Full wwPDB X-ray Structure Validation Report (i)

Jun 7, 2023 – 06:11 PM JST

PDB ID	:	8IAS
Title	:	Crystal structure of Streptococcus pneumoniae pyruvate kinase
Authors	:	Nakashima, R.; Taguchi, A.
Deposited on	:	2023-02-09
Resolution	:	2.00 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:

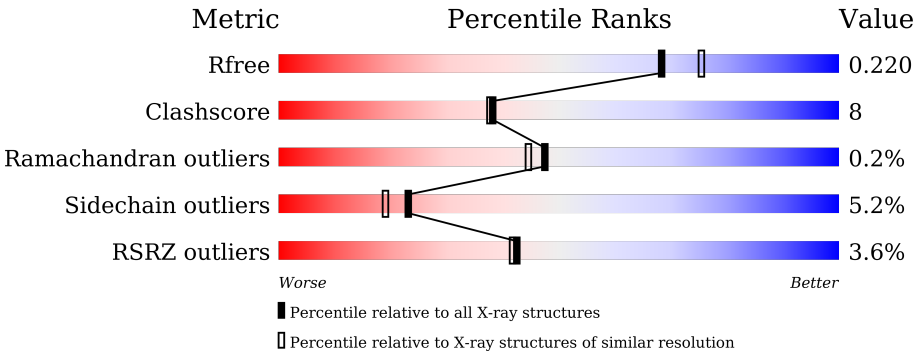
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.33
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.33

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 2.00 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	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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	521	83% 11%
1	B	521	4% 81% 13%
1	C	521	4% 81% 13%
1	D	521	6% 75% 19%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 16233 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 Pyruvate kinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	500	Total	C	N	O	S	0	0	0
			3832	2394	663	759	16			
1	B	501	Total	C	N	O	S	0	0	0
			3840	2399	664	760	17			
1	C	500	Total	C	N	O	S	0	0	0
			3832	2394	663	759	16			
1	D	501	Total	C	N	O	S	0	0	0
			3840	2399	664	760	17			

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	initiating methionine	UNP Q8DQ84
A	-18	GLY	-	expression tag	UNP Q8DQ84
A	-17	SER	-	expression tag	UNP Q8DQ84
A	-16	SER	-	expression tag	UNP Q8DQ84
A	-15	HIS	-	expression tag	UNP Q8DQ84
A	-14	HIS	-	expression tag	UNP Q8DQ84
A	-13	HIS	-	expression tag	UNP Q8DQ84
A	-12	HIS	-	expression tag	UNP Q8DQ84
A	-11	HIS	-	expression tag	UNP Q8DQ84
A	-10	HIS	-	expression tag	UNP Q8DQ84
A	-9	SER	-	expression tag	UNP Q8DQ84
A	-8	SER	-	expression tag	UNP Q8DQ84
A	-7	GLY	-	expression tag	UNP Q8DQ84
A	-6	LEU	-	expression tag	UNP Q8DQ84
A	-5	VAL	-	expression tag	UNP Q8DQ84
A	-4	PRO	-	expression tag	UNP Q8DQ84
A	-3	ARG	-	expression tag	UNP Q8DQ84
A	-2	GLY	-	expression tag	UNP Q8DQ84
A	-1	SER	-	expression tag	UNP Q8DQ84
A	0	HIS	-	expression tag	UNP Q8DQ84
B	1	MET	-	initiating methionine	UNP Q8DQ84

Continued on next page...

Continued from previous page...

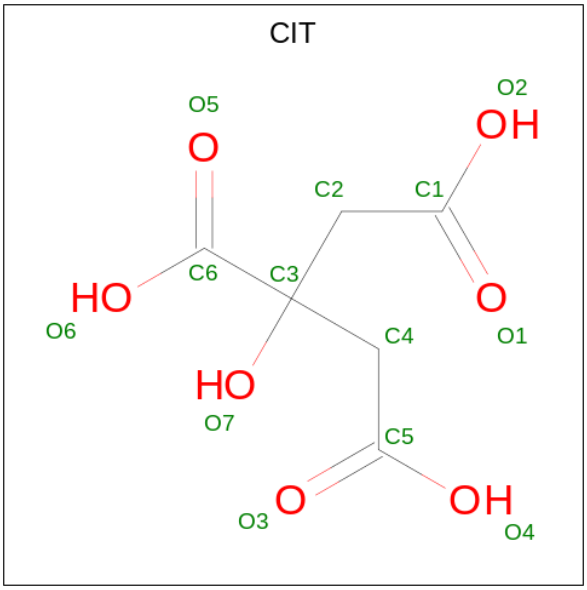
Chain	Residue	Modelled	Actual	Comment	Reference
B	2	GLY	-	expression tag	UNP Q8DQ84
B	3	SER	-	expression tag	UNP Q8DQ84
B	4	SER	-	expression tag	UNP Q8DQ84
B	5	HIS	-	expression tag	UNP Q8DQ84
B	6	HIS	-	expression tag	UNP Q8DQ84
B	7	HIS	-	expression tag	UNP Q8DQ84
B	8	HIS	-	expression tag	UNP Q8DQ84
B	9	HIS	-	expression tag	UNP Q8DQ84
B	10	HIS	-	expression tag	UNP Q8DQ84
B	11	SER	-	expression tag	UNP Q8DQ84
B	12	SER	-	expression tag	UNP Q8DQ84
B	13	GLY	-	expression tag	UNP Q8DQ84
B	14	LEU	-	expression tag	UNP Q8DQ84
B	15	VAL	-	expression tag	UNP Q8DQ84
B	16	PRO	-	expression tag	UNP Q8DQ84
B	17	ARG	-	expression tag	UNP Q8DQ84
B	18	GLY	-	expression tag	UNP Q8DQ84
B	19	SER	-	expression tag	UNP Q8DQ84
B	20	HIS	-	expression tag	UNP Q8DQ84
C	1	MET	-	initiating methionine	UNP Q8DQ84
C	2	GLY	-	expression tag	UNP Q8DQ84
C	3	SER	-	expression tag	UNP Q8DQ84
C	4	SER	-	expression tag	UNP Q8DQ84
C	5	HIS	-	expression tag	UNP Q8DQ84
C	6	HIS	-	expression tag	UNP Q8DQ84
C	7	HIS	-	expression tag	UNP Q8DQ84
C	8	HIS	-	expression tag	UNP Q8DQ84
C	9	HIS	-	expression tag	UNP Q8DQ84
C	10	HIS	-	expression tag	UNP Q8DQ84
C	11	SER	-	expression tag	UNP Q8DQ84
C	12	SER	-	expression tag	UNP Q8DQ84
C	13	GLY	-	expression tag	UNP Q8DQ84
C	14	LEU	-	expression tag	UNP Q8DQ84
C	15	VAL	-	expression tag	UNP Q8DQ84
C	16	PRO	-	expression tag	UNP Q8DQ84
C	17	ARG	-	expression tag	UNP Q8DQ84
C	18	GLY	-	expression tag	UNP Q8DQ84
C	19	SER	-	expression tag	UNP Q8DQ84
C	20	HIS	-	expression tag	UNP Q8DQ84
D	1	MET	-	initiating methionine	UNP Q8DQ84
D	2	GLY	-	expression tag	UNP Q8DQ84
D	3	SER	-	expression tag	UNP Q8DQ84

