



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 7, 2026 – 01:12 AM UTC

PDB ID : 3HGK / pdb_00003hgk
Title : crystal structure of effect protein AvrptoB complexed with kinase Pto
Authors : Dong, J.; Fan, F.; Gu, L.; Chai, J.
Deposited on : 2009-05-14
Resolution : 3.30 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

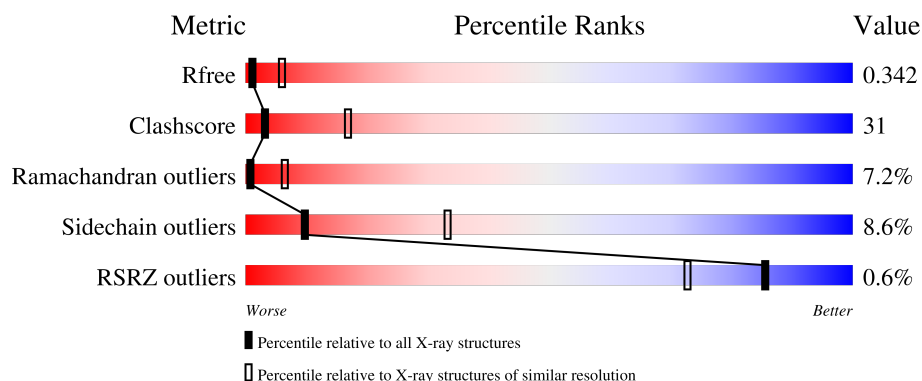
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.30 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1169 (3.32-3.28)
Clashscore	190562	1209 (3.32-3.28)
Ramachandran outliers	187476	1188 (3.32-3.28)
Sidechain outliers	187428	1187 (3.32-3.28)
RSRZ outliers	180081	1169 (3.32-3.28)

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	327	% 34% 43% 10% • 12%
1	B	327	% 37% 40% 10% • 12%
1	C	327	% 36% 40% 10% • 13%
1	D	327	37% 42% 9% • 12%
2	E	85	61% 26% • 9%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	F	85	% 67% 20% • 9%
2	G	85	62% 25% • 9%
2	H	85	68% 19% • 9%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 11599 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 Protein kinase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	288	Total	C	N	O	P	S	0	0	0
			2308	1462	398	435	2	11			
1	B	288	Total	C	N	O	P	S	0	0	0
			2306	1459	398	436	2	11			
1	C	286	Total	C	N	O	P	S	0	0	0
			2293	1451	396	433	2	11			
1	D	288	Total	C	N	O	P	S	0	0	0
			2308	1462	398	435	2	11			

There are 28 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	193	GLY	ASP	engineered mutation	UNP Q40234
A	322	HIS	-	expression tag	UNP Q40234
A	323	HIS	-	expression tag	UNP Q40234
A	324	HIS	-	expression tag	UNP Q40234
A	325	HIS	-	expression tag	UNP Q40234
A	326	HIS	-	expression tag	UNP Q40234
A	327	HIS	-	expression tag	UNP Q40234
B	193	GLY	ASP	engineered mutation	UNP Q40234
B	322	HIS	-	expression tag	UNP Q40234
B	323	HIS	-	expression tag	UNP Q40234
B	324	HIS	-	expression tag	UNP Q40234
B	325	HIS	-	expression tag	UNP Q40234
B	326	HIS	-	expression tag	UNP Q40234
B	327	HIS	-	expression tag	UNP Q40234
C	193	GLY	ASP	engineered mutation	UNP Q40234
C	322	HIS	-	expression tag	UNP Q40234
C	323	HIS	-	expression tag	UNP Q40234
C	324	HIS	-	expression tag	UNP Q40234
C	325	HIS	-	expression tag	UNP Q40234
C	326	HIS	-	expression tag	UNP Q40234
C	327	HIS	-	expression tag	UNP Q40234

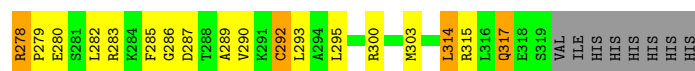
Continued on next page...

Continued from previous page...

