



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 02:11 PM UTC

PDB ID : 6VZO / pdb_00006vzo
Title : Crystal structure of human PPARgamma ligand binding domain (Protein delipidated by denature and refold)
Authors : Shang, J.; Kojetin, D.J.
Deposited on : 2020-02-28
Resolution : 2.27 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
Xtrriage (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

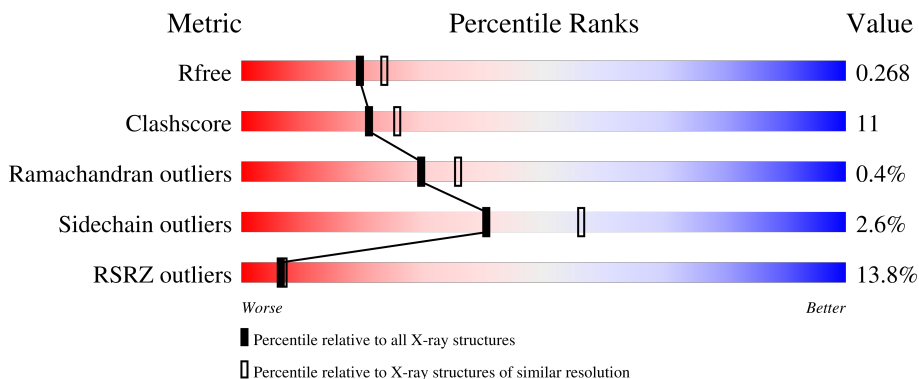
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.27 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	9078 (2.30-2.26)
Clashscore	190562	9802 (2.30-2.26)
Ramachandran outliers	187476	9690 (2.30-2.26)
Sidechain outliers	187428	9691 (2.30-2.26)
RSRZ outliers	180081	9085 (2.30-2.26)

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	275	
1	B	275	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4392 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 Peroxisome proliferator-activated receptor gamma.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	260	2083	1346	339	388	10	0	0	0
1	B	254	2039	1320	334	376	9	0	0	0

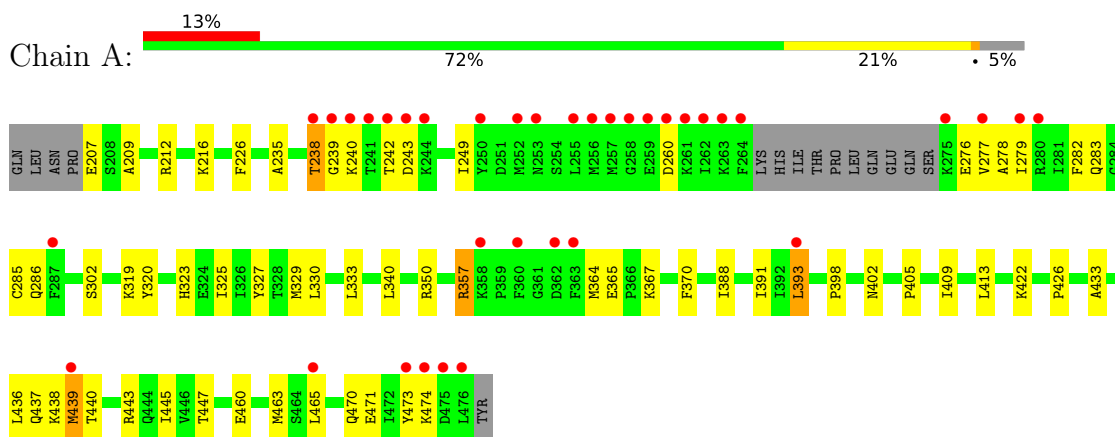
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
2	A	138	138	138	0	0
2	B	132	132	132	0	0

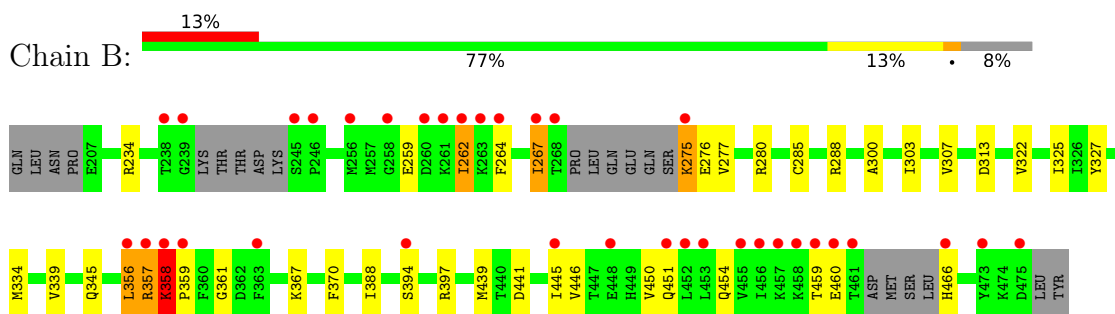
3 Residue-property plots [i](#)

