



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 14, 2026 – 08:17 PM UTC

PDB ID : 7BN2 / pdb_00007bn2
Title : Clathrin heavy chain N-terminal domain bound to Non structured protein 3 from Eastern Equine Encephalitis Virus
Authors : Badgujar, D.C.; Dobritsch, D.
Deposited on : 2021-01-21
Resolution : 1.97 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
Mogul	:	2022.3.0, CSD as543be (2022)
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

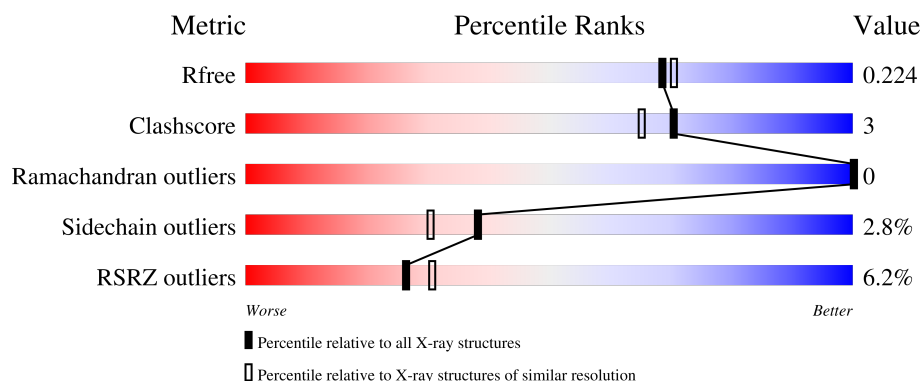
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.97 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	3494 (1.96-1.96)
Clashscore	190562	3612 (1.96-1.96)
Ramachandran outliers	187476	3587 (1.96-1.96)
Sidechain outliers	187428	3587 (1.96-1.96)
RSRZ outliers	180081	3495 (1.96-1.96)

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	AAA	364	7% 91% 8% ..
1	BBB	364	5% 89% 9% ..
2	CCC	17	6% 47% 53%
2	DDD	17	12% 29% 12% 59%

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 6323 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 Clathrin heavy chain 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	AAA	361	Total	C	N	O	S	0	5	0
			2845	1812	487	526	20			
1	BBB	361	Total	C	N	O	S	0	4	0
			2842	1807	488	528	19			

- Molecule 2 is a protein called Non structured protein 3 from Eastern Equine Encephalitis Virus.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	CCC	8	Total	C	N	O	0	0	0
			63	41	8	14			
2	DDD	7	Total	C	N	O	0	0	0
			57	38	7	12			

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	AAA	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is PHOSPHATE ION (CCD ID: PO4) (formula: O_4P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	BBB	1	Total	O	P	0	0
			5	4	1		

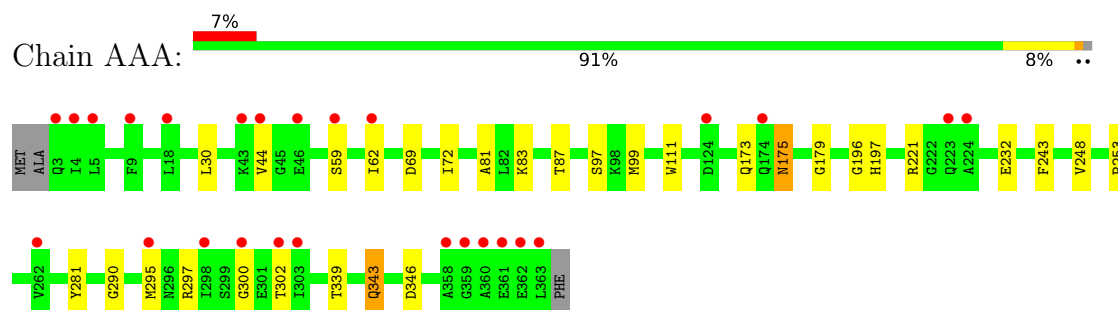
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	AAA	247	Total	O	0	2
			249	249		
5	BBB	246	Total	O	0	1
			247	247		
5	CCC	7	Total	O	0	0
			7	7		
5	DDD	3	Total	O	0	0
			3	3		

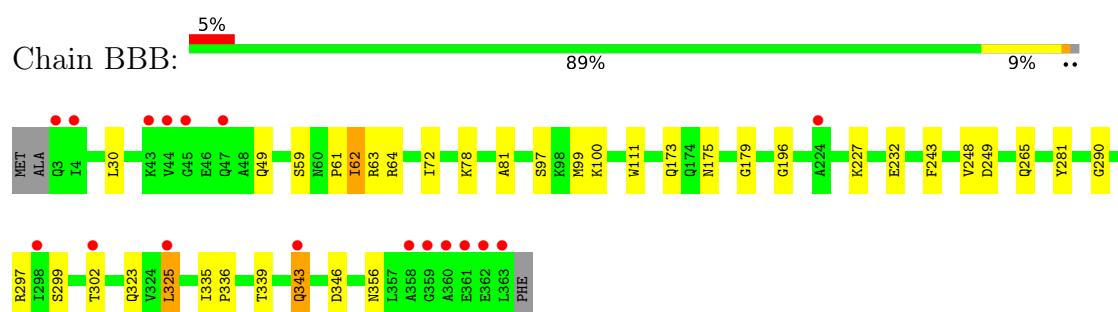
3 Residue-property plots [i](#)

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.

