



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 10:13 PM UTC

PDB ID : 4UXV / pdb_00004uxv
Title : Cytoplasmic domain of bacterial cell division protein EzrA
Authors : Cleverley, R.M.; Barrett, J.R.; Basle, A.; Khai-Bui, N.; Hewitt, L.; Solovyova, A.; Xu, Z.; Daniela, R.A.; Dixon, N.E.; Harry, E.J.; Oakley, A.J.; Vollmer, W.; Lewis, R.J.
Deposited on : 2014-08-27
Resolution : 3.96 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
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

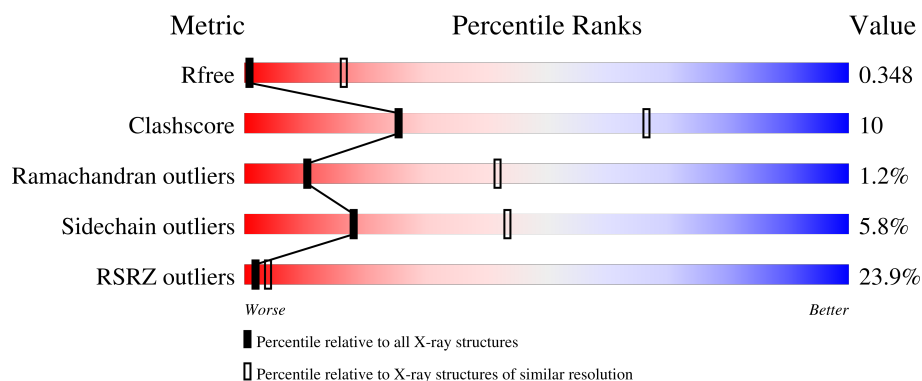
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.96 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	1046 (4.16-3.76)
Clashscore	190562	1019 (4.14-3.78)
Ramachandran outliers	187476	1031 (4.16-3.76)
Sidechain outliers	187428	1024 (4.16-3.76)
RSRZ outliers	180081	1046 (4.16-3.76)

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	545	23% 71% 22% • •

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 4264 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 SEPTATION RING FORMATION REGULATOR EZRA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	522	Total	C	N	O	S	0	0	0
			4264	2676	725	854	9			

