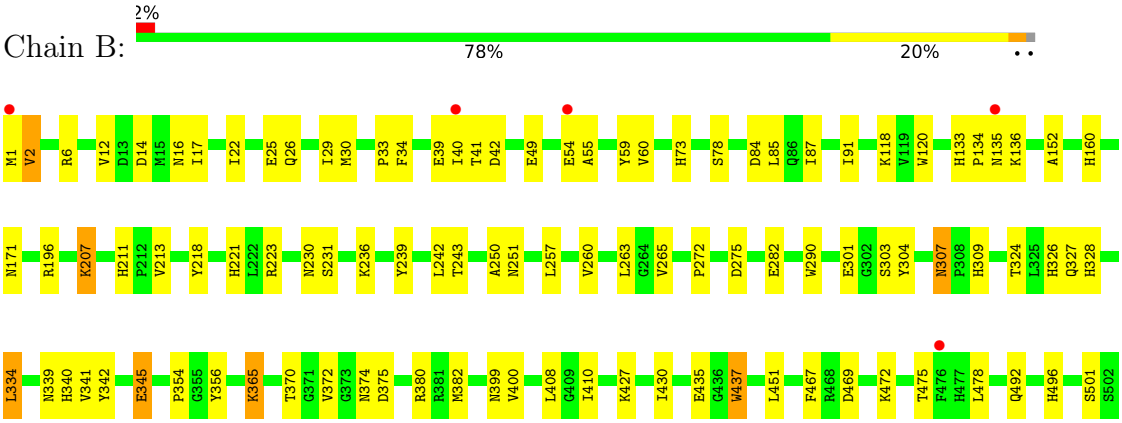
• Molecule 1: AmyX protein

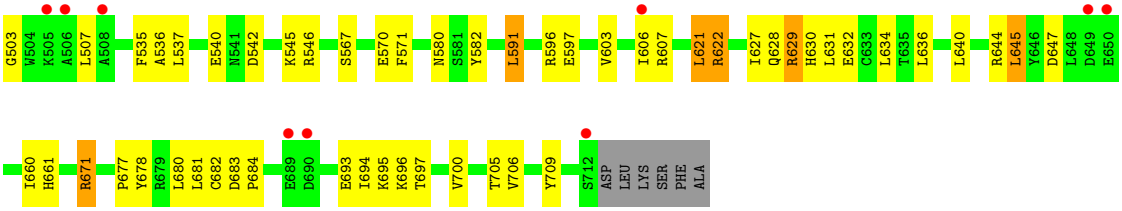
Chain A:



• Molecule 1: AmyX protein

Chain B:




G503
W504
K505
A506
L507
A508
F535
A536
L537
E540
N541
D542
K545
R546
S567
E570
F571
N580
S581
Y582
L591
R596
E597
V603
I606
R607
L621
R622
I627
Q628
R629
H630
L631
E632
C633
L634
T635
L636
L640
R644
L645
Y646
D647
L648
D649
E650
I660
H661
R671
P677
Y678
R679
L680
L681
C682
D683
P684
E689
D690
E693
I694
K695
K696
T697
V700
T705
V706
Y709
S712
ASP
LEU
LYS
SER
PHE
ALA

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	70.56Å 127.68Å 189.25Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	15.00 – 2.11 47.34 – 2.11	Depositor EDS
% Data completeness (in resolution range)	99.2 (15.00-2.11) 99.3 (47.34-2.11)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.00 (at 2.10Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.201 , 0.238 0.192 , 0.229	Depositor DCC
R_{free} test set	9885 reflections (9.99%)	wwPDB-VP
Wilson B-factor (Å^2)	23.2	Xtriage
Anisotropy	0.447	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 50.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	12049	wwPDB-VP
Average B, all atoms (Å^2)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 12.80% 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

Bond lengths and bond angles in the following residue types are not validated in this section: ACT, CA, 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	0.32	0/5820	0.58	0/7902
1	B	0.33	0/5820	0.59	0/7902
All	All	0.32	0/11640	0.59	0/15804

There are no bond length outliers.

There are no bond angle outliers.

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	5672	0	5521	153	0
1	B	5672	0	5521	133	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	4	0	3	3	0
3	B	4	0	3	0	0
4	A	6	0	4	1	0
4	B	6	0	4	0	0
5	A	333	0	0	11	0
5	B	350	0	0	7	0
All	All	12049	0	11056	284	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 13.