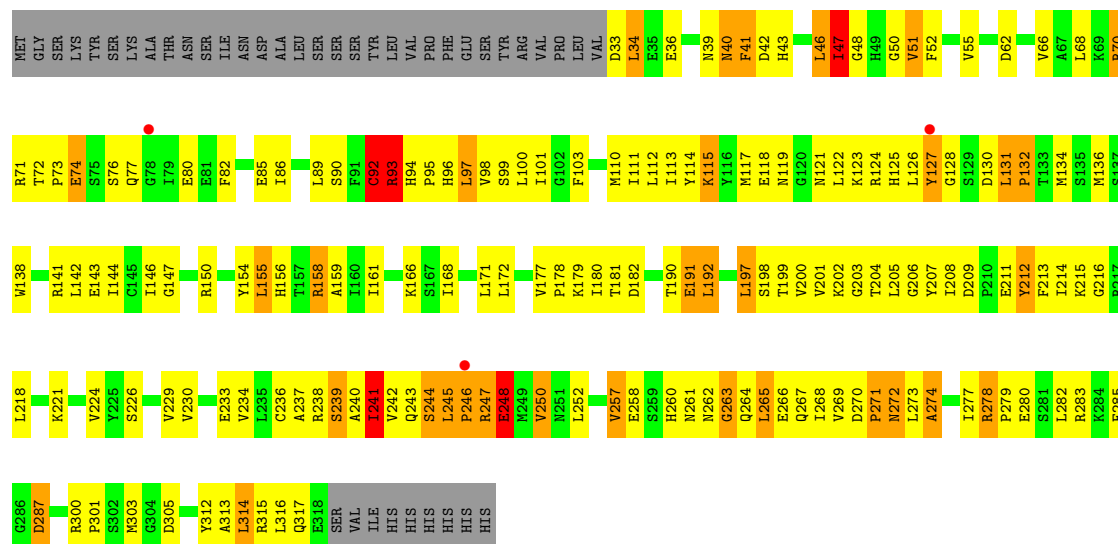
Chain	Residue	Modelled	Actual	Comment	Reference
D	193	GLY	ASP	engineered mutation	UNP Q40234
D	322	HIS	-	expression tag	UNP Q40234
D	323	HIS	-	expression tag	UNP Q40234
D	324	HIS	-	expression tag	UNP Q40234
D	325	HIS	-	expression tag	UNP Q40234
D	326	HIS	-	expression tag	UNP Q40234
D	327	HIS	-	expression tag	UNP Q40234

- Molecule 2 is a protein called Effector protein hopAB2.

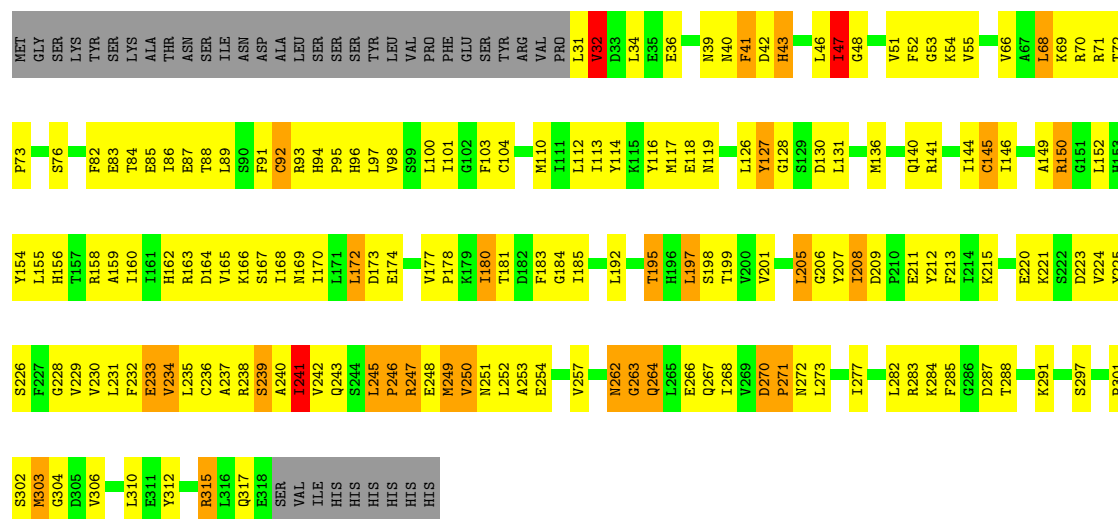
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	E	77	Total	C	N	O	S	0	0	0
			596	363	121	108	4			
2	F	77	Total	C	N	O	S	0	0	0
			596	363	121	108	4			
2	G	77	Total	C	N	O	S	0	0	0
			596	363	121	108	4			
2	H	77	Total	C	N	O	S	0	0	0
			596	363	121	108	4			



