



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 3, 2024 – 06:02 PM EDT

PDB ID : 8V52
Title : Crystal structure of 2A10 Fab bound to Human TGF-beta3
Authors : Yin, J.; Lupardus, P.J.
Deposited on : 2023-11-30
Resolution : 2.50 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 : 4.02b-467
Xtriage (Phenix) : 1.13
EDS : 2.36.1
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

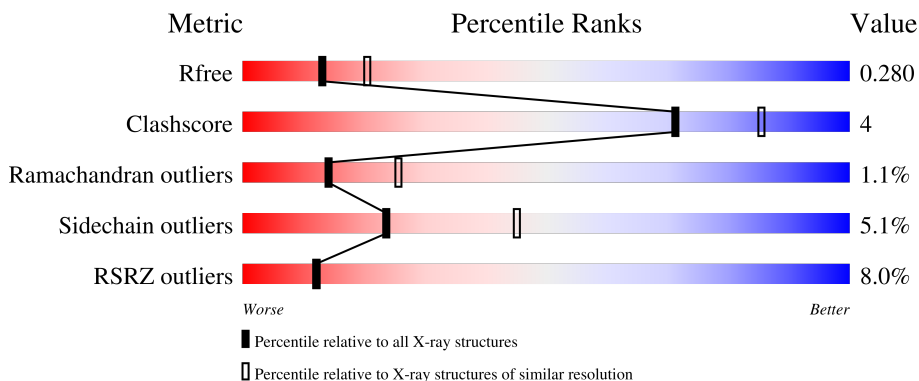
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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.



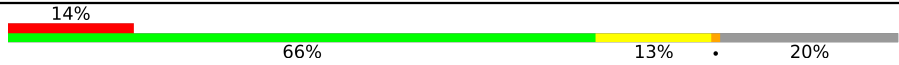
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	112	
1	B	112	
2	C	218	
2	E	218	
3	D	227	

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Mol	Chain	Length	Quality of chain
3	F	227	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into four segments: a red segment on the left labeled '14%', a green segment labeled '66%', a yellow segment labeled '13%', and a grey segment on the right labeled '20%'. A small black dot is located at the end of the yellow segment.</p>

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 7812 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 Transforming growth factor beta-3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	112	Total 890	C 564	N 148	O 168	S 10	0	0	0
1	B	112	Total 884	C 561	N 145	O 168	S 10	0	0	0

- Molecule 2 is a protein called 2A10 Fab Light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	216	Total 1663	C 1039	N 287	O 332	S 5	0	0	0
2	E	166	Total 1235	C 774	N 208	O 249	S 4	0	0	0

- Molecule 3 is a protein called 2A10 Fab Heavy Chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	D	220	Total 1631	C 1028	N 266	O 331	S 6	0	0	0
3	F	182	Total 1348	C 851	N 218	O 273	S 6	0	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	15	Total 15	O 15	0	0
4	B	19	Total 19	O 19	0	0
4	C	54	Total 54	O 54	0	0
4	D	59	Total 59	O 59	0	0

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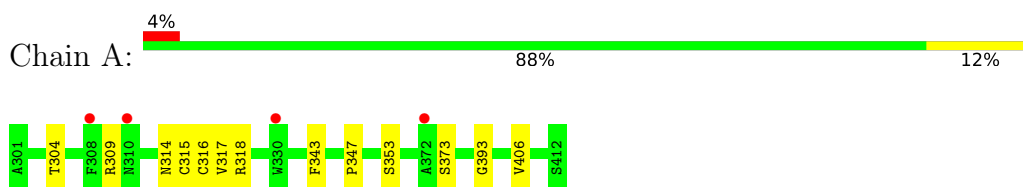
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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	E	2	Total O 2 2	0	0
4	F	12	Total O 12 12	0	0

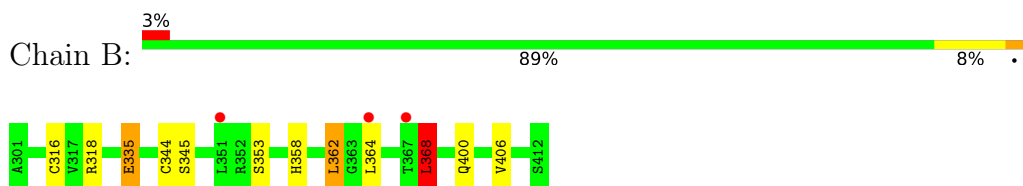
3 Residue-property plots [i](#)

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.