All (284) 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:207:LYS:HE2	1:A:207:LYS:H	1.00	1.07
1:B:230:ASN:HD21	1:B:250:ALA:H	1.03	1.00
1:A:230:ASN:HD21	1:A:250:ALA:H	1.10	1.00
1:A:207:LYS:HE2	1:A:207:LYS:N	1.75	0.99
1:A:87:ILE:H	1:A:171:ASN:HD21	1.12	0.92
1:A:111:THR:HG22	1:A:113:ASP:H	1.35	0.91
1:B:640:LEU:HD21	1:B:660:ILE:HD11	1.50	0.91
1:A:207:LYS:H	1:A:207:LYS:CE	1.86	0.89
1:A:660:ILE:HB	1:A:706:VAL:CG1	2.05	0.87
1:A:660:ILE:HB	1:A:706:VAL:HG13	1.57	0.86
1:A:263:LEU:HD22	1:A:606:ILE:HD11	1.57	0.86
1:A:160:HIS:HD2	1:A:196:ARG:H	1.21	0.84
1:B:160:HIS:HD2	1:B:196:ARG:H	1.22	0.83
1:A:339:ASN:HD21	1:A:340:HIS:HD2	1.26	0.82
1:A:496:HIS:HE1	1:A:503:GLY:H	1.27	0.82
1:B:263:LEU:HD22	1:B:606:ILE:HD11	1.63	0.80
1:B:230:ASN:HD21	1:B:250:ALA:N	1.80	0.80
1:A:339:ASN:ND2	1:A:340:HIS:HD2	1.81	0.78
1:B:22:ILE:HD12	1:B:59:TYR:HE1	1.48	0.78
1:B:22:ILE:HD13	1:B:30:MET:O	1.83	0.78
1:B:251:ASN:HB2	1:B:597:GLU:OE1	1.83	0.78
1:B:339:ASN:ND2	1:B:340:HIS:HD2	1.81	0.77
1:B:660:ILE:CG2	1:B:706:VAL:HB	2.15	0.77
1:A:87:ILE:N	1:A:171:ASN:HD21	1.82	0.77
1:A:87:ILE:H	1:A:171:ASN:ND2	1.83	0.76
1:B:87:ILE:H	1:B:171:ASN:ND2	1.85	0.74
1:B:39:GLU:HG3	1:B:40:ILE:HG13	1.68	0.74
1:B:341:VAL:H	1:B:374:ASN:HD21	1.33	0.74
1:B:677:PRO:HG3	1:B:695:LYS:HE2	1.68	0.74
1:B:603:VAL:O	1:B:606:ILE:HG13	1.87	0.73
1:A:22:ILE:HD13	1:A:30:MET:O	1.88	0.72
1:B:87:ILE:H	1:B:171:ASN:HD21	1.35	0.72
1:B:496:HIS:HE1	1:B:503:GLY:H	1.36	0.71
1:B:339:ASN:HD21	1:B:340:HIS:HD2	1.36	0.71
1:A:142:GLN:HG3	5:A:957:HOH:O	1.90	0.71
1:B:660:ILE:HG23	1:B:706:VAL:HB	1.71	0.71
1:B:622:ARG:HD3	5:B:913:HOH:O	1.90	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:22:ILE:HD12	1:B:59:TYR:CE1	2.25	0.70
1:A:542:ASP:HB3	3:A:751:ACT:H2	1.73	0.70
1:A:621:LEU:HD23	1:A:627:ILE:HA	1.72	0.70
1:A:456:ARG:HD3	5:A:1051:HOH:O	1.91	0.69
1:B:207:LYS:CD	1:B:207:LYS:H	2.03	0.69
1:B:22:ILE:HD11	1:B:34:PHE:HZ	1.56	0.69
1:B:207:LYS:H	1:B:207:LYS:HD2	1.57	0.68
1:A:603:VAL:O	1:A:606:ILE:HG13	1.93	0.68
1:A:692:THR:HG22	5:A:1088:HOH:O	1.92	0.68
1:B:14:ASP:HB3	1:B:17:ILE:HD13	1.76	0.68
1:B:54:GLU:HG3	1:B:55:ALA:H	1.58	0.68
1:A:87:ILE:HG13	1:A:171:ASN:HD21	1.59	0.68
1:A:435:GLU:HG2	5:A:989:HOH:O	1.95	0.67
1:A:571:PHE:HZ	1:A:591:LEU:HD22	1.59	0.66
1:A:671:ARG:HG2	1:A:697:THR:HG22	1.78	0.66
1:B:621:LEU:HD23	1:B:627:ILE:HA	1.79	0.65
1:B:133:HIS:HB3	1:B:136:LYS:HB2	1.77	0.65
1:B:307:ASN:HD21	1:B:309:HIS:HB2	1.62	0.63
1:A:341:VAL:H	1:A:374:ASN:HD21	1.46	0.63
1:A:307:ASN:HD21	1:A:309:HIS:HB2	1.63	0.63
1:A:242:LEU:HD23	5:A:820:HOH:O	1.99	0.63
1:A:492:GLN:HG2	1:A:507:LEU:HD11	1.80	0.63
1:B:211:HIS:HD2	1:B:213:VAL:H	1.48	0.62
1:A:230:ASN:HD21	1:A:250:ALA:N	1.89	0.62
1:A:307:ASN:ND2	1:A:309:HIS:H	1.97	0.62
1:A:316:THR:O	1:A:320:GLN:HG3	1.98	0.62
1:A:413:ILE:HB	5:A:896:HOH:O	1.99	0.62
1:B:540:GLU:O	1:B:545:LYS:HE3	1.99	0.62
1:B:207:LYS:HD2	1:B:207:LYS:N	2.15	0.61
1:B:339:ASN:ND2	1:B:340:HIS:CD2	2.67	0.61
1:A:211:HIS:CD2	1:A:213:VAL:HG22	2.36	0.61
1:A:6:ARG:HD3	1:A:84:ASP:OD2	2.00	0.61
1:A:73:HIS:HB2	1:A:85:LEU:HB2	1.82	0.61
1:A:546:ARG:HH11	3:A:751:ACT:CH3	2.13	0.60
1:A:38:THR:HB	1:A:41:THR:OG1	2.01	0.60