Continued on next page...

Continued from previous page...

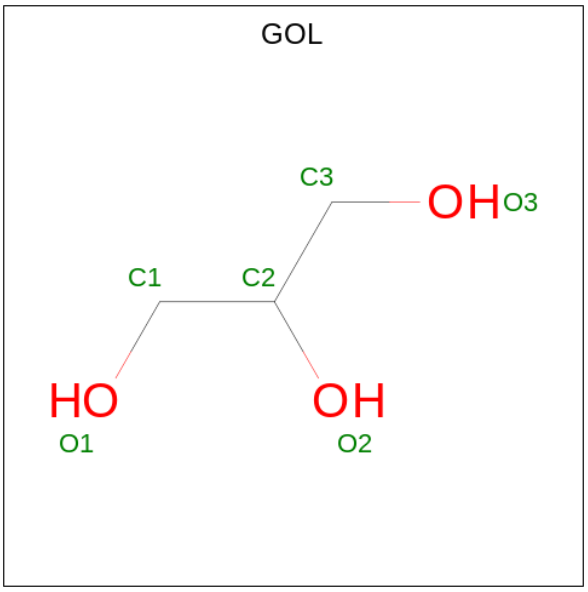
Chain	Residue	Modelled	Actual	Comment	Reference
D	4	SER	-	expression tag	UNP Q8DQ84
D	5	HIS	-	expression tag	UNP Q8DQ84
D	6	HIS	-	expression tag	UNP Q8DQ84
D	7	HIS	-	expression tag	UNP Q8DQ84
D	8	HIS	-	expression tag	UNP Q8DQ84
D	9	HIS	-	expression tag	UNP Q8DQ84
D	10	HIS	-	expression tag	UNP Q8DQ84
D	11	SER	-	expression tag	UNP Q8DQ84
D	12	SER	-	expression tag	UNP Q8DQ84
D	13	GLY	-	expression tag	UNP Q8DQ84
D	14	LEU	-	expression tag	UNP Q8DQ84
D	15	VAL	-	expression tag	UNP Q8DQ84
D	16	PRO	-	expression tag	UNP Q8DQ84
D	17	ARG	-	expression tag	UNP Q8DQ84
D	18	GLY	-	expression tag	UNP Q8DQ84
D	19	SER	-	expression tag	UNP Q8DQ84
D	20	HIS	-	expression tag	UNP Q8DQ84

- Molecule 2 is CITRIC ACID (three-letter code: CIT) (formula: $C_6H_8O_7$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total C O 13 6 7	0	0
2	D	1	Total C O 13 6 7	0	0

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 4 is water.

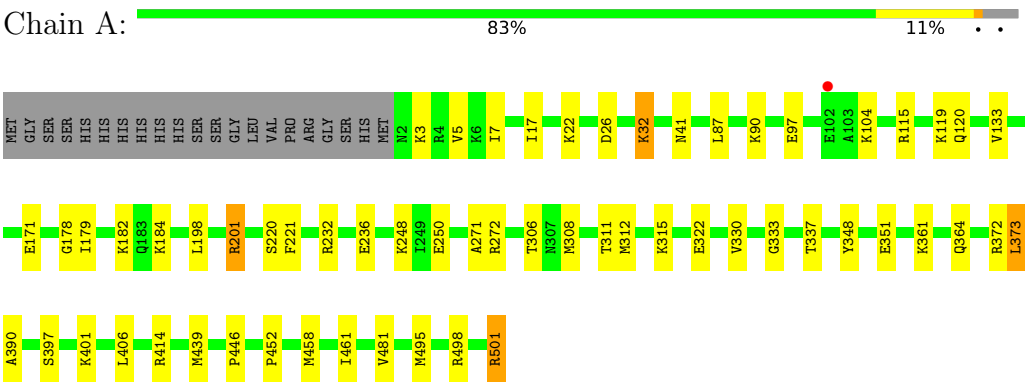
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	254	Total O 254 254	0	0
4	B	223	Total O 223 223	0	0
4	C	189	Total O 189 189	0	0
4	D	191	Total O 191 191	0	0

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.

