



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 12:44 PM UTC

PDB ID : 6WJH / pdb_00006wjh
Title : Crystal structure of MAGE-A11 bound to the PCF11 degran
Authors : Miller, D.J.; Huang, X.
Deposited on : 2020-04-13
Resolution : 2.19 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	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

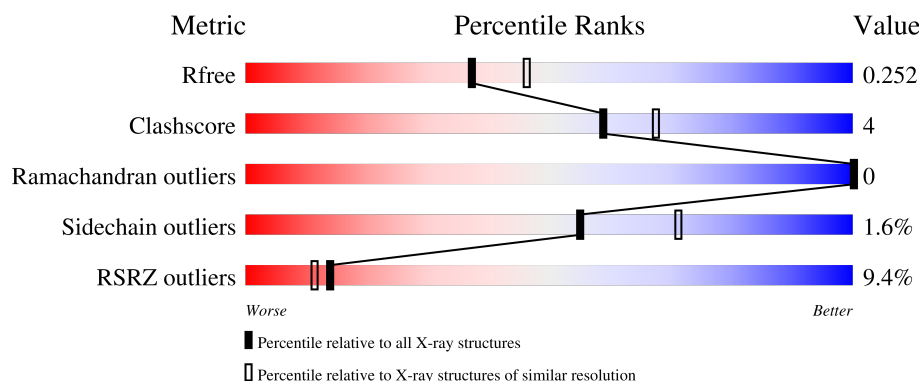
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.19 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	6164 (2.20-2.20)
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (2.20-2.20)

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	243	7% 82% 10% 7%
1	B	243	10% 85% 7% 8%
1	C	243	7% 75% 13% 12%
1	D	243	9% 80% 10% 10%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 7303 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 Fusion protein of PCF11 and MAGE-A11.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	227	Total	C	N	O	S	0	0	0
			1815	1178	296	331	10			
1	B	223	Total	C	N	O	S	0	0	0
			1791	1165	294	322	10			
1	C	214	Total	C	N	O	S	0	0	0
			1734	1128	282	314	10			
1	D	218	Total	C	N	O	S	0	0	0
			1755	1141	286	318	10			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	702	GLY	-	linker	UNP O94913
A	703	GLY	-	linker	UNP O94913
A	704	SER	-	linker	UNP O94913
A	705	GLY	-	linker	UNP O94913
A	706	ARG	-	linker	UNP O94913
A	707	PRO	-	linker	UNP O94913
B	702	GLY	-	linker	UNP O94913
B	703	GLY	-	linker	UNP O94913
B	704	SER	-	linker	UNP O94913
B	705	GLY	-	linker	UNP O94913
B	706	ARG	-	linker	UNP O94913
B	707	PRO	-	linker	UNP O94913
C	702	GLY	-	linker	UNP O94913
C	703	GLY	-	linker	UNP O94913
C	704	SER	-	linker	UNP O94913
C	705	GLY	-	linker	UNP O94913
C	706	ARG	-	linker	UNP O94913
C	707	PRO	-	linker	UNP O94913
D	702	GLY	-	linker	UNP O94913
D	703	GLY	-	linker	UNP O94913
D	704	SER	-	linker	UNP O94913

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Chain	Residue	Modelled	Actual	Comment	Reference
D	705	GLY	-	linker	UNP O94913
D	706	ARG	-	linker	UNP O94913
D	707	PRO	-	linker	UNP O94913

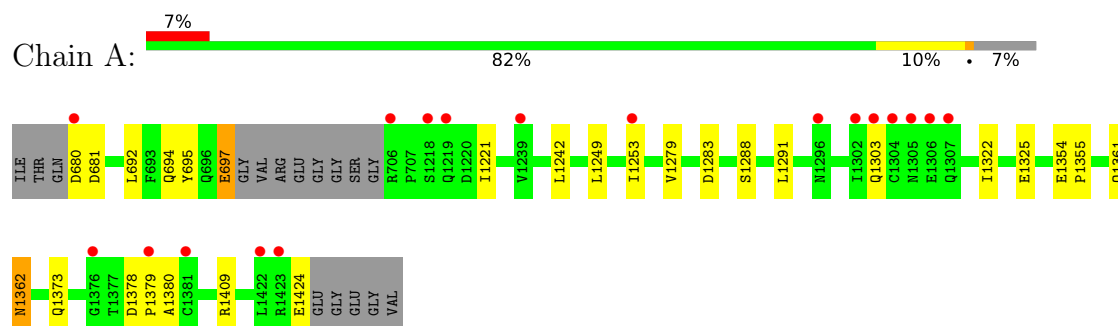
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	52	Total 52	O 52	0	0
2	B	64	Total 64	O 64	0	0
2	C	46	Total 46	O 46	0	0
2	D	46	Total 46	O 46	0	0

