



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 13, 2023 – 05:51 PM EST

PDB ID : 8TS7
Title : Human PI3K p85alpha/p110alpha
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Deposited on : 2023-08-11
Resolution : 2.71 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 : 2.36
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) : 2.36

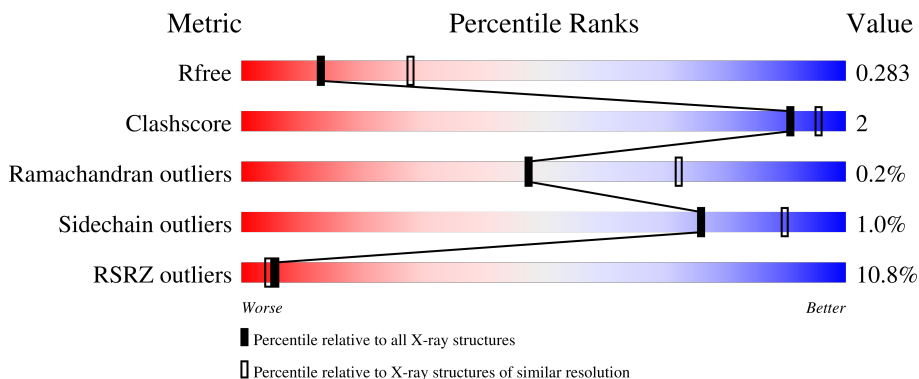
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.71 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	3359 (2.74-2.70)
Clashscore	141614	3686 (2.74-2.70)
Ramachandran outliers	138981	3622 (2.74-2.70)
Sidechain outliers	138945	3623 (2.74-2.70)
RSRZ outliers	127900	3276 (2.74-2.70)

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	1063	 8% 89% 5% 6%
2	B	300	 15% 84% 5% 11%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 20858 atoms, of which 10434 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 Phosphatidylinositol 4,5-bisphosphate 3-kinase catalytic subunit alpha isoform.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	997	16361	5224	8196	1399	1474	68	114	0	0

There are 11 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-9	GLY	-	expression tag	UNP P42336
A	-8	SER	-	expression tag	UNP P42336
A	-7	PRO	-	expression tag	UNP P42336
A	-6	GLY	-	expression tag	UNP P42336
A	-5	ILE	-	expression tag	UNP P42336
A	-4	SER	-	expression tag	UNP P42336
A	-3	GLY	-	expression tag	UNP P42336
A	-2	GLY	-	expression tag	UNP P42336
A	-1	GLY	-	expression tag	UNP P42336
A	0	GLY	-	expression tag	UNP P42336
A	1	GLY	-	expression tag	UNP P42336

- Molecule 2 is a protein called Phosphatidylinositol 3-kinase regulatory subunit alpha.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
2	B	266	4497	1414	2238	403	435	7	141	0	0

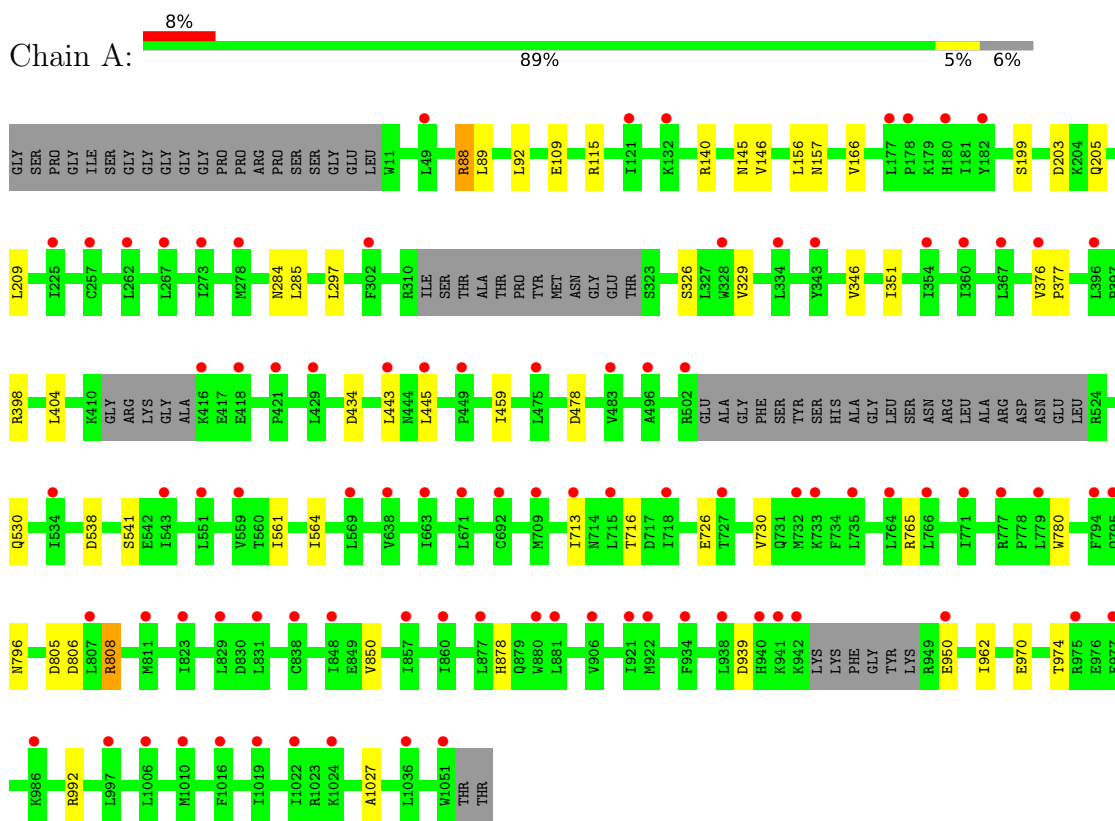
There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	316	GLY	-	expression tag	UNP P27986
B	317	PRO	-	expression tag	UNP P27986

