



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 20, 2026 – 02:45 AM UTC

PDB ID : 4PMW / pdb_00004pmw
Title : Structure of mouse Dis3L2 in complex with oligoU RNA substrate
Authors : Faehnle, C.R.; Walleshauser, J.; Joshua-Tor, L.
Deposited on : 2014-05-22
Resolution : 2.95 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

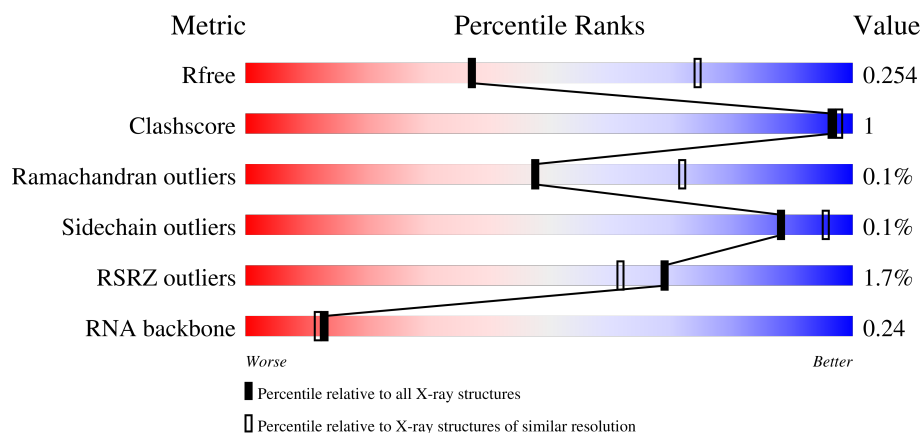
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.95 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	1130 (2.98-2.94)
Clashscore	190562	1157 (2.98-2.94)
Ramachandran outliers	187476	1101 (2.98-2.94)
Sidechain outliers	187428	1101 (2.98-2.94)
RSRZ outliers	180081	1130 (2.98-2.94)
RNA backbone	3983	1046 (3.16-2.76)

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	770	0% 88% 10%
1	B	770	2% 87% 10%
2	C	14	43% 43% 14%
2	D	14	7% 57% 43%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 22942 atoms, of which 11358 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 DIS3-like exonuclease 2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	691	Total	C	H	N	O	S	0	0	0
			11046	3518	5538	937	1022	31			
1	B	691	Total	C	H	N	O	S	0	0	0
			11046	3518	5538	937	1022	31			

There are 102 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	HIS	deletion	UNP Q8CI75
A	?	-	HIS	deletion	UNP Q8CI75
A	?	-	PRO	deletion	UNP Q8CI75
A	?	-	LEU	deletion	UNP Q8CI75
A	?	-	GLN	deletion	UNP Q8CI75
A	?	-	GLN	deletion	UNP Q8CI75
A	?	-	SER	deletion	UNP Q8CI75
A	?	-	ARG	deletion	UNP Q8CI75
A	?	-	LYS	deletion	UNP Q8CI75
A	?	-	GLY	deletion	UNP Q8CI75
A	?	-	TRP	deletion	UNP Q8CI75
A	?	-	SER	deletion	UNP Q8CI75
A	?	-	GLY	deletion	UNP Q8CI75
A	?	-	PRO	deletion	UNP Q8CI75
A	?	-	ASP	deletion	UNP Q8CI75
A	?	-	VAL	deletion	UNP Q8CI75
A	?	-	ILE	deletion	UNP Q8CI75
A	?	-	ILE	deletion	UNP Q8CI75
A	?	-	GLU	deletion	UNP Q8CI75
A	?	-	ALA	deletion	UNP Q8CI75
A	?	-	GLN	deletion	UNP Q8CI75
A	?	-	PHE	deletion	UNP Q8CI75
A	?	-	SER	deletion	UNP Q8CI75
A	?	-	THR	deletion	UNP Q8CI75
A	?	-	PRO	deletion	UNP Q8CI75

