



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 14, 2023 – 11:29 PM JST

PDB ID : 6IHJ  
Title : Crystal structure of Drosophila Nxf1 NTF2 domain in complex with Nxt1/p15  
Authors : Huang, Y.; Yuan, X.  
Deposited on : 2018-09-30  
Resolution : 2.70 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](mailto: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>.

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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

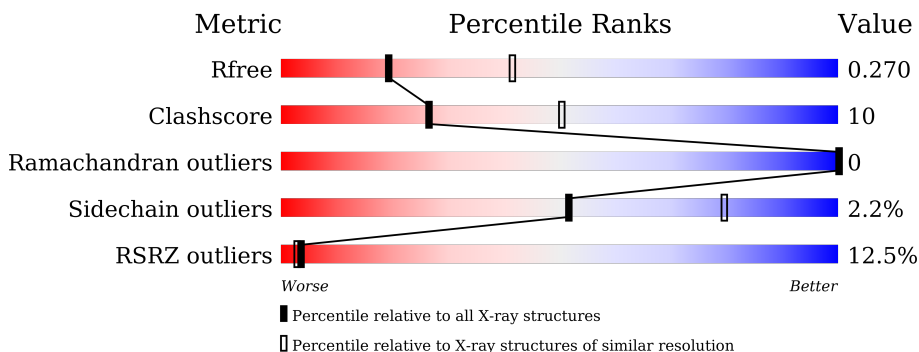
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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))
$R_{free}$	130704	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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  $\geq 3$ , 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	191	 7% 71% 18% 9%
1	C	191	 11% 66% 22% 12%
2	B	135	 4% 79% 16% 5%
2	D	135	 24% 70% 19% 10%

## 2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 4377 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 Nuclear RNA export factor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	173	1313	833	234	239	7	0	0	0
1	C	168	1231	785	213	226	7	0	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	354	GLY	-	expression tag	UNP Q9U1H9
A	355	PRO	-	expression tag	UNP Q9U1H9
A	356	LEU	-	expression tag	UNP Q9U1H9
A	357	GLY	-	expression tag	UNP Q9U1H9
A	358	SER	-	expression tag	UNP Q9U1H9
C	354	GLY	-	expression tag	UNP Q9U1H9
C	355	PRO	-	expression tag	UNP Q9U1H9
C	356	LEU	-	expression tag	UNP Q9U1H9
C	357	GLY	-	expression tag	UNP Q9U1H9
C	358	SER	-	expression tag	UNP Q9U1H9

- Molecule 2 is a protein called NTF2-related export protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	128	982	616	168	192	6	0	0	0
2	D	122	837	524	143	165	5	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-1	GLY	-	expression tag	UNP Q9V3H8
B	0	SER	-	expression tag	UNP Q9V3H8

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-1	GLY	-	expression tag	UNP Q9V3H8
D	0	SER	-	expression tag	UNP Q9V3H8

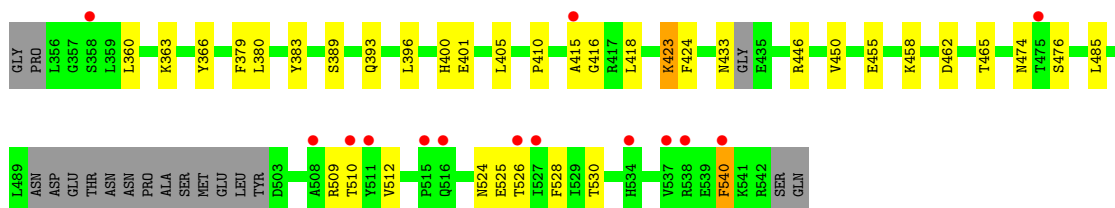
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	9	Total O 9 9	0	0
3	C	2	Total O 2 2	0	0
3	B	3	Total O 3 3	0	0

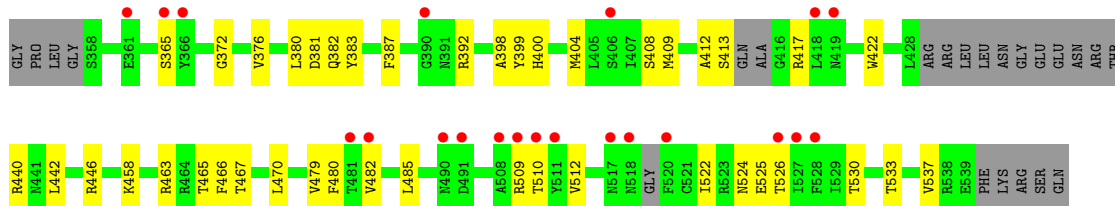
### 3 Residue-property plots [i](#)

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.

