



Full wwPDB X-ray Structure Validation Report ⓘ

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PDB ID : 9KS5 / pdb_00009ks5
Title : The crystal structure of ABL1 in complex with K-CNBA-1
Authors : Zhang, Z.M.; Duan, L.P.
Deposited on : 2024-11-29
Resolution : 2.20 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
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
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) : 2.47

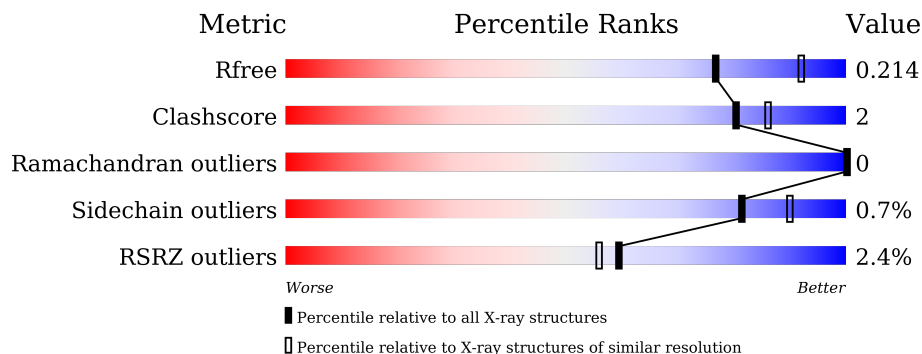
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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}	164625	5791 (2.20-2.20)
Clashscore	180529	6634 (2.20-2.20)
Ramachandran outliers	177936	6560 (2.20-2.20)
Sidechain outliers	177891	6561 (2.20-2.20)
RSRZ outliers	164620	5791 (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	272	 2% 91% 7% .
1	B	272	 3% 92% 6% ..

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 4773 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 Tyrosine-protein kinase ABL1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	P	S			
1	A	267	2197	1416	362	401	1	17	0	0	0
1	B	268	2200	1417	362	403	1	17	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	253	LYS	TYR	conflict	UNP P00519
B	253	LYS	TYR	conflict	UNP P00519

- Molecule 2 is water.

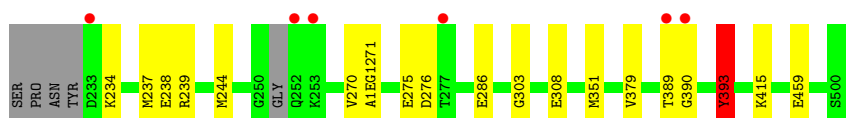
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	231	Total	O	0	0
			231	231		
2	B	145	Total	O	0	0
			145	145		

3 Residue-property plots [i](#)

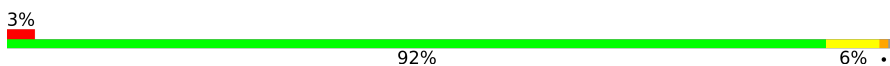
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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.

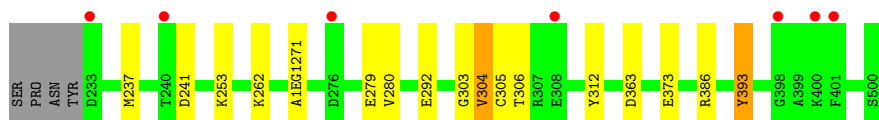
- Molecule 1: Tyrosine-protein kinase ABL1

Chain A:  91% 7% 2%



- Molecule 1: Tyrosine-protein kinase ABL1

Chain B:  92% 6% 3%



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	106.48Å 134.99Å 58.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	32.17 – 2.20 32.17 – 2.20	Depositor EDS
% Data completeness (in resolution range)	99.9 (32.17-2.20) 99.9 (32.17-2.20)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.98 (at 2.20Å)	Xtrriage
Refinement program	PHENIX 1.9_1692+SVN	Depositor
R, R_{free}	0.170 , 0.212 0.184 , 0.214	Depositor DCC
R_{free} test set	2000 reflections (3.59%)	wwPDB-VP
Wilson B-factor (Å ²)	28.0	Xtrriage
Anisotropy	0.444	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 66.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	4773	wwPDB-VP
Average B, all atoms (Å ²)	39.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.61% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: PTR, A1EG1