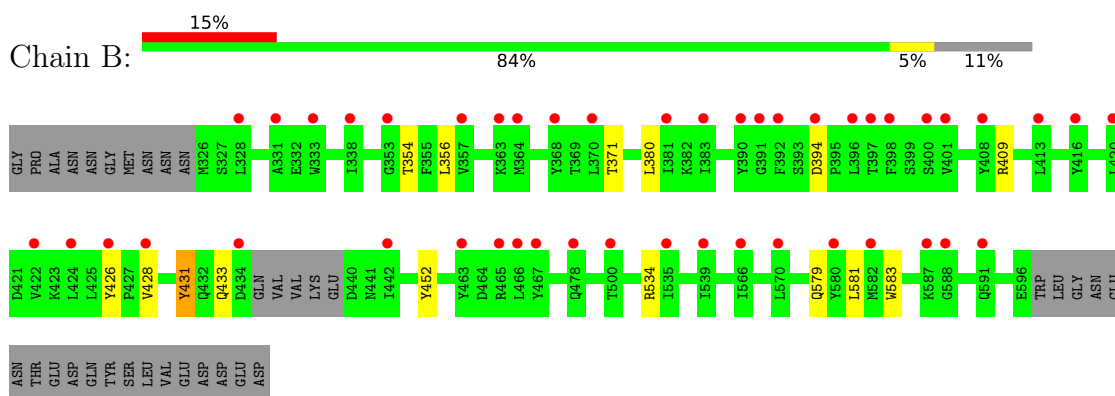
3 Residue-property plots [i](#)

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: Phosphatidylinositol 4,5-bisphosphate 3-kinase catalytic subunit alpha isoform



- Molecule 2: Phosphatidylinositol 3-kinase regulatory subunit alpha



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	87.99Å 120.33Å 190.95Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	74.79 – 2.71 74.79 – 2.71	Depositor EDS
% Data completeness (in resolution range)	99.9 (74.79-2.71) 99.9 (74.79-2.71)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.07 (at 2.73Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.259 , 0.288 0.256 , 0.283	Depositor DCC
R_{free} test set	2773 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å ²)	99.7	Xtrriage
Anisotropy	0.318	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 83.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	20858	wwPDB-VP
Average B, all atoms (Å ²)	131.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.89% 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	0.25	0/8347	0.46	0/11278
2	B	0.25	0/2296	0.48	0/3072
All	All	0.25	0/10643	0.47	0/14350

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	8165	8196	8189	29	0
2	B	2259	2238	2236	7	0
All	All	10424	10434	10425	36	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 2.