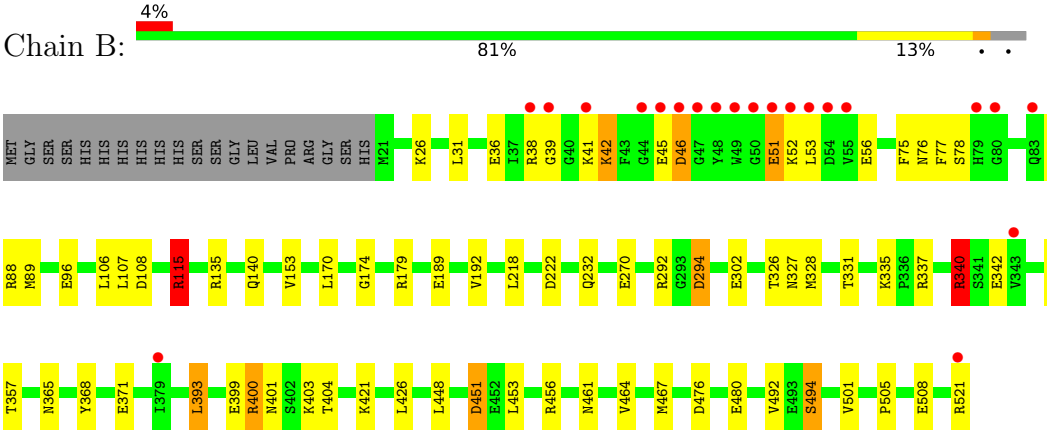
• Molecule 1: Pyruvate kinase

Chain A:



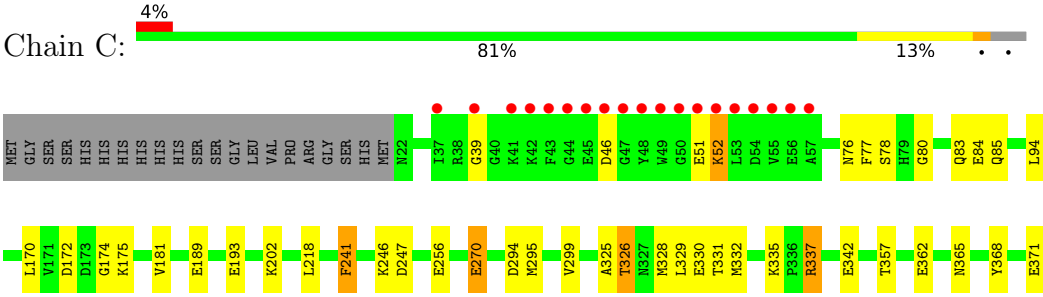
• Molecule 1: Pyruvate kinase

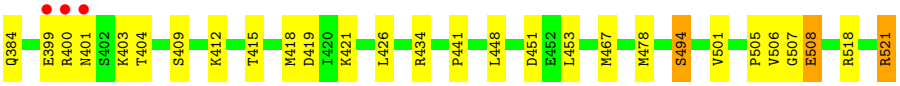
Chain B:



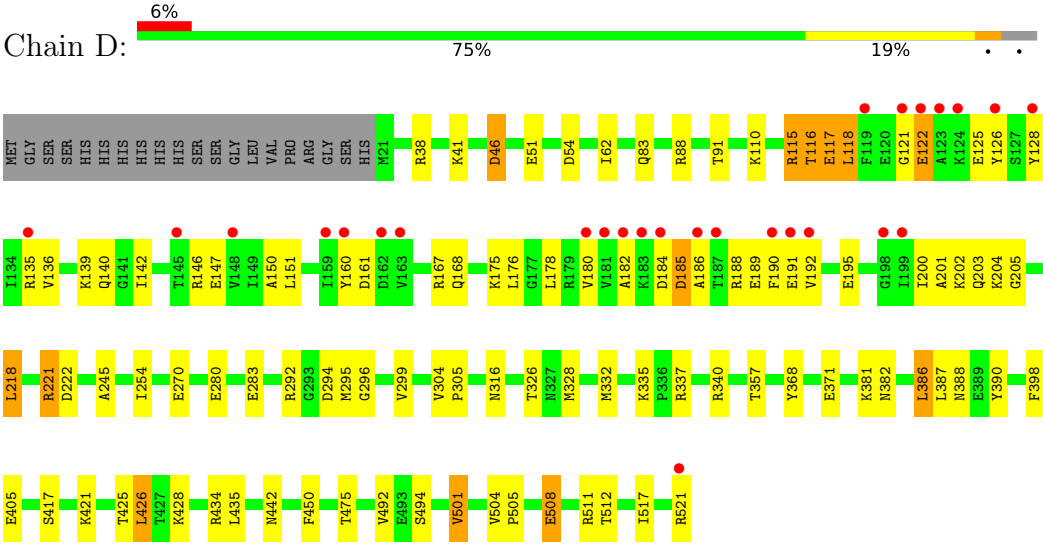
• Molecule 1: Pyruvate kinase

Chain C:





• Molecule 1: Pyruvate kinase



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	75.09Å 84.70Å 107.01Å 101.22° 96.82° 91.42°	Depositor
Resolution (Å)	49.07 – 2.00 49.07 – 2.00	Depositor EDS
% Data completeness (in resolution range)	96.8 (49.07-2.00) 96.8 (49.07-2.00)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.00 (at 2.00Å)	Xtriage
Refinement program	REFMAC 5	Depositor
R, R_{free}	0.178 , 0.215 0.185 , 0.220	Depositor DCC
R_{free} test set	8420 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	34.3	Xtriage
Anisotropy	0.054	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 39.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	16233	wwPDB-VP
Average B, all atoms (Å^2)	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.93% 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: GOL, CIT

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	0/3877	0.79	1/5228 (0.0%)
1	B	0.65	0/3885	0.79	2/5238 (0.0%)
1	C	0.63	0/3877	0.77	3/5228 (0.1%)
1	D	0.65	0/3885	0.78	2/5238 (0.0%)
All	All	0.65	0/15524	0.78	8/20932 (0.0%)

