Full wwPDB X-ray Structure Validation Report (i)

Jun 17, 2021 – 07:08 PM EDT

PDB ID	:	5ROS
Title	:	PanDDA analysis group deposition – Proteinase K crystal structure Apo34
Authors	:	Lima, G.M.A.; Talibov, V.; Benz, L.S.; Jagudin, E.; Mueller, U.
Deposited on	:	2020-09-23
Resolution	:	1.45 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 (i) symbol.

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

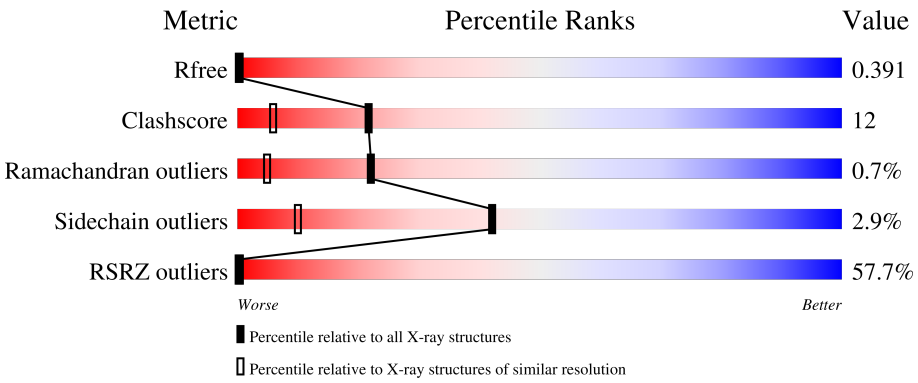
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.20
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.20

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.45 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	1156 (1.46-1.46)
Clashscore	141614	1202 (1.46-1.46)
Ramachandran outliers	138981	1178 (1.46-1.46)
Sidechain outliers	138945	1178 (1.46-1.46)
RSRZ outliers	127900	1139 (1.46-1.46)

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 <=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	279	

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 2093 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.

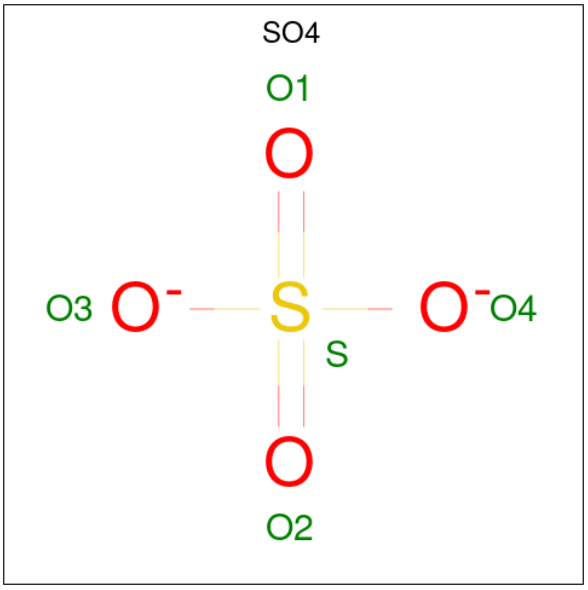
- Molecule 1 is a protein called Proteinase K.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	279	2023	1244	355	414	10	0	17	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	207	ASP	SER	conflict	UNP P06873

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
2	A	1	5	4	1	0	0

- Molecule 3 is water.

