



Full wwPDB X-ray Structure Validation Report

Feb 28, 2014 – 11:11 PM GMT

PDB ID : 3IBC
Title : Crystal Structure of Caspase-7 incomplex with Acetyl-YVAD-CHO
Authors : Agniswamy, J.
Deposited on : 2009-07-15
Resolution : 2.75 Å(reported)

This is a full wwPDB 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/ValidationPDFNotes.html>

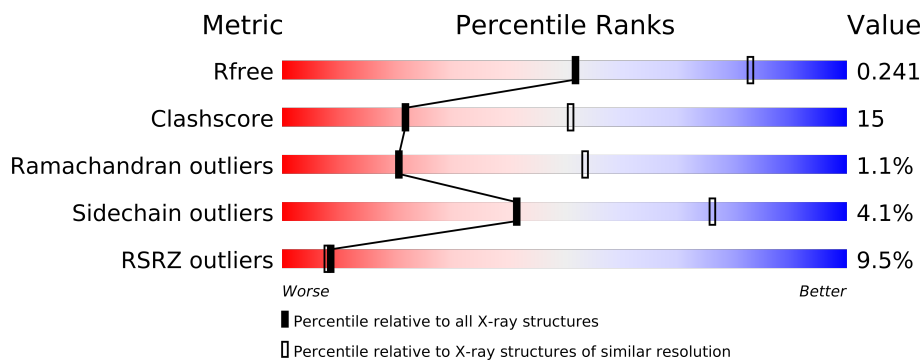
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 2.75 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}	66092	2406 (2.80-2.72)
Clashscore	79885	2995 (2.80-2.72)
Ramachandran outliers	78287	2941 (2.80-2.72)
Sidechain outliers	78261	2944 (2.80-2.72)
RSRZ outliers	66119	2409 (2.80-2.72)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	173	
1	C	173	
2	B	97	
2	D	97	
3	E	5	
3	F	5	

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 3857 atoms, of which 0 are hydrogen and 0 are deuterium.

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-7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	140	Total	C	N	O	S	0	0	0
			1100	691	188	210	11			
1	C	140	Total	C	N	O	S	0	0	0
			1100	691	188	210	11			

- Molecule 2 is a protein called Caspase-7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	92	Total	C	N	O	S	0	0	0
			758	487	128	139	4			
2	D	93	Total	C	N	O	S	0	0	0
			770	496	129	141	4			

- Molecule 3 is a protein called Acetyl-YVAD-CHO.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	E	5	Total	C	N	O	0	0	0
			35	23	4	8			
3	F	5	Total	C	N	O	0	0	0
			35	23	4	8			

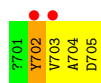
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	15	Total	O	0	0
			15	15		
4	B	8	Total	O	0	0
			8	8		
4	C	24	Total	O	0	0
			24	24		
4	D	12	Total	O	0	0
			12	12		



- Molecule 3: Acetyl-YVAD-CHO

Chain E:
A horizontal bar representing the sequence of Chain E. It is divided into four segments: green (residues 1-10), red (residues 11-20), yellow (residues 21-40), and orange (residues 41-50).



- Molecule 3: Acetyl-YVAD-CHO

Chain F:
A horizontal bar representing the sequence of Chain F. It is divided into four segments: green (residues 1-10), red (residues 11-20), yellow (residues 21-40), and orange (residues 41-50).