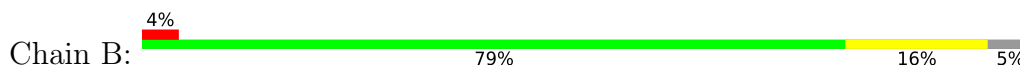
- Molecule 1: Nuclear RNA export factor 1



- Molecule 1: Nuclear RNA export factor 1



- Molecule 2: NTF2-related export protein



- Molecule 2: NTF2-related export protein





## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 62	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	152.20Å 152.20Å 49.83Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	28.76 – 2.70 29.48 – 2.70	Depositor EDS
% Data completeness (in resolution range)	99.7 (28.76-2.70) 99.7 (29.48-2.70)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.03 (at 2.68Å)	Xtrriage
Refinement program	PHENIX (1.13_2998: ???)	Depositor
R, $R_{free}$	0.224 , 0.269 0.224 , 0.270	Depositor DCC
$R_{free}$ test set	1831 reflections (9.95%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	62.8	Xtrriage
Anisotropy	0.094	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 73.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.047 for h,-h-k,-l	Xtrriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	4377	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	73.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.28% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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	0.29	0/1338	0.52	0/1816
1	C	0.29	0/1255	0.52	0/1711
2	B	0.30	0/998	0.49	0/1354
2	D	0.28	0/848	0.50	0/1160
All	All	0.29	0/4439	0.51	0/6041