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: Peroxisome proliferator-activated receptor gamma



- Molecule 1: Peroxisome proliferator-activated receptor gamma



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	93.04Å 62.10Å 118.85Å 90.00° 102.22° 90.00°	Depositor
Resolution (Å)	58.08 – 2.27 58.08 – 2.27	Depositor EDS
% Data completeness (in resolution range)	99.5 (58.08-2.27) 99.5 (58.08-2.27)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.81 (at 2.27Å)	Xtrriage
Refinement program	PHENIX 1.11.1_2575	Depositor
R, R_{free}	0.218 , 0.271 0.224 , 0.268	Depositor DCC
R_{free} test set	1540 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	22.7	Xtrriage
Anisotropy	0.000	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 42.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	4392	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.17% 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

5.1 Standard geometry

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	0.63	3/2117 (0.1%)	0.76	2/2850 (0.1%)
1	B	0.70	1/2072 (0.0%)	0.79	4/2787 (0.1%)
All	All	0.66	4/4189 (0.1%)	0.78	6/5637 (0.1%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	358	LYS	C-N	19.54	1.49	1.33
1	A	426	PRO	C-O	-7.24	1.15	1.24
1	A	405	PRO	C-O	-5.90	1.16	1.24
1	A	249	ILE	C-O	-5.26	1.18	1.24

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	358	LYS	CA-C-N	10.10	133.26	121.04
1	B	358	LYS	C-N-CA	10.10	133.26	121.04
1	A	243	ASP	N-CA-C	-7.63	101.39	111.24
1	A	240	LYS	N-CA-C	-7.53	104.60	114.31
1	B	356	LEU	CA-C-N	5.77	132.55	121.54
1	B	356	LEU	C-N-CA	5.77	132.55	121.54

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	2083	0	2148	53	0
1	B	2039	0	2100	40	0
2	A	138	0	0	6	0
2	B	132	0	0	7	0
All	All	4392	0	4248	92	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 11.