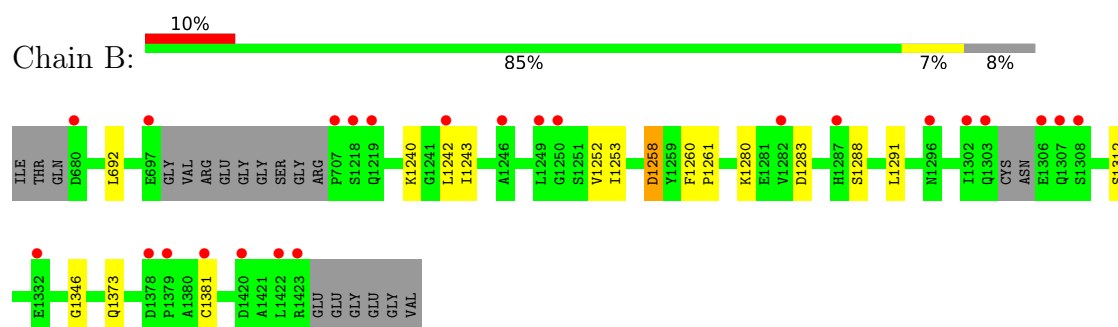
3 Residue-property plots [i](#)

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.

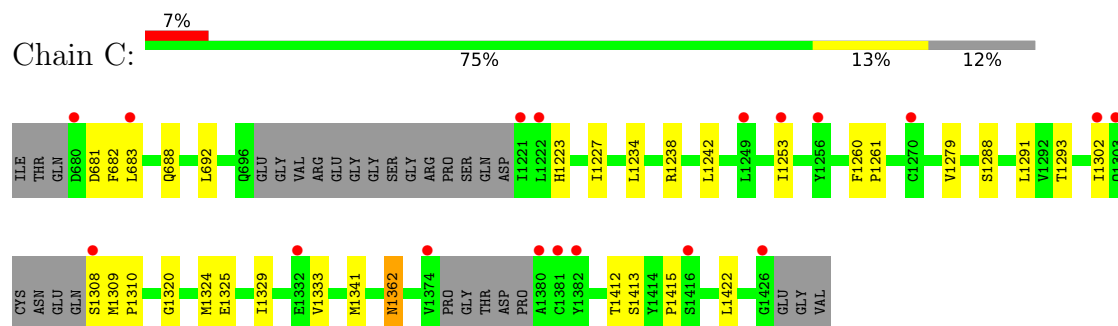
- Molecule 1: Fusion protein of PCF11 and MAGE-A11



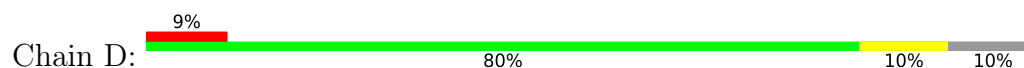
- Molecule 1: Fusion protein of PCF11 and MAGE-A11