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	1313	0	1206	27	0
1	C	1231	0	1089	29	0
2	B	982	0	915	15	0
2	D	837	0	689	24	0
3	A	9	0	0	0	0
3	B	3	0	0	0	0
3	C	2	0	0	0	0
All	All	4377	0	3899	85	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 (85) 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:C:387:PHE:O	1:C:392:ARG:NH1	1.97	0.97
2:D:44:LEU:HD21	2:D:46:TRP:CD1	2.02	0.95
2:D:44:LEU:HD21	2:D:46:TRP:HD1	1.34	0.92
1:A:360:LEU:O	1:A:360:LEU:HD13	1.74	0.85
2:D:113:ILE:HB	2:D:125:SER:HB3	1.59	0.84
1:A:465:THR:HG21	1:A:485:LEU:HG	1.60	0.82
2:D:47:ASN:HD21	2:D:130:MET:H	1.32	0.77
1:A:401:GLU:OE1	1:A:446:ARG:NH2	2.21	0.73
1:A:396:LEU:HA	1:A:450:VAL:HG21	1.72	0.70
1:A:510:THR:HG21	2:B:111:THR:HG21	1.71	0.69
2:D:98:VAL:HG13	2:D:108:PHE:CD1	2.28	0.68
1:C:404:MET:HE1	2:D:77:GLN:HB3	1.77	0.66
2:D:47:ASN:ND2	2:D:130:MET:H	1.94	0.66
1:A:363:LYS:NZ	2:B:49:ASN:OD1	2.31	0.64
1:C:465:THR:HG21	1:C:485:LEU:HB2	1.80	0.63
2:D:39:LEU:HD12	2:D:124:VAL:HG22	1.81	0.63
1:C:412:ALA:HA	1:C:413:SER:C	2.20	0.62
2:D:69:HIS:CG	2:D:98:VAL:HG12	2.34	0.62
1:A:410:PRO:HG2	1:A:415:ALA:HB2	1.81	0.62
1:C:440:ARG:NH1	2:D:10:GLU:OE2	2.33	0.61
2:B:71:LEU:HD11	2:B:94:ALA:HB1	1.82	0.61
1:A:401:GLU:OE1	1:A:446:ARG:NE	2.35	0.60
2:D:44:LEU:CD2	2:D:46:TRP:HD1	2.10	0.60
1:C:510:THR:HG21	2:D:111:THR:HG21	1.86	0.57
1:C:381:ASP:OD1	1:C:382:GLN:N	2.37	0.57
1:A:423:LYS:HE2	1:A:424:PHE:CZ	2.40	0.57
2:B:36:ARG:O	2:B:122:LYS:NZ	2.33	0.57
1:A:360:LEU:HD11	2:B:130:MET:SD	2.44	0.57
1:C:479:VAL:HG11	2:D:113:ILE:CD1	2.35	0.56
1:C:479:VAL:HG22	1:C:512:VAL:HG22	1.86	0.56
1:A:383:TYR:OH	1:A:509:ARG:NH2	2.41	0.54
1:C:400:HIS:O	1:C:446:ARG:HB3	2.08	0.54
2:D:71:LEU:HD23	2:D:71:LEU:H	1.73	0.54
2:B:79:ILE:HD11	2:B:91:LEU:HB2	1.90	0.52
1:C:408:SER:C	1:C:409:MET:HG3	2.30	0.52
1:C:372:GLY:O	1:C:376:VAL:HG23	2.11	0.51
1:A:474:ASN:OD1	1:A:476:SER:N	2.43	0.51
1:C:510:THR:HB	1:C:526:THR:HG22	1.93	0.51
1:A:512:VAL:HB	1:A:524:ASN:HB2	1.93	0.51
1:C:479:VAL:HG11	2:D:113:ILE:HD11	1.92	0.51
2:D:47:ASN:HD21	2:D:130:MET:N	2.06	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:462:ASP:HB2	1:A:540:PHE:CZ	2.46	0.50
1:C:398:ALA:O	1:C:522:ILE:HG13	2.11	0.50
1:C:399:TYR:OH	1:C:525:GLU:OE1	2.20	0.49
2:D:107:LYS:HE2	2:D:131:GLN:OE1	2.13	0.49
2:D:98:VAL:HG11	2:D:128:TYR:OH	2.13	0.49
1:C:533:THR:O	1:C:537:VAL:HG23	2.14	0.48
1:C:376:VAL:HG21	1:C:470:LEU:HD22	1.96	0.48
2:B:58:GLU:O	2:B:62:GLN:HG2	2.13	0.48
1:C:404:MET:HE2	1:C:442:LEU:HD11	1.96	0.47
2:B:35:GLY:HA3	2:B:58:GLU:OE2	2.14	0.47
1:A:401:GLU:OE1	1:A:446:ARG:CZ	2.61	0.47
1:A:400:HIS:O	1:A:446:ARG:HB3	2.16	0.46
1:A:418:LEU:HD11	1:A:530:THR:HA	1.97	0.46
1:A:366:TYR:CE2	2:B:50:GLY:HA3	2.50	0.46
2:B:32:GLN:HA	2:B:62:GLN:HE22	1.81	0.46
1:C:512:VAL:HB	1:C:524:ASN:HB2	1.97	0.46
1:A:393:GLN:O	1:A:396:LEU:HB2	2.16	0.45
2:B:101:ALA:HA	2:B:102:ASP:HA	1.49	0.45
2:B:66:SER:HB3	2:B:101:ALA:HB3	1.97	0.45
1:C:404:MET:HE2	1:C:404:MET:HB3	1.77	0.45
1:A:379:PHE:HD1	1:A:380:LEU:HD23	1.81	0.45
1:A:415:ALA:H	1:A:416:GLY:HA2	1.81	0.44
1:C:530:THR:HG21	2:D:107:LYS:HE3	1.99	0.44
1:A:410:PRO:HD3	1:A:528:PHE:CE1	2.51	0.44
1:A:465:THR:HG21	1:A:485:LEU:CG	2.39	0.44
1:C:417:ARG:O	1:C:422:TRP:NE1	2.51	0.44
2:D:4:ASP:OD1	2:D:5:LEU:N	2.51	0.44
1:A:423:LYS:NZ	1:A:455:GLU:HG2	2.33	0.44
2:D:79:ILE:HD11	2:D:91:LEU:HB2	2.00	0.43
2:D:101:ALA:HA	2:D:102:ASP:HA	1.48	0.42
1:C:467:THR:O	1:C:482:VAL:HA	2.20	0.42
1:C:463:ARG:HA	1:C:466:PHE:CD1	2.54	0.42
1:A:405:LEU:HA	1:A:525:GLU:O	2.20	0.41
1:C:470:LEU:CD1	1:C:480:PHE:HB3	2.50	0.41
1:C:376:VAL:O	1:C:380:LEU:HG	2.21	0.41
1:A:415:ALA:N	1:A:416:GLY:HA2	2.35	0.41
1:C:392:ARG:HH22	1:C:458:LYS:HA	1.86	0.41
1:A:510:THR:HB	1:A:526:THR:HG22	2.02	0.41
2:B:44:LEU:HD13	2:B:57:ILE:HG23	2.03	0.40
2:B:107:LYS:HE2	2:B:131:GLN:OE1	2.21	0.40
2:D:89:ALA:HB2	2:D:115:THR:HG22	2.04	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:47:ASN:HA	2:D:129:ARG:HD2	2.02	0.40
1:C:383:TYR:OH	1:C:509:ARG:NH2	2.53	0.40
2:B:102:ASP:N	2:B:102:ASP:OD1	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	167/191 (87%)	163 (98%)	4 (2%)	0	100	100
1	C	160/191 (84%)	156 (98%)	4 (2%)	0	100	100
2	B	124/135 (92%)	123 (99%)	1 (1%)	0	100	100
2	D	114/135 (84%)	111 (97%)	3 (3%)	0	100	100
All	All	565/652 (87%)	553 (98%)	12 (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	127/170 (75%)	122 (96%)	5 (4%)	32	61
1	C	114/170 (67%)	113 (99%)	1 (1%)	78	92

