



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 24, 2024 – 11:47 PM EDT

PDB ID : 5RDH
Title : PanDDA analysis group deposition – Endothiapepsin ground state model 39
Authors : Weiss, M.S.; Wollenhaupt, J.; Metz, A.; Barthel, T.; Lima, G.M.A.; Heine, A.;
Mueller, U.; Klebe, G.
Deposited on : 2020-03-24
Resolution : 0.85 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 : 2.37.1
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) : 2.37.1

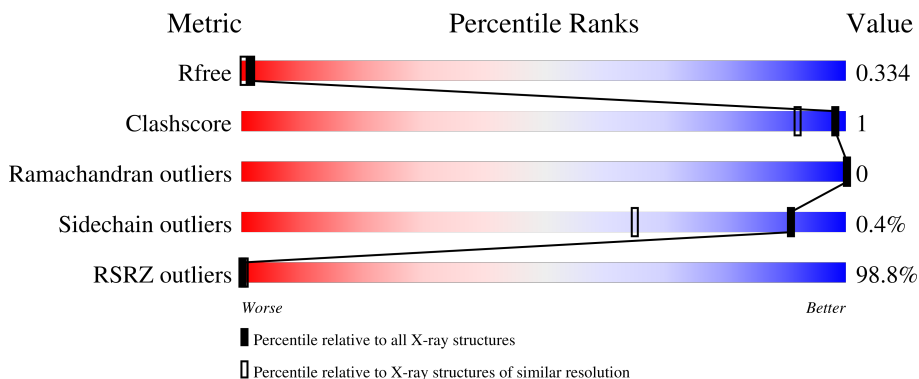
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 0.85 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	1071 (1.04-0.70)
Clashscore	141614	1143 (1.04-0.68)
Ramachandran outliers	138981	1065 (1.04-0.68)
Sidechain outliers	138945	1066 (1.04-0.68)
RSRZ outliers	127900	1038 (1.04-0.70)

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	419	

2 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 2462 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.

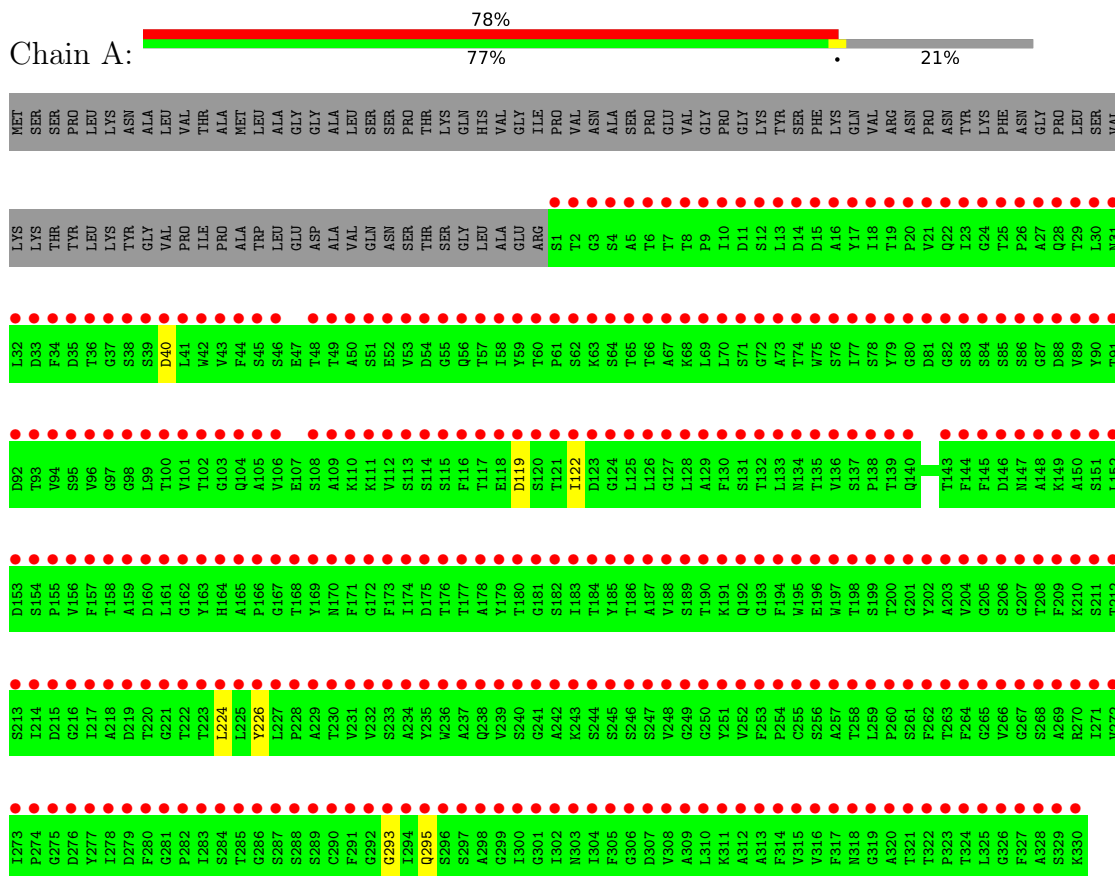
- Molecule 1 is a protein called Endothiapepsin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	330	2462	1566	367	527	2	0	19	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: Endothiapepsin