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	0/2185	0.71	0/2955
1	B	0.42	0/2188	0.69	0/2960
All	All	0.46	0/4373	0.70	0/5915

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	393	PTR	Mainchain

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	2197	0	2087	12	0
1	B	2200	0	2092	9	0
2	A	231	0	0	5	1
2	B	145	0	0	3	0
All	All	4773	0	4179	21	1

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 2.

All (21) 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:351:MET:SD	2:A:780:HOH:O	2.30	0.88
1:B:363:ASP:OD1	2:B:601:HOH:O	1.95	0.85
1:B:373:GLU:OE2	2:B:602:HOH:O	1.95	0.83
1:A:393:PTR:O3P	2:A:601:HOH:O	2.07	0.71
1:B:393:PTR:O2P	2:B:603:HOH:O	2.09	0.70
1:A:237:MET:HE3	1:A:303:GLY:HA3	1.75	0.67
1:B:237:MET:HE3	1:B:303:GLY:HA3	1.80	0.63
1:B:253:LYS:HG2	1:B:279:GLU:HG3	1.83	0.60
1:A:286:GLU:OE2	2:A:602:HOH:O	2.16	0.60
1:A:415:LYS:NZ	2:A:605:HOH:O	2.27	0.60
1:B:241:ASP:HA	1:B:262:LYS:HE2	1.84	0.60
1:B:292:GLU:OE1	1:B:386:ARG:NH1	2.37	0.58
1:B:305:CYS:HB2	1:B:312:TYR:HB2	1.89	0.55
1:A:459:GLU:HG2	2:A:730:HOH:O	2.10	0.50
1:A:275:GLU:HA	1:A:276:ASP:HA	1.51	0.48
1:B:304:VAL:HG13	1:B:306:THR:HG23	1.98	0.45
1:A:244:MET:HE1	1:A:270:VAL:HG11	1.99	0.45
1:A:239:ARG:NH2	1:A:308:GLU:O	2.50	0.44
1:A:351:MET:HE3	1:A:379:VAL:HG21	2.00	0.44
1:A:389:THR:HA	1:A:390:GLY:HA2	1.63	0.42
1:A:234:LYS:HE2	1:A:234:LYS:HB3	1.76	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:754:HOH:O	2:A:794:HOH:O[2_555]	2.01	0.19

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	261/272 (96%)	252 (97%)	9 (3%)	0	100	100
1	B	264/272 (97%)	256 (97%)	8 (3%)	0	100	100
All	All	525/544 (96%)	508 (97%)	17 (3%)	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	226/236 (96%)	225 (100%)	1 (0%)	89	95
1	B	226/236 (96%)	224 (99%)	2 (1%)	75	86
All	All	452/472 (96%)	449 (99%)	3 (1%)	81	90

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	238	GLU
1	B	280	VAL
1	B	304	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	396	HIS
1	A	490	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

4 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	PTR	A	393	1	15,16,17	1.21	1 (6%)	19,22,24	0.78	0
1	PTR	B	393	1	15,16,17	1.21	1 (6%)	19,22,24	0.76	0
1	A1EG1	A	271	1	48,52,53	4.31	23 (47%)	56,73,75	2.96	15 (26%)
1	A1EG1	B	271	1	48,52,53	4.23	23 (47%)	56,73,75	2.25	16 (28%)

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	PTR	A	393	1	-	2/10/11/13	0/1/1/1
1	PTR	B	393	1	-	0/10/11/13	0/1/1/1
1	A1EG1	A	271	1	-	3/29/61/63	0/6/6/6
1	A1EG1	B	271	1	-	4/29/61/63	0/6/6/6