All (92) 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:B:358:LYS:HB3	1:B:359:PRO:CD	1.50	1.33
1:B:358:LYS:HB3	1:B:359:PRO:HD2	1.17	1.10
1:B:358:LYS:HB3	1:B:359:PRO:HD3	1.38	1.01
1:B:358:LYS:CB	1:B:359:PRO:CD	2.40	0.98
1:B:358:LYS:HE3	1:B:459:THR:HG23	1.45	0.97
1:A:393:LEU:HD21	1:A:409:ILE:CG2	1.96	0.94
1:A:393:LEU:CD2	1:A:409:ILE:CG2	2.48	0.92
1:A:393:LEU:CD2	1:A:409:ILE:HB	2.00	0.91
1:A:393:LEU:HD22	1:A:409:ILE:HG22	1.59	0.84
1:A:393:LEU:HD21	1:A:409:ILE:HG21	1.61	0.82
1:B:358:LYS:CB	1:B:359:PRO:HD3	2.08	0.80
1:A:393:LEU:HD13	1:A:413:LEU:CD1	2.13	0.79
1:A:393:LEU:CD2	1:A:409:ILE:CB	2.60	0.79
1:B:325:ILE:HD12	1:B:388:ILE:HG23	1.66	0.78
1:B:358:LYS:CE	1:B:459:THR:HG23	2.16	0.75
1:A:212:ARG:O	1:A:216:LYS:HG2	1.88	0.73
1:A:391:ILE:HG12	1:A:439:MET:HE3	1.71	0.73
1:B:327:TYR:CE2	1:B:367:LYS:HE3	2.23	0.73
1:A:285:CYS:SG	2:A:628:HOH:O	2.47	0.73
1:A:393:LEU:HD13	1:A:413:LEU:HD11	1.69	0.72
1:B:441:ASP:O	1:B:445:ILE:HG13	1.88	0.71
1:A:393:LEU:CD2	1:A:409:ILE:HG22	2.17	0.71
1:A:319:LYS:HZ3	1:A:474:LYS:HG3	1.54	0.71
1:A:438:LYS:NZ	2:A:501:HOH:O	2.21	0.69
1:A:393:LEU:HD23	1:A:409:ILE:HB	1.72	0.69
1:B:460:GLU:HG2	1:B:460:GLU:O	1.91	0.69
1:A:239:GLY:HA2	2:A:541:HOH:O	1.93	0.69
1:B:451:GLN:HA	1:B:454:GLN:HG2	1.77	0.67
1:B:262:ILE:HD11	1:B:345:GLN:HB3	1.77	0.66
1:A:325:ILE:HG23	1:A:388:ILE:HD12	1.78	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:393:LEU:HD21	1:A:409:ILE:CB	2.26	0.64
1:A:370:PHE:HB2	1:A:445:ILE:HD11	1.82	0.62
1:B:276:GLU:HG2	1:B:277:VAL:N	2.13	0.62
1:B:370:PHE:HB2	1:B:445:ILE:HD11	1.81	0.61
1:B:358:LYS:CB	1:B:359:PRO:HD2	2.11	0.60
1:A:393:LEU:HD22	1:A:409:ILE:CG2	2.22	0.60
1:A:350:ARG:NH2	1:A:365:GLU:OE2	2.28	0.60
1:B:358:LYS:HE3	1:B:459:THR:CG2	2.28	0.59
1:A:302:SER:HB3	2:A:513:HOH:O	2.02	0.58
1:A:319:LYS:NZ	1:A:474:LYS:CG	2.66	0.58
1:B:285:CYS:SG	2:B:623:HOH:O	2.54	0.58
1:B:358:LYS:CD	1:B:359:PRO:HD3	2.34	0.58
1:B:288:ARG:NH2	2:B:502:HOH:O	2.38	0.57
1:A:319:LYS:NZ	1:A:474:LYS:HG3	2.20	0.56
1:A:437:GLN:O	1:A:440:THR:HG22	2.05	0.56
1:A:463:MET:HG2	2:A:504:HOH:O	2.06	0.56
1:B:275:LYS:O	1:B:280:ARG:NH1	2.38	0.56
1:A:242:THR:O	1:A:242:THR:OG1	2.22	0.55
1:B:466:HIS:N	2:B:509:HOH:O	2.40	0.55
1:B:276:GLU:HG2	1:B:277:VAL:H	1.71	0.54
1:A:279:ILE:O	1:A:283:GLN:HG2	2.07	0.53
1:B:358:LYS:CG	1:B:359:PRO:HD3	2.38	0.52
1:A:276:GLU:OE2	1:A:357:ARG:HD3	2.09	0.52
1:B:275:LYS:HB3	1:B:280:ARG:HD3	1.92	0.51
1:A:207:GLU:HG3	1:A:209:ALA:H	1.75	0.51
1:A:422:LYS:HG3	2:A:594:HOH:O	2.12	0.50
1:A:235:ALA:O	1:A:238:THR:OG1	2.28	0.50
1:A:471:GLU:HA	1:A:474:LYS:HE2	1.94	0.50
1:A:226:PHE:CG	1:A:329:MET:HE1	2.47	0.49
1:B:313:ASP:OD2	2:B:501:HOH:O	2.20	0.49
1:A:320:TYR:CZ	1:A:398:PRO:HG2	2.47	0.49
1:B:446:VAL:O	1:B:450:VAL:HG13	2.12	0.49
1:A:465:LEU:HD23	1:A:470:GLN:HG2	1.96	0.47
1:A:333:LEU:HB3	1:A:340:LEU:HB2	1.96	0.47
1:A:323:HIS:CE1	1:A:473:TYR:CE1	3.03	0.46
1:A:436:LEU:O	1:A:439:MET:HB2	2.16	0.46
1:B:334:MET:HG2	1:B:339:VAL:HB	1.98	0.46
1:B:234:ARG:HD3	1:B:234:ARG:HA	1.81	0.45
1:A:357:ARG:O	1:A:357:ARG:HG3	2.16	0.45
1:A:282:PHE:O	1:A:286:GLN:HG2	2.17	0.45
1:B:234:ARG:NH2	2:B:517:HOH:O	2.49	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:319:LYS:HZ1	1:A:474:LYS:CG	2.30	0.44
1:A:370:PHE:CB	1:A:445:ILE:HD11	2.46	0.44
1:A:443:ARG:O	1:A:447:THR:HG23	2.17	0.44
1:A:319:LYS:HZ1	1:A:474:LYS:HG2	1.83	0.44
1:B:267:ILE:N	2:B:518:HOH:O	2.50	0.44
1:A:319:LYS:HZ3	1:A:474:LYS:CG	2.24	0.44
1:A:433:ALA:O	1:A:437:GLN:HG3	2.19	0.43
1:B:307:VAL:HG22	2:B:552:HOH:O	2.16	0.43
1:A:437:GLN:OE1	1:B:439:MET:HE1	2.18	0.43
1:B:370:PHE:HB2	1:B:445:ILE:CD1	2.48	0.43
1:B:259:GLU:HG2	1:B:264:PHE:HD2	1.84	0.42
1:B:264:PHE:HD1	1:B:264:PHE:HA	1.72	0.42
1:B:394:SER:O	1:B:397:ARG:HG2	2.20	0.42
1:A:393:LEU:HD21	1:A:409:ILE:HB	1.86	0.41
1:B:300:ALA:HA	1:B:303:ILE:HD12	2.02	0.41
1:B:327:TYR:CZ	1:B:367:LYS:HE3	2.56	0.41
1:A:330:LEU:HD21	1:A:364:MET:HE1	2.03	0.41
1:A:327:TYR:CE1	1:A:367:LYS:HE3	2.55	0.41
1:A:260:ASP:OD1	1:A:260:ASP:N	2.51	0.40
1:A:277:VAL:HG13	1:A:278:ALA:N	2.37	0.40
1:B:356:LEU:HB2	1:B:361: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	256/275 (93%)	249 (97%)	7 (3%)	0	100	100
1	B	246/275 (90%)	236 (96%)	8 (3%)	2 (1%)	16	18
All	All	502/550 (91%)	485 (97%)	15 (3%)	2 (0%)	30	36