1:B:606:ILE:HD12	1:B:607:ARG:N	2.16	0.60
1:B:22:ILE:HD11	1:B:34:PHE:CZ	2.37	0.60
1:A:339:ASN:ND2	1:A:340:HIS:CD2	2.68	0.59
1:B:211:HIS:CD2	1:B:213:VAL:HG22	2.37	0.59
1:B:469:ASP:OD2	1:B:475:THR:HG23	2.03	0.59
1:B:365:LYS:HE2	1:B:365:LYS:N	2.17	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:52:SER:C	1:A:53:LEU:HD12	2.24	0.59
1:A:133:HIS:HB3	1:A:136:LYS:HB3	1.83	0.58
1:A:87:ILE:HG13	1:A:171:ASN:ND2	2.17	0.58
1:B:307:ASN:ND2	1:B:309:HIS:H	2.01	0.58
1:B:91:ILE:HD12	1:B:354:PRO:O	2.04	0.58
1:A:22:ILE:HD12	1:A:59:TYR:CE1	2.39	0.58
1:A:622:ARG:HD3	5:A:939:HOH:O	2.01	0.58
1:A:13:ASP:HB2	1:A:17:ILE:HD11	1.84	0.58
1:A:118:LYS:HG2	1:A:152:ALA:HB2	1.86	0.57
1:A:680:LEU:HD12	1:A:688:GLN:HG3	1.85	0.57
1:B:54:GLU:HG3	1:B:55:ALA:N	2.19	0.57
1:B:472:LYS:NZ	1:B:475:THR:HG22	2.20	0.57
1:B:631:LEU:C	1:B:631:LEU:HD23	2.25	0.57
1:A:40:ILE:HG22	1:A:40:ILE:O	2.05	0.56
1:A:340:HIS:HE1	5:A:830:HOH:O	1.88	0.56
1:B:660:ILE:HD13	1:B:700:VAL:HG21	1.88	0.56
1:A:128:ALA:HA	1:A:143:MET:HG3	1.87	0.55
1:B:571:PHE:HZ	1:B:591:LEU:HD22	1.70	0.55
1:B:339:ASN:HD21	1:B:340:HIS:CD2	2.22	0.55
1:A:211:HIS:HD2	1:A:213:VAL:H	1.54	0.55
1:B:356:TYR:O	1:B:380:ARG:HD3	2.06	0.54
1:B:1:MET:HG2	1:B:2:VAL:N	2.23	0.54
1:A:694:ILE:C	1:A:694:ILE:HD12	2.28	0.54
1:B:606:ILE:HD12	1:B:606:ILE:C	2.28	0.54
1:B:1:MET:HG2	1:B:2:VAL:HG23	1.90	0.54
1:B:16:ASN:C	1:B:17:ILE:HD12	2.28	0.54
1:A:111:THR:HB	1:A:114:HIS:O	2.08	0.54
1:B:221:HIS:CD2	1:B:223:ARG:H	2.26	0.54
1:A:546:ARG:HD3	3:A:751:ACT:H1	1.90	0.53
1:A:571:PHE:CZ	1:A:591:LEU:HD22	2.42	0.53
1:B:91:ILE:CD1	1:B:354:PRO:O	2.56	0.53
1:A:22:ILE:HD11	1:A:34:PHE:CZ	2.44	0.53
1:B:17:ILE:HD12	1:B:17:ILE:N	2.23	0.53
1:A:26:GLN:NE2	1:A:29:ILE:HD12	2.23	0.53
1:A:211:HIS:HD2	1:A:213:VAL:HG22	1.72	0.53
1:A:661:HIS:HE1	5:A:813:HOH:O	1.92	0.53
1:B:345:GLU:H	1:B:345:GLU:CD	2.11	0.53
1:A:370:THR:HG23	1:A:375:ASP:OD2	2.09	0.53
1:A:463:PHE:HA	1:A:518:ILE:HB	1.89	0.53
1:A:91:ILE:HD12	1:A:354:PRO:O	2.09	0.53
1:B:260:VAL:HG13	1:B:265:VAL:HG21	1.90	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:22:ILE:HD11	1:A:34:PHE:HZ	1.75	0.52
1:A:606:ILE:C	1:A:606:ILE:HD12	2.30	0.52
1:B:694:ILE:HD12	1:B:694:ILE:O	2.08	0.52
1:B:6:ARG:HD3	1:B:84:ASP:OD2	2.10	0.52
1:A:23:PRO:HG2	1:A:26:GLN:HB2	1.92	0.51
1:A:221:HIS:CD2	1:A:223:ARG:HB3	2.45	0.51
1:B:160:HIS:CD2	1:B:196:ARG:H	2.13	0.51
1:B:49:GLU:CG	1:B:60:VAL:HB	2.40	0.51
1:B:570:GLU:HB2	1:B:606:ILE:HG12	1.92	0.51
1:A:22:ILE:HD12	1:A:59:TYR:HE1	1.76	0.51
1:B:118:LYS:HG2	1:B:152:ALA:HB2	1.92	0.51
1:B:435:GLU:HB2	1:B:437:TRP:CE2	2.45	0.51
1:A:309:HIS:O	1:A:311:PRO:HD3	2.11	0.50
1:B:630:HIS:O	1:B:645:LEU:HA	2.11	0.50
1:B:263:LEU:CD2	1:B:606:ILE:HD11	2.39	0.50
1:B:536:ALA:C	1:B:537:LEU:HD12	2.32	0.50
1:A:630:HIS:O	1:A:645:LEU:HA	2.12	0.50
1:B:303:SER:HA	5:B:877:HOH:O	2.12	0.50
1:A:496:HIS:CE1	1:A:503:GLY:H	2.18	0.49
1:B:324:THR:HA	1:B:327:GLN:HE21	1.78	0.49
1:A:204:ALA:N	1:A:205:PRO:HD3	2.27	0.49
1:B:41:THR:HG22	1:B:42:ASP:N	2.27	0.49
1:B:260:VAL:CG1	1:B:265:VAL:HG21	2.42	0.49
1:B:694:ILE:HD12	1:B:694:ILE:C	2.33	0.49
1:B:695:LYS:O	1:B:697:THR:N	2.45	0.49