All (48) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	271	A1EG1	C13-N12	-11.14	1.26	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	271	A1EG1	C13-N12	-11.12	1.26	1.47
1	B	271	A1EG1	C15-C16	9.60	1.55	1.39
1	A	271	A1EG1	C23-C22	9.59	1.55	1.39
1	B	271	A1EG1	C23-C22	9.45	1.55	1.39
1	A	271	A1EG1	C15-C16	9.39	1.55	1.39
1	A	271	A1EG1	C08-N27	7.66	1.47	1.34
1	A	271	A1EG1	C15-C14	7.65	1.52	1.39
1	B	271	A1EG1	C15-C14	7.55	1.52	1.39
1	A	271	A1EG1	C08-N07	7.20	1.47	1.34
1	B	271	A1EG1	C08-N27	7.19	1.47	1.34
1	A	271	A1EG1	C23-C24	7.17	1.51	1.38
1	B	271	A1EG1	C23-C24	7.08	1.51	1.38
1	A	271	A1EG1	C20-NZ	7.08	1.51	1.40
1	B	271	A1EG1	C08-N07	7.07	1.46	1.34
1	B	271	A1EG1	C20-NZ	6.77	1.51	1.40
1	A	271	A1EG1	C06-N07	6.59	1.44	1.34
1	B	271	A1EG1	C06-N07	6.57	1.44	1.34
1	A	271	A1EG1	C10-N09	-5.75	1.37	1.46
1	A	271	A1EG1	C24-C14	5.74	1.51	1.38
1	B	271	A1EG1	C24-C14	5.69	1.51	1.38
1	B	271	A1EG1	C26-N09	-5.27	1.38	1.46
1	B	271	A1EG1	C08-N09	5.09	1.45	1.35
1	A	271	A1EG1	C05-N04	5.09	1.45	1.33
1	A	271	A1EG1	C26-N09	-5.01	1.38	1.46
1	A	271	A1EG1	C08-N09	4.89	1.44	1.35
1	B	271	A1EG1	C10-N09	-4.81	1.39	1.46
1	A	271	A1EG1	C28-N27	4.57	1.43	1.34
1	B	271	A1EG1	C28-N27	4.53	1.43	1.34
1	B	271	A1EG1	C05-N04	4.12	1.42	1.33
1	A	393	PTR	OH-CZ	-4.06	1.31	1.40
1	B	393	PTR	OH-CZ	-4.00	1.31	1.40
1	A	271	A1EG1	C22-C16	3.77	1.44	1.39
1	A	271	A1EG1	C38-C28	3.73	1.49	1.39
1	B	271	A1EG1	C38-C28	3.67	1.48	1.39
1	A	271	A1EG1	C28-N29	3.63	1.45	1.38
1	A	271	A1EG1	C30-N29	3.63	1.45	1.38
1	B	271	A1EG1	C30-N29	3.61	1.45	1.38
1	B	271	A1EG1	C38-C06	3.58	1.49	1.40
1	B	271	A1EG1	C22-C16	3.56	1.44	1.39
1	B	271	A1EG1	C28-N29	3.42	1.44	1.38
1	A	271	A1EG1	C38-C06	3.38	1.49	1.40
1	A	271	A1EG1	C11-N12	-2.84	1.39	1.46

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	271	A1EG1	C25-N12	-2.77	1.39	1.46
1	B	271	A1EG1	C03-C02	2.76	1.52	1.46
1	B	271	A1EG1	C11-N12	-2.73	1.39	1.46
1	A	271	A1EG1	C03-C02	2.52	1.52	1.46
1	A	271	A1EG1	C25-N12	-2.52	1.40	1.46

