



wwPDB X-ray Structure Validation Summary Report ⓘ

Dec 16, 2023 – 12:33 PM EST

PDB ID : 4P2R
Title : Crystal structure of the 5cc7 TCR in complex with 5c1/I-Ek
Authors : Birnbaum, M.E.; Ozkan, E.; Garcia, K.C.
Deposited on : 2014-03-04
Resolution : 3.29 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 : 4.02b-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

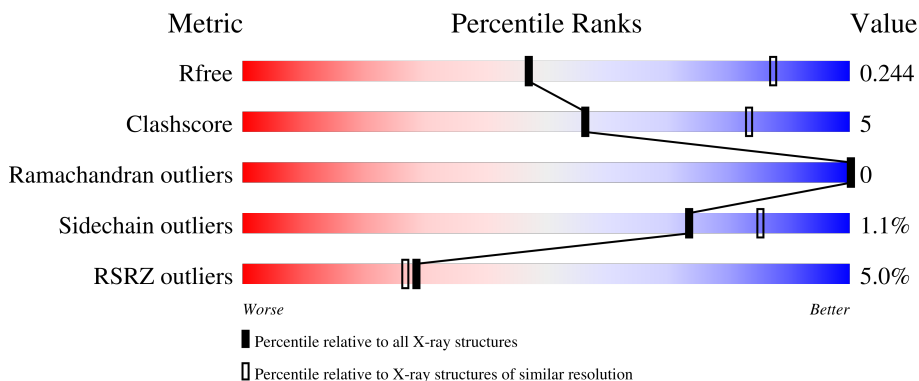
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.29 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	1149 (3.34-3.26)
Clashscore	141614	1205 (3.34-3.26)
Ramachandran outliers	138981	1183 (3.34-3.26)
Sidechain outliers	138945	1182 (3.34-3.26)
RSRZ outliers	127900	1115 (3.34-3.26)

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	204	 72% 16% 12%
1	F	204	 75% 13% 12%
1	K	204	 69% 19% 12%
1	P	204	 73% 15% 12%
2	B	212	 67% 14% 19%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	G	212	
2	L	212	
2	Q	212	
3	C	13	
3	H	13	
3	M	13	
3	R	13	
4	D	205	
4	I	205	
4	N	205	
4	S	205	
5	E	266	
5	J	266	
5	O	266	
5	T	266	

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 25651 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 H-2 class II histocompatibility antigen, E-K alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	180	1473	951	243	275	4	0	0	0
1	F	180	1473	951	243	275	4	0	0	0
1	K	180	1469	948	242	275	4	0	0	0
1	P	179	1461	942	241	274	4	0	0	0

There are 52 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	ALA	-	expression tag	UNP P04224
A	-1	ASP	-	expression tag	UNP P04224
A	0	PRO	-	expression tag	UNP P04224
A	192	SER	-	expression tag	UNP P04224
A	193	ARG	-	expression tag	UNP P04224
A	194	GLY	-	expression tag	UNP P04224
A	195	GLY	-	expression tag	UNP P04224
A	196	LEU	-	expression tag	UNP P04224
A	197	GLU	-	expression tag	UNP P04224
A	198	VAL	-	expression tag	UNP P04224
A	199	LEU	-	expression tag	UNP P04224
A	200	PHE	-	expression tag	UNP P04224
A	201	GLN	-	expression tag	UNP P04224
F	-2	ALA	-	expression tag	UNP P04224
F	-1	ASP	-	expression tag	UNP P04224
F	0	PRO	-	expression tag	UNP P04224
F	192	SER	-	expression tag	UNP P04224
F	193	ARG	-	expression tag	UNP P04224
F	194	GLY	-	expression tag	UNP P04224
F	195	GLY	-	expression tag	UNP P04224
F	196	LEU	-	expression tag	UNP P04224