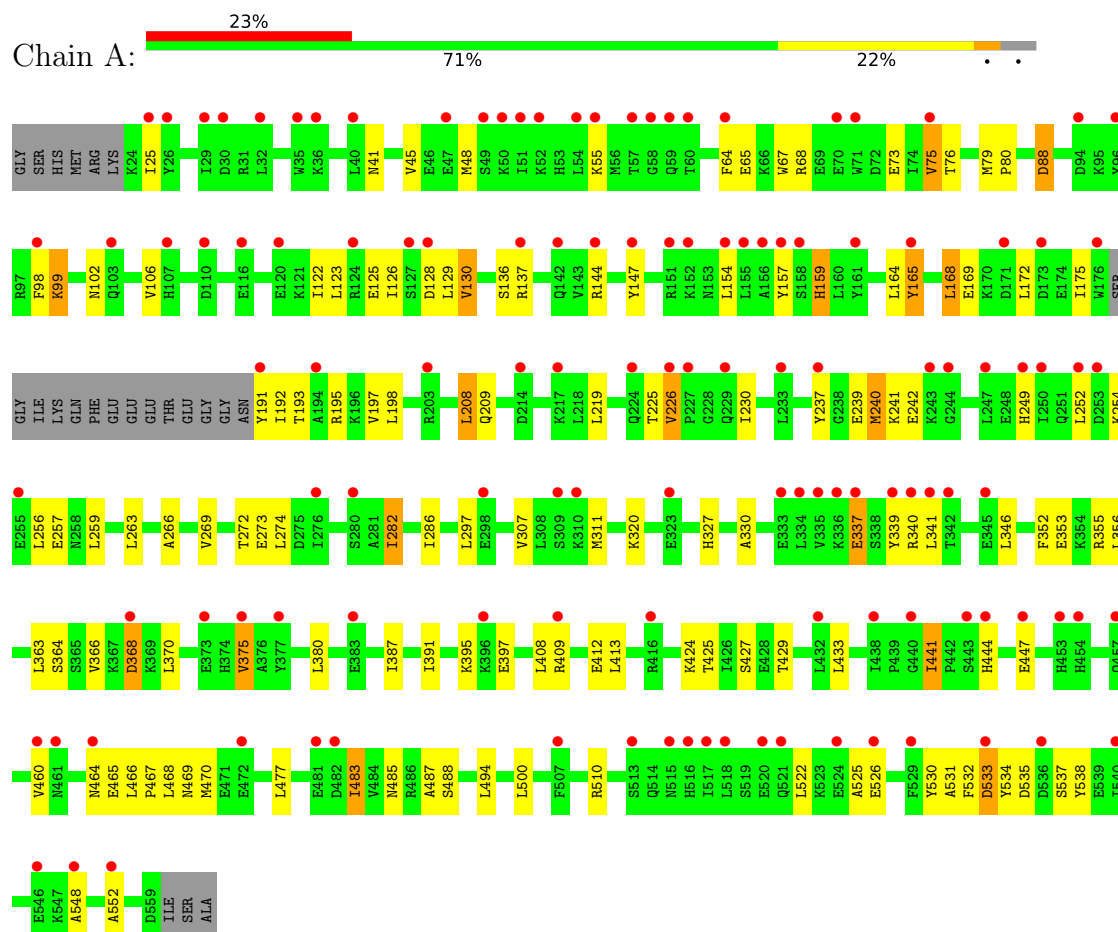
There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	18	GLY	-	expression tag	UNP O34894
A	19	SER	-	expression tag	UNP O34894
A	20	HIS	-	expression tag	UNP O34894
A	21	MET	-	expression tag	UNP O34894

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: SEPTATION RING FORMATION REGULATOR EZRA



4 Data and refinement statistics

Property	Value	Source
Space group	H 3 2	Depositor
Cell constants a, b, c, α , β , γ	222.70Å 222.70Å 184.12Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	29.04 – 3.96 29.04 – 3.96	Depositor EDS
% Data completeness (in resolution range)	99.7 (29.04-3.96) 99.5 (29.04-3.96)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.36 (at 3.98Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, R_{free}	0.317 , 0.348 0.318 , 0.348	Depositor DCC
R_{free} test set	1543 reflections (10.07%)	wwPDB-VP
Wilson B-factor (Å ²)	130.8	Xtriage
Anisotropy	0.903	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 236.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.44$, $\langle L^2 \rangle = 0.26$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	4264	wwPDB-VP
Average B, all atoms (Å ²)	155.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.69% 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	0.30	0/4320	0.78	4/5806 (0.1%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	249	HIS	N-CA-C	-6.16	104.55	114.09
1	A	483	ILE	N-CA-C	-5.72	107.69	113.47
1	A	226	VAL	CA-C-N	-5.46	114.05	119.56
1	A	226	VAL	C-N-CA	-5.46	114.05	119.56

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	4264	0	4265	82	0
All	All	4264	0	4265	82	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 10.