All (36) 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:433:GLN:OE1	2:B:579:GLN:NE2	2.27	0.68
1:A:805:ASP:N	1:A:805:ASP:OD1	2.36	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:346:VAL:HG21	1:A:351:ILE:HD13	1.88	0.55
1:A:806:ASP:OD2	1:A:808:ARG:NH1	2.40	0.55
1:A:109:GLU:N	1:A:109:GLU:OE1	2.41	0.54
2:B:431:TYR:HH	2:B:583:TRP:HE3	1.57	0.52
1:A:398:ARG:NH1	1:A:434:ASP:OD1	2.42	0.52
1:A:166:VAL:HG11	1:A:297:LEU:HD22	1.93	0.51
1:A:284:ASN:C	1:A:285:LEU:HD12	2.31	0.51
1:A:285:LEU:HD12	1:A:285:LEU:N	2.28	0.49
1:A:992:ARG:NH1	1:A:1027:ALA:O	2.46	0.49
1:A:376:VAL:HG22	1:A:377:PRO:HD2	1.96	0.48
1:A:765:ARG:NH1	1:A:796:ASN:OD1	2.46	0.48
2:B:354:THR:HG22	2:B:426:TYR:HB2	1.94	0.48
1:A:199:SER:OG	1:A:203:ASP:OD1	2.18	0.47
2:B:356:LEU:HD11	2:B:428:VAL:HG21	1.96	0.46
1:A:209:LEU:HD12	1:A:209:LEU:N	2.31	0.46
2:B:371:THR:HG22	2:B:380:LEU:CD2	2.46	0.46
1:A:780:TRP:CH2	1:A:850:VAL:HG21	2.51	0.45
1:A:459:ILE:HG22	1:A:459:ILE:O	2.16	0.45
1:A:713:ILE:HA	1:A:716:THR:HG22	1.97	0.45
1:A:88:ARG:O	1:A:92:LEU:HD13	2.17	0.45
1:A:538:ASP:OD1	1:A:541:SER:OG	2.32	0.45
1:A:561:ILE:O	1:A:561:ILE:HG23	2.16	0.45
1:A:443:LEU:HD22	1:A:445:LEU:HD23	1.99	0.45
1:A:726:GLU:HB3	1:A:730:VAL:HG13	1.99	0.44
1:A:346:VAL:HG21	1:A:351:ILE:CD1	2.48	0.43
2:B:394:ASP:OD1	2:B:394:ASP:N	2.47	0.43
1:A:561:ILE:O	1:A:564:ILE:HG22	2.19	0.43
2:B:581:LEU:O	2:B:581:LEU:HD23	2.20	0.42
1:A:326:SER:O	1:A:329:VAL:HG22	2.20	0.42
1:A:404:LEU:C	1:A:404:LEU:HD12	2.41	0.41
1:A:878:HIS:HB2	1:A:962:ILE:HD12	2.03	0.41
1:A:970:GLU:O	1:A:974:THR:HG23	2.20	0.41
1:A:156:LEU:O	1:A:157:ASN:HB2	2.20	0.40
1:A:145:ASN:OD1	1:A:146:VAL:N	2.54	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	987/1063 (93%)	953 (97%)	32 (3%)	2 (0%)	47	72
2	B	262/300 (87%)	254 (97%)	8 (3%)	0	100	100
All	All	1249/1363 (92%)	1207 (97%)	40 (3%)	2 (0%)	47	72

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	939	ASP
1	A	950	GLU

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	916/963 (95%)	908 (99%)	8 (1%)	78	91
2	B	247/277 (89%)	243 (98%)	4 (2%)	62	83
All	All	1163/1240 (94%)	1151 (99%)	12 (1%)	76	90

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

Mol	Chain	Res	Type
1	A	88	ARG
1	A	89	LEU
1	A	115	ARG
1	A	140	ARG

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Mol	Chain	Res	Type
1	A	205	GLN
1	A	478	ASP
1	A	530	GLN
1	A	808	ARG
2	B	409	ARG
2	B	431	TYR
2	B	452	TYR
2	B	534	ARG

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	997/1063 (93%)	0.75	90 (9%) 9 8	74, 107, 153, 208	9 (0%)
2	B	266/300 (88%)	1.01	46 (17%) 1 1	91, 141, 202, 220	12 (4%)
All	All	1263/1363 (92%)	0.80	136 (10%) 5 4	74, 112, 179, 220	21 (1%)