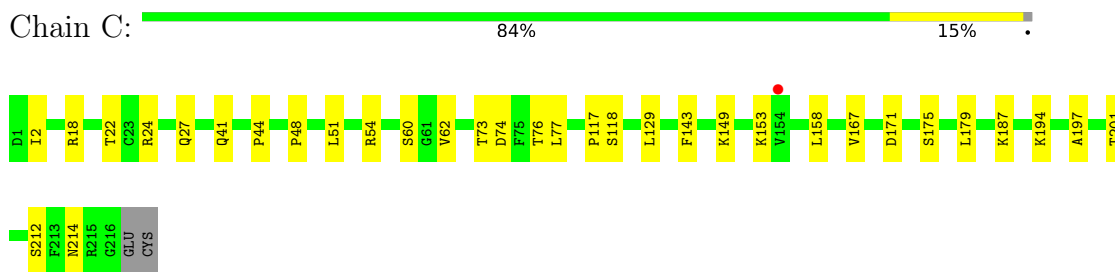
- Molecule 1: Transforming growth factor beta-3



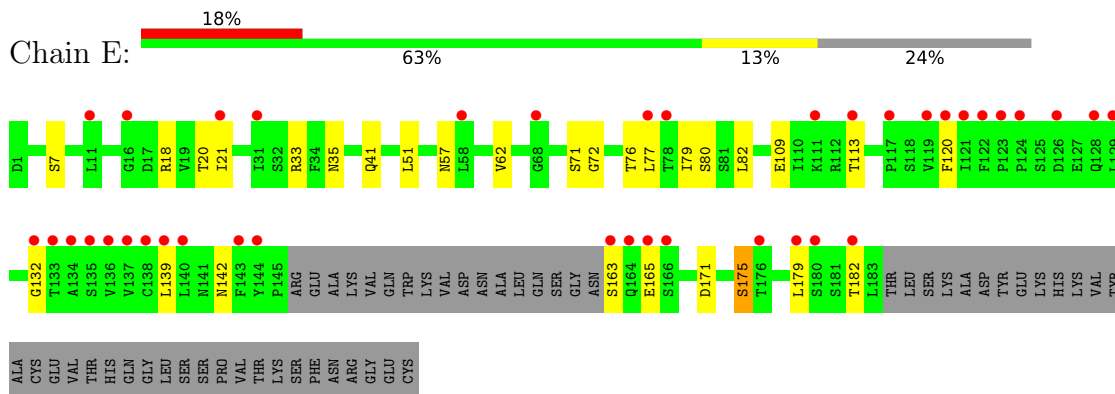
- Molecule 1: Transforming growth factor beta-3



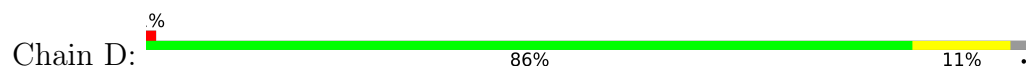
- Molecule 2: 2A10 Fab Light chain



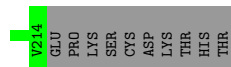
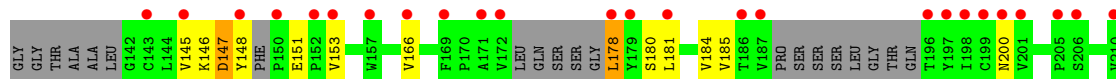
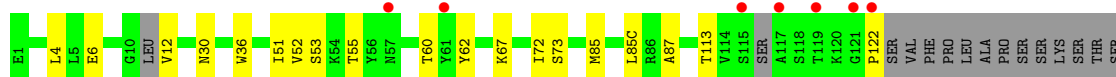
- Molecule 2: 2A10 Fab Light chain