All (82) 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:137:ARG:HE	1:A:198:LEU:HD11	1.56	0.71
1:A:340:ARG:HE	1:A:408:LEU:HD12	1.55	0.69
1:A:164:LEU:HB3	1:A:208:LEU:HD21	1.77	0.66
1:A:429:THR:HG21	1:A:488:SER:HB2	1.79	0.64
1:A:88:ASP:OD1	1:A:88:ASP:N	2.33	0.61
1:A:125:GLU:O	1:A:129:LEU:N	2.26	0.61
1:A:339:TYR:HB3	1:A:469:ASN:HB2	1.83	0.61
1:A:526:GLU:HG2	1:A:534:TYR:HB3	1.84	0.59
1:A:99:LYS:HA	1:A:102:ASN:HB2	1.86	0.58
1:A:64:PHE:CE2	1:A:68:ARG:HB3	2.39	0.57
1:A:240:MET:HE2	1:A:297:LEU:HD22	1.87	0.56
1:A:172:LEU:HA	1:A:175:ILE:HD12	1.88	0.56
1:A:144:ARG:HH12	1:A:172:LEU:HB2	1.71	0.56
1:A:266:ALA:HB2	1:A:282:ILE:HG21	1.87	0.55
1:A:147:TYR:CZ	1:A:209:GLN:HB2	2.41	0.55
1:A:409:ARG:HH12	1:A:413:LEU:HD21	1.72	0.55
1:A:144:ARG:CZ	1:A:168:LEU:HB3	2.38	0.54
1:A:424:LYS:O	1:A:427:SER:OG	2.25	0.53
1:A:327:HIS:NE2	1:A:353:GLU:OE2	2.41	0.52
1:A:239:GLU:C	1:A:241:LYS:H	2.18	0.52
1:A:441:ILE:HG23	1:A:494:LEU:HD11	1.92	0.52
1:A:193:THR:O	1:A:197:VAL:HG23	2.10	0.52
1:A:548:ALA:O	1:A:552:ALA:N	2.43	0.51
1:A:165:TYR:CE1	1:A:169:GLU:HG3	2.45	0.51
1:A:341:LEU:HD12	1:A:346:LEU:HD22	1.93	0.51
1:A:157:TYR:HA	1:A:159:HIS:CE1	2.47	0.50
1:A:534:TYR:HA	1:A:537:SER:HB3	1.94	0.50
1:A:370:LEU:HD13	1:A:380:LEU:HD22	1.94	0.49
1:A:64:PHE:CZ	1:A:68:ARG:HB3	2.47	0.49
1:A:256:LEU:HD23	1:A:259:LEU:HD12	1.95	0.49
1:A:191:TYR:CG	1:A:192:ILE:N	2.81	0.48
1:A:175:ILE:HG21	1:A:198:LEU:HD21	1.93	0.48
1:A:25:ILE:HD12	1:A:25:ILE:H	1.78	0.48
1:A:259:LEU:O	1:A:263:LEU:HG	2.13	0.48
1:A:327:HIS:HA	1:A:330:ALA:HB3	1.96	0.47
1:A:460:VAL:O	1:A:464:ASN:HB2	2.14	0.47
1:A:366:VAL:HG13	1:A:380:LEU:HD11	1.97	0.47
1:A:254:LYS:HA	1:A:257:GLU:CD	2.40	0.47
1:A:272:THR:O	1:A:274:LEU:N	2.48	0.47
1:A:64:PHE:CE2	1:A:123:LEU:HD21	2.51	0.46
1:A:123:LEU:C	1:A:125:GLU:H	2.24	0.46