All (136) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	368	TYR	4.9
2	B	391	GLY	4.4
2	B	434	ASP	4.3
1	A	940	HIS	4.1
1	A	551	LEU	3.9
2	B	424	LEU	3.6
2	B	426	TYR	3.6
1	A	715	LEU	3.4
1	A	225	ILE	3.4
2	B	338	ILE	3.4
2	B	392	PHE	3.4
2	B	416	TYR	3.4
2	B	370	LEU	3.3
1	A	278	MET	3.1
1	A	534	ILE	3.1
1	A	416	LYS	3.1
1	A	942	LYS	3.1
1	A	950	GLU	3.0
1	A	811	MET	3.0
1	A	771	ILE	3.0
2	B	396	LEU	3.0
1	A	343	TYR	3.0
1	A	829	LEU	3.0
1	A	569	LEU	2.9

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Mol	Chain	Res	Type	RSRZ
2	B	588	GLY	2.9
2	B	381	ILE	2.9
1	A	732	MET	2.9
1	A	941	LYS	2.9
1	A	180	HIS	2.9
2	B	463	TYR	2.9
1	A	838	CYS	2.8
2	B	408	TYR	2.8
1	A	777	ARG	2.8
1	A	735	LEU	2.8
1	A	502	ARG	2.8
2	B	428	VAL	2.8
2	B	539	ILE	2.8
2	B	331	ALA	2.8
1	A	880	TRP	2.7
2	B	328	LEU	2.7
1	A	638	VAL	2.7
1	A	857	ILE	2.7
1	A	396	LEU	2.7
2	B	570	LEU	2.7
1	A	938	LEU	2.7
2	B	357	VAL	2.6
2	B	535	ILE	2.6
2	B	364	MET	2.6
1	A	475	LEU	2.6
1	A	795	GLN	2.6
1	A	1036	LEU	2.6
1	A	273	ILE	2.6
1	A	267	LEU	2.6
1	A	663	ILE	2.6
2	B	587	LYS	2.6
1	A	483	VAL	2.6
1	A	177	LEU	2.6
1	A	881	LEU	2.6
1	A	1010	MET	2.6
2	B	401	VAL	2.5
2	B	413	LEU	2.5
1	A	443	LEU	2.5
1	A	178	PRO	2.5
1	A	559	VAL	2.5
2	B	397	THR	2.5
1	A	877	LEU	2.5

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Mol	Chain	Res	Type	RSRZ
2	B	390	TYR	2.5
1	A	449	PRO	2.5
1	A	1024	LYS	2.5
1	A	779	LEU	2.4
1	A	1022	ILE	2.4
1	A	727	THR	2.4
1	A	766	LEU	2.4
2	B	353	GLY	2.4
1	A	1006	LEU	2.4
2	B	465	ARG	2.4
1	A	257	CYS	2.4
1	A	807	LEU	2.4
1	A	354	ILE	2.4
2	B	591	GLN	2.4
1	A	543	ILE	2.4
1	A	334	LEU	2.3
1	A	121	ILE	2.3
2	B	383	ILE	2.3
2	B	363	LYS	2.3
1	A	671	LEU	2.3
2	B	420	LEU	2.3
1	A	997	LEU	2.3
1	A	922	MET	2.3
1	A	132	LYS	2.3
1	A	376	VAL	2.3
1	A	975	ARG	2.3
2	B	394	ASP	2.3
2	B	333	TRP	2.3
1	A	709	MET	2.3
1	A	860	ILE	2.3
2	B	478	GLN	2.2
1	A	421	PRO	2.2
1	A	692	CYS	2.2
1	A	262	LEU	2.2
1	A	764	LEU	2.2
2	B	467	TYR	2.2
1	A	934	PHE	2.2
1	A	328	TRP	2.2
2	B	422	VAL	2.2
2	B	398	PHE	2.2
2	B	580	TYR	2.2
1	A	445	LEU	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	1051	TRP	2.2
1	A	823	ILE	2.2
2	B	466	LEU	2.2
2	B	500	THR	2.2
2	B	400	SER	2.1
2	B	442	ILE	2.1
1	A	1016	PHE	2.1
1	A	848	ILE	2.1
1	A	794	PHE	2.1
1	A	986	LYS	2.1
1	A	496	ALA	2.1
1	A	182	TYR	2.1
1	A	360	ILE	2.1
1	A	977	PHE	2.1
1	A	906	VAL	2.1
2	B	582	MET	2.1
1	A	367	LEU	2.0
1	A	713	ILE	2.0
1	A	718	ILE	2.0
1	A	1019	ILE	2.0
2	B	566	ILE	2.0
1	A	418	GLU	2.0
1	A	733	LYS	2.0
1	A	49	LEU	2.0
1	A	831	LEU	2.0
1	A	429	LEU	2.0
1	A	921	ILE	2.0
1	A	302	PHE	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 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.