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
F	197	GLU	-	expression tag	UNP P04224
F	198	VAL	-	expression tag	UNP P04224
F	199	LEU	-	expression tag	UNP P04224
F	200	PHE	-	expression tag	UNP P04224
F	201	GLN	-	expression tag	UNP P04224
K	-2	ALA	-	expression tag	UNP P04224
K	-1	ASP	-	expression tag	UNP P04224
K	0	PRO	-	expression tag	UNP P04224
K	192	SER	-	expression tag	UNP P04224
K	193	ARG	-	expression tag	UNP P04224
K	194	GLY	-	expression tag	UNP P04224
K	195	GLY	-	expression tag	UNP P04224
K	196	LEU	-	expression tag	UNP P04224
K	197	GLU	-	expression tag	UNP P04224
K	198	VAL	-	expression tag	UNP P04224
K	199	LEU	-	expression tag	UNP P04224
K	200	PHE	-	expression tag	UNP P04224
K	201	GLN	-	expression tag	UNP P04224
P	-2	ALA	-	expression tag	UNP P04224
P	-1	ASP	-	expression tag	UNP P04224
P	0	PRO	-	expression tag	UNP P04224
P	192	SER	-	expression tag	UNP P04224
P	193	ARG	-	expression tag	UNP P04224
P	194	GLY	-	expression tag	UNP P04224
P	195	GLY	-	expression tag	UNP P04224
P	196	LEU	-	expression tag	UNP P04224
P	197	GLU	-	expression tag	UNP P04224
P	198	VAL	-	expression tag	UNP P04224
P	199	LEU	-	expression tag	UNP P04224
P	200	PHE	-	expression tag	UNP P04224
P	201	GLN	-	expression tag	UNP P04224

- Molecule 2 is a protein called MHC class II E-beta-k.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	171	Total	C	N	O	S	0	0	0
			1387	885	237	259	6			
2	G	171	Total	C	N	O	S	0	0	0
			1382	883	237	256	6			
2	L	171	Total	C	N	O	S	0	0	0
			1382	883	237	256	6			
2	Q	171	Total	C	N	O	S	0	0	0
			1382	883	237	256	6			

There are 64 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-3	GLY	-	expression tag	UNP Q31163
B	-2	SER	-	expression tag	UNP Q31163
B	-1	GLY	-	expression tag	UNP Q31163
B	0	GLY	-	expression tag	UNP Q31163
B	1	GLY	-	expression tag	UNP Q31163
B	2	GLY	-	expression tag	UNP Q31163
B	199	SER	-	expression tag	UNP Q31163
B	200	ARG	-	expression tag	UNP Q31163
B	201	GLY	-	expression tag	UNP Q31163
B	202	GLY	-	expression tag	UNP Q31163
B	203	LEU	-	expression tag	UNP Q31163
B	204	GLU	-	expression tag	UNP Q31163
B	205	VAL	-	expression tag	UNP Q31163
B	206	LEU	-	expression tag	UNP Q31163
B	207	PHE	-	expression tag	UNP Q31163
B	208	GLN	-	expression tag	UNP Q31163
G	-3	GLY	-	expression tag	UNP Q31163
G	-2	SER	-	expression tag	UNP Q31163
G	-1	GLY	-	expression tag	UNP Q31163
G	0	GLY	-	expression tag	UNP Q31163
G	1	GLY	-	expression tag	UNP Q31163
G	2	GLY	-	expression tag	UNP Q31163
G	199	SER	-	expression tag	UNP Q31163
G	200	ARG	-	expression tag	UNP Q31163
G	201	GLY	-	expression tag	UNP Q31163
G	202	GLY	-	expression tag	UNP Q31163
G	203	LEU	-	expression tag	UNP Q31163
G	204	GLU	-	expression tag	UNP Q31163
G	205	VAL	-	expression tag	UNP Q31163
G	206	LEU	-	expression tag	UNP Q31163
G	207	PHE	-	expression tag	UNP Q31163
G	208	GLN	-	expression tag	UNP Q31163
L	-3	GLY	-	expression tag	UNP Q31163
L	-2	SER	-	expression tag	UNP Q31163
L	-1	GLY	-	expression tag	UNP Q31163
L	0	GLY	-	expression tag	UNP Q31163
L	1	GLY	-	expression tag	UNP Q31163
L	2	GLY	-	expression tag	UNP Q31163
L	199	SER	-	expression tag	UNP Q31163
L	200	ARG	-	expression tag	UNP Q31163
L	201	GLY	-	expression tag	UNP Q31163
L	202	GLY	-	expression tag	UNP Q31163