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Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	ASP	deletion	UNP Q8CI75
A	?	-	ARG	deletion	UNP Q8CI75
A	?	-	GLY	deletion	UNP Q8CI75
A	?	-	LYS	deletion	UNP Q8CI75
A	?	-	GLU	deletion	UNP Q8CI75
A	?	-	ASP	deletion	UNP Q8CI75
A	?	-	SER	deletion	UNP Q8CI75
A	?	-	SER	deletion	UNP Q8CI75
A	?	-	THR	deletion	UNP Q8CI75
A	?	-	PRO	deletion	UNP Q8CI75
A	?	-	VAL	deletion	UNP Q8CI75
A	?	-	MET	deletion	UNP Q8CI75
A	?	-	LYS	deletion	UNP Q8CI75
A	?	-	ASP	deletion	UNP Q8CI75
A	?	-	GLU	deletion	UNP Q8CI75
A	?	-	ASN	deletion	UNP Q8CI75
A	?	-	THR	deletion	UNP Q8CI75
A	?	-	PRO	deletion	UNP Q8CI75
A	?	-	ILE	deletion	UNP Q8CI75
A	?	-	PRO	deletion	UNP Q8CI75
A	?	-	GLN	deletion	UNP Q8CI75
A	?	-	ASP	deletion	UNP Q8CI75
A	?	-	THR	deletion	UNP Q8CI75
A	?	-	ARG	deletion	UNP Q8CI75
A	?	-	GLY	deletion	UNP Q8CI75
A	389	ASN	ASP	engineered mutation	UNP Q8CI75
B	?	-	HIS	deletion	UNP Q8CI75
B	?	-	HIS	deletion	UNP Q8CI75
B	?	-	PRO	deletion	UNP Q8CI75
B	?	-	LEU	deletion	UNP Q8CI75
B	?	-	GLN	deletion	UNP Q8CI75
B	?	-	GLN	deletion	UNP Q8CI75
B	?	-	SER	deletion	UNP Q8CI75
B	?	-	ARG	deletion	UNP Q8CI75
B	?	-	LYS	deletion	UNP Q8CI75
B	?	-	GLY	deletion	UNP Q8CI75
B	?	-	TRP	deletion	UNP Q8CI75
B	?	-	SER	deletion	UNP Q8CI75
B	?	-	GLY	deletion	UNP Q8CI75
B	?	-	PRO	deletion	UNP Q8CI75
B	?	-	ASP	deletion	UNP Q8CI75
B	?	-	VAL	deletion	UNP Q8CI75

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Chain	Residue	Modelled	Actual	Comment	Reference
B	?	-	ILE	deletion	UNP Q8CI75
B	?	-	ILE	deletion	UNP Q8CI75
B	?	-	GLU	deletion	UNP Q8CI75
B	?	-	ALA	deletion	UNP Q8CI75
B	?	-	GLN	deletion	UNP Q8CI75
B	?	-	PHE	deletion	UNP Q8CI75
B	?	-	SER	deletion	UNP Q8CI75
B	?	-	THR	deletion	UNP Q8CI75
B	?	-	PRO	deletion	UNP Q8CI75
B	?	-	ASP	deletion	UNP Q8CI75
B	?	-	ARG	deletion	UNP Q8CI75
B	?	-	GLY	deletion	UNP Q8CI75
B	?	-	LYS	deletion	UNP Q8CI75
B	?	-	GLU	deletion	UNP Q8CI75
B	?	-	ASP	deletion	UNP Q8CI75
B	?	-	SER	deletion	UNP Q8CI75
B	?	-	SER	deletion	UNP Q8CI75
B	?	-	THR	deletion	UNP Q8CI75
B	?	-	PRO	deletion	UNP Q8CI75
B	?	-	VAL	deletion	UNP Q8CI75
B	?	-	MET	deletion	UNP Q8CI75
B	?	-	LYS	deletion	UNP Q8CI75
B	?	-	ASP	deletion	UNP Q8CI75
B	?	-	GLU	deletion	UNP Q8CI75
B	?	-	ASN	deletion	UNP Q8CI75
B	?	-	THR	deletion	UNP Q8CI75
B	?	-	PRO	deletion	UNP Q8CI75
B	?	-	ILE	deletion	UNP Q8CI75
B	?	-	PRO	deletion	UNP Q8CI75
B	?	-	GLN	deletion	UNP Q8CI75
B	?	-	ASP	deletion	UNP Q8CI75
B	?	-	THR	deletion	UNP Q8CI75
B	?	-	ARG	deletion	UNP Q8CI75
B	?	-	GLY	deletion	UNP Q8CI75
B	389	ASN	ASP	engineered mutation	UNP Q8CI75