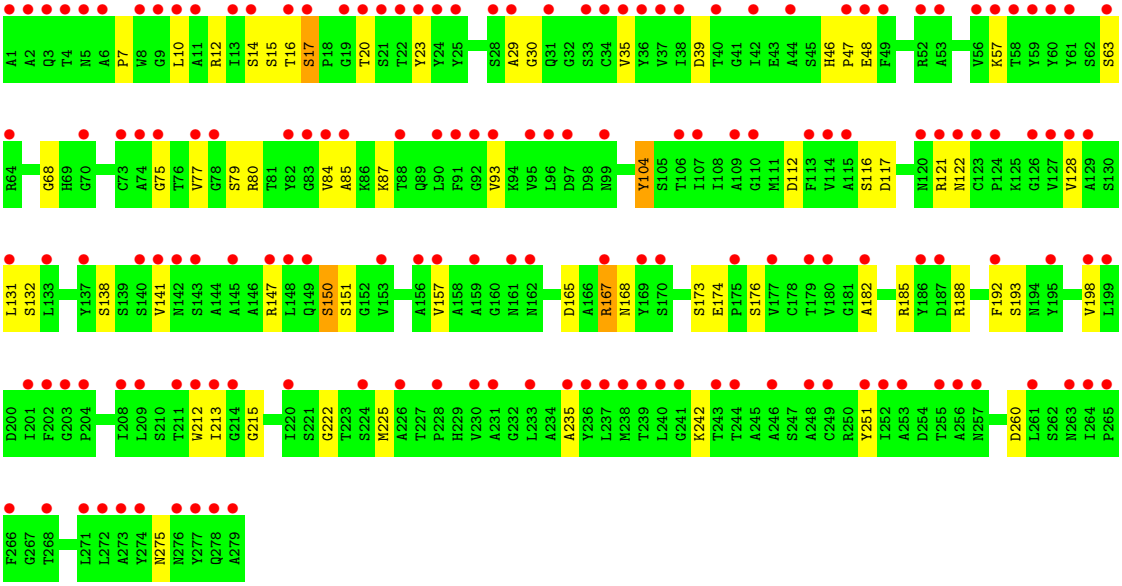
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	65	65	65	0	0

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: Proteinase K

Chain A:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α, β, γ	68.01Å 68.01Å 106.10Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.09 – 1.45 57.26 – 1.45	Depositor EDS
% Data completeness (in resolution range)	56.1 (48.09-1.45) 56.2 (57.26-1.45)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.16 (at 1.45Å)	Xtriage
Refinement program	PHENIX 1.19.1	Depositor
R, R_{free}	0.345 , 0.390 0.346 , 0.391	Depositor DCC
R_{free} test set	1268 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å^2)	13.4	Xtriage
Anisotropy	0.831	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 25.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.84	EDS
Total number of atoms	2093	wwPDB-VP
Average B, all atoms (Å^2)	16.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.90% of the height of the origin peak. No significant pseudotranslation is detected.*

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: SO4

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	0.44	0/2062	0.66	0/2804

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	2023	0	1900	47	0
2	A	5	0	0	1	0
3	A	65	0	0	18	1
All	All	2093	0	1900	47	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 12.

All (47) 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:212:TRP:O	3:A:1101:HOH:O	1.93	0.86