1:A:363:LEU:HD23	1:A:387:ILE:HD13	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:64:PHE:HA	1:A:67:TRP:HB2	1.97	0.46
1:A:263:LEU:HD23	1:A:286:ILE:HD13	1.98	0.45
1:A:320:LYS:HG3	1:A:395:LYS:HG2	1.99	0.45
1:A:99:LYS:HE3	1:A:102:ASN:HD22	1.80	0.45
1:A:444:HIS:ND1	1:A:447:GLU:OE1	2.49	0.45
1:A:157:TYR:HD2	1:A:219:LEU:HD22	1.81	0.45
1:A:355:ARG:NH1	1:A:397:GLU:OE2	2.51	0.44
1:A:269:VAL:O	1:A:274:LEU:HB2	2.17	0.44
1:A:530:TYR:CE2	1:A:532:PHE:HB3	2.53	0.44
1:A:129:LEU:HD22	1:A:195:ARG:NH1	2.33	0.44
1:A:242:GLU:C	1:A:375:VAL:HG11	2.43	0.44
1:A:65:GLU:HA	1:A:68:ARG:HD3	2.00	0.43
1:A:73:GLU:HA	1:A:76:THR:HG22	2.00	0.43
1:A:485:ASN:C	1:A:487:ALA:H	2.26	0.43
1:A:45:VAL:O	1:A:48:MET:HG3	2.19	0.43
1:A:41:ASN:ND2	1:A:75:VAL:HG21	2.34	0.43
1:A:64:PHE:CZ	1:A:123:LEU:HD21	2.53	0.43
1:A:412:GLU:HB3	1:A:470:MET:HE1	2.00	0.43
1:A:320:LYS:HE3	1:A:395:LYS:HG2	1.99	0.42
1:A:364:SER:O	1:A:368:ASP:HB2	2.19	0.42
1:A:522:LEU:HD13	1:A:537:SER:HB2	2.00	0.42
1:A:79:MET:N	1:A:80:PRO:HD2	2.35	0.42
1:A:79:MET:H	1:A:80:PRO:HD2	1.84	0.42
1:A:172:LEU:HA	1:A:172:LEU:HD23	1.83	0.42
1:A:477:LEU:HD23	1:A:477:LEU:HA	1.93	0.42
1:A:320:LYS:HD3	1:A:320:LYS:HA	1.87	0.41
1:A:531:ALA:HA	1:A:534:TYR:CE2	2.56	0.41
1:A:465:GLU:HB3	1:A:468:LEU:HA	2.02	0.41
1:A:123:LEU:HA	1:A:123:LEU:HD23	1.67	0.41
1:A:237:TYR:O	1:A:241:LYS:HG2	2.21	0.41
1:A:352:PHE:CE2	1:A:397:GLU:HB3	2.56	0.41
1:A:525:ALA:HB1	1:A:533:ASP:HB3	2.03	0.41
1:A:130:VAL:HG23	1:A:191:TYR:CD2	2.56	0.41
1:A:391:ILE:HB	1:A:395:LYS:HE3	2.02	0.41
1:A:122:ILE:O	1:A:126:ILE:HG13	2.21	0.41
1:A:466:LEU:HA	1:A:467:PRO:HA	1.94	0.40
1:A:175:ILE:HD13	1:A:198:LEU:HD23	2.04	0.40
1:A:307:VAL:HG13	1:A:311:MET:HG2	2.04	0.40
1:A:425:THR:O	1:A:429:THR:HG23	2.22	0.40
1:A:537:SER:OG	1:A:538:TYR:N	2.55	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	518/545 (95%)	459 (89%)	53 (10%)	6 (1%)	10	42