- Molecule 3: 2A10 Fab Heavy Chain



- Molecule 3: 2A10 Fab Heavy Chain



4 Data and refinement statistics

Property	Value	Source
Space group	I 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	133.94Å 47.20Å 200.83Å 90.00° 101.68° 90.00°	Depositor
Resolution (Å)	49.17 – 2.50 49.17 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.2 (49.17-2.50) 99.1 (49.17-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.52 (at 2.51Å)	Xtrriage
Refinement program	BUSTER 2.11.7	Depositor
R, R_{free}	0.221 , 0.269 0.232 , 0.280	Depositor DCC
R_{free} test set	2096 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å ²)	51.9	Xtrriage
Anisotropy	0.131	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 60.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	7812	wwPDB-VP
Average B, all atoms (Å ²)	59.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.67% 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	0.50	0/915	0.73	0/1248
1	B	0.48	0/909	0.68	0/1241
2	C	0.53	0/1700	0.77	0/2306
2	E	0.49	0/1262	0.70	0/1719
3	D	0.54	0/1669	0.75	0/2276
3	F	0.50	0/1374	0.75	0/1870
All	All	0.51	0/7829	0.74	0/10660

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	890	0	847	4	0
1	B	884	0	836	5	0
2	C	1663	0	1623	15	0
2	E	1235	0	1179	11	0
3	D	1631	0	1574	9	0
3	F	1348	0	1254	13	0
4	A	15	0	0	0	0
4	B	19	0	0	0	0
4	C	54	0	0	0	0
4	D	59	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	E	2	0	0	0	0
4	F	12	0	0	0	0
All	All	7812	0	7313	53	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 (53) 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)
3:F:85:MET:HE2	3:F:85(C):LEU:HD21	1.69	0.75
1:B:335:GLU:HG3	2:C:54:ARG:NH2	2.09	0.68
2:E:171:ASP:HB3	2:E:175:SER:H	1.66	0.60
3:F:122:PRO:HB3	3:F:148:TYR:HB3	1.83	0.60
3:F:36:TRP:HD1	3:F:72:ILE:HD12	1.66	0.60
2:C:167:VAL:HG22	2:C:179:LEU:HD12	1.85	0.59
2:C:51:LEU:HA	2:C:62:VAL:HG21	1.85	0.58
2:C:153:LYS:HG2	2:C:158:LEU:HD12	1.86	0.58
3:D:4:LEU:HD11	3:D:97:VAL:HG23	1.85	0.57
1:A:314:ASN:HA	1:A:347:PRO:HD2	1.87	0.56
2:E:79:ILE:HG21	2:E:82:LEU:HD12	1.86	0.56
3:F:12:VAL:HG11	3:F:85(C):LEU:HD13	1.88	0.54
2:E:163:SER:HA	2:E:182:THR:O	2.07	0.54
3:F:166:VAL:HG13	3:F:185:VAL:HG22	1.90	0.54
2:E:139:LEU:HD11	3:F:184:VAL:HG21	1.91	0.53
1:A:393:GLY:HA2	3:F:52:VAL:HG11	1.91	0.53
2:E:120:PHE:HB2	2:E:139:LEU:HB3	1.91	0.52
2:C:194:LYS:HE3	2:C:214:ASN:HB3	1.92	0.52
2:E:20:THR:HG23	2:E:76:THR:HG23	1.92	0.51
3:F:52:VAL:HG12	3:F:53:SER:N	2.26	0.51
2:E:21:ILE:HG13	2:E:77:LEU:HB3	1.92	0.50
2:C:149:LYS:HB3	2:C:201:THR:HB	1.95	0.48
2:E:41:GLN:HB2	2:E:51:LEU:HD11	1.95	0.48
3:D:34:MET:HB3	3:D:81:LEU:HD22	1.95	0.48
1:A:317:VAL:HG13	1:A:406:VAL:HG12	1.95	0.48
2:C:41:GLN:HB2	2:C:51:LEU:HD11	1.97	0.47
2:C:129:LEU:O	2:C:187:LYS:HD2	2.15	0.47
3:F:147:ASP:HB3	3:F:178:LEU:HD23	1.95	0.47
3:D:144:VAL:HG11	3:D:152:VAL:HG11	1.96	0.46
3:F:146:LYS:HA	3:F:180:SER:OG	2.15	0.46
2:C:2:ILE:HG12	2:C:27:GLN:HB2	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:F:145:VAL:HG11	3:F:153:VAL:HG11	1.99	0.44
3:F:62:TYR:HB2	3:F:67:LYS:HG3	1.99	0.44
2:C:48:PRO:HD2	3:D:105:TRP:CE3	2.53	0.44
1:A:318:ARG:HB2	1:A:343:PHE:CE1	2.53	0.44
2:C:171:ASP:O	2:C:175:SER:HA	2.18	0.43
1:B:358:HIS:O	1:B:362:LEU:HB2	2.17	0.43
2:E:35:ASN:OD1	2:E:71:SER:HA	2.19	0.43
2:E:51:LEU:HA	2:E:62:VAL:HG21	2.00	0.43
2:C:24:ARG:HD3	2:C:74:ASP:OD1	2.19	0.42
3:D:62:TYR:HB2	3:D:67:LYS:HG3	2.01	0.42
2:C:117:PRO:HB3	2:C:143:PHE:HB3	2.02	0.42
3:F:51:ILE:HG13	3:F:60:THR:HG22	2.02	0.42
1:B:364:LEU:HD23	1:B:368:LEU:HD13	2.02	0.42
3:D:12:VAL:HG11	3:D:85(C):LEU:HD13	2.02	0.41
2:C:197:ALA:HB2	2:C:212:SER:HB3	2.03	0.41
3:D:35:SER:HB3	3:D:47:LEU:CD1	2.51	0.41
2:E:18:ARG:HG3	2:E:80:SER:HA	2.03	0.40
1:B:318:ARG:HG3	1:B:345:SER:HB3	2.03	0.40
1:B:362:LEU:HD23	1:B:362:LEU:HA	1.86	0.40
3:D:150:GLU:HG3	3:D:151:PRO:HA	2.02	0.40
3:D:22:CYS:HB3	3:D:81:LEU:HB3	2.04	0.40
2:C:24:ARG:HA	2:C:73:THR:O	2.20	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	110/112 (98%)	98 (89%)	9 (8%)	3 (3%)	5 7
1	B	110/112 (98%)	102 (93%)	7 (6%)	1 (1%)	17 31
2	C	214/218 (98%)	205 (96%)	8 (4%)	1 (0%)	29 48