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	B	100/117 (86%)	99 (99%)	1 (1%)	76	91
2	D	69/117 (59%)	67 (97%)	2 (3%)	42	71
All	All	410/574 (71%)	401 (98%)	9 (2%)	52	79

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	389	SER
1	A	423	LYS
1	A	433	ASN
1	A	458	LYS
1	A	540	PHE
1	C	365	SER
2	B	31	ARG
2	D	71	LEU
2	D	130	MET

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	433	ASN
2	B	62	GLN
2	D	47	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 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	173/191 (90%)	0.33	14 (8%) 12 10	41, 62, 103, 163	0
1	C	168/191 (87%)	0.57	21 (12%) 3 3	53, 78, 121, 162	0
2	B	128/135 (94%)	0.06	6 (4%) 31 30	35, 51, 92, 119	0
2	D	122/135 (90%)	1.12	33 (27%) 0 0	66, 99, 128, 139	0
All	All	591/652 (90%)	0.50	74 (12%) 3 3	35, 71, 121, 163	0

All (74) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	111	THR	6.9
1	C	390	GLY	5.5
1	A	537	VAL	5.3
2	D	93	MET	5.0
1	C	508	ALA	4.5
2	D	121	TRP	4.5
2	D	5	LEU	4.4
2	D	127	CYS	4.3
2	D	72	ASN	4.2
1	C	510	THR	4.2
1	C	490	ASN	4.1
1	A	534	HIS	4.0
2	D	14	ARG	3.8
2	B	93	MET	3.7
2	D	92	ILE	3.6
2	D	116	ALA	3.6
2	D	71	LEU	3.5
2	D	110	GLN	3.5
2	B	101	ALA	3.4
1	A	510	THR	3.4
1	C	518	ASN	3.4

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	C	526	THR	3.3
1	A	511	TYR	3.3
2	D	55	GLN	3.2
1	A	508	ALA	3.2
2	D	69	HIS	3.2
1	C	482	VAL	3.2
2	D	94	ALA	3.1
2	D	41	ASN	3.1
1	C	481	THR	3.1
2	D	7	ALA	3.1
1	A	526	THR	3.1
1	A	538	ARG	3.1
2	B	102	ASP	3.0
2	B	111	THR	3.0
1	A	540	PHE	2.9
1	C	418	LEU	2.7
1	A	515	PRO	2.6
1	C	366	TYR	2.6
2	B	103	GLN	2.6
1	C	511	TYR	2.6
2	D	46	TRP	2.6
2	D	11	SER	2.6
1	A	475	THR	2.6
2	D	112	PHE	2.5
1	C	527	ILE	2.5
2	D	10	GLU	2.5
2	D	40	ASP	2.5
1	C	517	ASN	2.5
2	D	125	SER	2.4
1	A	527	ILE	2.4
2	B	125	SER	2.4
2	D	4	ASP	2.4
1	C	365	SER	2.4
1	C	361	GLU	2.3
1	C	528	PHE	2.3
2	D	130	MET	2.2
1	C	509	ARG	2.2
2	D	32	GLN	2.2
2	D	109	GLN	2.2
1	C	419	ASN	2.2
1	A	516	GLN	2.2
1	C	520	PHE	2.1

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Mol	Chain	Res	Type	RSRZ
2	D	25	ALA	2.1
2	D	115	THR	2.1
1	C	491	ASP	2.1
1	A	358	SER	2.1
2	D	95	SER	2.1
2	D	53	GLY	2.1
1	A	415	ALA	2.1
1	C	406	SER	2.1
2	D	113	ILE	2.0
2	D	17	ASP	2.0
2	D	26	SER	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.