1:A:76:ARG:HD2	1:A:82:LYS:HE2	1.94	0.49
1:A:413:ILE:HD13	1:A:456:ARG:CZ	2.43	0.49
1:B:492:GLN:HG2	1:B:507:LEU:HD11	1.95	0.49
1:A:536:ALA:C	1:A:537:LEU:HD12	2.33	0.48
1:A:631:LEU:C	1:A:631:LEU:HD23	2.33	0.48
1:A:263:LEU:CD2	1:A:606:ILE:HD11	2.35	0.48
1:A:12:VAL:HG23	1:A:85:LEU:HD22	1.94	0.48
1:A:496:HIS:HE1	1:A:503:GLY:N	2.03	0.48
1:A:682:CYS:O	1:A:706:VAL:HA	2.12	0.48
1:A:31:THR:HB	1:A:32:PRO:HD2	1.96	0.48
1:A:679:ARG:CZ	1:A:693:GLU:HG3	2.43	0.48
1:B:41:THR:CG2	1:B:42:ASP:N	2.77	0.48
1:B:49:GLU:HG2	1:B:60:VAL:HB	1.95	0.48
1:A:91:ILE:CD1	1:A:354:PRO:O	2.62	0.48
1:B:73:HIS:HE1	5:B:845:HOH:O	1.96	0.48
1:A:570:GLU:HB2	1:A:606:ILE:HG12	1.95	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:677:PRO:CG	1:B:695:LYS:HE2	2.42	0.47
1:A:485:LEU:HA	1:A:548:ARG:HD3	1.96	0.47
1:A:359:ARG:HB3	1:A:442:PRO:HG2	1.95	0.47
1:A:111:THR:HG22	1:A:113:ASP:N	2.16	0.47
1:A:136:LYS:HD3	1:A:162:TYR:OH	2.13	0.47
1:B:282:GLU:OE2	1:B:309:HIS:HE1	1.96	0.47
1:B:631:LEU:HD23	1:B:632:GLU:N	2.30	0.47
1:A:290:TRP:CD2	1:A:582:TYR:HA	2.49	0.47
1:B:334:LEU:HD22	1:B:400:VAL:HG11	1.96	0.47
1:A:145:ARG:HB2	1:A:151:TYR:CE1	2.50	0.47
1:A:221:HIS:CD2	1:A:223:ARG:H	2.33	0.47
1:B:427:LYS:O	1:B:430:ILE:HG23	2.15	0.47
1:A:339:ASN:HD21	1:A:340:HIS:CD2	2.17	0.47
1:A:75:VAL:HG23	1:A:83:THR:HG22	1.97	0.46
1:B:12:VAL:O	1:B:12:VAL:HG13	2.16	0.46
1:A:454:ALA:N	1:A:455:PRO:CD	2.78	0.46
1:A:694:ILE:HD12	1:A:694:ILE:O	2.16	0.46
1:A:683:ASP:HB2	1:A:684:PRO:CD	2.45	0.46
1:B:370:THR:HG23	1:B:375:ASP:OD2	2.16	0.46
1:B:671:ARG:HG2	1:B:697:THR:HG22	1.96	0.46
1:A:10:ALA:CB	1:A:75:VAL:HG21	2.46	0.46
1:A:26:GLN:HE22	1:A:29:ILE:HD12	1.80	0.46
1:A:203:THR:C	1:A:205:PRO:HD3	2.35	0.46
1:A:73:HIS:HD2	5:A:993:HOH:O	1.99	0.46
1:A:695:LYS:O	1:A:697:THR:N	2.42	0.46
1:B:571:PHE:CZ	1:B:591:LEU:HD22	2.50	0.46
1:B:133:HIS:CG	1:B:134:PRO:HD2	2.51	0.46
1:A:445:HIS:HD2	1:B:632:GLU:OE2	1.99	0.45
1:A:536:ALA:O	1:A:537:LEU:HD12	2.16	0.45
1:B:660:ILE:CD1	1:B:700:VAL:HG21	2.44	0.45
1:A:76:ARG:CZ	1:A:80:GLY:HA2	2.46	0.45
1:A:223:ARG:HD2	4:A:761:GOL:O3	2.16	0.45
1:A:548:ARG:NH1	1:A:703:ILE:CD1	2.78	0.45
1:B:496:HIS:HE1	1:B:503:GLY:N	2.09	0.45
1:A:548:ARG:NH1	1:A:703:ILE:HD11	2.32	0.45
1:B:25:GLU:CD	1:B:25:GLU:H	2.20	0.45
1:A:19:THR:HG23	1:A:58:LYS:HE3	1.99	0.45
1:B:681:LEU:C	1:B:681:LEU:HD13	2.37	0.45
1:A:512:PRO:HD2	1:A:516:GLN:NE2	2.32	0.45
1:B:478:LEU:HD11	1:B:535:PHE:CD2	2.52	0.45
1:B:370:THR:OG1	1:B:372:VAL:HG22	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:33:PRO:HD2	1:B:78:SER:HB3	2.00	0.44
1:B:207:LYS:H	1:B:207:LYS:HZ2	1.64	0.44
1:A:616:HIS:HB3	1:A:652:ASP:OD2	2.18	0.44
1:B:243:THR:HA	1:B:324:THR:HG21	1.99	0.44
1:A:362:GLU:HB3	1:B:636:LEU:HB3	1.99	0.44
1:A:679:ARG:NH2	1:A:693:GLU:HG3	2.32	0.44
1:B:496:HIS:CE1	1:B:501:SER:HA	2.53	0.44
1:A:288:TYR:CD1	1:A:289:ASN:N	2.86	0.44
1:B:661:HIS:HE1	5:B:891:HOH:O	2.00	0.44
1:A:160:HIS:CD2	1:A:196:ARG:H	2.14	0.44
1:A:413:ILE:HD13	1:A:456:ARG:NH2	2.32	0.44
1:B:496:HIS:CE1	1:B:503:GLY:H	2.25	0.44
1:A:640:LEU:HD21	1:A:660:ILE:CG2	2.48	0.44
1:A:39:GLU:O	1:A:40:ILE:HB	2.17	0.43
1:A:359:ARG:NH2	1:A:443:LEU:HD11	2.33	0.43