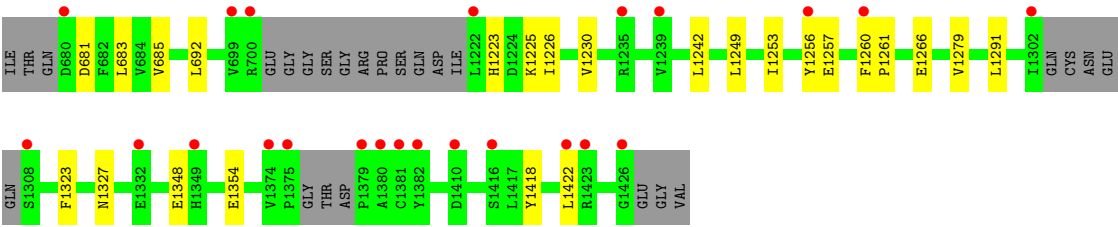


- Molecule 1: Fusion protein of PCF11 and MAGE-A11



- Molecule 1: Fusion protein of PCF11 and MAGE-A11





4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	55.49Å 78.19Å 72.91Å 77.44° 77.34° 89.59°	Depositor
Resolution (Å)	38.79 – 2.19 38.79 – 2.19	Depositor EDS
% Data completeness (in resolution range)	94.8 (38.79-2.19) 94.8 (38.79-2.19)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.12	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.50 (at 2.20Å)	Xtriage
Refinement program	REFMAC 5.8.0257	Depositor
R, R_{free}	0.205 , 0.246 0.210 , 0.252	Depositor DCC
R_{free} test set	2846 reflections (4.77%)	wwPDB-VP
Wilson B-factor (Å ²)	37.1	Xtriage
Anisotropy	0.080	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 31.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	7303	wwPDB-VP
Average B, all atoms (Å ²)	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.35% 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 [i](#)

5.1 Standard geometry [i](#)

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	1.01	0/1858	1.23	1/2522 (0.0%)
1	B	1.01	0/1833	1.26	0/2484
1	C	0.98	0/1772	1.24	1/2396 (0.0%)
1	D	0.98	0/1795	1.22	0/2429
All	All	0.99	0/7258	1.23	2/9831 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1322	ILE	N-CA-C	-5.74	104.91	110.42
1	C	1293	THR	CA-CB-OG1	-5.14	101.88	109.60

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	1815	0	1785	18	0
1	B	1791	0	1778	9	0
1	C	1734	0	1724	22	0
1	D	1755	0	1736	14	0
2	A	52	0	0	1	0
2	B	64	0	0	1	0
2	C	46	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	46	0	0	0	0
All	All	7303	0	7023	62	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 4.