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	45.27Å 72.92Å 52.51Å 90.00° 109.33° 90.00°	Depositor
Resolution (Å)	42.75 – 0.85 42.71 – 0.85	Depositor EDS
% Data completeness (in resolution range)	69.3 (42.75-0.85) 69.3 (42.71-0.85)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.96 (at 0.85Å)	Xtrriage
Refinement program	REFMAC 5.8.0238, PHENIX 1.16.3549	Depositor
R, R_{free}	0.334 , 0.334 0.338 , 0.334	Depositor DCC
R_{free} test set	9534 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	9.3	Xtrriage
Anisotropy	0.006	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	1.46 , 94.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.52$, $\langle L^2 \rangle = 0.36$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.81	EDS
Total number of atoms	2462	wwPDB-VP
Average B, all atoms (Å ²)	10.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.68% 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	0.75	0/2552	0.85	0/3496

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	2462	0	2329	3	0
All	All	2462	0	2329	3	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 1.

All (3) 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:119:ASP:OD2	1:A:122:ILE:HD12	2.14	0.46
1:A:226:TYR:HA	1:A:295:GLN:O	2.21	0.41
1:A:224:LEU:HD22	1:A:293:GLY:HA2	2.02	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	347/419 (83%)	342 (99%)	5 (1%)	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	270/336 (80%)	269 (100%)	1 (0%)	91 65

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	40	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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	330/419 (78%)	4.12	326 (98%) 0 0	7, 10, 16, 21	0

All (326) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	325[A]	LEU	9.1
1	A	300[A]	ILE	8.9
1	A	299[A]	GLY	7.8
1	A	82	GLY	7.2
1	A	53	VAL	6.8
1	A	197	TRP	6.6
1	A	150	ALA	6.5
1	A	321	THR	6.5
1	A	298[A]	ALA	6.5
1	A	174[A]	ILE	6.5
1	A	194	PHE	6.4
1	A	79	TYR	6.3
1	A	304	ILE	6.2
1	A	90	TYR	6.2
1	A	195	TRP	6.1
1	A	144	PHE	6.1
1	A	30	LEU	6.1
1	A	264	PHE	6.1
1	A	78	SER	6.0
1	A	185	TYR	5.9
1	A	294	ILE	5.9
1	A	126	LEU	5.9
1	A	257	ALA	5.9
1	A	145	PHE	5.8
1	A	117	THR	5.8
1	A	80	GLY	5.8
1	A	109	ALA	5.8

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Mol	Chain	Res	Type	RSRZ
1	A	231	VAL	5.8
1	A	225	LEU	5.7
1	A	18	ILE	5.7
1	A	44	PHE	5.7
1	A	49	THR	5.7
1	A	116	PHE	5.7
1	A	128	LEU	5.7
1	A	152	LEU	5.7
1	A	272	VAL	5.7
1	A	323	PRO	5.7
1	A	17	TYR	5.6
1	A	327	PHE	5.6
1	A	133	LEU	5.6
1	A	58	ILE	5.5
1	A	236	TRP	5.5
1	A	202	TYR	5.5
1	A	308	VAL	5.5
1	A	273	ILE	5.5
1	A	75	TRP	5.5
1	A	169	TYR	5.5
1	A	302	ILE	5.4
1	A	312	ALA	5.4
1	A	173	PHE	5.4
1	A	278	ILE	5.4
1	A	320	ALA	5.4
1	A	209	PHE	5.3
1	A	42	TRP	5.3
1	A	94	VAL	5.3
1	A	255	CYS	5.3
1	A	34	PHE	5.3
1	A	235	TYR	5.3
1	A	259	LEU	5.2
1	A	226	TYR	5.2
1	A	248	VAL	5.2
1	A	280	PHE	5.2
1	A	50	ALA	5.2
1	A	203	ALA	5.2
1	A	309	ALA	5.2
1	A	186	THR	5.2
1	A	183	ILE	5.2
1	A	316	VAL	5.2
1	A	157	PHE	5.1