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	E	162/218 (74%)	144 (89%)	14 (9%)	4 (2%)	5	8
3	D	218/227 (96%)	208 (95%)	10 (5%)	0	100	100
3	F	168/227 (74%)	156 (93%)	10 (6%)	2 (1%)	13	24
All	All	982/1114 (88%)	913 (93%)	58 (6%)	11 (1%)	14	26

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	E	175	SER
3	F	147	ASP
2	E	72	GLY
3	F	87	ALA
1	A	309	ARG
1	A	353	SER
2	E	132	GLY
1	A	315	CYS
2	C	44	PRO
2	E	142	ASN
1	B	368	LEU

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	102/102 (100%)	99 (97%)	3 (3%)	42	69
1	B	101/102 (99%)	93 (92%)	8 (8%)	12	24
2	C	190/192 (99%)	184 (97%)	6 (3%)	39	65
2	E	139/192 (72%)	132 (95%)	7 (5%)	24	46
3	D	183/193 (95%)	173 (94%)	10 (6%)	21	41
3	F	146/193 (76%)	136 (93%)	10 (7%)	16	30
All	All	861/974 (88%)	817 (95%)	44 (5%)	24	45

All (44) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	304	THR
1	A	316	CYS
1	A	373	SER
1	B	316	CYS
1	B	335	GLU
1	B	344	CYS
1	B	353	SER
1	B	362	LEU
1	B	368	LEU
1	B	400	GLN
1	B	406	VAL
2	C	18	ARG
2	C	22	THR
2	C	60	SER
2	C	76	THR
2	C	77	LEU
2	C	118	SER
3	D	5	LEU
3	D	48	VAL
3	D	67	LYS
3	D	85(B)	SER
3	D	130	SER
3	D	132	SER
3	D	133	THR
3	D	134	SER
3	D	140	LEU
3	D	199	ASN
2	E	7	SER
2	E	33	ARG
2	E	57	ASN
2	E	109	GLU
2	E	113	THR
2	E	165	GLU
2	E	179	LEU
3	F	4	LEU
3	F	6	GLU
3	F	30	ASN
3	F	55	THR
3	F	73	SER
3	F	113	THR
3	F	151	GLU
3	F	178	LEU
3	F	181	LEU