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	434	ARG	NE-CZ-NH1	8.24	124.42	120.30
1	D	434	ARG	NE-CZ-NH2	-7.66	116.47	120.30
1	C	434	ARG	NE-CZ-NH1	-6.93	116.84	120.30
1	B	340	ARG	NE-CZ-NH1	6.46	123.53	120.30
1	A	414	ARG	NE-CZ-NH2	-6.44	117.08	120.30
1	C	521	ARG	NE-CZ-NH2	6.33	123.47	120.30
1	C	434	ARG	NE-CZ-NH2	5.96	123.28	120.30
1	B	115	ARG	NE-CZ-NH2	-5.78	117.41	120.30

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	3832	0	3876	36	0
1	B	3840	0	3885	67	0
1	C	3832	0	3876	41	0
1	D	3840	0	3885	97	0
2	B	13	0	5	0	0
2	D	13	0	5	1	0
3	D	6	0	8	0	0
4	A	254	0	0	2	0
4	B	223	0	0	2	0
4	C	189	0	0	3	0
4	D	191	0	0	3	0
All	All	16233	0	15540	234	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 8.

All (234) 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:494:SER:HB2	1:B:521:ARG:OXT	1.50	1.11
1:D:116:THR:HG22	1:D:203:GLN:N	1.68	1.08
1:B:39:GLY:HA3	1:B:51:GLU:HG2	1.32	1.08
1:C:328:MET:HE3	1:C:357:THR:HB	1.38	1.04
1:D:139:LYS:HD3	1:D:142:ILE:HD11	1.36	1.03
1:D:116:THR:HG21	1:D:201:ALA:O	1.58	1.02
1:D:126:TYR:CG	1:D:146:ARG:HG3	1.97	0.99
1:D:139:LYS:CD	1:D:142:ILE:HD11	1.93	0.98
1:C:328:MET:CE	1:C:357:THR:HB	1.96	0.95
1:B:302:GLU:HG3	1:D:382:ASN:ND2	1.85	0.92
1:D:139:LYS:HB3	1:D:142:ILE:CD1	2.02	0.89
1:D:404:THR:HG22	1:D:435:LEU:HD12	1.54	0.89
1:B:77:PHE:CZ	1:B:89:MET:CE	2.56	0.89
1:B:39:GLY:HA3	1:B:51:GLU:CG	2.07	0.85
1:B:328:MET:HE3	1:B:346:VAL:HG22	1.58	0.84
1:D:126:TYR:CD1	1:D:146:ARG:HG3	2.12	0.84
1:B:77:PHE:HZ	1:B:89:MET:CE	1.91	0.84
1:D:126:TYR:CE1	1:D:146:ARG:HB2	2.13	0.82
1:B:77:PHE:CZ	1:B:89:MET:HE1	2.15	0.81
1:A:306:THR:HG22	4:A:642:HOH:O	1.81	0.79
1:D:404:THR:HG22	1:D:435:LEU:CD1	2.12	0.79
1:A:120:GLN:HE22	1:A:133:VAL:H	1.31	0.77
1:D:116:THR:CG2	1:D:203:GLN:N	2.47	0.77

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:77:PHE:CZ	1:B:89:MET:HE2	2.20	0.76
1:C:505:PRO:HG2	1:C:508:GLU:HB2	1.65	0.76
1:B:96:GLU:OE1	1:B:456:ARG:NH1	2.20	0.75
1:B:39:GLY:CA	1:B:51:GLU:HG2	2.13	0.74
1:B:340:ARG:HG2	1:B:340:ARG:HH11	1.53	0.72
1:D:62:ILE:HD12	1:D:91:THR:HG22	1.71	0.71
1:D:116:THR:HG22	1:D:204:LYS:H	1.55	0.71
1:B:340:ARG:HE	1:D:296:GLY:HA3	1.56	0.70
1:A:308:MET:CE	1:A:337:THR:HB	2.22	0.70
1:B:76:ASN:HD21	1:B:78:SER:HB2	1.55	0.70
1:D:388:ASN:HD21	1:D:442:ASN:ND2	1.90	0.69
1:D:126:TYR:CD1	1:D:146:ARG:CG	2.76	0.69
1:D:404:THR:CG2	1:D:435:LEU:HD12	2.23	0.68
1:B:115:ARG:HD2	4:B:890:HOH:O	1.94	0.68
1:B:327:ASN:HD22	1:D:340:ARG:HD2	1.59	0.68
1:B:140:GLN:HE22	1:B:153:VAL:H	1.42	0.67
1:D:501:VAL:HG13	1:D:512:THR:HG21	1.77	0.67
1:B:476:ASP:O	1:B:480:GLU:HG3	1.94	0.67
1:D:116:THR:HG23	1:D:202:LYS:HA	1.77	0.66
1:B:77:PHE:HZ	1:B:89:MET:HE2	1.55	0.66
1:D:182:ALA:O	1:D:191:GLU:N	2.25	0.65
1:C:401:ASN:HB3	4:C:617:HOH:O	1.97	0.65
1:D:116:THR:HG22	1:D:202:LYS:C	2.18	0.65
1:B:77:PHE:HZ	1:B:89:MET:HE1	1.57	0.64
1:B:77:PHE:HA	1:B:85:GLN:NE2	2.13	0.64
1:B:218:LEU:HB3	1:B:222:ASP:HB2	1.79	0.64
1:C:328:MET:CE	1:C:357:THR:CB	2.74	0.64
1:D:139:LYS:HB3	1:D:142:ILE:HD12	1.77	0.64
1:B:328:MET:HE2	1:B:357:THR:HB	1.80	0.64
1:B:26:LYS:HE2	1:B:461:ASN:O	1.99	0.63
1:C:337:ARG:HB2	1:C:337:ARG:HH21	1.62	0.63
1:C:80:GLY:HA3	1:C:84:GLU:OE2	1.99	0.62
1:D:421:LYS:CG	1:D:492:VAL:HG12	2.28	0.62
1:B:340:ARG:HH11	1:B:340:ARG:CG	2.13	0.62
1:D:126:TYR:CE1	1:D:146:ARG:CB	2.83	0.61
1:A:333:GLY:HA3	1:A:373:LEU:HD22	1.82	0.61
1:B:77:PHE:CE2	1:B:89:MET:CE	2.83	0.61
1:D:116:THR:CG2	1:D:202:LYS:C	2.69	0.61
1:D:116:THR:CG2	1:D:204:LYS:H	2.14	0.61
1:D:421:LYS:HG2	1:D:492:VAL:HG12	1.83	0.61
1:B:107:LEU:C	1:B:107:LEU:HD23	2.22	0.60