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
L	203	LEU	-	expression tag	UNP Q31163
L	204	GLU	-	expression tag	UNP Q31163
L	205	VAL	-	expression tag	UNP Q31163
L	206	LEU	-	expression tag	UNP Q31163
L	207	PHE	-	expression tag	UNP Q31163
L	208	GLN	-	expression tag	UNP Q31163
Q	-3	GLY	-	expression tag	UNP Q31163
Q	-2	SER	-	expression tag	UNP Q31163
Q	-1	GLY	-	expression tag	UNP Q31163
Q	0	GLY	-	expression tag	UNP Q31163
Q	1	GLY	-	expression tag	UNP Q31163
Q	2	GLY	-	expression tag	UNP Q31163
Q	199	SER	-	expression tag	UNP Q31163
Q	200	ARG	-	expression tag	UNP Q31163
Q	201	GLY	-	expression tag	UNP Q31163
Q	202	GLY	-	expression tag	UNP Q31163
Q	203	LEU	-	expression tag	UNP Q31163
Q	204	GLU	-	expression tag	UNP Q31163
Q	205	VAL	-	expression tag	UNP Q31163
Q	206	LEU	-	expression tag	UNP Q31163
Q	207	PHE	-	expression tag	UNP Q31163
Q	208	GLN	-	expression tag	UNP Q31163

- Molecule 3 is a protein called 5c1 peptide.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	13	Total	C	N	O	0	0	0
			98	68	15	15			
3	H	13	Total	C	N	O	0	0	0
			98	68	15	15			
3	M	13	Total	C	N	O	0	0	0
			98	68	15	15			
3	R	13	Total	C	N	O	0	0	0
			98	68	15	15			

- Molecule 4 is a protein called 5cc7 T-cell receptor alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	196	Total	C	N	O	S	0	0	0
			1523	942	264	309	8			
4	I	196	Total	C	N	O	S	0	0	0
			1517	939	261	309	8			

Continued on next page...

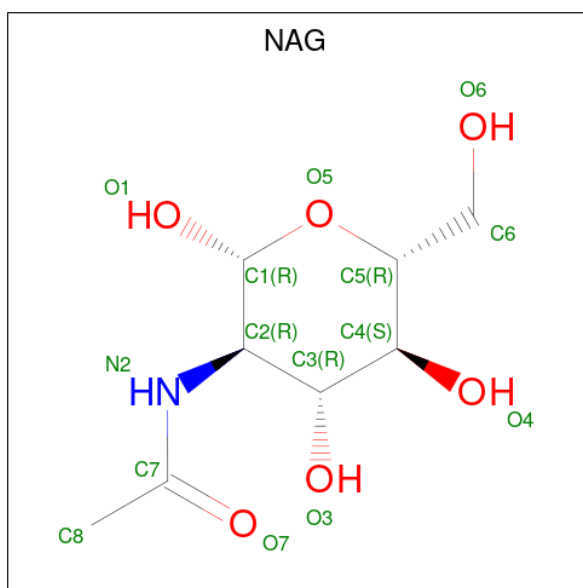
Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	N	196	Total 1523	C 942	N 264	O 309	S 8	0	0	0
4	S	196	Total 1523	C 942	N 264	O 309	S 8	0	0	0

- Molecule 5 is a protein called 5cc7 T-cell receptor beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	E	245	Total 1929	C 1212	N 336	O 372	S 9	0	0	0
5	J	245	Total 1929	C 1212	N 336	O 372	S 9	0	0	0
5	O	242	Total 1920	C 1208	N 334	O 369	S 9	0	0	0
5	T	242	Total 1916	C 1205	N 333	O 369	S 9	0	0	0

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).

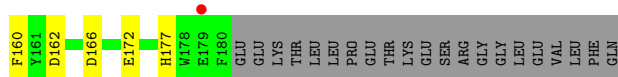


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
6	A	1	Total 14	C 8	N 1	O 5	0	0
6	B	1	Total 14	C 8	N 1	O 5	0	0
6	G	1	Total 14	C 8	N 1	O 5	0	0

Continued on next page...

Continued from previous page...