4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	88.25Å 88.25Å 188.15Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	50.00 – 2.75 48.48 – 2.75	Depositor EDS
% Data completeness (in resolution range)	83.5 (50.00-2.75) 83.8 (48.48-2.75)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.38 (at 2.77Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.203 , 0.242 0.204 , 0.241	Depositor DCC
R_{free} test set	915 reflections (4.81%)	DCC
Wilson B-factor (Å ²)	58.8	Xtriage
Anisotropy	0.615	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 61.4	EDS
Estimated twinning fraction	0.025 for -h,-k,l	Xtriage
L-test for twinning	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 20517 reflections	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	3857	wwPDB-VP
Average B, all atoms (Å ²)	73.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.27% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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: ACE

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	0.39	0/1117	0.61	1/1496 (0.1%)
1	C	0.41	0/1117	0.62	1/1496 (0.1%)
2	B	0.39	0/780	0.59	0/1054
2	D	0.40	0/793	0.62	0/1072
3	E	2.01	1/33 (3.0%)	1.07	0/45
3	F	2.10	1/33 (3.0%)	0.99	0/45
All	All	0.48	2/3873 (0.1%)	0.62	2/5208 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	F	805	ASP	C-O	11.67	1.45	1.23
3	E	705	ASP	C-O	11.14	1.44	1.23

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	452	GLY	N-CA-C	-5.99	98.14	113.10
1	A	152	GLY	N-CA-C	-5.96	98.20	113.10

There are no chirality outliers.

There are no planarity outliers.

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the

chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1100	0	1085	45	0
1	C	1100	0	1085	33	0
2	B	758	0	731	29	0
2	D	770	0	740	28	0
3	E	35	0	30	3	0
3	F	35	0	30	2	0
4	A	15	0	0	0	0
4	B	8	0	0	0	0
4	C	24	0	0	0	0
4	D	12	0	0	0	0
All	All	3857	0	3701	113	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 15.

All (113) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:80:LYS:HD2	1:A:80:LYS:H	1.08	1.18
1:A:175:LEU:HD11	1:C:495:ILE:HG21	1.51	0.93
1:A:191:LEU:HD23	2:B:285:LYS:HG3	1.53	0.90
1:A:80:LYS:N	1:A:80:LYS:HD2	1.93	0.76
1:A:195:ILE:HD11	1:C:472:LYS:HE3	1.65	0.76
2:B:233:ARG:HA	2:B:239:SER:HA	1.68	0.73
1:A:95:GLU:HG2	1:A:99:LYS:NZ	2.05	0.72
1:C:424:LYS:O	1:C:428:GLU:HG3	1.91	0.70
2:D:533:ARG:HA	2:D:539:SER:HA	1.74	0.68
1:A:163:THR:HG21	2:B:221:PHE:HE1	1.59	0.67
2:B:240:TRP:HE1	3:E:702:TYR:HE2	1.44	0.66
1:C:397:LEU:HD13	1:C:440:ILE:HG21	1.77	0.66
2:B:246:CYS:O	2:B:250:GLU:HG2	1.96	0.65
1:C:393:ASP:HB3	2:D:542:VAL:HG11	1.81	0.63
1:A:97:LEU:HD13	1:A:140:ILE:HG21	1.81	0.62
3:E:703:VAL:HG12	3:E:704:ALA:H	1.65	0.62
1:C:436:CYS:HB3	1:C:478:PRO:HG2	1.82	0.61
1:A:147:GLU:HG3	1:A:148:ASN:OD1	2.01	0.60
1:C:411:TYR:CG	1:C:422:LEU:HD11	2.37	0.59
1:A:153:LYS:HB2	1:A:153:LYS:NZ	2.18	0.59
2:D:566:ASN:OD1	2:D:589:PRO:HB2	2.02	0.58
1:C:464:ALA:O	1:C:467:ARG:HG3	2.02	0.58
1:C:436:CYS:CB	1:C:478:PRO:HG2	2.33	0.58