All (62) 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:1242:LEU:HD21	1:A:1288:SER:HB3	1.69	0.74
1:C:1320:GLY:O	1:C:1324:MET:HG3	1.88	0.74
1:C:683:LEU:HG	1:C:1227:ILE:HD11	1.79	0.64
1:C:1238:ARG:NH1	1:C:1308:SER:O	2.28	0.64
1:D:1253:ILE:O	1:D:1253:ILE:HG22	1.99	0.62
1:C:681:ASP:OD2	1:C:1223:HIS:NE2	2.32	0.62
1:C:1242:LEU:HD21	1:C:1288:SER:HB3	1.82	0.61
1:B:1252:VAL:HG12	1:B:1253:ILE:HD13	1.83	0.60
1:A:1242:LEU:HD21	1:A:1288:SER:CB	2.31	0.60
1:C:682:PHE:HB2	1:C:1227:ILE:CD1	2.35	0.57
1:C:1234:LEU:HD13	1:C:1309:MET:HE1	1.87	0.55
1:C:1279:VAL:HG22	1:C:1291:LEU:CD1	2.38	0.54
1:D:1249:LEU:HD22	1:D:1257:GLU:HG3	1.89	0.53
1:A:1279:VAL:HG22	1:A:1291:LEU:CD1	2.39	0.53
1:A:694:GLN:HE21	1:A:694:GLN:HA	1.75	0.51
1:D:1279:VAL:HG22	1:D:1291:LEU:CD1	2.42	0.50
1:B:1346:GLY:O	1:C:1412:THR:HB	2.12	0.50
1:B:1258:ASP:OD1	1:B:1258:ASP:N	2.44	0.49
1:D:1291:LEU:HD22	1:D:1291:LEU:N	2.27	0.49
1:C:692:LEU:C	1:C:692:LEU:HD23	2.38	0.49
1:C:1302:ILE:HD11	1:C:1310:PRO:HG3	1.94	0.49
1:C:1325:GLU:HG3	1:C:1329:ILE:HD12	1.95	0.49
1:A:680:ASP:CG	1:A:681:ASP:H	2.21	0.48
1:B:1283:ASP:HB3	1:B:1288:SER:HB2	1.95	0.48
1:D:683:LEU:HD12	1:D:1223:HIS:CD2	2.49	0.48
1:A:1303:GLN:NE2	2:A:1003:HOH:O	2.45	0.48
1:A:692:LEU:C	1:A:692:LEU:HD23	2.40	0.47
1:C:1253:ILE:O	1:C:1253:ILE:HG22	2.14	0.47
1:B:1291:LEU:N	1:B:1291:LEU:HD22	2.30	0.47
1:C:1242:LEU:HD21	1:C:1288:SER:CB	2.45	0.46
1:C:682:PHE:HB2	1:C:1227:ILE:HD13	1.96	0.46
1:A:1373:GLN:HG3	1:A:1380:ALA:HB1	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:1348:GLU:OE1	1:D:1354:GLU:HB2	2.17	0.44
1:B:692:LEU:C	1:B:692:LEU:HD23	2.42	0.44
1:A:694:GLN:HE22	1:A:1409:ARG:HH11	1.65	0.44
1:A:1362:ASN:HD22	1:A:1362:ASN:N	2.15	0.44
1:C:688:GLN:HB3	1:C:1341:MET:HA	1.99	0.44
1:C:1329:ILE:HD11	1:C:1333:VAL:HG12	1.98	0.44
1:C:1279:VAL:HG22	1:C:1291:LEU:HD11	1.99	0.43
1:C:1422:LEU:HD23	1:C:1422:LEU:HA	1.87	0.43
1:D:1225:LYS:HE3	1:D:1256:TYR:CE1	2.54	0.43
1:C:1413:SER:C	1:C:1415:PRO:HD3	2.43	0.42
1:A:1249:LEU:HA	1:A:1253:ILE:HB	2.01	0.42
1:D:1226:ILE:HD13	1:D:1266:GLU:HG2	2.02	0.42
1:D:692:LEU:C	1:D:692:LEU:HD23	2.44	0.42
1:A:694:GLN:HE22	1:A:1409:ARG:NH1	2.17	0.41
1:A:695:TYR:OH	1:A:1325:GLU:OE2	2.30	0.41
1:B:1240:LYS:NZ	2:B:1005:HOH:O	2.46	0.41
1:D:1418:TYR:O	1:D:1422:LEU:HB2	2.20	0.41
1:C:1260:PHE:HB3	1:C:1261:PRO:HD3	2.03	0.41
1:A:1283:ASP:HB3	1:A:1288:SER:HB2	2.03	0.41
1:A:1354:GLU:HA	1:A:1355:PRO:HD3	1.95	0.41
1:B:1260:PHE:HB3	1:B:1261:PRO:HD3	2.03	0.41
1:D:681:ASP:O	1:D:685:VAL:HG23	2.21	0.41
1:D:1323:PHE:HD1	1:D:1327:ASN:HD21	1.68	0.41
1:B:1373:GLN:HA	1:B:1381:CYS:O	2.21	0.40
1:D:1226:ILE:O	1:D:1230:VAL:HG23	2.20	0.40
1:A:697:GLU:OE1	1:A:1409:ARG:NH1	2.54	0.40
1:A:1291:LEU:N	1:A:1291:LEU:HD22	2.37	0.40
1:A:1378:ASP:HA	1:A:1379:PRO:C	2.46	0.40
1:C:1362:ASN:N	1:C:1362:ASN:HD22	2.19	0.40
1:D:1260:PHE:HB3	1:D:1261:PRO:HD3	2.03	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	223/243 (92%)	215 (96%)	8 (4%)	0	100	100
1	B	217/243 (89%)	209 (96%)	8 (4%)	0	100	100
1	C	206/243 (85%)	197 (96%)	9 (4%)	0	100	100
1	D	210/243 (86%)	204 (97%)	6 (3%)	0	100	100
All	All	856/972 (88%)	825 (96%)	31 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	196/215 (91%)	191 (97%)	5 (3%)	40	55
1	B	194/215 (90%)	189 (97%)	5 (3%)	40	55
1	C	189/215 (88%)	188 (100%)	1 (0%)	81	90
1	D	190/215 (88%)	189 (100%)	1 (0%)	81	90
All	All	769/860 (89%)	757 (98%)	12 (2%)	55	71

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	697	GLU
1	A	1221	ILE
1	A	1361	GLN
1	A	1362	ASN
1	A	1424	GLU
1	B	1242	LEU
1	B	1243	ILE
1	B	1258	ASP
1	B	1280	LYS
1	B	1312	SER