1:B:472:LYS:HZ1	1:B:475:THR:HG22	1.81	0.43
1:A:73:HIS:HB2	1:A:85:LEU:CB	2.46	0.43
1:A:136:LYS:HG2	1:A:137:SER:H	1.83	0.43
1:A:221:HIS:HD2	1:A:223:ARG:HB3	1.83	0.43
1:B:12:VAL:HB	1:B:85:LEU:HD21	2.01	0.43
1:A:136:LYS:HG2	1:A:137:SER:N	2.33	0.43
1:B:26:GLN:NE2	1:B:29:ILE:HD12	2.34	0.43
1:B:682:CYS:O	1:B:706:VAL:HA	2.19	0.43
1:A:117:PHE:O	1:A:152:ALA:HA	2.18	0.43
1:A:37:GLU:N	1:A:74:CYS:O	2.49	0.43
1:B:221:HIS:HD2	1:B:223:ARG:H	1.67	0.43
1:B:542:ASP:O	1:B:546:ARG:HG3	2.19	0.42
1:B:683:ASP:HB2	1:B:684:PRO:CD	2.49	0.42
1:A:606:ILE:HD12	1:A:607:ARG:N	2.35	0.42
1:B:661:HIS:HD2	1:B:705:THR:OG1	2.02	0.42
1:A:592:ASP:OD1	1:A:594:ASP:HB2	2.18	0.42
1:A:39:GLU:O	1:A:40:ILE:CB	2.68	0.42
1:B:591:LEU:HD23	1:B:591:LEU:HA	1.95	0.42
1:A:395:LEU:O	1:A:399:ASN:HA	2.20	0.42
1:B:628:GLN:HE21	1:B:628:GLN:HA	1.84	0.42
1:B:290:TRP:CD2	1:B:582:TYR:HA	2.54	0.42
1:A:501:SER:HB3	1:A:510:ILE:HB	2.00	0.42
1:A:527:HIS:CE1	1:A:579:GLU:HB2	2.55	0.42
1:B:275:ASP:HA	1:B:301:GLU:HA	2.00	0.42
1:B:365:LYS:HE2	1:B:365:LYS:CA	2.49	0.42
1:A:230:ASN:ND2	1:A:250:ALA:H	1.94	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:283:LYS:HB2	1:A:283:LYS:HE3	1.75	0.42
1:A:591:LEU:HD23	1:A:591:LEU:HA	1.87	0.42
1:B:221:HIS:CD2	1:B:223:ARG:HB3	2.55	0.42
1:B:370:THR:HG22	1:B:410:ILE:HG13	2.01	0.42
1:A:275:ASP:HA	1:A:301:GLU:HA	2.02	0.42
1:A:35:ARG:HH12	1:A:44:PRO:HB3	1.85	0.41
1:A:640:LEU:HD13	1:A:641:ILE:N	2.35	0.41
1:B:231:SER:OG	1:B:236:LYS:HE3	2.20	0.41
1:B:472:LYS:HZ1	1:B:475:THR:CG2	2.32	0.41
1:A:640:LEU:HD13	1:A:640:LEU:C	2.40	0.41
1:A:662:HIS:NE2	1:A:664:SER:OG	2.52	0.41
1:B:680:LEU:HD13	1:B:680:LEU:C	2.40	0.41
1:A:38:THR:OG1	1:A:73:HIS:ND1	2.49	0.41
1:A:26:GLN:HG3	1:A:30:MET:HE1	2.03	0.41
1:B:342:TYR:HA	5:B:940:HOH:O	2.20	0.41
1:A:38:THR:HG22	1:A:39:GLU:N	2.35	0.41
1:B:239:TYR:CZ	1:B:304:TYR:HB2	2.56	0.41
1:B:324:THR:HA	1:B:327:GLN:NE2	2.35	0.41
1:A:35:ARG:NH1	1:A:44:PRO:HB3	2.35	0.41
1:A:307:ASN:C	1:A:307:ASN:HD22	2.22	0.41
1:A:17:ILE:O	1:A:17:ILE:HG13	2.20	0.41
1:A:539:GLN:HG2	5:A:1058:HOH:O	2.20	0.41
1:A:680:LEU:C	1:A:680:LEU:HD13	2.41	0.41
1:A:39:GLU:C	1:A:40:ILE:HG13	2.41	0.41
1:A:239:TYR:CZ	1:A:304:TYR:HB2	2.56	0.41
1:A:427:LYS:HB3	1:A:430:ILE:HG23	2.02	0.41
1:A:681:LEU:HD13	1:A:681:LEU:C	2.41	0.41
1:A:73:HIS:CB	1:A:85:LEU:HB2	2.48	0.40
1:B:211:HIS:HE1	5:B:1049:HOH:O	2.04	0.40
1:A:631:LEU:HD23	1:A:632:GLU:N	2.37	0.40
1:B:1:MET:CG	1:B:2:VAL:N	2.84	0.40
1:B:695:LYS:HE3	5:B:1107:HOH:O	2.21	0.40
1:A:115:THR:HB	1:A:159:LEU:HD12	2.03	0.40
1:B:218:TYR:CZ	1:B:567:SER:HA	2.56	0.40
1:B:324:THR:O	1:B:328:HIS:HD2	2.03	0.40
1:B:678:TYR:O	1:B:693:GLU:HA	2.22	0.40
1:B:681:LEU:HB2	1:B:709:TYR:CE2	2.57	0.40
1:B:307:ASN:C	1:B:307:ASN:HD22	2.24	0.40
1:B:120:TRP:CE2	1:B:382:MET:HG3	2.57	0.40
1:B:133:HIS:CB	1:B:136:LYS:HB2	2.49	0.40
1:B:326:HIS:HE1	1:B:399:ASN:O	2.04	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:629:ARG:NH2	1:B:647:ASP:OD1	2.45	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	710/718 (99%)	683 (96%)	21 (3%)	6 (1%)	19	14
1	B	710/718 (99%)	685 (96%)	22 (3%)	3 (0%)	34	32
All	All	1420/1436 (99%)	1368 (96%)	43 (3%)	9 (1%)	25	20

