



Full wwPDB X-ray Structure Validation Report ⓘ

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PDB ID : 5RP1 / pdb_00005rp1
Title : PanDDA analysis group deposition – Proteinase K crystal structure Apo36
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Deposited on : 2020-09-23
Resolution : 1.11 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	:	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

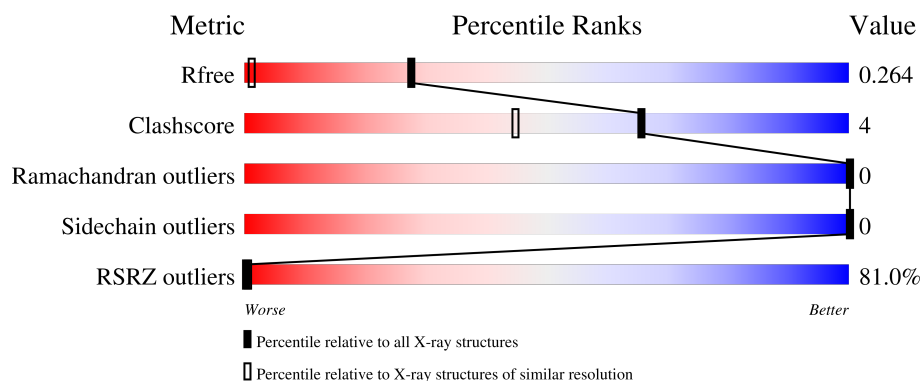
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.11 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	1985 (1.14-1.10)
Clashscore	190562	2021 (1.14-1.10)
Ramachandran outliers	187476	1978 (1.14-1.10)
Sidechain outliers	187428	1974 (1.14-1.10)
RSRZ outliers	180081	1984 (1.14-1.10)

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	279	81% 93% 7%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 2213 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 (CCD ID: SO4) (formula: O₄S).



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

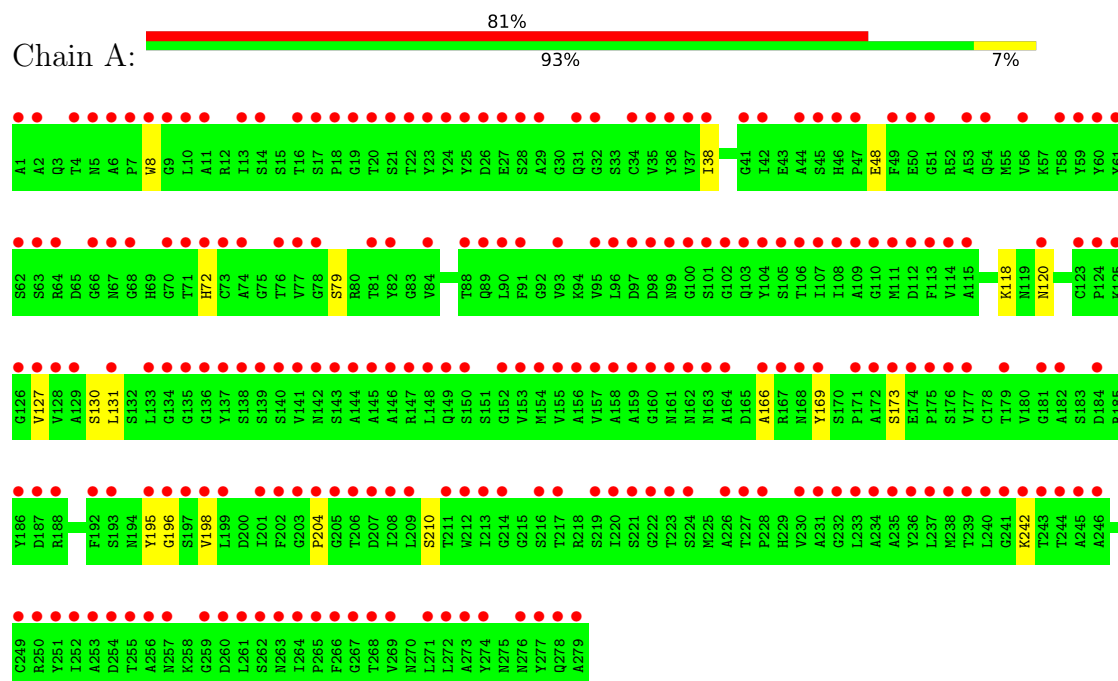
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	185	Total 185	O 185	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