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:175:LEU:CD1	1:C:495:ILE:HG21	2.31	0.58
2:D:539:SER:O	2:D:543:GLN:HG3	2.04	0.58
1:A:95:GLU:HG2	1:A:99:LYS:HZ3	1.67	0.58
1:C:423:LEU:HD12	1:C:462:LEU:HD22	1.85	0.58
1:A:76:LYS:HB2	1:A:90:THR:HG21	1.86	0.57
1:A:60:TYR:CD1	1:A:178:PRO:HD3	2.38	0.57
2:D:560:GLN:O	2:D:564:ARG:HG3	2.04	0.57
2:D:588:ILE:HD12	2:D:589:PRO:HD2	1.86	0.57
2:B:212:LYS:HA	1:C:495:ILE:O	2.04	0.56
3:E:703:VAL:HG12	3:E:704:ALA:N	2.21	0.56
2:D:576:GLN:H	3:F:802:TYR:HD1	1.52	0.56
1:A:143:SER:HB3	1:A:150:ILE:HD11	1.86	0.56
2:B:257:GLU:OE2	2:B:258:ILE:HG22	2.05	0.56
2:D:571:ARG:O	2:D:573:PHE:N	2.39	0.56
2:B:265:VAL:O	2:B:269:VAL:HG23	2.06	0.56
2:B:271:ARG:O	2:B:273:PHE:N	2.39	0.55
1:A:136:CYS:HB3	1:A:178:PRO:HG2	1.89	0.54
2:D:546:CYS:O	2:D:550:GLU:HG3	2.07	0.54
1:C:384:MET:HB3	1:C:444:HIS:CD2	2.44	0.53
1:C:369:LYS:HE2	1:C:409:ILE:HD11	1.91	0.53
1:A:60:TYR:CD2	2:B:297:LYS:HB2	2.43	0.53
2:D:571:ARG:HH11	2:D:571:ARG:HG2	1.73	0.53
1:A:184:GLN:HE22	2:B:231:SER:HB3	1.75	0.52
1:A:145:GLY:O	1:A:186:CYS:HB2	2.10	0.52
1:A:80:LYS:CD	1:A:80:LYS:H	1.88	0.51
1:A:115:SER:HB2	1:A:154:ASP:OD2	2.11	0.51
1:A:195:ILE:O	1:A:196:GLN:HG3	2.10	0.51
1:A:189:THR:HG22	2:B:230:TYR:OH	2.11	0.50
1:C:398:PHE:C	1:C:398:PHE:CD1	2.84	0.50
2:D:557:GLU:OE2	2:D:558:ILE:HG22	2.11	0.50
1:A:70:CYS:HB3	1:A:108:VAL:HB	1.93	0.50
1:A:158:PRO:HB2	1:A:161:ASP:OD2	2.12	0.50
1:A:163:THR:HG21	2:B:221:PHE:CE1	2.45	0.50
2:B:274:GLU:OE2	2:B:284:GLU:HG2	2.12	0.50
2:B:214:PRO:HG3	2:D:586:LYS:HB3	1.93	0.49
1:C:491:LEU:CD2	2:D:530:TYR:HD2	2.24	0.49
1:A:136:CYS:CB	1:A:178:PRO:HG2	2.42	0.49
2:D:575:SER:HA	3:F:802:TYR:CD1	2.47	0.49
1:A:175:LEU:O	1:A:176:GLU:HB2	2.11	0.49
1:A:84:MET:HB3	1:A:144:HIS:CD2	2.48	0.49
1:A:175:LEU:HD11	1:C:495:ILE:CG2	2.34	0.48
2:B:271:ARG:HH11	2:B:271:ARG:HG3	1.77	0.48