- Molecule 2 is a RNA chain called U-U-U-U-U-U-U-U-U-U-U-U-U-U.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	C	14	Total	C	H	N	O	P	0	0	0
			421	126	141	28	112	14			
2	D	14	Total	C	H	N	O	P	0	0	0
			421	126	141	28	112	14			

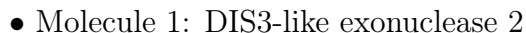
- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

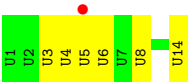
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Mg	0	0
			1	1		
3	B	1	Total	Mg	0	0
			1	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	5	Total	O	0	0
			5	5		
4	B	1	Total	O	0	0
			1	1		

- Molecule 1: DIS3-like exonuclease 2





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	63.93Å 96.08Å 157.31Å 90.00° 98.75° 90.00°	Depositor
Resolution (Å)	63.18 – 2.95 63.18 – 2.95	Depositor EDS
% Data completeness (in resolution range)	99.8 (63.18-2.95) 99.8 (63.18-2.95)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.25 (at 2.96Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.9_1692)	Depositor
R, R_{free}	0.202 , 0.251 0.209 , 0.254	Depositor DCC
R_{free} test set	2001 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	60.0	Xtriage
Anisotropy	0.638	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 48.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.028 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	22942	wwPDB-VP
Average B, all atoms (Å ²)	78.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.67% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MG

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	0.31	0/5624	0.62	0/7613
1	B	0.65	6/5624 (0.1%)	0.82	10/7613 (0.1%)
2	C	0.18	0/307	0.48	0/472
2	D	0.20	0/307	0.41	0/472
All	All	0.50	6/11862 (0.1%)	0.71	10/16170 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	433	TYR	CD2-CE2	25.36	2.14	1.38
1	B	433	TYR	CD1-CE1	25.16	2.14	1.38
1	B	433	TYR	CE1-CZ	-14.34	1.03	1.38
1	B	433	TYR	CE2-CZ	-13.56	1.05	1.38
1	B	433	TYR	CG-CD2	-10.16	1.18	1.39
1	B	433	TYR	CG-CD1	-10.02	1.18	1.39

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	433	TYR	CD1-CG-CD2	-25.12	80.41	118.10
1	B	433	TYR	CE1-CZ-CE2	-21.75	76.81	120.30
1	B	433	TYR	CG-CD1-CE1	-16.00	97.20	121.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	433	TYR	CG-CD2-CE2	-15.29	98.27	121.20
1	B	433	TYR	CZ-CE2-CD2	-11.32	99.22	119.60
1	B	433	TYR	CD1-CE1-CZ	-9.94	101.70	119.60
1	B	433	TYR	CB-CG-CD1	9.35	134.83	120.80
1	B	433	TYR	CB-CG-CD2	9.35	134.83	120.80
1	B	433	TYR	OH-CZ-CE2	7.52	142.47	119.90
1	B	433	TYR	CE1-CZ-OH	6.89	140.58	119.90

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	433	TYR	Sidechain

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	5508	5538	5554	9	0
1	B	5508	5538	5554	11	0
2	C	280	141	141	3	0
2	D	280	141	141	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	5	0	0	0	0
4	B	1	0	0	0	0
All	All	11584	11358	11390	22	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 1.