• Molecule 1: Protein kinase



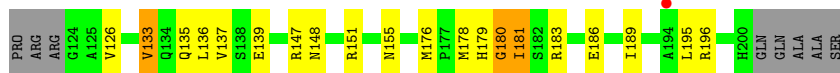
• Molecule 1: Protein kinase



• Molecule 2: Effector protein hopAB2



● Molecule 2: Effector protein hopAB2



● Molecule 2: Effector protein hopAB2



● Molecule 2: Effector protein hopAB2



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	61.07Å 104.47Å 298.86Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 3.30 20.00 – 3.30	Depositor EDS
% Data completeness (in resolution range)	99.7 (20.00-3.30) 99.2 (20.00-3.30)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.03 (at 3.32Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.317 , 0.331 0.329 , 0.342	Depositor DCC
R_{free} test set	1508 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	95.1	Xtriage
Anisotropy	0.895	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , 9.8	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	0.91	EDS
Total number of atoms	11599	wwPDB-VP
Average B, all atoms (Å ²)	81.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 49.13 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 7.7970e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: SEP, TPO

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	2/2331 (0.1%)	0.99	11/3143 (0.3%)
1	B	0.62	0/2329	1.00	10/3140 (0.3%)
1	C	0.61	0/2316	0.99	10/3122 (0.3%)
1	D	0.61	0/2331	0.98	7/3143 (0.2%)
2	E	0.44	0/605	0.87	0/814
2	F	0.47	0/605	0.88	0/814
2	G	0.61	2/605 (0.3%)	0.93	1/814 (0.1%)
2	H	0.48	0/605	0.88	0/814
All	All	0.60	4/11727 (0.0%)	0.97	39/15804 (0.2%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	126	LEU	C-N	-8.33	1.22	1.33
2	G	124	GLY	C-O	-5.57	1.12	1.23
1	A	128	GLY	C-N	5.49	1.41	1.33
2	G	124	GLY	CA-C	-5.19	1.42	1.52

The worst 5 of 39 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	47	ILE	N-CA-C	9.16	128.40	109.34
1	B	46	LEU	N-CA-C	7.37	118.27	107.88
1	A	248	GLU	N-CA-C	-7.25	104.81	112.93
1	D	267	GLN	N-CA-C	-7.14	104.17	113.17
1	A	32	VAL	N-CA-C	-6.84	106.33	112.90

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	2308	0	2301	183	0
1	B	2306	0	2295	164	0
1	C	2293	0	2281	185	0
1	D	2308	0	2301	155	0
2	E	596	0	585	22	0
2	F	596	0	585	20	0
2	G	596	0	585	20	0
2	H	596	0	585	19	0
All	All	11599	0	11518	717	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 31.

The worst 5 of 717 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:245:LEU:HB3	1:D:240:ALA:HB2	1.38	1.06
1:B:240:ALA:HB2	1:D:245:LEU:HB3	1.40	1.03
1:C:238:ARG:HD2	1:C:252:LEU:HD13	1.43	0.98
1:A:203:GLY:HA3	1:A:208:ILE:HD11	1.43	0.97
1:C:77:GLN:HE21	1:C:80:GLU:HB2	1.26	0.97

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	284/327 (87%)	209 (74%)	54 (19%)	21 (7%)	1	6
1	B	284/327 (87%)	194 (68%)	63 (22%)	27 (10%)	0	3
1	C	282/327 (86%)	201 (71%)	60 (21%)	21 (7%)	1	6
1	D	284/327 (87%)	209 (74%)	49 (17%)	26 (9%)	0	3
2	E	75/85 (88%)	62 (83%)	11 (15%)	2 (3%)	4	22
2	F	75/85 (88%)	62 (83%)	11 (15%)	2 (3%)	4	22
2	G	75/85 (88%)	61 (81%)	12 (16%)	2 (3%)	4	22
2	H	75/85 (88%)	67 (89%)	6 (8%)	2 (3%)	4	22
All	All	1434/1648 (87%)	1065 (74%)	266 (18%)	103 (7%)	1	6

5 of 103 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	39	ASN
1	A	47	ILE
1	A	92	CYS
1	B	39	ASN
1	B	47	ILE

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	251/287 (88%)	228 (91%)	23 (9%)	8	30
1	B	251/287 (88%)	223 (89%)	28 (11%)	6	22
1	C	249/287 (87%)	220 (88%)	29 (12%)	5	21
1	D	251/287 (88%)	231 (92%)	20 (8%)	11	36
2	E	62/68 (91%)	61 (98%)	1 (2%)	55	72
2	F	62/68 (91%)	60 (97%)	2 (3%)	34	60
2	G	62/68 (91%)	60 (97%)	2 (3%)	34	60
2	H	62/68 (91%)	60 (97%)	2 (3%)	34	60

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
All	All	1250/1420 (88%)	1143 (91%)	107 (9%)	10	33