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
2:B:266:ASN:OD1	2:B:289:PRO:HB2	2.14	0.48
1:C:496:GLN:HG2	1:C:496:GLN:O	2.14	0.48
1:A:189:THR:HA	2:B:230:TYR:CZ	2.49	0.47
1:C:491:LEU:HD21	2:D:530:TYR:HD2	1.79	0.47
1:A:194:GLY:HA2	2:D:513:ILE:O	2.15	0.47
2:D:571:ARG:NH1	2:D:571:ARG:HG2	2.30	0.47
2:B:220:LEU:HD23	2:B:220:LEU:C	2.35	0.47
2:B:249:LEU:C	2:B:251:GLU:H	2.17	0.46
2:B:257:GLU:OE1	2:B:259:MET:HB2	2.15	0.46
2:D:567:ASP:O	2:D:571:ARG:HG3	2.16	0.46
1:A:124:LYS:O	1:A:128:GLU:HG3	2.16	0.46
2:B:288:ILE:HG21	2:D:516:GLU:HB2	1.97	0.46
2:D:583:HIS:CE1	2:D:584:GLU:HG3	2.51	0.46
2:B:286:LYS:HB3	2:D:514:PRO:HG3	1.97	0.46
1:C:366:LYS:HE3	1:C:407:ASP:OD2	2.16	0.46
1:C:415:SER:HB2	1:C:454:ASP:OD2	2.16	0.46
1:C:436:CYS:HB2	1:C:478:PRO:O	2.17	0.45
1:A:195:ILE:O	1:A:196:GLN:OXT	2.35	0.45
1:C:372:ILE:HG12	1:C:440:ILE:HD12	1.98	0.45
1:A:153:LYS:HB2	1:A:153:LYS:HZ2	1.81	0.45
1:A:118:LYS:HE3	1:A:122:LEU:HD11	1.98	0.45
1:C:487:ARG:CZ	2:D:527:PRO:HG3	2.47	0.44
1:A:143:SER:OG	1:A:144:HIS:N	2.50	0.44
1:C:491:LEU:HD13	2:D:581:HIS:O	2.17	0.44
1:A:136:CYS:HB2	1:A:178:PRO:O	2.18	0.44
2:D:558:ILE:HG23	2:D:559:MET:N	2.33	0.44
2:B:234:SER:O	2:B:236:GLY:N	2.51	0.44
1:C:495:ILE:HG13	1:C:496:GLN:N	2.33	0.44
1:C:388:ASN:O	2:D:535:PRO:HA	2.18	0.43
2:B:244:ALA:O	2:B:248:ILE:HG12	2.18	0.43
1:C:411:TYR:CD2	1:C:422:LEU:HD11	2.54	0.43
1:C:489:THR:HA	2:D:530:TYR:CE1	2.54	0.43
1:A:120:GLN:NE2	1:A:162:LEU:HD23	2.33	0.43
1:C:416:CYS:H	1:C:454:ASP:HB2	1.83	0.43
1:A:121:ASP:O	1:A:125:LYS:HG2	2.19	0.43
2:B:239:SER:O	2:B:243:GLN:HG3	2.18	0.42
1:C:463:THR:HG22	1:C:481:PHE:CE2	2.54	0.42
1:C:495:ILE:HG13	1:C:496:GLN:H	1.85	0.42
1:A:61:ASN:ND2	1:A:64:PHE:CE2	2.87	0.42
2:B:251:GLU:HG2	2:B:252:HIS:CD2	2.54	0.41
1:C:442:LEU:HD23	1:C:484:GLN:HB3	2.01	0.41
2:D:520:LEU:HD23	2:D:520:LEU:C	2.41	0.41

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
2:D:588:ILE:HD12	2:D:589:PRO:CD	2.50	0.41
1:A:196:GLN:OE1	1:A:196:GLN:OXT	2.39	0.41
2:B:278:ASP:O	2:B:279:ASP:C	2.59	0.41
1:A:157:THR:HA	1:A:158:PRO:HD3	1.89	0.40
1:A:76:LYS:HB2	1:A:90:THR:CG2	2.51	0.40
1:A:188:GLY:HA3	2:B:228:GLY:HA2	2.04	0.40

There are no symmetry-related clashes.