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:448:LEU:HD23	1:C:467:MET:HB3	1.82	0.60
1:C:403:LYS:HE3	1:D:517:ILE:O	2.02	0.60
1:D:129:LYS:O	1:D:132:GLU:HB2	2.02	0.60
1:D:110:LYS:HD3	1:D:221:ARG:CZ	2.33	0.59
1:A:372:ARG:HD2	1:A:372:ARG:O	2.03	0.59
1:B:328:MET:CE	1:B:346:VAL:HG22	2.31	0.59
1:A:308:MET:HE2	1:A:337:THR:HB	1.83	0.59
1:B:421:LYS:HG2	1:B:492:VAL:HG12	1.85	0.58
1:C:399:GLU:HG3	1:C:399:GLU:O	2.03	0.58
1:A:120:GLN:NE2	1:A:133:VAL:H	1.98	0.58
1:A:361:LYS:O	1:A:364:GLN:HG2	2.03	0.58
1:B:107:LEU:HD23	1:B:108:ASP:N	2.18	0.58
1:C:94:LEU:HD12	1:C:94:LEU:O	2.03	0.58
1:D:501:VAL:HG13	1:D:512:THR:CG2	2.33	0.58
1:B:331:THR:OG1	1:B:342:GLU:OE2	2.22	0.58
1:D:116:THR:CG2	1:D:202:LYS:HA	2.33	0.57
1:B:494:SER:CB	1:B:521:ARG:OXT	2.40	0.57
1:D:168:GLN:NE2	1:D:195:GLU:OE2	2.37	0.57
1:D:140:GLN:NE2	1:D:151:LEU:O	2.35	0.56
1:C:80:GLY:CA	1:C:84:GLU:OE2	2.52	0.56
1:A:311:THR:HG23	1:A:322:GLU:OE1	2.05	0.55
1:B:368:TYR:HB3	1:B:371:GLU:HB2	1.88	0.55
1:C:337:ARG:HH21	1:C:337:ARG:CB	2.19	0.55
1:D:139:LYS:HD2	1:D:142:ILE:HD11	1.83	0.55
1:C:494:SER:OG	1:C:521:ARG:O	2.24	0.55
1:C:181:VAL:HG11	1:C:193:GLU:HG3	1.88	0.54
1:D:126:TYR:CD1	1:D:146:ARG:CB	2.90	0.54
1:D:182:ALA:HB3	1:D:191:GLU:HB2	1.89	0.54
1:B:135:ARG:HD3	1:B:189:GLU:OE2	2.08	0.54
1:D:116:THR:HG22	1:D:204:LYS:N	2.22	0.54
1:D:139:LYS:HD3	1:D:142:ILE:CD1	2.22	0.54
1:D:46:ASP:OD2	1:D:46:ASP:N	2.29	0.54
1:D:328:MET:CE	1:D:357:THR:HB	2.38	0.54
1:A:3:LYS:HE2	1:A:7:ILE:HD12	1.90	0.53
1:C:326:THR:HG21	4:C:768:HOH:O	2.07	0.53
1:A:250:GLU:HG2	1:A:271:ALA:HB3	1.88	0.53
1:B:353:GLY:HA3	1:B:393:LEU:HD22	1.90	0.53
1:D:116:THR:CG2	1:D:202:LYS:CA	2.86	0.53
1:B:140:GLN:NE2	1:B:153:VAL:H	2.06	0.53
1:A:104:LYS:HD3	1:A:182:LYS:HE2	1.90	0.53
1:A:115:ARG:NH2	1:A:171:GLU:OE1	2.41	0.53