5 of 107 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	74	GLU
1	C	248	GLU
1	D	315	ARG
1	C	92	CYS
1	C	177	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 37 such sidechains are listed below:

Mol	Chain	Res	Type
2	F	134	GLN
2	H	155	ASN
2	F	155	ASN
2	G	134	GLN
1	C	77	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

8 non-standard protein/DNA/RNA residues 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	$\# Z > 2$
1	TPO	A	199	1	8,10,11	1.00	0	10,14,16	1.02	0
1	SEP	C	198	1	8,9,10	2.27	3 (37%)	7,12,14	0.68	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	SEP	A	198	1	8,9,10	1.94	3 (37%)	7,12,14	1.41	1 (14%)
1	TPO	D	199	1	8,10,11	1.14	1 (12%)	10,14,16	1.00	0
1	TPO	B	199	1	8,10,11	1.22	1 (12%)	10,14,16	0.96	0
1	SEP	D	198	1	8,9,10	1.85	3 (37%)	7,12,14	1.31	1 (14%)
1	SEP	B	198	1	8,9,10	2.06	3 (37%)	7,12,14	1.23	1 (14%)
1	TPO	C	199	1	8,10,11	0.92	0	10,14,16	0.99	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
1	TPO	A	199	1	-	1/9/11/13	-
1	SEP	C	198	1	-	5/6/8/10	-
1	SEP	A	198	1	-	5/6/8/10	-
1	TPO	D	199	1	-	2/9/11/13	-
1	TPO	B	199	1	-	2/9/11/13	-
1	SEP	D	198	1	-	5/6/8/10	-
1	SEP	B	198	1	-	5/6/8/10	-
1	TPO	C	199	1	-	1/9/11/13	-

The worst 5 of 14 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	198	SEP	P-O1P	4.85	1.65	1.50
1	B	198	SEP	P-O1P	4.36	1.64	1.50
1	A	198	SEP	P-O1P	3.99	1.62	1.50
1	D	198	SEP	P-O1P	3.85	1.62	1.50
1	C	198	SEP	P-O2P	2.84	1.65	1.54

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	198	SEP	OG-CB-CA	2.80	110.87	108.14
1	D	198	SEP	OG-CB-CA	2.56	110.64	108.14
1	B	198	SEP	OG-CB-CA	2.01	110.10	108.14

There are no chirality outliers.

5 of 26 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	198	SEP	N-CA-CB-OG
1	A	198	SEP	C-CA-CB-OG
1	A	198	SEP	CB-OG-P-O2P
1	A	198	SEP	CB-OG-P-O3P
1	A	199	TPO	N-CA-CB-OG1

There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	199	TPO	1	0
1	B	199	TPO	2	0
1	B	198	SEP	1	0
1	C	199	TPO	1	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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	286/327 (87%)	-0.15	2 (0%) 84 70	48, 81, 109, 115	0
1	B	286/327 (87%)	-0.20	2 (0%) 84 70	50, 74, 98, 107	0
1	C	284/327 (86%)	-0.15	3 (1%) 78 60	47, 75, 99, 110	0
1	D	286/327 (87%)	-0.21	0 100 100	50, 82, 103, 109	0
2	E	77/85 (90%)	-0.36	0 100 100	74, 90, 105, 107	0
2	F	77/85 (90%)	-0.27	1 (1%) 75 56	72, 85, 109, 113	0
2	G	77/85 (90%)	-0.24	0 100 100	83, 102, 113, 115	0
2	H	77/85 (90%)	-0.38	0 100 100	76, 85, 95, 101	0
All	All	1450/1648 (87%)	-0.21	8 (0%) 85 73	47, 81, 105, 115	0

The worst 5 of 8 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	127	TYR	3.6
1	C	127	TYR	3.5
1	A	261	ASN	2.5
1	A	75	SER	2.5
1	C	246	PRO	2.2

6.2 Non-standard residues in protein, DNA, RNA chains [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
1	SEP	B	198	10/11	0.34	0.20	78,82,83,88	0

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
1	SEP	C	198	10/11	0.57	0.19	82,85,86,89	0
1	SEP	A	198	10/11	0.62	0.12	84,85,86,90	0
1	SEP	D	198	10/11	0.72	0.12	78,79,81,85	0
1	TPO	C	199	11/12	0.87	0.10	82,83,85,88	0
1	TPO	A	199	11/12	0.88	0.08	83,83,85,87	0
1	TPO	B	199	11/12	0.90	0.08	79,79,80,80	0
1	TPO	D	199	11/12	0.92	0.07	79,80,81,82	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.