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	40	ILE
1	A	696	LYS
1	B	696	LYS
1	A	25	GLU
1	A	649	ASP
1	B	2	VAL
1	A	272	PRO
1	A	711	ALA
1	B	272	PRO

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	608/615 (99%)	585 (96%)	23 (4%)	33	33
1	B	608/615 (99%)	586 (96%)	22 (4%)	35	35
All	All	1216/1230 (99%)	1171 (96%)	45 (4%)	34	34

All (45) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	17	ILE
1	A	25	GLU
1	A	85	LEU
1	A	97	ASP
1	A	207	LYS
1	A	257	LEU
1	A	307	ASN
1	A	362	GLU
1	A	404	ARG
1	A	408	LEU
1	A	419	MET
1	A	451	LEU
1	A	467	PHE
1	A	539	GLN
1	A	580	ASN
1	A	591	LEU
1	A	596	ARG
1	A	621	LEU
1	A	622	ARG
1	A	644	ARG
1	A	645	LEU
1	A	671	ARG
1	A	690	ASP
1	B	135	ASN
1	B	207	LYS
1	B	242	LEU
1	B	257	LEU
1	B	307	ASN
1	B	334	LEU
1	B	345	GLU
1	B	365	LYS
1	B	408	LEU
1	B	437	TRP
1	B	451	LEU