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:220:SER:HA	1:A:248:LYS:HD3	1.91	0.53
1:D:160:TYR:CE2	1:D:188:ARG:HA	2.44	0.53
1:D:182:ALA:O	1:D:191:GLU:HB2	2.09	0.53
1:B:399:GLU:HG2	1:B:401:ASN:HD21	1.75	0.52
1:C:328:MET:HE3	1:C:357:THR:CB	2.25	0.52
1:D:116:THR:HG22	1:D:203:GLN:H	1.67	0.52
1:D:139:LYS:CD	1:D:142:ILE:CD1	2.80	0.52
1:A:312:MET:HA	1:A:315:LYS:O	2.10	0.52
1:D:110:LYS:HD3	1:D:221:ARG:NE	2.25	0.52
1:A:178:GLY:C	1:A:179:ILE:HD12	2.30	0.52
1:B:448:LEU:HD23	1:B:467:MET:HB3	1.90	0.51
1:D:368:TYR:HB3	1:D:371:GLU:HB2	1.92	0.51
1:D:421:LYS:HG3	1:D:492:VAL:HG12	1.92	0.51
1:D:128:TYR:N	1:D:128:TYR:CD2	2.79	0.51
1:B:77:PHE:CE2	1:B:89:MET:HE2	2.46	0.51
2:D:601:CIT:H21	4:D:758:HOH:O	2.10	0.51
1:A:179:ILE:HD12	1:A:179:ILE:N	2.26	0.50
1:C:400:ARG:HD3	1:D:417:SER:OG	2.11	0.50
1:B:36:GLU:OE1	1:B:88:ARG:NE	2.37	0.50
1:D:115:ARG:HH11	1:D:205:GLY:N	2.09	0.50
1:A:140:TYR:CE2	1:A:168:ARG:HA	2.47	0.50
1:B:399:GLU:HG2	1:B:401:ASN:ND2	2.26	0.50
1:C:172:ASP:O	1:C:175:LYS:HD2	2.12	0.49
1:D:126:TYR:CD2	1:D:146:ARG:HG3	2.45	0.49
1:D:381:LYS:NZ	4:D:707:HOH:O	2.46	0.49
1:B:328:MET:HE1	1:B:346:VAL:HA	1.95	0.49
1:D:38:ARG:HB3	1:D:51:GLU:HB2	1.95	0.49
1:A:90:LYS:HD3	1:A:201:ARG:HD3	1.95	0.49
1:B:337:ARG:HH21	1:D:175:LYS:HE3	1.78	0.48
1:C:329:LEU:O	1:C:362:GLU:HG2	2.13	0.48
1:C:451:ASP:OD1	1:C:453:LEU:HB2	2.14	0.48
1:C:135:ARG:HD3	1:C:189:GLU:OE2	2.14	0.48
1:D:126:TYR:O	1:D:128:TYR:HE2	1.97	0.48
1:D:180:VAL:HA	1:D:192:VAL:HG12	1.96	0.47
1:B:42:LYS:NZ	1:B:42:LYS:CB	2.76	0.47
1:D:117:GLU:HB2	1:D:150:ALA:O	2.13	0.47
1:A:406:LEU:HD22	1:A:458:MET:HG2	1.94	0.47
1:C:381:LYS:O	1:C:384:GLN:HG2	2.15	0.47
1:D:332:MET:HA	1:D:335:LYS:O	2.15	0.47
1:D:494:SER:CB	1:D:521:ARG:OXT	2.62	0.47
1:B:115:ARG:CD	4:B:890:HOH:O	2.58	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:368:TYR:HB3	1:C:371:GLU:HB2	1.97	0.47
1:C:415:THR:O	1:C:418:MET:O	2.33	0.47
1:D:221:ARG:HG3	1:D:222:ASP:N	2.30	0.47
1:D:295:MET:O	1:D:299:VAL:HG22	2.14	0.47
1:B:270:GLU:HB3	1:B:294:ASP:HB3	1.97	0.47
1:A:381:ASN:C	1:A:381:ASN:HD22	2.18	0.46
1:B:302:GLU:HG3	1:D:382:ASN:HD22	1.76	0.46
1:D:386:LEU:HD13	1:D:390:TYR:CE2	2.50	0.46
1:C:51:GLU:HA	1:C:51:GLU:OE1	2.15	0.46
1:D:386:LEU:HD13	1:D:390:TYR:CD2	2.50	0.46
1:D:136:VAL:HB	1:D:190:PHE:HB2	1.98	0.46
1:B:505:PRO:HG2	1:B:508:GLU:HG2	1.97	0.46
1:B:46:ASP:OD1	1:B:46:ASP:N	2.49	0.46
1:D:304:VAL:HB	1:D:305:PRO:HD3	1.97	0.46
1:A:32:LYS:HD2	1:A:32:LYS:HA	1.70	0.46
1:A:184:LYS:HD3	1:A:184:LYS:HA	1.77	0.46
1:B:41:LYS:HA	1:B:45:GLU:OE2	2.16	0.46
1:B:170:LEU:HB3	1:B:174:GLY:HA2	1.97	0.46
1:C:76:ASN:OD1	1:C:78:SER:HB2	2.16	0.46
1:C:241:PHE:N	1:C:270:GLU:OE2	2.49	0.45
1:D:126:TYR:CD1	1:D:146:ARG:HA	2.51	0.45
1:A:333:GLY:CA	1:A:373:LEU:HD22	2.46	0.45
1:B:53:LEU:HD23	1:B:87:GLU:HB3	1.98	0.45
1:B:451:ASP:OD1	1:B:453:LEU:HB2	2.17	0.45
1:C:412:LYS:HD2	1:C:441:PRO:HA	1.98	0.45
1:A:348:TYR:HB3	1:A:351:GLU:HB2	1.97	0.45
1:D:185:ASP:OD1	1:D:185:ASP:N	2.50	0.45
1:D:426:LEU:HD11	1:D:450:PHE:CZ	2.51	0.45
1:B:26:LYS:NZ	1:B:464:VAL:O	2.33	0.44
1:C:295:MET:O	1:C:299:VAL:HG22	2.18	0.44
1:C:325:ALA:C	1:C:326:THR:HG23	2.38	0.44
1:D:126:TYR:O	1:D:128:TYR:CE2	2.70	0.44
1:D:83:GLN:H	1:D:83:GLN:NE2	2.15	0.44
1:B:84:GLU:O	1:B:87:GLU:HB2	2.18	0.44
1:A:390:ALA:HB1	1:A:495:MET:HE1	2.00	0.44
1:C:426:LEU:HD22	1:C:478:MET:HG2	1.99	0.44
1:D:167:ARG:HD3	1:D:167:ARG:HA	1.84	0.44
1:B:84:GLU:OE2	1:B:88:ARG:NH2	2.46	0.44
1:B:106:LEU:HD23	1:B:106:LEU:C	2.39	0.43
1:D:135:ARG:HD3	1:D:189:GLU:OE2	2.17	0.43
1:B:38:ARG:HB3	1:B:51:GLU:HB3	2.00	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:316:ASN:ND2	1:D:398:PHE:HZ	2.16	0.43
1:D:245:ALA:HB2	1:D:280:GLU:HG3	2.00	0.43
1:A:17:ILE:HD11	1:A:41:ASN:HD21	1.83	0.43
1:B:31:LEU:HD12	1:B:75:PHE:CE1	2.53	0.43
1:B:179:ARG:O	1:B:192:VAL:HA	2.19	0.43
1:A:452:PRO:HB3	1:A:461:ILE:HD12	2.00	0.43
1:C:332:MET:HA	1:C:335:LYS:O	2.19	0.43
1:D:139:LYS:HB3	1:D:142:ILE:HD13	1.91	0.43
1:D:508:GLU:H	1:D:508:GLU:HG3	1.54	0.43
1:A:501:ARG:NH2	4:A:620:HOH:O	2.52	0.43
1:C:39:GLY:N	1:C:52:LYS:O	2.44	0.42
1:C:331:THR:HG23	1:C:342:GLU:OE1	2.19	0.42
1:A:5:VAL:HG21	1:A:330:VAL:HG13	2.01	0.42
1:B:42:LYS:NZ	1:B:42:LYS:HB2	2.33	0.42
1:C:124:LYS:HD2	1:C:202:LYS:NZ	2.34	0.42
1:D:387:LEU:HD23	1:D:387:LEU:HA	1.81	0.42
1:B:85:GLN:OE1	1:B:85:GLN:HA	2.20	0.42
1:C:400:ARG:CZ	1:C:409:SER:OG	2.67	0.42
1:D:176:LEU:HD22	1:D:200:ILE:HG12	2.02	0.42
1:A:137:LEU:HD23	1:A:137:LEU:HA	1.84	0.42
1:D:208:ILE:HG22	1:D:211:THR:CG2	2.50	0.42
1:B:328:MET:HE3	1:B:328:MET:HB3	1.69	0.42
1:A:87:LEU:C	1:A:87:LEU:HD23	2.40	0.41
1:B:107:LEU:C	1:B:107:LEU:CD2	2.89	0.41
1:B:331:THR:HG1	1:B:342:GLU:CD	2.20	0.41
1:D:115:ARG:NH1	1:D:205:GLY:N	2.68	0.41
1:C:80:GLY:HA2	1:C:84:GLU:OE2	2.20	0.41
1:C:507:GLY:N	4:C:603:HOH:O	2.33	0.41
1:D:494:SER:OG	1:D:521:ARG:OXT	2.31	0.41
1:D:184:ASP:OD1	1:D:186:ALA:HB3	2.21	0.41
1:D:475:THR:OG1	1:D:504:VAL:HG13	2.20	0.41
1:D:218:LEU:HD11	1:D:254:ILE:HD11	2.03	0.41
1:A:308:MET:CE	1:A:337:THR:CB	2.96	0.41
1:C:77:PHE:CZ	1:C:85:GLN:HG3	2.56	0.41
1:D:178:LEU:HB3	1:D:192:VAL:HG21	2.02	0.41
1:D:504:VAL:HA	1:D:505:PRO:C	2.40	0.41
1:D:38:ARG:O	1:D:41:LYS:HB2	2.21	0.41
1:D:326:THR:HG21	4:D:871:HOH:O	2.20	0.40
1:A:397:SER:HB3	1:B:400:ARG:O	2.21	0.40
1:A:439:MET:HG3	1:A:446:PRO:HG2	2.02	0.40
1:D:161:ASP:OD1	1:D:188:ARG:NH2	2.54	0.40