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Mol	Chain	Res	Type
3	F	200	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
2	E	141	ASN

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](#)

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	112/112 (100%)	0.36	4 (3%) 42 46	39, 52, 75, 84	0
1	B	112/112 (100%)	0.24	3 (2%) 54 58	41, 54, 77, 83	0
2	C	216/218 (99%)	0.23	1 (0%) 91 91	29, 45, 68, 80	0
2	E	166/218 (76%)	1.12	39 (23%) 0 0	39, 79, 113, 121	0
3	D	220/227 (96%)	0.27	2 (0%) 84 86	30, 45, 70, 87	0
3	F	182/227 (80%)	1.04	32 (17%) 1 1	38, 75, 98, 108	0
All	All	1008/1114 (90%)	0.55	81 (8%) 12 12	29, 55, 98, 121	0

All (81) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	F	166	VAL	5.7
3	F	153	VAL	5.1
3	F	119	THR	5.1
2	E	129	LEU	4.9
2	E	182	THR	4.9
3	F	186	THR	4.8
3	F	187	VAL	4.8
2	E	165	GLU	4.4
2	E	119	VAL	4.3
2	E	16	GLY	4.3
3	F	178	LEU	4.2
2	E	126	ASP	4.1
2	E	122	PHE	4.0
3	F	121	GLY	4.0
3	F	57	ASN	3.7
3	F	115	SER	3.7
2	E	121	ILE	3.7
2	E	135	SER	3.6
2	E	133	THR	3.6

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Mol	Chain	Res	Type	RSRZ
3	F	196	THR	3.6
3	D	132	SER	3.5
3	F	148	TYR	3.5
3	F	200	ASN	3.5
2	E	136	VAL	3.4
2	E	124	PRO	3.3
2	E	117	PRO	3.3
2	E	134	ALA	3.2
3	F	179	TYR	3.2
3	D	133	THR	3.1
3	F	181	LEU	3.1
2	E	123	PRO	3.1
3	F	205	PRO	3.1
2	E	179	LEU	3.1
2	E	137	VAL	3.1
3	F	198	ILE	3.0
3	F	210	VAL	3.0
1	A	330	TRP	3.0
3	F	169	PHE	2.9
2	E	113	THR	2.9
2	E	11	LEU	2.8
2	E	138	CYS	2.8
3	F	172	VAL	2.8
3	F	206	SER	2.8
2	E	144	TYR	2.8
3	F	201	VAL	2.7
3	F	171	ALA	2.7
2	E	164	GLN	2.7
1	B	351	LEU	2.6
2	E	140	LEU	2.6
3	F	150	PRO	2.6
3	F	197	TYR	2.6
2	E	128	GLN	2.5
2	E	139	LEU	2.5
1	A	308	PHE	2.5
3	F	143	CYS	2.5
3	F	199	CYS	2.4
3	F	117	ALA	2.4
2	E	68	GLY	2.4
2	E	120	PHE	2.4
2	E	132	GLY	2.3
1	A	310	ASN	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	364	LEU	2.3
2	C	154	VAL	2.3
2	E	143	PHE	2.3
3	F	152	PRO	2.2
2	E	163	SER	2.2
2	E	180	SER	2.2
2	E	166	SER	2.2
2	E	77	LEU	2.2
3	F	145	VAL	2.2
1	B	367	THR	2.2
3	F	122	PRO	2.2
1	A	372	ALA	2.1
3	F	157	TRP	2.1
2	E	21	ILE	2.1
2	E	31	ILE	2.1
2	E	176	THR	2.1
2	E	111	LYS	2.1
3	F	61	TYR	2.0
2	E	78	THR	2.0
2	E	58	LEU	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](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.