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Mol	Chain	Res	Type
1	B	467	PHE
1	B	580	ASN
1	B	591	LEU
1	B	596	ARG
1	B	621	LEU
1	B	622	ARG
1	B	629	ARG
1	B	634	LEU
1	B	644	ARG
1	B	645	LEU
1	B	671	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (54) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	26	GLN
1	A	133	HIS
1	A	135	ASN
1	A	160	HIS
1	A	171	ASN
1	A	180	GLN
1	A	199	GLN
1	A	211	HIS
1	A	221	HIS
1	A	230	ASN
1	A	248	GLN
1	A	307	ASN
1	A	309	HIS
1	A	312	GLN
1	A	327	GLN
1	A	339	ASN
1	A	340	HIS
1	A	374	ASN
1	A	445	HIS
1	A	496	HIS
1	A	516	GLN
1	A	527	HIS
1	A	549	GLN
1	A	580	ASN
1	A	583	GLN
1	A	628	GLN
1	A	661	HIS

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Mol	Chain	Res	Type
1	B	26	GLN
1	B	73	HIS
1	B	133	HIS
1	B	142	GLN
1	B	160	HIS
1	B	171	ASN
1	B	180	GLN
1	B	211	HIS
1	B	221	HIS
1	B	230	ASN
1	B	248	GLN
1	B	251	ASN
1	B	307	ASN
1	B	309	HIS
1	B	312	GLN
1	B	327	GLN
1	B	339	ASN
1	B	340	HIS
1	B	374	ASN
1	B	496	HIS
1	B	516	GLN
1	B	527	HIS
1	B	549	GLN
1	B	580	ASN
1	B	604	HIS
1	B	628	GLN
1	B	661	HIS