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	271	A1EG1	O18-C17-NZ	-15.83	92.23	112.17
1	B	271	A1EG1	CE-NZ-C17	7.81	131.68	121.94
1	A	271	A1EG1	C06-C05-N04	6.91	125.26	115.59
1	B	271	A1EG1	O18-C17-NZ	6.52	120.38	112.17
1	A	271	A1EG1	C06-N07-C08	5.78	120.94	115.70
1	B	271	A1EG1	C06-N07-C08	5.16	120.39	115.70
1	B	271	A1EG1	N27-C08-N07	-3.95	119.79	126.31
1	B	271	A1EG1	C17-NZ-C20	-3.74	100.61	111.49
1	A	271	A1EG1	C03-N04-C05	3.74	125.71	120.16
1	A	271	A1EG1	N27-C08-N07	-3.55	120.44	126.31
1	B	271	A1EG1	C36-C34-C33	-3.52	116.20	120.33
1	A	271	A1EG1	C35-C34-C33	-3.41	116.32	120.33
1	B	271	A1EG1	N07-C08-N09	3.13	120.97	117.11
1	A	271	A1EG1	O39-C05-N04	-3.09	116.46	122.61
1	A	271	A1EG1	C05-C06-N07	3.03	122.23	117.42
1	A	271	A1EG1	C17-NZ-C20	-3.02	102.71	111.49
1	B	271	A1EG1	C34-C33-N32	2.95	124.58	120.23
1	A	271	A1EG1	C02-C03-N04	-2.93	108.72	112.31
1	B	271	A1EG1	C15-C16-C17	2.90	132.99	128.84
1	A	271	A1EG1	C38-C06-N07	-2.73	118.45	123.40
1	A	271	A1EG1	C14-C13-N12	-2.71	107.87	113.12
1	A	271	A1EG1	N07-C08-N09	2.61	120.33	117.11
1	B	271	A1EG1	C35-C34-C33	-2.54	117.35	120.33
1	B	271	A1EG1	C02-C03-N04	-2.51	109.23	112.31
1	B	271	A1EG1	C26-N09-C08	-2.45	117.62	121.69
1	B	271	A1EG1	C33-C37-C30	2.42	108.21	106.07
1	A	271	A1EG1	C36-C34-C33	-2.42	117.48	120.33
1	B	271	A1EG1	C37-C30-N31	-2.22	107.30	110.47
1	B	271	A1EG1	C16-C15-C14	-2.17	119.95	121.98
1	A	271	A1EG1	C15-C16-C17	2.15	131.92	128.84
1	B	271	A1EG1	C38-C06-N07	-2.01	119.76	123.40

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	393	PTR	C-CA-CB-CG
1	A	271	A1EG1	C06-C05-N04-C03
1	A	271	A1EG1	O39-C05-N04-C03
1	B	271	A1EG1	N07-C08-N09-C26
1	B	271	A1EG1	N27-C08-N09-C26
1	A	393	PTR	N-CA-CB-CG
1	A	271	A1EG1	C02-C03-N04-C05
1	B	271	A1EG1	C37-C33-C34-C36
1	B	271	A1EG1	N32-C33-C34-C36

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	393	PTR	1	0
1	B	393	PTR	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	265/272 (97%)	-0.44	6 (2%) 61 57	16, 29, 63, 101	0
1	B	266/272 (97%)	-0.12	7 (2%) 57 54	17, 36, 87, 103	0
All	All	531/544 (97%)	-0.28	13 (2%) 59 56	16, 32, 80, 103	0

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	252	GLN	3.4
1	B	233	ASP	3.4
1	B	398	GLY	3.2
1	B	240	THR	3.2
1	A	389	THR	3.1
1	A	390	GLY	2.9
1	A	233	ASP	2.8
1	B	401	PHE	2.7
1	B	400	LYS	2.5
1	B	276	ASP	2.4
1	A	277	THR	2.2
1	B	308	GLU	2.2
1	A	253	LYS	2.1

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	A1EG1	B	271	47/48	0.91	0.12	32,57,82,86	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
1	PTR	A	393	16/17	0.93	0.10	19,34,66,70	0
1	A1EG1	A	271	47/48	0.94	0.10	23,44,63,67	0
1	PTR	B	393	16/17	0.95	0.07	21,30,56,59	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.