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Mol	Chain	Res	Type	RSRZ
1	A	305	PHE	5.1
1	A	77	ILE	5.1
1	A	283	ILE	5.1
1	A	176	THR	5.1
1	A	322	THR	5.1
1	A	310	LEU	5.1
1	A	10	ILE	5.1
1	A	136	VAL	5.0
1	A	314	PHE	5.0
1	A	251	TYR	5.0
1	A	69	LEU	5.0
1	A	227	LEU	5.0
1	A	234	ALA	4.9
1	A	21	VAL	4.9
1	A	124	GLY	4.9
1	A	70	LEU	4.9
1	A	161	LEU	4.9
1	A	132	THR	4.9
1	A	125	LEU	4.9
1	A	115	SER	4.9
1	A	159	ALA	4.8
1	A	277	TYR	4.8
1	A	188	VAL	4.8
1	A	27	ALA	4.8
1	A	220	THR	4.8
1	A	96	VAL	4.8
1	A	262	PHE	4.8
1	A	99	LEU	4.7
1	A	258	THR	4.7
1	A	252	VAL	4.7
1	A	253	PHE	4.7
1	A	317	PHE	4.7
1	A	89	VAL	4.7
1	A	112	VAL	4.7
1	A	43	VAL	4.6
1	A	130	PHE	4.6
1	A	232	VAL	4.6
1	A	266	VAL	4.6
1	A	246[A]	SER	4.6
1	A	122	ILE	4.6
1	A	228	PRO	4.6
1	A	32	LEU	4.6

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Mol	Chain	Res	Type	RSRZ
1	A	224	LEU	4.6
1	A	156	VAL	4.6
1	A	206[A]	SER	4.6
1	A	214	ILE	4.6
1	A	221	GLY	4.5
1	A	285	THR	4.5
1	A	239	VAL	4.5
1	A	290	CYS	4.5
1	A	9[A]	PRO	4.5
1	A	138	PRO	4.5
1	A	7	THR	4.5
1	A	229	ALA	4.5
1	A	271	ILE	4.5
1	A	315	VAL	4.5
1	A	74	THR	4.5
1	A	158	THR	4.5
1	A	36	THR	4.4
1	A	190	THR	4.4
1	A	171	PHE	4.4
1	A	263	THR	4.4
1	A	6	THR	4.4
1	A	135	THR	4.4
1	A	23	ILE	4.4
1	A	313	ALA	4.4
1	A	222	THR	4.3
1	A	187	ALA	4.3
1	A	275	GLY	4.3
1	A	106	VAL	4.3
1	A	180	THR	4.3
1	A	41	LEU	4.3
1	A	105	ALA	4.2
1	A	265	GLY	4.2
1	A	81	ASP	4.2
1	A	217	ILE	4.2
1	A	240[A]	SER	4.2
1	A	139	THR	4.2
1	A	101	VAL	4.2
1	A	291	PHE	4.2
1	A	13	LEU	4.2
1	A	282	PRO	4.2
1	A	60	THR	4.2
1	A	200	THR	4.2

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Mol	Chain	Res	Type	RSRZ
1	A	24	GLY	4.1
1	A	37	GLY	4.1
1	A	204	VAL	4.1
1	A	93	THR	4.1
1	A	230	THR	4.1
1	A	269	ALA	4.1
1	A	19	THR	4.1
1	A	20	PRO	4.1
1	A	155	PRO	4.1
1	A	72	GLY	4.1
1	A	121	THR	4.1
1	A	208	THR	4.1
1	A	100	THR	4.0
1	A	184	THR	4.0
1	A	51	SER	4.0
1	A	148	ALA	4.0
1	A	91	THR	4.0
1	A	168	THR	3.9
1	A	250	GLY	3.9
1	A	179	TYR	3.9
1	A	247	SER	3.9
1	A	306	GLY	3.9
1	A	218	ALA	3.9
1	A	25	THR	3.8
1	A	178	ALA	3.8
1	A	223	THR	3.8
1	A	324	THR	3.8
1	A	284	SER	3.8
1	A	103	GLY	3.8
1	A	29	THR	3.8
1	A	237	ALA	3.8
1	A	287	SER	3.8
1	A	293	GLY	3.8
1	A	143	THR	3.8
1	A	73	ALA	3.8
1	A	242	ALA	3.8
1	A	26	PRO	3.8
1	A	8	THR	3.8
1	A	191	LYS	3.7
1	A	119	ASP	3.7
1	A	114	SER	3.7
1	A	35	ASP	3.7