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 monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 6 ligands modelled in this entry, 2 are monoatomic - leaving 4 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
4	GOL	B	762	-	5,5,5	4.59	5 (100%)	5,5,5	5.79	3 (60%)
3	ACT	B	752	-	3,3,3	4.94	1 (33%)	3,3,3	0.72	0
4	GOL	A	761	-	5,5,5	4.55	5 (100%)	5,5,5	5.80	3 (60%)
3	ACT	A	751	-	3,3,3	4.89	1 (33%)	3,3,3	0.86	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
4	GOL	B	762	-	-	2/4/4/4	-
4	GOL	A	761	-	-	2/4/4/4	-

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	752	ACT	O-C	8.53	1.61	1.22
3	A	751	ACT	O-C	8.45	1.60	1.22
4	B	762	GOL	C3-C2	-7.64	1.20	1.51
4	A	761	GOL	C3-C2	-7.60	1.20	1.51
4	B	762	GOL	O1-C1	4.54	1.61	1.42
4	A	761	GOL	O1-C1	4.47	1.61	1.42
4	B	762	GOL	O3-C3	3.12	1.55	1.42
4	B	762	GOL	O2-C2	-3.09	1.34	1.43
4	A	761	GOL	O3-C3	3.05	1.55	1.42
4	A	761	GOL	O2-C2	-2.90	1.34	1.43
4	A	761	GOL	C1-C2	-2.85	1.40	1.51
4	B	762	GOL	C1-C2	-2.68	1.40	1.51

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	762	GOL	O3-C3-C2	10.63	161.16	110.20
4	A	761	GOL	O3-C3-C2	10.63	161.16	110.20
4	A	761	GOL	O2-C2-C3	6.66	138.45	109.12
4	B	762	GOL	O2-C2-C3	6.59	138.15	109.12
4	B	762	GOL	O1-C1-C2	3.27	125.87	110.20
4	A	761	GOL	O1-C1-C2	3.20	125.53	110.20

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	761	GOL	C1-C2-C3-O3
4	B	762	GOL	C1-C2-C3-O3
4	B	762	GOL	O1-C1-C2-O2
4	A	761	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
4	A	761	GOL	1	0
3	A	751	ACT	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

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, 95^{th} 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	712/718 (99%)	-0.07	23 (3%)	47	54	15, 24, 47, 70	0
1	B	712/718 (99%)	-0.19	14 (1%)	65	69	13, 23, 42, 59	0
All	All	1424/1436 (99%)	-0.13	37 (2%)	56	61	13, 24, 44, 70	0

All (37) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1	MET	7.8
1	A	40	ILE	6.8
1	A	650	GLU	5.2
1	A	39	GLU	5.0
1	B	1	MET	4.6
1	A	135	ASN	4.1
1	A	54	GLU	4.1
1	B	40	ILE	3.9
1	A	25	GLU	3.9
1	B	54	GLU	3.9
1	B	649	ASP	3.7
1	B	506	ALA	3.5
1	A	43	PHE	3.4
1	A	506	ALA	3.3
1	A	53	LEU	3.3
1	A	41	THR	3.3
1	B	689	GLU	3.3
1	A	24	ALA	3.2
1	A	689	GLU	3.2
1	B	650	GLU	3.1
1	A	690	ASP	2.9
1	B	476	PHE	2.9
1	A	476	PHE	2.7
1	A	55	ALA	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	649	ASP	2.4
1	B	508	ALA	2.4
1	B	135	ASN	2.4
1	B	712	SER	2.4
1	A	52	SER	2.3
1	A	712	SER	2.3
1	A	29	ILE	2.2
1	B	690	ASP	2.2
1	A	38	THR	2.1
1	B	606	ILE	2.1
1	A	76	ARG	2.1
1	B	505	LYS	2.1
1	A	73	HIS	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 monosaccharides 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, 95^{th} 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
4	GOL	A	761	6/6	0.84	0.25	37,41,42,43	0
4	GOL	B	762	6/6	0.85	0.17	34,37,39,43	0
3	ACT	A	751	4/4	0.90	0.12	26,28,29,31	0
3	ACT	B	752	4/4	0.90	0.22	33,33,33,35	0
2	CA	B	742	1/1	0.99	0.10	18,18,18,18	0
2	CA	A	741	1/1	1.00	0.12	19,19,19,19	0

6.5 Other polymers (i)

There are no such residues in this entry.