



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 21, 2017 – 12:01 PM EDT

PDB ID : 2CDR
Title : Crystal structures of caspase-3 in complex with aza-peptide epoxide inhibitors.
Authors : Ganesan, R.; Jelakovic, S.; Campbell, A.J.; Li, Z.Z.; Asgian, J.L.; Powers, J.C.; Gruetter, M.G.
Deposited on : 2006-01-27
Resolution : 1.70 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

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20029077
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	rb-20029077

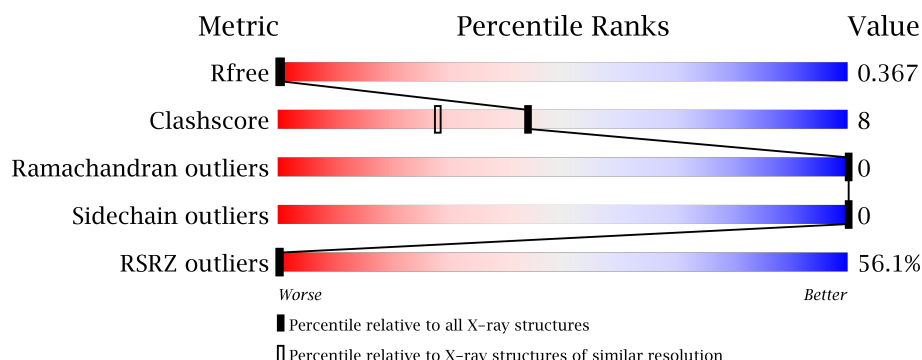
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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}	100719	3453 (1.70-1.70)
Clashscore	112137	3876 (1.70-1.70)
Ramachandran outliers	110173	3815 (1.70-1.70)
Sidechain outliers	110143	3815 (1.70-1.70)
RSRZ outliers	101464	3491 (1.70-1.70)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	147	<div> <div>47%</div> <div> <div></div> <div>87%</div> <div>13%</div> </div> </div>
2	B	103	<div> <div>69%</div> <div> <div></div> <div>80%</div> <div>20%</div> </div> </div>
3	I	5	<div> <div>40%</div> <div> <div></div> <div>80%</div> <div>20%</div> </div> </div>

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 2429 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 CASPASE-3 SUBUNIT P17.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	147	Total	C	N	O	S	0	0	0
			1161	716	208	228	9			

- Molecule 2 is a protein called CASPASE-3 SUBUNIT P12.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	103	Total	C	N	O	S	0	0	0
			843	547	135	154	7			

- Molecule 3 is a protein called AZA-PEPTIDE EXPOXIDE.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	I	5	Total	C	N	O	0	0	0
			62	42	6	14			

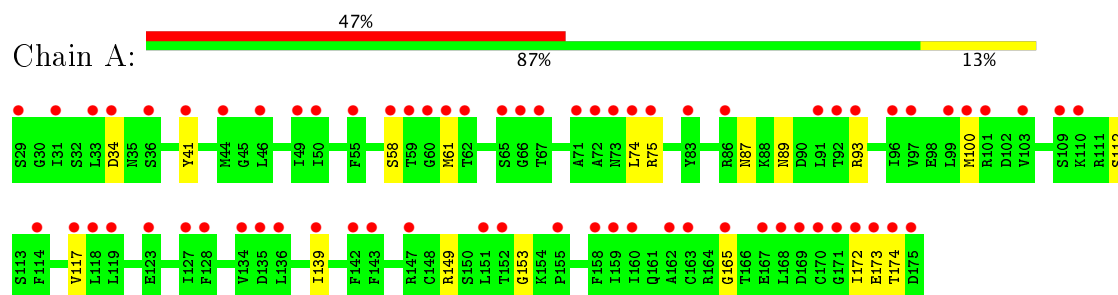
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	231	Total	O	0	0
			231	231		
4	B	126	Total	O	0	0
			126	126		
4	I	6	Total	O	0	0
			6	6		