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	68.08Å 68.08Å 102.33Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.14 – 1.11 48.14 – 1.11	Depositor EDS
% Data completeness (in resolution range)	97.2 (48.14-1.11) 97.3 (48.14-1.11)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.96 (at 1.11Å)	Xtriage
Refinement program	PHENIX 1.19.1	Depositor
R, R_{free}	0.285 , 0.287 (Not available) , 0.264	Depositor DCC
R_{free} test set	4417 reflections (4.68%)	wwPDB-VP
Wilson B-factor (Å ²)	9.4	Xtriage
Anisotropy	0.124	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 35.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.52$, $\langle L^2 \rangle = 0.36$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.87	EDS
Total number of atoms	2213	wwPDB-VP
Average B, all atoms (Å ²)	10.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.83% 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: 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	0.24	0/2062	0.49	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	15	0
2	A	5	0	0	0	0
3	A	185	0	0	9	2
All	All	2213	0	1900	15	2

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 (15) 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:166:ALA:O	3:A:1101:HOH:O	1.86	0.93

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:169:TYR:HB2	3:A:1101:HOH:O	1.70	0.89
1:A:195:TYR:O	3:A:1102:HOH:O	1.98	0.82
1:A:127:VAL:HG21	3:A:1249:HOH:O	1.88	0.74
1:A:120:ASN:ND2	3:A:1104:HOH:O	2.28	0.66
1:A:118:LYS:HB2	3:A:1249:HOH:O	1.97	0.64
1:A:196:GLY:HA3	3:A:1102:HOH:O	2.06	0.56
1:A:242[A]:LYS:NZ	3:A:1105:HOH:O	2.34	0.50
1:A:173:SER:HA	1:A:198:VAL:HG21	1.96	0.47
1:A:38:ILE:HD12	1:A:131[A]:LEU:HD11	1.98	0.45
1:A:127:VAL:CG2	3:A:1249:HOH:O	2.55	0.42
1:A:130:SER:C	1:A:131[A]:LEU:HD12	2.44	0.42
1:A:48:GLU:HB3	1:A:79:SER:HB2	2.01	0.42
1:A:8:TRP:CH2	1:A:204:PRO:HB3	2.56	0.41
1:A:72:HIS:CD2	1:A:210:SER:HB3	2.55	0.41

All (2) 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:1105:HOH:O	3:A:1226:HOH:O[3_644]	1.85	0.35
3:A:1118:HOH:O	3:A:1196:HOH:O[5_655]	2.13	0.07

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%)	269 (97%)	8 (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	210/213 (99%)	210 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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	54[A]	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](#)

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	0.27	0	6,6,6	0.24	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.

No monomer is involved in short contacts.

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	279/279 (100%)	3.19	226 (81%) 0 0	5, 9, 13, 20	11 (3%)

All (226) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	279	ALA	9.6
1	A	212	TRP	7.8
1	A	195	TYR	7.7
1	A	35	VAL	6.5
1	A	198	VAL	6.3
1	A	239	THR	6.3
1	A	269	VAL	6.0
1	A	266	PHE	5.9
1	A	105	SER	5.9
1	A	56	VAL	5.8
1	A	144	ALA	5.7
1	A	77	VAL	5.6
1	A	37	VAL	5.6
1	A	228	PRO	5.5
1	A	145	ALA	5.5
1	A	164	ALA	5.5
1	A	99	ASN	5.3
1	A	137	TYR	5.3
1	A	16	THR	5.3
1	A	159	ALA	5.3
1	A	13[A]	ILE	5.2
1	A	169	TYR	5.1
1	A	18	PRO	5.1
1	A	277	TYR	5.1
1	A	202	PHE	5.0
1	A	235	ALA	5.0
1	A	106	THR	5.0