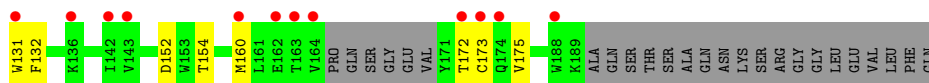
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	K	1	Total	C	N	O	0	0
			14	8	1	5		
6	L	1	Total	C	N	O	0	0
			14	8	1	5		



- Molecule 2: MHC class II E-beta-k



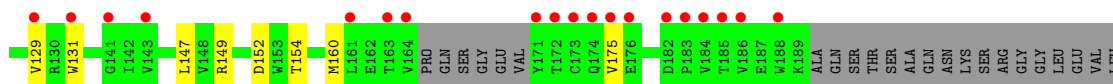
- Molecule 2: MHC class II E-beta-k



- Molecule 2: MHC class II E-beta-k



- Molecule 2: MHC class II E-beta-k




- Molecule 3: 5c1 peptide

Chain C:  62% 31% 8%




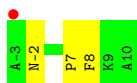
• Molecule 3: 5c1 peptide

Chain H:  8% 85% 15%




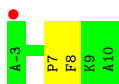
• Molecule 3: 5c1 peptide

Chain M:  8% 77% 23%




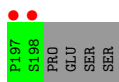
• Molecule 3: 5c1 peptide

Chain R:  8% 85% 15%




• Molecule 4: 5cc7 T-cell receptor alpha chain

Chain D:  3% 84% 11%

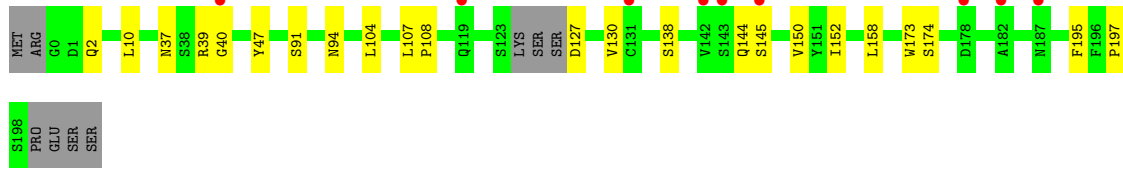
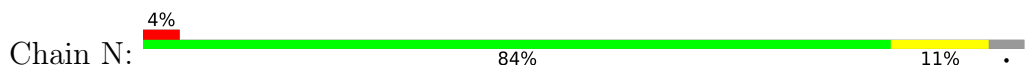


• Molecule 4: 5cc7 T-cell receptor alpha chain

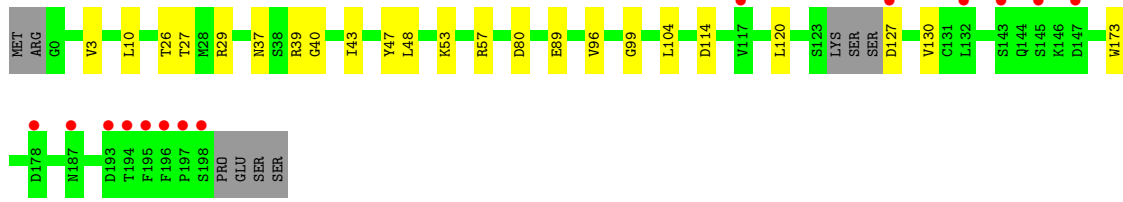
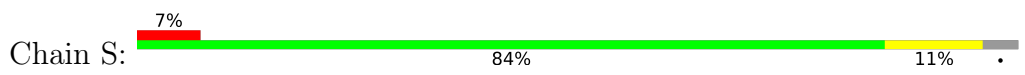
Chain I:  4% 86% 10%



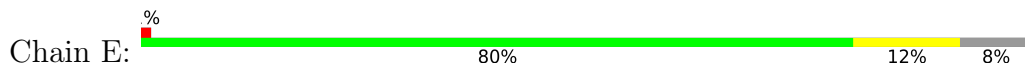
• Molecule 4: 5cc7 T-cell receptor alpha chain



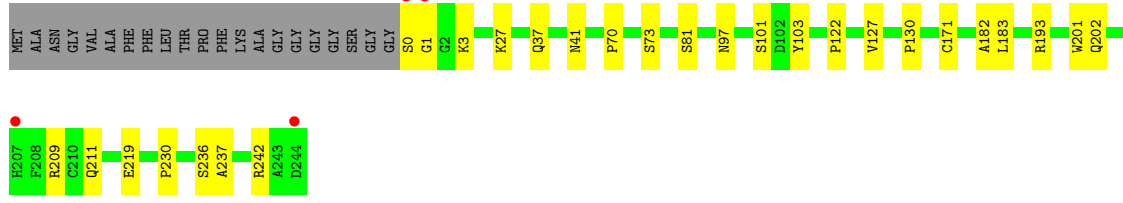
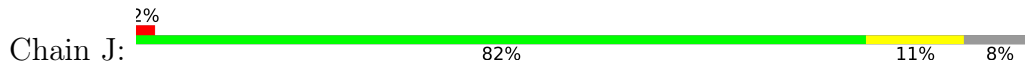
• Molecule 4: 5cc7 T-cell receptor alpha chain