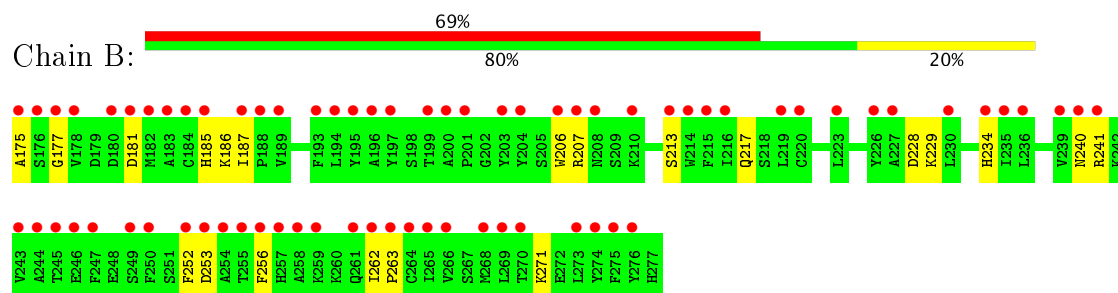
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

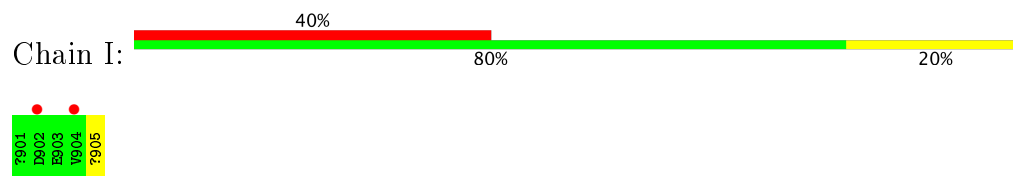
• Molecule 1: CASPASE-3 SUBUNIT P17



• Molecule 2: CASPASE-3 SUBUNIT P12



• Molecule 3: AZA-PEPTIDE EXPOXIDE



4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	67.47Å 83.78Å 96.25Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.49 – 1.70 19.80 – 1.70	Depositor EDS
% Data completeness (in resolution range)	97.9 (19.49-1.70) 95.6 (19.80-1.70)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.37 (at 1.70Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.177 , 0.204 0.368 , 0.367	Depositor DCC
R_{free} test set	2876 reflections (9.97%)	DCC
Wilson B-factor (Å ²)	17.8	Xtriage
Anisotropy	0.655	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 54.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.82	EDS
Total number of atoms	2429	wwPDB-VP
Average B, all atoms (Å ²)	21.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.48% 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: MY1, PHQ

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	0.29	0/1176	0.58	0/1574
2	B	0.34	0/868	0.63	0/1171
3	I	0.25	0/23	0.62	0/30
All	All	0.31	0/2067	0.60	0/2775

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	1161	0	1152	19	12
2	B	843	0	807	13	15
3	I	62	0	44	3	0
4	A	231	0	0	8	6
4	B	126	0	0	6	4
4	I	6	0	0	0	0
All	All	2429	0	2003	31	21

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 8.

All (31) 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)
2:B:185:HIS:O	4:B:2044:HOH:O	1.77	1.01
1:A:61:MET:HG2	3:I:905:MY1:H20	1.48	0.92
1:A:174:THR:OG1	4:A:2221:HOH:O	1.60	0.74
2:B:185:HIS:HB2	4:B:2044:HOH:O	1.88	0.74
1:A:87:ASN:HB2	4:A:2121:HOH:O	1.89	0.71
2:B:241:ARG:NH1	4:B:2096:HOH:O	2.19	0.70
2:B:252:PHE:HB2	4:B:2110:HOH:O	1.90	0.70
2:B:175:ALA:N	4:B:2028:HOH:O	2.27	0.67
2:B:228:ASP:OD1	2:B:229:LYS:HG3	1.97	0.64
1:A:100:MET:HG3	1:A:139:ILE:HG23	1.84	0.59
2:B:177:GLY:HA3	4:B:2035:HOH:O	2.04	0.58
1:A:74:LEU:HD13	1:A:117:VAL:HG11	1.87	0.57
1:A:153:GLY:HA3	4:A:2196:HOH:O	2.07	0.54
1:A:149:ARG:HH11	1:A:149:ARG:HA	1.74	0.53
1:A:165:GLY:HA2	3:I:905:MY1:H27	1.94	0.50
2:B:240:ASN:OD1	2:B:263:PRO:HB2	2.12	0.50
1:A:93:ARG:NH1	4:A:2131:HOH:O	2.45	0.50
2:B:206:TRP:HH2	2:B:256:PHE:HB3	1.76	0.50
2:B:213:SER:O	2:B:217:GLN:HG3	2.12	0.49
2:B:207:ARG:HA	2:B:213:SER:HA	1.96	0.47
1:A:34:ASP:OD1	2:B:271:LYS:HE2	2.15	0.46
1:A:89:ASN:O	4:A:2124:HOH:O	2.20	0.46
2:B:262:ILE:O	2:B:262:ILE:HG23	2.15	0.46
1:A:75:ARG:HD2	4:A:2121:HOH:O	2.16	0.45
1:A:149:ARG:NH1	1:A:149:ARG:HB3	2.32	0.45
1:A:149:ARG:HH11	1:A:149:ARG:CA	2.31	0.43
1:A:89:ASN:HB3	4:A:2038:HOH:O	2.18	0.43
1:A:153:GLY:CA	4:A:2196:HOH:O	2.65	0.43
1:A:74:LEU:CD1	1:A:117:VAL:HG11	2.48	0.42
1:A:41:TYR:HB2	1:A:112:SER:OG	2.21	0.41
1:A:61:MET:SD	3:I:905:MY1:H19	2.60	0.41