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	55	LYS
1	A	240	MET
1	A	252	LEU
1	A	273	GLU
1	A	98	PHE
1	A	337	GLU

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	466/484 (96%)	439 (94%)	27 (6%)	18	43

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	75	VAL
1	A	88	ASP
1	A	99	LYS
1	A	106	VAL
1	A	128	ASP

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Mol	Chain	Res	Type
1	A	130	VAL
1	A	136	SER
1	A	154	LEU
1	A	159	HIS
1	A	165	TYR
1	A	168	LEU
1	A	208	LEU
1	A	225	THR
1	A	226	VAL
1	A	230	ILE
1	A	282	ILE
1	A	337	GLU
1	A	356	LEU
1	A	368	ASP
1	A	375	VAL
1	A	433	LEU
1	A	441	ILE
1	A	483	ILE
1	A	500	LEU
1	A	510	ARG
1	A	533	ASP
1	A	535	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	159	HIS
1	A	204	ASN
1	A	258	ASN
1	A	414	GLN

5.3.3 RNA ⓘ

There are no RNA molecules 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 [i](#)

There are no oligosaccharides 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	522/545 (95%)	1.25	125 (23%) 2 4	31, 143, 266, 399	0

All (125) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	340	ARG	7.0
1	A	157	TYR	6.8
1	A	546	GLU	6.3
1	A	247	LEU	5.8
1	A	52	LYS	5.5
1	A	98	PHE	5.4
1	A	154	LEU	5.4
1	A	158	SER	5.4
1	A	461	ASN	5.4
1	A	57	THR	5.1
1	A	176	TRP	5.1
1	A	55	LYS	4.8
1	A	58	GLY	4.5
1	A	444	HIS	4.5
1	A	173	ASP	4.5
1	A	453	HIS	4.4
1	A	161	TYR	4.0
1	A	120	GLU	3.9
1	A	50	LYS	3.9
1	A	155	LEU	3.8
1	A	64	PHE	3.8
1	A	116	GLU	3.6
1	A	191	TYR	3.6
1	A	71	TRP	3.6
1	A	438	ILE	3.5
1	A	137	ARG	3.5
1	A	481	GLU	3.5

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Mol	Chain	Res	Type	RSRZ
1	A	40	LEU	3.5
1	A	377	TYR	3.4
1	A	255	GLU	3.3
1	A	341	LEU	3.3
1	A	194	ALA	3.3
1	A	513	SER	3.3
1	A	51	ILE	3.3
1	A	54	LEU	3.3
1	A	165	TYR	3.3
1	A	26	TYR	3.2
1	A	224	GLN	3.2
1	A	521	GLN	3.1
1	A	103	GLN	3.0
1	A	237	TYR	3.0
1	A	464	ASN	3.0
1	A	156	ALA	3.0
1	A	243	LYS	2.9
1	A	552	ALA	2.9
1	A	249	HIS	2.9
1	A	457	GLN	2.9
1	A	47	GLU	2.9
1	A	229	GLN	2.9
1	A	533	ASP	2.9
1	A	396	LYS	2.9
1	A	94	ASP	2.8
1	A	227	PRO	2.8
1	A	144	ARG	2.8
1	A	29	ILE	2.8
1	A	472	GLU	2.8
1	A	517	ILE	2.8
1	A	336	LYS	2.8
1	A	128	ASP	2.7
1	A	75	VAL	2.7
1	A	339	TYR	2.7
1	A	345	GLU	2.7
1	A	515	ASN	2.7
1	A	409	ARG	2.7
1	A	310	LYS	2.7
1	A	337	GLU	2.7
1	A	373	GLU	2.7
1	A	250	ILE	2.6
1	A	529	PHE	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	25	ILE	2.6
1	A	107	HIS	2.6
1	A	524	GLU	2.6
1	A	540	ILE	2.5
1	A	335	VAL	2.5
1	A	203	ARG	2.5
1	A	416	ARG	2.5
1	A	171	ASP	2.5
1	A	342	THR	2.5
1	A	375	VAL	2.5
1	A	333	GLU	2.5
1	A	460	VAL	2.5
1	A	298	GLU	2.4
1	A	110	ASP	2.4
1	A	214	ASP	2.4
1	A	152	LYS	2.4
1	A	276	ILE	2.4
1	A	124	ARG	2.4
1	A	520	GLU	2.4
1	A	151	ARG	2.4
1	A	30	ASP	2.4
1	A	507	PHE	2.4
1	A	432	LEU	2.3
1	A	60	THR	2.3
1	A	142	GLN	2.3
1	A	280	SER	2.3
1	A	518	LEU	2.3
1	A	70	GLU	2.3
1	A	35	TRP	2.3
1	A	147	TYR	2.3
1	A	548	ALA	2.3
1	A	253	ASP	2.3
1	A	440	GLY	2.3
1	A	454	HIS	2.2
1	A	32	LEU	2.2
1	A	447	GLU	2.2
1	A	368	ASP	2.2
1	A	233	LEU	2.2
1	A	59	GLN	2.1
1	A	443	SER	2.1
1	A	244	GLY	2.1
1	A	252	LEU	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	127	SER	2.1
1	A	516	HIS	2.1
1	A	226	VAL	2.1
1	A	482	ASP	2.1
1	A	323	GLU	2.1
1	A	526	GLU	2.1
1	A	49	SER	2.1
1	A	96	TYR	2.1
1	A	309	SER	2.1
1	A	334	LEU	2.0
1	A	217	LYS	2.0
1	A	536	ASP	2.0
1	A	36	LYS	2.0
1	A	383	GLU	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 [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.