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Mol	Chain	Res	Type
1	C	1362	ASN
1	D	1242	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	694	GLN
1	A	1231	HIS
1	A	1362	ASN
1	B	691	GLN
1	B	1296	ASN
1	B	1327	ASN
1	B	1365	GLN
1	C	687	HIS
1	C	1296	ASN
1	C	1362	ASN
1	C	1391	HIS
1	D	687	HIS
1	D	1296	ASN
1	D	1327	ASN
1	D	1361	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 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 ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	227/243 (93%)	0.59	18 (7%) 18 16	25, 35, 60, 87	0
1	B	223/243 (91%)	0.66	24 (10%) 11 8	22, 37, 56, 77	1 (0%)
1	C	214/243 (88%)	0.83	18 (8%) 17 14	28, 39, 58, 68	1 (0%)
1	D	218/243 (89%)	0.88	23 (10%) 11 8	29, 40, 63, 71	1 (0%)
All	All	882/972 (90%)	0.74	83 (9%) 14 11	22, 38, 59, 87	3 (0%)

All (83) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	1221	ILE	5.3
1	D	1379	PRO	5.1
1	D	1302	ILE	4.5
1	D	1426	GLY	4.0
1	D	1422	LEU	3.9
1	A	1304	CYS	3.8
1	A	1307	GLN	3.7
1	C	680	ASP	3.7
1	B	1219	GLN	3.6
1	B	1378	ASP	3.5
1	A	1305	ASN	3.5
1	B	1308	SER	3.5
1	C	1416	SER	3.4
1	D	1222	LEU	3.4
1	C	1222	LEU	3.3
1	A	1302	ILE	3.3
1	D	1308	SER	3.3
1	B	1306	GLU	3.3
1	D	1332	GLU	3.3
1	C	1302	ILE	3.2
1	D	700	ARG	3.2

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Mol	Chain	Res	Type	RSRZ
1	B	1303	GLN	3.1
1	C	1374	VAL	3.1
1	C	1426	GLY	3.0
1	A	1379	PRO	3.0
1	B	1423	ARG	3.0
1	B	1307	GLN	3.0
1	A	1306	GLU	3.0
1	C	1249	LEU	2.9
1	A	1219	GLN	2.8
1	D	1349	HIS	2.8
1	B	1422	LEU	2.8
1	B	1249	LEU	2.8
1	A	1218	SER	2.7
1	D	1375	PRO	2.7
1	B	1282	VAL	2.7
1	D	699	VAL	2.7
1	B	1302	ILE	2.7
1	D	1381	CYS	2.7
1	C	1380	ALA	2.7
1	A	1303	GLN	2.7
1	B	707	PRO	2.7
1	A	1423	ARG	2.7
1	C	1303	GLN	2.6
1	A	1376	GLY	2.6
1	B	1242	LEU	2.6
1	D	680	ASP	2.6
1	A	680	ASP	2.6
1	B	1381	CYS	2.5
1	D	1382	TYR	2.5
1	B	1332	GLU	2.5
1	A	1296	ASN	2.5
1	B	1296	ASN	2.5
1	C	1256	TYR	2.4
1	B	680	ASP	2.4
1	C	1253	ILE	2.4
1	D	1416	SER	2.4
1	B	1246	ALA	2.4
1	C	1308	SER	2.4
1	B	1218	SER	2.4
1	A	1381	CYS	2.4
1	A	1422	LEU	2.3
1	D	1260	PHE	2.3

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Mol	Chain	Res	Type	RSRZ
1	D	1380	ALA	2.3
1	D	1410	ASP	2.3
1	B	697	GLU	2.2
1	D	1256	TYR	2.2
1	A	1239	VAL	2.2
1	C	1381	CYS	2.2
1	B	1379	PRO	2.1
1	B	1420	ASP	2.2
1	C	1332	GLU	2.1
1	B	1287	HIS	2.1
1	D	1239	VAL	2.1
1	D	1374	VAL	2.1
1	C	1270	CYS	2.1
1	A	1253	ILE	2.1
1	B	1250	GLY	2.1
1	A	706	ARG	2.1
1	C	683	LEU	2.0
1	D	1423	ARG	2.0
1	D	1235	ARG	2.0
1	C	1382	TYR	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 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.