All (21) 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)
1:A:58:SER:OG	2:B:253:ASP:OD2[2_665]	1.16	1.04
1:A:173:GLU:OE2	2:B:186:LYS:CG[3_656]	1.49	0.71
1:A:173:GLU:OE2	2:B:186:LYS:CD[3_656]	1.53	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:172:ILE:N	2:B:187:ILE:O[3_656]	1.59	0.61
2:B:234:HIS:CE1	2:B:234:HIS:CE1[3_656]	1.74	0.46
1:A:172:ILE:O	2:B:187:ILE:N[3_656]	1.75	0.45
1:A:173:GLU:CD	2:B:186:LYS:CG[3_656]	1.76	0.44
2:B:234:HIS:NE2	2:B:234:HIS:NE2[3_656]	1.78	0.42
4:A:2126:HOH:O	4:B:2043:HOH:O[6_554]	1.79	0.41
4:A:2063:HOH:O	4:B:2060:HOH:O[2_665]	1.85	0.35
1:A:58:SER:OG	2:B:253:ASP:CG[2_665]	1.86	0.34
1:A:174:THR:CG2	2:B:187:ILE:CG2[3_656]	1.87	0.33
1:A:89:ASN:N	2:B:181:ASP:OD2[6_554]	1.90	0.30
4:A:2085:HOH:O	4:A:2085:HOH:O[3_656]	1.91	0.29
1:A:173:GLU:OE1	2:B:185:HIS:O[3_656]	2.00	0.20
4:A:2156:HOH:O	4:A:2156:HOH:O[3_656]	2.06	0.14
1:A:87:ASN:ND2	2:B:181:ASP:O[6_554]	2.09	0.11
4:A:2079:HOH:O	4:B:2045:HOH:O[6_554]	2.09	0.11
2:B:234:HIS:CE1	2:B:234:HIS:NE2[3_656]	2.13	0.07
1:A:173:GLU:OE1	2:B:186:LYS:CG[3_656]	2.14	0.06
4:A:2059:HOH:O	4:B:2107:HOH:O[2_665]	2.17	0.03

5.3 Torsion angles

5.3.1 Protein backbone

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	145/147 (99%)	140 (97%)	5 (3%)	0	100	100
2	B	101/103 (98%)	100 (99%)	1 (1%)	0	100	100
3	I	1/5 (20%)	1 (100%)	0	0	100	100
All	All	247/255 (97%)	241 (98%)	6 (2%)	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	132/132 (100%)	132 (100%)	0	100	100
2	B	90/90 (100%)	90 (100%)	0	100	100
3	I	3/3 (100%)	3 (100%)	0	100	100
All	All	225/225 (100%)	225 (100%)	0	100	100

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

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

Mol	Chain	Res	Type
1	A	80	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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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	147/147 (100%)	2.15	69 (46%) 0 0	12, 18, 29, 56	0
2	B	103/103 (100%)	2.72	71 (68%) 0 0	11, 15, 28, 34	0
3	I	3/5 (60%)	2.79	2 (66%) 0 0	23, 23, 26, 31	0
All	All	253/255 (99%)	2.39	142 (56%) 0 0	11, 17, 29, 56	0

All (142) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	168	LEU	7.3
2	B	204	TYR	7.1
2	B	180	ASP	6.5
1	A	61	MET	6.1
2	B	256	PHE	5.8
1	A	175	ASP	5.5
2	B	183	ALA	5.4
1	A	172	ILE	5.3
2	B	252	PHE	5.2
1	A	174	THR	5.2
2	B	184	CYS	4.9
2	B	250	PHE	4.8
2	B	262	ILE	4.8
1	A	170	CYS	4.8
3	I	904	VAL	4.8
1	A	33	LEU	4.7
2	B	206	TRP	4.7
1	A	128	PHE	4.6
2	B	255	THR	4.6
2	B	200	ALA	4.6
2	B	215	PHE	4.6
1	A	29	SER	4.4
2	B	203	TYR	4.4