All (22) 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:109:ASP:OD2	1:B:243:ARG:NH2	2.29	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:80:PHE:O	1:A:102:ARG:NH2	2.32	0.63
1:A:625:GLN:OE1	1:A:625:GLN:N	2.33	0.62
1:A:449:GLU:O	1:A:459:LYS:NZ	2.33	0.61
1:B:80:PHE:O	1:B:102:ARG:NH2	2.32	0.61
1:B:625:GLN:N	1:B:625:GLN:OE1	2.34	0.60
1:B:353:LEU:O	1:B:355:GLN:NE2	2.38	0.56
1:B:538:ARG:NH2	1:B:581:GLU:OE1	2.39	0.56
1:A:275:ARG:NH2	2:C:1:U:O4'	2.42	0.53
1:B:449:GLU:O	1:B:459:LYS:NZ	2.43	0.52
1:A:353:LEU:O	1:A:355:GLN:NE2	2.44	0.50
1:A:538:ARG:NH2	1:A:581:GLU:OE1	2.45	0.50
1:A:87:SER:OG	1:A:90:GLY:O	2.33	0.46
1:B:275:ARG:N	1:B:275:ARG:HD2	2.30	0.46
2:C:6:U:O2'	2:C:7:U:OP1	2.33	0.45
1:B:428:ARG:O	1:B:430:THR:N	2.47	0.43
2:C:6:U:O2'	2:C:7:U:P	2.77	0.42
1:A:441:MET:HE1	1:A:704:PHE:N	2.35	0.42
1:B:544:ASP:O	1:B:690:ASN:ND2	2.47	0.41
1:B:87:SER:OG	1:B:90:GLY:O	2.36	0.41
1:B:274:PRO:HG3	1:B:306:TRP:CZ3	2.56	0.40
1:A:288:MET:HA	1:A:288:MET:HE2	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	685/770 (89%)	664 (97%)	21 (3%)	0	100	100
1	B	685/770 (89%)	662 (97%)	22 (3%)	1 (0%)	48	72
All	All	1370/1540 (89%)	1326 (97%)	43 (3%)	1 (0%)	48	72

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	90	GLY

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	613/682 (90%)	613 (100%)	0	100	100
1	B	613/682 (90%)	612 (100%)	1 (0%)	87	94
All	All	1226/1364 (90%)	1225 (100%)	1 (0%)	88	95

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	275	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	70	GLN
1	A	271	HIS
1	A	501	ASN
1	A	593	HIS
1	B	70	GLN
1	B	593	HIS
1	B	612	GLN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	C	13/14 (92%)	7 (53%)	1 (7%)
2	D	13/14 (92%)	6 (46%)	0
All	All	26/28 (92%)	13 (50%)	1 (3%)

All (13) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	C	3	U
2	C	4	U
2	C	5	U
2	C	6	U
2	C	7	U
2	C	8	U
2	C	14	U
2	D	3	U
2	D	4	U
2	D	5	U
2	D	6	U
2	D	8	U
2	D	14	U

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	C	6	U

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](#)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	691/770 (89%)	-0.10	6 (0%) 81 76	34, 67, 117, 170	0
1	B	691/770 (89%)	0.05	17 (2%) 58 50	44, 76, 135, 192	0
2	C	14/14 (100%)	0.09	0 100 100	47, 106, 139, 174	0
2	D	14/14 (100%)	0.27	1 (7%) 22 19	55, 113, 156, 180	0
All	All	1410/1568 (89%)	-0.02	24 (1%) 69 62	34, 72, 129, 192	0

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	646	PHE	5.1
1	B	646	PHE	4.6
1	B	259	LEU	4.4
1	B	648	ASP	4.0
1	A	49	ILE	3.9
1	A	259	LEU	3.8
1	B	49	ILE	3.7
1	A	251	LEU	3.7
1	B	647	GLY	3.5
1	B	260	PHE	3.3
1	B	812	PRO	3.0
1	B	118	GLU	3.0
1	A	260	PHE	2.9
1	B	808	VAL	2.7
1	B	507	PRO	2.7
1	B	251	LEU	2.7
1	B	265	LEU	2.6
1	B	230	SER	2.6
1	B	65	ARG	2.6
1	A	647	GLY	2.6
1	B	645	THR	2.6

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Mol	Chain	Res	Type	RSRZ
2	D	5	U	2.4
1	B	117	PRO	2.3
1	B	552	LEU	2.1

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](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	MG	B	901	1/1	0.86	0.13	51,51,51,51	0
3	MG	A	901	1/1	0.97	0.07	37,37,37,37	0

6.5 Other polymers [i](#)

There are no such residues in this entry.