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Mol	Chain	Res	Type	RSRZ
1	A	87	GLY	3.7
1	A	71[A]	SER	3.7
1	A	66	THR	3.7
1	A	88	ASP	3.7
1	A	165	ALA	3.7
1	A	65	THR	3.6
1	A	120	SER	3.6
1	A	211	SER	3.6
1	A	249	GLY	3.6
1	A	104	GLN	3.6
1	A	102	THR	3.6
1	A	276[A]	ASP	3.6
1	A	2	THR	3.6
1	A	261	SER	3.6
1	A	216	GLY	3.6
1	A	260	PRO	3.5
1	A	163	TYR	3.5
1	A	146	ASP	3.5
1	A	292	GLY	3.5
1	A	16	ALA	3.5
1	A	256	SER	3.5
1	A	219	ASP	3.5
1	A	151	SER	3.5
1	A	56	GLN	3.5
1	A	5	ALA	3.5
1	A	55	GLY	3.5
1	A	59	TYR	3.4
1	A	182[A]	SER	3.4
1	A	279	ASP	3.4
1	A	172	GLY	3.4
1	A	233	SER	3.4
1	A	245	SER	3.4
1	A	33	ASP	3.4
1	A	127	GLY	3.4
1	A	270	ARG	3.4
1	A	12	SER	3.4
1	A	205	GLY	3.4
1	A	54	ASP	3.3
1	A	241	GLY	3.3
1	A	175	ASP	3.3
1	A	215[A]	ASP	3.3
1	A	207	GLY	3.3

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Mol	Chain	Res	Type	RSRZ
1	A	328	ALA	3.3
1	A	57	THR	3.3
1	A	61	PRO	3.2
1	A	31	ASN	3.2
1	A	46	SER	3.2
1	A	134	ASN	3.2
1	A	166	PRO	3.2
1	A	38	SER	3.2
1	A	48	THR	3.2
1	A	3	GLY	3.2
1	A	326	GLY	3.2
1	A	45	SER	3.2
1	A	289[A]	SER	3.2
1	A	97	GLY	3.1
1	A	281	GLY	3.1
1	A	301	GLY	3.1
1	A	149[A]	LYS	3.1
1	A	238	GLN	3.1
1	A	212	THR	3.1
1	A	162	GLY	3.1
1	A	28	GLN	3.1
1	A	286	GLY	3.1
1	A	14	ASP	3.1
1	A	295	GLN	3.0
1	A	62	SER	3.0
1	A	154[A]	SER	3.0
1	A	288	SER	3.0
1	A	318	ASN	3.0
1	A	181	GLY	3.0
1	A	192	GLN	3.0
1	A	311[A]	LYS	3.0
1	A	244	SER	3.0
1	A	254	PRO	3.0
1	A	40	ASP	3.0
1	A	319	GLY	3.0
1	A	4	SER	3.0
1	A	64	SER	3.0
1	A	147	ASN	2.9
1	A	131	SER	2.9
1	A	170	ASN	2.9
1	A	95	SER	2.9
1	A	297	SER	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	303	ASN	2.9
1	A	108	SER	2.9
1	A	68[A]	LYS	2.8
1	A	118	GLU	2.8
1	A	67	ALA	2.8
1	A	129	ALA	2.8
1	A	39	SER	2.8
1	A	137	SER	2.8
1	A	123	ASP	2.8
1	A	111	LYS	2.8
1	A	85	SER	2.8
1	A	92	ASP	2.8
1	A	140	GLN	2.8
1	A	198	THR	2.7
1	A	274	PRO	2.7
1	A	15	ASP	2.7
1	A	86	SER	2.7
1	A	296	SER	2.7
1	A	98	GLY	2.7
1	A	177	THR	2.7
1	A	267	GLY	2.7
1	A	167	GLY	2.6
1	A	76	SER	2.6
1	A	196	GLU	2.6
1	A	83	SER	2.6
1	A	201	GLY	2.6
1	A	189	SER	2.6
1	A	84	SER	2.6
1	A	329	SER	2.6
1	A	193	GLY	2.6
1	A	22	GLN	2.5
1	A	11	ASP	2.5
1	A	330	LYS	2.5
1	A	52	GLU	2.5
1	A	1	SER	2.5
1	A	213	SER	2.5
1	A	164	HIS	2.5
1	A	210	LYS	2.4
1	A	153	ASP	2.4
1	A	160	ASP	2.4
1	A	268[A]	SER	2.4
1	A	113	SER	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	199	SER	2.3
1	A	243	LYS	2.3
1	A	307	ASP	2.2
1	A	63	LYS	2.2
1	A	110	LYS	2.2

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.