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	357	ARG
1	B	358	LYS

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	233/248 (94%)	227 (97%)	6 (3%)	40 56
1	B	227/248 (92%)	221 (97%)	6 (3%)	40 56
All	All	460/496 (93%)	448 (97%)	12 (3%)	40 56

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	238	THR
1	A	357	ARG
1	A	393	LEU
1	A	402	ASN
1	A	439	MET
1	A	460	GLU
1	B	262	ILE
1	B	267	ILE
1	B	275	LYS
1	B	322	VAL
1	B	357	ARG
1	B	358	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	402	ASN
1	A	430	GLN
1	B	470	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](#)

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	260/275 (94%)	0.60	36 (13%) 6 7	7, 26, 61, 92	0
1	B	254/275 (92%)	0.56	35 (13%) 6 7	7, 27, 62, 74	0
All	All	514/550 (93%)	0.58	71 (13%) 6 7	7, 27, 62, 92	0

All (71) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	476	LEU	7.8
1	B	239	GLY	4.8
1	B	263	LYS	4.8
1	A	243	ASP	4.8
1	A	264	PHE	4.7
1	A	241	THR	4.7
1	A	262	ILE	4.7
1	B	459	THR	4.7
1	A	244	LYS	4.7
1	A	475	ASP	4.6
1	B	461	THR	4.5
1	A	240	LYS	4.5
1	A	257	MET	4.4
1	A	474	LYS	4.4
1	A	238	THR	4.3
1	B	245	SER	4.3
1	A	261	LYS	4.2
1	A	258	GLY	4.2
1	A	256	MET	4.1
1	A	239	GLY	4.0
1	B	456	ILE	3.8
1	A	275	LYS	3.8
1	B	475	ASP	3.8
1	B	260	ASP	3.7

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Mol	Chain	Res	Type	RSRZ
1	A	242	THR	3.6
1	B	458	LYS	3.6
1	B	356	LEU	3.5
1	A	253	ASN	3.4
1	A	260	ASP	3.4
1	A	263	LYS	3.2
1	B	256	MET	3.1
1	B	460	GLU	3.1
1	A	362	ASP	3.0
1	B	267	ILE	2.9
1	A	252	MET	2.8
1	B	261	LYS	2.8
1	A	277	VAL	2.8
1	A	393	LEU	2.8
1	B	268	THR	2.7
1	A	250	TYR	2.6
1	A	287	PHE	2.6
1	B	238	THR	2.6
1	B	466	HIS	2.6
1	B	363	PHE	2.6
1	B	455	VAL	2.6
1	A	363	PHE	2.5
1	A	465	LEU	2.5
1	B	473	TYR	2.5
1	A	358	LYS	2.5
1	B	358	LYS	2.5
1	B	451	GLN	2.4
1	B	394	SER	2.4
1	A	280	ARG	2.3
1	A	473	TYR	2.3
1	B	359	PRO	2.3
1	B	457	LYS	2.3
1	A	259	GLU	2.2
1	A	439	MET	2.2
1	B	357	ARG	2.1
1	A	279	ILE	2.1
1	B	275	LYS	2.1
1	B	258	GLY	2.1
1	A	255	LEU	2.1
1	B	445	ILE	2.1
1	B	264	PHE	2.1
1	B	448	GLU	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	452	LEU	2.1
1	B	262	ILE	2.0
1	B	246	PRO	2.0
1	A	360	PHE	2.0
1	B	453	LEU	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.