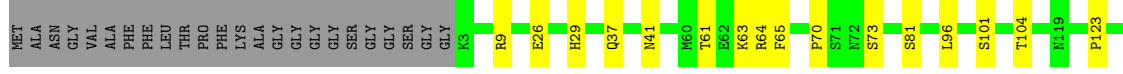
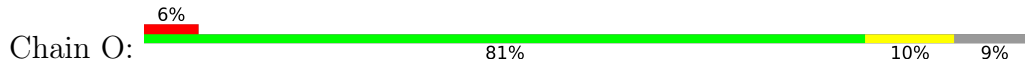
• Molecule 5: 5cc7 T-cell receptor beta chain

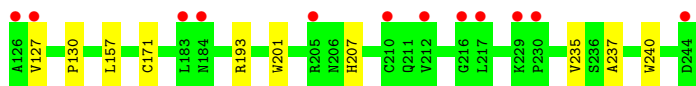


• Molecule 5: 5cc7 T-cell receptor beta chain

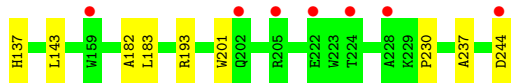
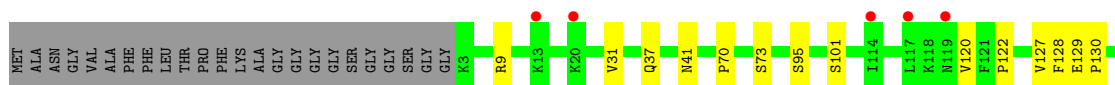
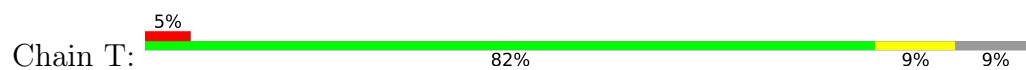


• Molecule 5: 5cc7 T-cell receptor beta chain





- Molecule 5: 5cc7 T-cell receptor beta chain



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	261.60Å 101.87Å 214.64Å 90.00° 94.89° 90.00°	Depositor
Resolution (Å)	39.45 – 3.29 39.45 – 3.29	Depositor EDS
% Data completeness (in resolution range)	98.7 (39.45-3.29) 98.8 (39.45-3.29)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.14	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.64 (at 3.32Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.4_1496)	Depositor
R, R_{free}	0.212 , 0.243 0.214 , 0.244	Depositor DCC
R_{free} test set	4218 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	100.5	Xtriage
Anisotropy	0.268	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 57.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	25651	wwPDB-VP
Average B, all atoms (Å ²)	117.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.23% 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:
NAG

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	0.52	0/1516	0.54	0/2062
1	F	0.38	0/1516	0.45	0/2062
1	K	0.40	0/1512	0.49	0/2058
1	P	0.28	0/1504	0.42	0/2047
2	B	0.53	0/1424	0.48	0/1943
2	G	0.48	0/1419	0.48	0/1937
2	L	0.39	0/1419	0.46	0/1937
2	Q	0.33	0/1419	0.44	0/1937
3	C	0.69	0/101	0.45	0/136
3	H	0.52	0/101	0.43	0/136
3	M	0.50	0/101	0.41	0/136
3	R	0.37	0/101	0.42	0/136
4	D	0.44	0/1551	0.46	0/2098
4	I	0.39	0/1545	0.44	0/2091
4	N	0.39	0/1551	0.47	0/2098
4	S	0.34	0/1551	0.43	0/2098
5	E	0.40	0/1978	0.44	0/2691
5	J	0.34	0/1978	0.42	0/2691
5	O	0.27	0/1969	0.41	0/2678
5	T	0.27	0/1965	0.41	0/2674
All	All	0.39	0/26221	0.45	0/35646

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 [i](#)