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	138/173 (80%)	131 (95%)	7 (5%)	0	100	100
1	C	138/173 (80%)	130 (94%)	8 (6%)	0	100	100
2	B	90/97 (93%)	79 (88%)	9 (10%)	2 (2%)	10	29
2	D	91/97 (94%)	85 (93%)	4 (4%)	2 (2%)	10	29
3	E	3/5 (60%)	2 (67%)	0	1 (33%)	0	0
3	F	3/5 (60%)	3 (100%)	0	0	100	100
All	All	463/550 (84%)	430 (93%)	28 (6%)	5 (1%)	21	53

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	272	HIS
2	D	572	HIS
3	E	702	TYR
2	D	571	ARG
2	B	235	PRO

5.3.2 Protein sidechains ⓘ

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	120/152 (79%)	113 (94%)	7 (6%)	28	60
1	C	120/152 (79%)	115 (96%)	5 (4%)	40	75
2	B	84/88 (96%)	83 (99%)	1 (1%)	82	97
2	D	85/88 (97%)	82 (96%)	3 (4%)	48	81
3	E	3/3 (100%)	3 (100%)	0	100	100
3	F	3/3 (100%)	2 (67%)	1 (33%)	0	0
All	All	415/486 (85%)	398 (96%)	17 (4%)	41	76

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	59	GLN
1	A	80	LYS
1	A	81	VAL
1	A	92	LYS
1	A	153	LYS
1	A	193	ASP
1	A	196	GLN
2	B	255	ASP
1	C	392	LYS
1	C	398	PHE
1	C	408	VAL
1	C	449	VAL
1	C	454	ASP
2	D	513	ILE
2	D	554	LYS
2	D	581	HIS
3	F	805	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	144	HIS

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Mol	Chain	Res	Type
1	A	184	GLN
2	B	252	HIS
2	B	283	HIS
1	C	448	ASN

5.3.3 RNA ⓘ

There are no RNA chains in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

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	140/173 (80%)	0.44	10 (7%) 16 16	52, 74, 99, 107	0
1	C	140/173 (80%)	0.26	6 (4%) 34 36	49, 63, 91, 121	0
2	B	92/97 (94%)	0.69	11 (11%) 5 5	47, 69, 134, 144	0
2	D	93/97 (95%)	0.75	15 (16%) 2 3	46, 66, 134, 141	0
3	E	5/5 (100%)	1.76	2 (40%) 1 0	95, 100, 112, 112	0
3	F	5/5 (100%)	0.90	1 (20%) 2 1	80, 82, 94, 98	0
All	All	475/550 (86%)	0.52	45 (9%) 8 8	46, 68, 114, 144	0

All (45) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	580	PRO	5.9
2	B	282	PHE	5.2
2	B	278	ASP	5.1
2	B	277	SER	5.1
2	D	576	GLN	4.9
2	B	280	PRO	4.7
2	B	281	HIS	4.5
2	D	581	HIS	4.4
2	B	276	GLN	4.4
1	A	78	PHE	4.2
2	D	582	PHE	4.1
2	D	579	ASP	4.1
3	E	703	VAL	3.6
2	D	578	ASP	3.6
2	D	511	TYR	3.5
2	D	577	SER	3.4
1	C	363	ASN	3.2
2	B	230	TYR	3.2
2	D	584	GLU	3.2

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Mol	Chain	Res	Type	RSRZ
1	A	82	THR	3.1
2	D	575	SER	3.1
2	B	279	ASP	3.1
1	C	495	ILE	3.0
2	D	603	GLN	2.9
2	D	574	GLU	2.9
1	A	81	VAL	2.9
2	D	583	HIS	2.8
2	D	585	LYS	2.8
1	C	496	GLN	2.7
2	B	237	ARG	2.7
1	A	153	LYS	2.7
1	A	77	ASN	2.6
3	E	702	TYR	2.6
2	D	572	HIS	2.5
1	C	491	LEU	2.4
1	A	80	LYS	2.4
1	A	83	GLY	2.3
1	A	57	THR	2.2
1	C	494	GLY	2.2
1	A	172	LYS	2.2
2	B	235	PRO	2.2
1	C	493	ASP	2.2
3	F	802	TYR	2.2
1	A	88	ASN	2.1
2	B	212	LYS	2.1

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 ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.