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:112:ASP:O	3:A:1102:HOH:O	1.96	0.82
1:A:20:THR:O	3:A:1103:HOH:O	1.98	0.81
1:A:147:ARG:O	3:A:1104:HOH:O	2.01	0.78
1:A:122:ASN:HA	3:A:1119:HOH:O	1.84	0.75
1:A:29:ALA:HB3	1:A:87[A]:LYS:HG2	1.68	0.75
1:A:168:ASN:O	3:A:1105:HOH:O	2.07	0.71
1:A:242[A]:LYS:HD2	1:A:251:TYR:OH	1.92	0.69
1:A:75:GLY:HA2	1:A:79:SER:HB3	1.81	0.63
1:A:260:ASP:OD2	3:A:1106:HOH:O	2.16	0.63
1:A:150:SER:N	3:A:1104:HOH:O	2.32	0.61
1:A:68:GLY:HA2	1:A:213:ILE:HG23	1.83	0.61
1:A:131[A]:LEU:HB2	1:A:157:VAL:HG12	1.84	0.60
1:A:150:SER:CA	3:A:1104:HOH:O	2.50	0.60
1:A:14:SER:HB3	1:A:275:ASN:HD21	1.66	0.60
1:A:174:GLU:OE2	1:A:176:SER:OG	2.20	0.59
1:A:35:VAL:HG22	1:A:128:VAL:HB	1.83	0.59
1:A:151:SER:N	3:A:1104:HOH:O	2.36	0.58
1:A:48:GLU:OE2	1:A:80:ARG:HG2	2.06	0.54
1:A:30:GLY:HA3	1:A:85:ALA:HB1	1.90	0.54
1:A:7:PRO:HD2	1:A:10:LEU:HD12	1.91	0.53
1:A:46:HIS:ND1	1:A:47:PRO:HD2	2.24	0.53
1:A:150:SER:CB	3:A:1104:HOH:O	2.57	0.53
1:A:150:SER:HB3	3:A:1104:HOH:O	2.09	0.53
1:A:14:SER:HB3	1:A:275:ASN:ND2	2.24	0.52
1:A:63:SER:O	3:A:1107:HOH:O	2.19	0.52
1:A:138:SER:HB3	1:A:141:VAL:HB	1.90	0.52
1:A:173:SER:HA	1:A:198:VAL:HG21	1.91	0.52
1:A:165:ASP:CG	1:A:167:ARG:HG2	2.30	0.51
1:A:188:ARG:HD2	3:A:1163:HOH:O	2.10	0.51
1:A:10:LEU:HD22	1:A:23:TYR:CE2	2.47	0.49
1:A:182:ALA:HB3	1:A:193:SER:HB2	1.93	0.49
1:A:35:VAL:HG11	1:A:77:VAL:HG11	1.96	0.48
1:A:116:SER:N	3:A:1102:HOH:O	2.01	0.47
1:A:46:HIS:CD2	3:A:1101:HOH:O	2.68	0.47
1:A:15:SER:OG	1:A:17:SER:O	2.34	0.45
1:A:23:TYR:OH	1:A:84:VAL:HG13	2.17	0.44
1:A:185:ARG:NH1	3:A:1121:HOH:O	2.50	0.44
1:A:128:VAL:HG21	1:A:235:ALA:HB2	1.99	0.43
1:A:215:GLY:CA	3:A:1101:HOH:O	2.66	0.43
1:A:192:PHE:CE1	1:A:222:GLY:HA2	2.54	0.43
1:A:12:ARG:NH1	1:A:15:SER:O	2.52	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:57:LYS:HD2	1:A:57:LYS:HA	1.72	0.41
1:A:185:ARG:NH1	2:A:1001:SO4:O4	2.31	0.41
1:A:117:ASP:O	1:A:121:ARG:HG2	2.20	0.41
1:A:57:LYS:HB3	1:A:93:VAL:HG13	2.03	0.40
1:A:104:TYR:HD1	1:A:104:TYR:HA	1.69	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)
3:A:1154:HOH:O	3:A:1163:HOH:O[3_644]	2.15	0.05

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	277/279 (99%)	264 (95%)	11 (4%)	2 (1%)	22 5

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	132	SER
1	A	39	ASP

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	210/213 (99%)	204 (97%)	6 (3%)	42 10

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	16	THR
1	A	17	SER
1	A	104	TYR
1	A	150	SER
1	A	167	ARG
1	A	225	MET

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

Mol	Chain	Res	Type
1	A	89	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)

1 ligand is 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	$\#\|Z\| > 2$
2	SO4	A	1001	-	4,4,4	0.31	0	6,6,6	0.17	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1001	SO4	1	0

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	279/279 (100%)	2.49	161 (57%) 0 0	11, 16, 21, 25	8 (2%)

All (161) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	61	TYR	6.6
1	A	236	TYR	6.5
1	A	44	ALA	5.8
1	A	266	PHE	5.7
1	A	8	TRP	5.7
1	A	274	TYR	5.7
1	A	261	LEU	5.6
1	A	248	ALA	5.5
1	A	209	LEU	5.2
1	A	272	LEU	5.2
1	A	195	TYR	5.2
1	A	233	LEU	5.1
1	A	127	VAL	5.0
1	A	74	ALA	4.9
1	A	237	LEU	4.9
1	A	113	PHE	4.8
1	A	24	TYR	4.8
1	A	186	TYR	4.8
1	A	202	PHE	4.7
1	A	34[A]	CYS	4.6
1	A	192	PHE	4.6
1	A	13[A]	ILE	4.6
1	A	10	LEU	4.6
1	A	19	GLY	4.5
1	A	251	TYR	4.4
1	A	11	ALA	4.4
1	A	279	ALA	4.4