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	1473	0	1402	20	0
1	F	1473	0	1403	14	0
1	K	1469	0	1391	26	0
1	P	1461	0	1378	20	0
2	B	1387	0	1279	21	0
2	G	1382	0	1272	18	0
2	L	1382	0	1272	21	0
2	Q	1382	0	1273	20	0
3	C	98	0	100	4	0
3	H	98	0	100	1	0
3	M	98	0	100	2	0
3	R	98	0	100	2	0
4	D	1523	0	1441	15	0
4	I	1517	0	1430	12	0
4	N	1523	0	1441	17	0
4	S	1523	0	1441	15	0
5	E	1929	0	1816	19	0
5	J	1929	0	1816	19	0
5	O	1920	0	1816	17	0
5	T	1916	0	1805	14	0
6	A	14	0	13	0	0
6	B	14	0	13	0	0
6	G	14	0	13	0	0
6	K	14	0	13	0	0
6	L	14	0	13	0	0
All	All	25651	0	24141	250	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 5.

The worst 5 of 250 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)
2:L:48:ARG:NH1	1:P:141:ASP:OD2	2.12	0.81
2:L:21:THR:O	2:L:80:ARG:NH1	2.15	0.79

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:I:57:ARG:NH1	4:I:80:ASP:OD2	2.19	0.75
2:B:21:THR:O	2:B:80:ARG:NH1	2.19	0.75
2:G:10:TYR:HB3	2:G:31:PHE:HB2	1.69	0.74

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	178/204 (87%)	173 (97%)	5 (3%)	0	100	100
1	F	178/204 (87%)	173 (97%)	5 (3%)	0	100	100
1	K	178/204 (87%)	174 (98%)	4 (2%)	0	100	100
1	P	177/204 (87%)	172 (97%)	5 (3%)	0	100	100
2	B	165/212 (78%)	156 (94%)	9 (6%)	0	100	100
2	G	165/212 (78%)	157 (95%)	8 (5%)	0	100	100
2	L	165/212 (78%)	157 (95%)	8 (5%)	0	100	100
2	Q	165/212 (78%)	157 (95%)	8 (5%)	0	100	100
3	C	11/13 (85%)	11 (100%)	0	0	100	100
3	H	11/13 (85%)	11 (100%)	0	0	100	100
3	M	11/13 (85%)	11 (100%)	0	0	100	100
3	R	11/13 (85%)	11 (100%)	0	0	100	100
4	D	192/205 (94%)	186 (97%)	6 (3%)	0	100	100
4	I	192/205 (94%)	186 (97%)	6 (3%)	0	100	100
4	N	192/205 (94%)	186 (97%)	6 (3%)	0	100	100
4	S	192/205 (94%)	186 (97%)	6 (3%)	0	100	100
5	E	243/266 (91%)	232 (96%)	11 (4%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
5	J	243/266 (91%)	232 (96%)	11 (4%)	0	100	100
5	O	240/266 (90%)	230 (96%)	10 (4%)	0	100	100
5	T	240/266 (90%)	230 (96%)	10 (4%)	0	100	100
All	All	3149/3600 (88%)	3031 (96%)	118 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	161/184 (88%)	158 (98%)	3 (2%)	57	77
1	F	161/184 (88%)	158 (98%)	3 (2%)	57	77
1	K	160/184 (87%)	157 (98%)	3 (2%)	57	77
1	P	159/184 (86%)	156 (98%)	3 (2%)	57	77
2	B	150/191 (78%)	149 (99%)	1 (1%)	84	90
2	G	148/191 (78%)	147 (99%)	1 (1%)	84	90
2	L	148/191 (78%)	147 (99%)	1 (1%)	84	90
2	Q	148/191 (78%)	148 (100%)	0	100	100
3	C	9/9 (100%)	7 (78%)	2 (22%)	1	3
3	H	9/9 (100%)	8 (89%)	1 (11%)	6	23
3	M	9/9 (100%)	8 (89%)	1 (11%)	6	23
3	R	9/9 (100%)	9 (100%)	0	100	100
4	D	171/181 (94%)	170 (99%)	1 (1%)	86	91
4	I	170/181 (94%)	169 (99%)	1 (1%)	86	91
4	N	171/181 (94%)	169 (99%)	2 (1%)	71	83
4	S	171/181 (94%)	170 (99%)	1 (1%)	86	91
5	E	209/226 (92%)	207 (99%)	2 (1%)	76	86
5	J	209/226 (92%)	208 (100%)	1 (0%)	88	93