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Mol	Chain	Res	Type	RSRZ
1	A	100	GLY	5.0
1	A	2	ALA	5.0
1	A	54[A]	GLN	5.0
1	A	49	PHE	5.0
1	A	197	SER	4.9
1	A	246	ALA	4.9
1	A	162	ASN	4.9
1	A	155	VAL	4.9
1	A	104	TYR	4.8
1	A	231	ALA	4.8
1	A	261	LEU	4.8
1	A	272	LEU	4.8
1	A	38	ILE	4.8
1	A	107	ILE	4.7
1	A	220	ILE	4.7
1	A	131[A]	LEU	4.7
1	A	128	VAL	4.6
1	A	109	ALA	4.6
1	A	124	PRO	4.6
1	A	232	GLY	4.5
1	A	278	GLN	4.5
1	A	110	GLY	4.5
1	A	8	TRP	4.4
1	A	114	VAL	4.4
1	A	42	ILE	4.4
1	A	163	ASN	4.4
1	A	96	LEU	4.4
1	A	59	TYR	4.4
1	A	61	TYR	4.4
1	A	93	VAL	4.3
1	A	256	ALA	4.3
1	A	271	LEU	4.3
1	A	204	PRO	4.3
1	A	133	LEU	4.3
1	A	186	TYR	4.3
1	A	199	LEU	4.2
1	A	127	VAL	4.2
1	A	76	THR	4.2
1	A	192	PHE	4.2
1	A	267	GLY	4.2
1	A	1	ALA	4.1
1	A	276	ASN	4.0

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Mol	Chain	Res	Type	RSRZ
1	A	265	PRO	4.0
1	A	90	LEU	4.0
1	A	91[A]	PHE	4.0
1	A	255	THR	4.0
1	A	175	PRO	4.0
1	A	274	TYR	3.9
1	A	6	ALA	3.9
1	A	172	ALA	3.9
1	A	245	ALA	3.9
1	A	21	SER	3.9
1	A	148	LEU	3.9
1	A	95	VAL	3.9
1	A	216[A]	SER	3.8
1	A	213	ILE	3.8
1	A	64	ARG	3.8
1	A	58	THR	3.8
1	A	113	PHE	3.8
1	A	36	TYR	3.7
1	A	226	ALA	3.7
1	A	251	TYR	3.7
1	A	31[A]	GLN	3.7
1	A	143[A]	SER	3.7
1	A	115	ALA	3.7
1	A	136	GLY	3.6
1	A	168	ASN	3.6
1	A	129	ALA	3.6
1	A	146	ALA	3.6
1	A	187	ASP	3.6
1	A	19	GLY	3.6
1	A	82	TYR	3.5
1	A	11	ALA	3.5
1	A	139[A]	SER	3.5
1	A	268	THR	3.5
1	A	5	ASN	3.5
1	A	4	THR	3.4
1	A	227	THR	3.4
1	A	240	LEU	3.4
1	A	25	TYR	3.4
1	A	182	ALA	3.4
1	A	78	GLY	3.4
1	A	84	VAL	3.4
1	A	141	VAL	3.4