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	93	VAL	4.4
1	A	235	ALA	4.3
1	A	35	VAL	4.3
1	A	123	CYS	4.2
1	A	252	ILE	4.2
1	A	2	ALA	4.2
1	A	277	TYR	4.2
1	A	246	ALA	4.2
1	A	85	ALA	4.2
1	A	49	PHE	4.1
1	A	59	TYR	4.1
1	A	37	VAL	4.1
1	A	60	TYR	4.1
1	A	169	TYR	4.1
1	A	159	ALA	4.1
1	A	20	THR	4.0
1	A	264	ILE	4.0
1	A	4	THR	3.9
1	A	96	LEU	3.9
1	A	244	THR	3.8
1	A	82	TYR	3.8
1	A	114	VAL	3.8
1	A	141	VAL	3.8
1	A	148	LEU	3.8
1	A	25	TYR	3.7
1	A	77	VAL	3.6
1	A	241	GLY	3.6
1	A	23	TYR	3.6
1	A	129	ALA	3.6
1	A	115	ALA	3.5
1	A	95	VAL	3.5
1	A	249	CYS	3.5
1	A	29	ALA	3.4
1	A	28	SER	3.4
1	A	16	THR	3.4
1	A	36	TYR	3.3
1	A	128	VAL	3.3
1	A	83	GLY	3.3
1	A	268	THR	3.2
1	A	64	ARG	3.2
1	A	240	LEU	3.2
1	A	122	ASN	3.2

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	271	LEU	3.1
1	A	224	SER	3.1
1	A	199	LEU	3.1
1	A	5	ASN	3.0
1	A	47	PRO	3.0
1	A	90	LEU	3.0
1	A	208	ILE	2.9
1	A	84	VAL	2.9
1	A	124	PRO	2.9
1	A	180	VAL	2.9
1	A	107	ILE	2.9
1	A	110	GLY	2.9
1	A	212	TRP	2.9
1	A	198	VAL	2.9
1	A	58	THR	2.8
1	A	255	THR	2.8
1	A	38	ILE	2.8
1	A	42	ILE	2.8
1	A	273	ALA	2.8
1	A	276	ASN	2.8
1	A	109	ALA	2.8
1	A	142	ASN	2.8
1	A	149	GLN	2.7
1	A	40	THR	2.7
1	A	226	ALA	2.7
1	A	179	THR	2.7
1	A	140[A]	SER	2.7
1	A	9	GLY	2.7
1	A	156	ALA	2.7
1	A	92	GLY	2.7
1	A	133	LEU	2.7
1	A	213	ILE	2.6
1	A	230	VAL	2.6
1	A	157	VAL	2.6
1	A	14	SER	2.6
1	A	17	SER	2.6
1	A	203	GLY	2.6
1	A	238[A]	MET	2.6
1	A	91[A]	PHE	2.6
1	A	167	ARG	2.6
1	A	175	PRO	2.6
1	A	265	PRO	2.6

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	177	VAL	2.6
1	A	220	ILE	2.6
1	A	53	ALA	2.5
1	A	257	ASN	2.5
1	A	204	PRO	2.5
1	A	145	ALA	2.5
1	A	22	THR	2.5
1	A	63	SER	2.4
1	A	52	ARG	2.4
1	A	31[A]	GLN	2.4
1	A	278	GLN	2.4
1	A	256	ALA	2.4
1	A	48	GLU	2.4
1	A	106	THR	2.3
1	A	75	GLY	2.3
1	A	131[A]	LEU	2.3
1	A	3	GLN	2.3
1	A	99	ASN	2.3
1	A	1	ALA	2.3
1	A	253	ALA	2.3
1	A	126	GLY	2.3
1	A	239	THR	2.3
1	A	243	THR	2.3
1	A	161[A]	ASN	2.3
1	A	162	ASN	2.3
1	A	263	ASN	2.3
1	A	57	LYS	2.3
1	A	182	ALA	2.3
1	A	121	ARG	2.3
1	A	73	CYS	2.2
1	A	21	SER	2.2
1	A	211	THR	2.2
1	A	147	ARG	2.2
1	A	187	ASP	2.2
1	A	214	GLY	2.2
1	A	88	THR	2.2
1	A	33	SER	2.2
1	A	56	VAL	2.1
1	A	6	ALA	2.1
1	A	78	GLY	2.1
1	A	201	ILE	2.1
1	A	120	ASN	2.1

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	228	PRO	2.1
1	A	231	ALA	2.1
1	A	170	SER	2.1
1	A	137	TYR	2.0
1	A	70	GLY	2.0
1	A	97	ASP	2.0
1	A	143[A]	SER	2.0
1	A	153	VAL	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)

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
2	SO4	A	1001	5/5	0.85	0.12	17,18,23,24	0

6.5 Other polymers (i)

There are no such residues in this entry.