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:232:ARG:O	1:A:236:GLU:HG2	2.22	0.40
1:B:42:LYS:HB2	1:B:42:LYS:HZ1	1.87	0.40
1:C:170:LEU:HB3	1:C:174:GLY:HA2	2.02	0.40
1:D:116:THR:CG2	1:D:203:GLN:H	2.28	0.40
1:D:121:GLY:O	1:D:122:GLU:CB	2.70	0.40
1:D:118:LEU:HD12	1:D:118:LEU:HA	1.93	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	498/521 (96%)	489 (98%)	9 (2%)	0	100	100
1	B	499/521 (96%)	490 (98%)	8 (2%)	1 (0%)	47	44
1	C	498/521 (96%)	492 (99%)	5 (1%)	1 (0%)	47	44
1	D	499/521 (96%)	491 (98%)	7 (1%)	1 (0%)	47	44
All	All	1994/2084 (96%)	1962 (98%)	29 (2%)	3 (0%)	47	44

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	508	GLU
1	B	326	THR
1	C	326	THR

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	410/428 (96%)	393 (96%)	17 (4%)	30	28
1	B	411/428 (96%)	391 (95%)	20 (5%)	25	21
1	C	410/428 (96%)	388 (95%)	22 (5%)	22	18
1	D	411/428 (96%)	384 (93%)	27 (7%)	16	12
All	All	1642/1712 (96%)	1556 (95%)	86 (5%)	23	19

All (86) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	22	LYS
1	A	26	ASP
1	A	32	LYS
1	A	97	GLU
1	A	119	LYS
1	A	137	LEU
1	A	198	LEU
1	A	201	ARG
1	A	221	PHE
1	A	272	ARG
1	A	373	LEU
1	A	381	ASN
1	A	384	THR
1	A	401	LYS
1	A	481	VAL
1	A	498	ARG
1	A	501	ARG
1	B	42	LYS
1	B	46	ASP
1	B	51	GLU
1	B	52	LYS
1	B	56	GLU
1	B	115	ARG
1	B	232	GLN
1	B	292	ARG
1	B	294	ASP
1	B	335	LYS
1	B	340	ARG
1	B	365	ASN
1	B	393	LEU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	400	ARG
1	B	403	LYS
1	B	404	THR
1	B	426	LEU
1	B	451	ASP
1	B	494	SER
1	B	501	VAL
1	C	46	ASP
1	C	52	LYS
1	C	83	GLN
1	C	218	LEU
1	C	241	PHE
1	C	246	LYS
1	C	247	ASP
1	C	256	GLU
1	C	270	GLU
1	C	294	ASP
1	C	330	GLU
1	C	337	ARG
1	C	365	ASN
1	C	382	ASN
1	C	404	THR
1	C	419	ASP
1	C	421	LYS
1	C	494	SER
1	C	501	VAL
1	C	506	VAL
1	C	508	GLU
1	C	518	ARG
1	D	46	ASP
1	D	54	ASP
1	D	88	ARG
1	D	115	ARG
1	D	116	THR
1	D	117	GLU
1	D	118	LEU
1	D	122	GLU
1	D	125	GLU
1	D	132	GLU
1	D	147	GLU
1	D	185	ASP
1	D	218	LEU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	D	221	ARG
1	D	270	GLU
1	D	283	GLU
1	D	292	ARG
1	D	294	ASP
1	D	337	ARG
1	D	386	LEU
1	D	400	ARG
1	D	405	GLU
1	D	425	THR
1	D	426	LEU
1	D	428	LYS
1	D	501	VAL
1	D	511	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	41	ASN
1	A	120	GLN
1	A	381	ASN
1	B	76	ASN
1	B	140	GLN
1	B	232	GLN
1	B	316	ASN
1	B	327	ASN
1	B	382	ASN
1	C	22	ASN
1	C	83	GLN
1	C	382	ASN
1	D	83	GLN
1	D	210	ASN
1	D	316	ASN
1	D	382	ASN
1	D	388	ASN