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
5	O	210/226 (93%)	208 (99%)	2 (1%)	76	86
5	T	209/226 (92%)	207 (99%)	2 (1%)	76	86
All	All	2791/3164 (88%)	2760 (99%)	31 (1%)	73	85

5 of 31 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	I	127	ASP
1	P	172	GLU
1	K	114	PRO
5	T	193	ARG
5	O	193	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
5	J	97	ASN
5	O	80	GLN
5	T	37	GLN

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](#)

5 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
6	NAG	B	901	2	14,14,15	0.39	0	17,19,21	0.56	0
6	NAG	K	901	1	14,14,15	0.44	0	17,19,21	0.54	0
6	NAG	L	901	2	14,14,15	0.52	0	17,19,21	0.50	0
6	NAG	G	901	2	14,14,15	0.35	0	17,19,21	0.80	1 (5%)
6	NAG	A	901	1	14,14,15	0.36	0	17,19,21	0.41	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
6	NAG	B	901	2	-	0/6/23/26	0/1/1/1
6	NAG	K	901	1	-	2/6/23/26	0/1/1/1
6	NAG	L	901	2	-	0/6/23/26	0/1/1/1
6	NAG	G	901	2	-	0/6/23/26	0/1/1/1
6	NAG	A	901	1	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	G	901	NAG	C1-O5-C5	2.54	115.63	112.19

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	K	901	NAG	O5-C5-C6-O6
6	A	901	NAG	O5-C5-C6-O6
6	K	901	NAG	C4-C5-C6-O6
6	A	901	NAG	C4-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

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	180/204 (88%)	0.05	1 (0%) 89 90	59, 78, 123, 149	0
1	F	180/204 (88%)	0.18	3 (1%) 70 68	70, 106, 163, 191	0
1	K	180/204 (88%)	0.05	1 (0%) 89 90	77, 97, 146, 184	0
1	P	179/204 (87%)	0.33	11 (6%) 21 20	97, 140, 196, 225	0
2	B	171/212 (80%)	0.24	8 (4%) 31 29	55, 81, 160, 188	0
2	G	171/212 (80%)	0.41	13 (7%) 13 13	60, 88, 169, 199	0
2	L	171/212 (80%)	0.37	17 (9%) 7 7	70, 103, 192, 245	0
2	Q	171/212 (80%)	0.78	31 (18%) 1 1	84, 129, 205, 223	0
3	C	13/13 (100%)	-0.04	0 100 100	58, 64, 83, 105	0
3	H	13/13 (100%)	0.22	1 (7%) 13 12	61, 76, 113, 132	0
3	M	13/13 (100%)	0.19	1 (7%) 13 12	87, 93, 102, 124	0
3	R	13/13 (100%)	0.70	1 (7%) 13 12	91, 111, 126, 162	0
4	D	196/205 (95%)	0.22	7 (3%) 42 40	67, 98, 181, 225	0
4	I	196/205 (95%)	0.34	8 (4%) 37 35	73, 108, 178, 203	0
4	N	196/205 (95%)	0.36	9 (4%) 32 30	81, 107, 189, 239	0
4	S	196/205 (95%)	0.43	14 (7%) 16 16	82, 113, 201, 254	0
5	E	245/266 (92%)	0.04	3 (1%) 79 78	73, 111, 156, 184	0
5	J	245/266 (92%)	0.10	4 (1%) 72 70	85, 114, 162, 196	0
5	O	242/266 (90%)	0.40	17 (7%) 16 16	104, 142, 188, 229	0
5	T	242/266 (90%)	0.44	12 (4%) 28 27	111, 145, 187, 213	0
All	All	3213/3600 (89%)	0.29	162 (5%) 28 27	55, 115, 181, 254	0

The worst 5 of 162 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	R	-3	ALA	7.3
2	Q	103	PRO	5.5
1	A	1	ILE	5.5
4	S	196	PHE	5.3
4	S	197	PRO	5.2

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, 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
6	NAG	L	901	14/15	0.69	0.24	79,107,117,119	0
6	NAG	B	901	14/15	0.75	0.23	78,112,126,126	0
6	NAG	G	901	14/15	0.84	0.15	69,84,108,110	0
6	NAG	K	901	14/15	0.91	0.16	95,115,120,132	0
6	NAG	A	901	14/15	0.92	0.21	65,92,106,112	0

6.5 Other polymers [i](#)

There are no such residues in this entry.