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Mol	Chain	Res	Type	RSRZ
1	A	209	LEU	3.4
1	A	108	ILE	3.4
1	A	44	ALA	3.4
1	A	29	ALA	3.3
1	A	252	ILE	3.3
1	A	211	THR	3.3
1	A	102	GLY	3.3
1	A	233	LEU	3.3
1	A	60	TYR	3.3
1	A	201	ILE	3.2
1	A	177	VAL	3.2
1	A	230	VAL	3.2
1	A	62	SER	3.2
1	A	103	GLN	3.2
1	A	222	GLY	3.2
1	A	34[A]	CYS	3.2
1	A	176	SER	3.1
1	A	221	SER	3.1
1	A	273	ALA	3.1
1	A	101	SER	3.1
1	A	53	ALA	3.1
1	A	166	ALA	3.1
1	A	24	TYR	3.1
1	A	66	GLY	3.1
1	A	196	GLY	3.1
1	A	244	THR	3.1
1	A	236	TYR	3.0
1	A	70	GLY	3.0
1	A	153	VAL	3.0
1	A	237	LEU	3.0
1	A	142	ASN	3.0
1	A	28	SER	3.0
1	A	157	VAL	3.0
1	A	20	THR	3.0
1	A	156	ALA	3.0
1	A	238[A]	MET	3.0
1	A	47	PRO	3.0
1	A	89	GLN	3.0
1	A	112	ASP	2.9
1	A	134	GLY	2.9
1	A	214	GLY	2.9
1	A	259	GLY	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	250[A]	ARG	2.9
1	A	262	SER	2.9
1	A	73	CYS	2.9
1	A	173	SER	2.9
1	A	254	ASP	2.9
1	A	242[A]	LYS	2.8
1	A	208	ILE	2.8
1	A	135	GLY	2.8
1	A	26	ASP	2.8
1	A	223	THR	2.8
1	A	147	ARG	2.8
1	A	179	THR	2.7
1	A	32	GLY	2.7
1	A	126	GLY	2.7
1	A	45	SER	2.7
1	A	217	THR	2.7
1	A	123	CYS	2.7
1	A	46	HIS	2.7
1	A	41	GLY	2.7
1	A	253	ALA	2.7
1	A	14	SER	2.7
1	A	63	SER	2.7
1	A	171	PRO	2.7
1	A	181	GLY	2.7
1	A	17	SER	2.6
1	A	81	THR	2.6
1	A	167	ARG	2.6
1	A	263	ASN	2.6
1	A	74	ALA	2.6
1	A	72	HIS	2.6
1	A	71	THR	2.5
1	A	206	THR	2.5
1	A	260	ASP	2.5
1	A	184	ASP	2.5
1	A	22	THR	2.4
1	A	68	GLY	2.4
1	A	111	MET	2.4
1	A	140[A]	SER	2.4
1	A	152	GLY	2.4
1	A	241	GLY	2.4
1	A	161[A]	ASN	2.4
1	A	158	ALA	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	98	ASP	2.4
1	A	264	ILE	2.4
1	A	10	LEU	2.3
1	A	207	ASP	2.3
1	A	7	PRO	2.3
1	A	50	GLU	2.3
1	A	243	THR	2.3
1	A	249	CYS	2.3
1	A	219[A]	SER	2.3
1	A	149	GLN	2.3
1	A	97	ASP	2.3
1	A	257	ASN	2.3
1	A	88	THR	2.3
1	A	125	LYS	2.2
1	A	51	GLY	2.2
1	A	150	SER	2.2
1	A	188	ARG	2.2
1	A	120	ASN	2.2
1	A	154[A]	MET	2.2
1	A	224	SER	2.2
1	A	138	SER	2.1
1	A	160	GLY	2.1
1	A	234	ALA	2.1
1	A	23	TYR	2.1
1	A	174	GLU	2.1
1	A	67	ASN	2.1
1	A	27	GLU	2.1
1	A	9	GLY	2.0
1	A	193	SER	2.0
1	A	203	GLY	2.0
1	A	205	GLY	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

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($\text{\AA}^2$)	Q<0.9
2	SO4	A	1001	5/5	0.90	0.14	10,11,13,14	0

6.5 Other polymers

There are no such residues in this entry.