5.3.3 RNA

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)

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	$\#\|Z\| > 2$
3	GOL	D	602	-	5,5,5	0.30	0	5,5,5	0.69	0
2	CIT	D	601	-	12,12,12	1.30	1 (8%)	17,17,17	1.27	2 (11%)
2	CIT	B	601	-	12,12,12	1.48	1 (8%)	17,17,17	1.58	2 (11%)

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	D	602	-	-	4/4/4/4	-
2	CIT	D	601	-	-	0/16/16/16	-
2	CIT	B	601	-	-	0/16/16/16	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	601	CIT	C3-C6	3.94	1.57	1.53
2	D	601	CIT	C3-C6	2.79	1.56	1.53

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	601	CIT	O5-C6-C3	-4.05	116.52	122.25
2	B	601	CIT	O6-C6-C3	3.68	119.44	113.05
2	D	601	CIT	O5-C6-C3	-3.15	117.80	122.25
2	D	601	CIT	O6-C6-C3	2.40	117.22	113.05

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	602	GOL	O1-C1-C2-C3
3	D	602	GOL	C1-C2-C3-O3
3	D	602	GOL	O2-C2-C3-O3
3	D	602	GOL	O1-C1-C2-O2

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	601	CIT	1	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	500/521 (95%)	-0.46	1 (0%)	95	94	22, 35, 54, 90	0
1	B	501/521 (96%)	-0.12	21 (4%)	36	35	25, 38, 69, 124	0
1	C	500/521 (95%)	-0.05	22 (4%)	34	33	24, 41, 73, 95	0
1	D	501/521 (96%)	0.19	29 (5%)	23	22	23, 39, 76, 98	0
All	All	2002/2084 (96%)	-0.11	73 (3%)	42	42	22, 38, 69, 124	0

All (73) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	79	HIS	10.6
1	C	50	GLY	5.8
1	B	53	LEU	5.8
1	B	47	GLY	5.2
1	C	49	TRP	5.1
1	D	123	ALA	5.0
1	C	53	LEU	4.9
1	C	47	GLY	4.8
1	B	50	GLY	4.7
1	B	49	TRP	4.5
1	C	44	GLY	4.4
1	D	126	TYR	4.4
1	C	48	TYR	4.3
1	C	41	LYS	4.3
1	C	46	ASP	4.1
1	B	55	VAL	4.1
1	D	128	TYR	3.8
1	D	122	GLU	3.8
1	A	102	GLU	3.8
1	D	124	LYS	3.5
1	C	39	GLY	3.4

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	C	43	PHE	3.4
1	D	162	ASP	3.4
1	B	48	TYR	3.3
1	D	121	GLY	3.3
1	C	57	ALA	3.2
1	D	163	VAL	3.2
1	D	182	ALA	3.2
1	B	52	LYS	3.2
1	C	51	GLU	3.2
1	C	54	ASP	3.2
1	D	199	ILE	3.2
1	C	45	GLU	3.1
1	D	187	THR	3.0
1	B	41	LYS	3.0
1	B	46	ASP	3.0
1	B	80	GLY	2.9
1	D	160	TYR	2.9
1	B	44	GLY	2.8
1	D	198	GLY	2.8
1	C	37	ILE	2.7
1	C	55	VAL	2.7
1	D	133	LYS	2.7
1	D	184	ASP	2.7
1	B	521	ARG	2.6
1	D	148	VAL	2.6
1	B	38	ARG	2.6
1	D	132	GLU	2.6
1	B	83	GLN	2.6
1	D	119	PHE	2.5
1	B	51	GLU	2.5
1	B	343	VAL	2.5
1	B	54	ASP	2.5
1	D	135	ARG	2.5
1	D	159	ILE	2.4
1	C	52	LYS	2.4
1	C	400	ARG	2.4
1	D	183	LYS	2.4
1	D	190	PHE	2.4
1	C	56	GLU	2.4
1	B	45	GLU	2.3
1	D	180	VAL	2.3
1	D	191	GLU	2.3

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	B	379	ILE	2.3
1	D	186	ALA	2.2
1	D	181	VAL	2.2
1	C	42	LYS	2.2
1	D	192	VAL	2.1
1	D	521	ARG	2.1
1	B	39	GLY	2.1
1	D	145	THR	2.0
1	C	399	GLU	2.0
1	C	401	ASN	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
2	CIT	B	601	13/13	0.90	0.21	41,51,58,63	0
3	GOL	D	602	6/6	0.92	0.27	39,49,52,52	0
2	CIT	D	601	13/13	0.93	0.22	45,62,71,71	0

6.5 Other polymers (i)

There are no such residues in this entry.