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Mol	Chain	Res	Type	RSRZ
2	B	210	LYS	4.3
2	B	253	ASP	4.1
1	A	173	GLU	4.0
1	A	169	ASP	4.0
1	A	34	ASP	3.9
1	A	58	SER	3.8
2	B	199	THR	3.8
2	B	176	SER	3.7
1	A	96	ILE	3.7
2	B	246	GLU	3.7
2	B	266	VAL	3.7
2	B	201	PRO	3.6
2	B	273	LEU	3.6
2	B	247	PHE	3.6
1	A	60	GLY	3.6
2	B	182	MET	3.4
1	A	139	ILE	3.4
2	B	270	THR	3.4
2	B	177	GLY	3.3
2	B	254	ALA	3.3
2	B	243	VAL	3.3
2	B	264	CYS	3.3
2	B	241	ARG	3.3
1	A	62	THR	3.3
2	B	195	TYR	3.3
2	B	276	TYR	3.3
2	B	214	TRP	3.3
2	B	235	ILE	3.3
1	A	119	LEU	3.2
2	B	261	GLN	3.2
1	A	171	GLY	3.2
2	B	230	LEU	3.2
1	A	151	LEU	3.2
1	A	147	ARG	3.2
2	B	265	ILE	3.2
1	A	118	LEU	3.1
2	B	189	VAL	3.1
1	A	162	ALA	3.1
1	A	55	PHE	3.1
2	B	249	SER	3.1
1	A	93	ARG	3.0
2	B	187	ILE	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	134	VAL	3.0
1	A	36	SER	2.9
2	B	185	HIS	2.9
2	B	219	LEU	2.9
2	B	236	LEU	2.9
2	B	216	ILE	2.9
2	B	213	SER	2.9
1	A	114	PHE	2.9
2	B	258	ALA	2.9
2	B	239	VAL	2.9
1	A	59	THR	2.8
2	B	188	PRO	2.8
1	A	127	ILE	2.8
1	A	165	GLY	2.8
1	A	67	THR	2.8
2	B	220	CYS	2.8
1	A	163	CYS	2.7
2	B	178	VAL	2.7
2	B	227	ALA	2.7
1	A	155	PRO	2.7
1	A	65	SER	2.7
1	A	143	PHE	2.7
2	B	257	HIS	2.7
1	A	46	LEU	2.7
1	A	152	THR	2.7
2	B	193	PHE	2.7
2	B	244	ALA	2.6
1	A	100	MET	2.6
2	B	208	ASN	2.6
1	A	123	GLU	2.6
1	A	31	ILE	2.6
1	A	91	LEU	2.6
2	B	223	LEU	2.6
1	A	83	TYR	2.6
1	A	72	ALA	2.5
1	A	109	SER	2.5
1	A	99	LEU	2.5
1	A	160	ILE	2.4
2	B	275	PHE	2.4
2	B	226	TYR	2.4
1	A	136	LEU	2.4
2	B	181	ASP	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	50	ILE	2.3
1	A	71	ALA	2.3
1	A	142	PHE	2.3
1	A	110	LYS	2.3
2	B	197	TYR	2.3
2	B	175	ALA	2.3
2	B	196	ALA	2.3
2	B	263	PRO	2.3
2	B	269	LEU	2.2
2	B	259	LYS	2.2
1	A	101	ARG	2.2
1	A	66	GLY	2.2
1	A	75	ARG	2.2
1	A	73	ASN	2.2
1	A	97	VAL	2.2
1	A	44	MET	2.2
2	B	207	ARG	2.2
2	B	240	ASN	2.2
1	A	49	ILE	2.2
1	A	167	GLU	2.2
1	A	158	PHE	2.1
1	A	135	ASP	2.1
2	B	194	LEU	2.1
1	A	92	THR	2.1
1	A	159	ILE	2.1
2	B	268	MET	2.1
3	I	902	ASP	2.1
1	A	41	TYR	2.1
1	A	103	VAL	2.1
1	A	74	LEU	2.1
1	A	86	ARG	2.0
2	B	234	HIS	2.0
2	B	274	TYR	2.0
1	A	117	VAL	2.0
2	B	245	THR	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

There are no carbohydrates 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.