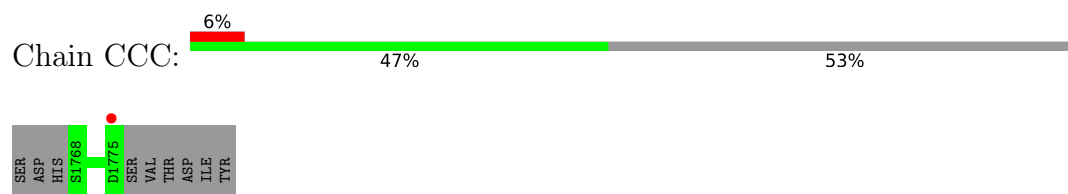
- Molecule 1: Clathrin heavy chain 1



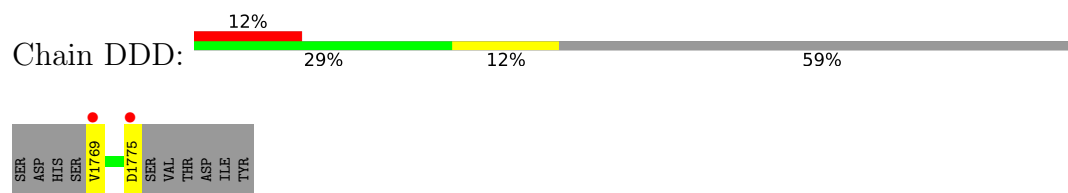
- Molecule 1: Clathrin heavy chain 1



- Molecule 2: Non structured protein 3 from Eastern Equine Encephalitis Virus



- Molecule 2: Non structured protein 3 from Eastern Equine Encephalitis Virus



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	136.90Å 129.12Å 77.88Å 90.00° 115.29° 90.00°	Depositor
Resolution (Å)	89.35 – 1.97 89.35 – 1.97	Depositor EDS
% Data completeness (in resolution range)	71.7 (89.35-1.97) 72.1 (89.35-1.97)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.82 (at 1.97Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.181 , 0.219 0.188 , 0.224	Depositor DCC
R_{free} test set	4314 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	31.4	Xtriage
Anisotropy	0.111	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 43.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	6323	wwPDB-VP
Average B, all atoms (Å ²)	36.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.79% 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

Bond lengths and bond angles in the following residue types are not validated in this section: PO4, SO4

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	AAA	1.01	1/2919 (0.0%)	1.24	3/3957 (0.1%)
1	BBB	1.03	1/2912 (0.0%)	1.23	0/3948
2	CCC	0.99	0/63	1.35	0/85
2	DDD	1.00	0/57	1.40	0/77
All	All	1.02	2/5951 (0.0%)	1.24	3/8067 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	BBB	302	THR	C-O	5.09	1.29	1.24
1	AAA	302	THR	C-O	5.06	1.29	1.24

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	AAA	300	GLY	CA-C-N	5.34	128.30	120.71
1	AAA	300	GLY	C-N-CA	5.34	128.30	120.71
1	AAA	69	ASP	CA-CB-CG	5.18	117.78	112.60

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	AAA	2845	0	2867	14	0
1	BBB	2842	0	2859	26	0
2	CCC	63	0	59	0	0
2	DDD	57	0	54	0	0
3	AAA	5	0	0	0	0
4	BBB	5	0	0	0	0
5	AAA	249	0	0	0	0
5	BBB	247	0	0	3	0
5	CCC	7	0	0	0	0
5	DDD	3	0	0	0	0
All	All	6323	0	5839	39	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 3.

All (39) 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:BBB:62:ILE:HD11	1:BBB:64[A]:ARG:CZ	2.19	0.73
1:BBB:299:SER:HB3	5:BBB:647:HOH:O	1.87	0.72
1:AAA:97:SER:OG	1:AAA:99[B]:MET:HE1	1.94	0.68
1:BBB:323:GLN:OE1	1:BBB:325:LEU:HD22	1.98	0.64
1:AAA:97:SER:OG	1:AAA:99[B]:MET:CE	2.47	0.62
1:BBB:64[A]:ARG:HH21	1:BBB:64[A]:ARG:HG3	1.65	0.62
1:BBB:62:ILE:HG23	5:BBB:684:HOH:O	2.02	0.59
1:BBB:49:GLN:OE1	1:BBB:63:ARG:HD3	2.08	0.53
1:BBB:227:LYS:NZ	1:BBB:249:ASP:OD1	2.39	0.52
1:BBB:97:SER:OG	1:BBB:99[B]:MET:CE	2.58	0.51
1:BBB:72:ILE:HG13	1:BBB:81:ALA:HB3	1.93	0.50
1:BBB:232:GLU:HB2	1:BBB:243:PHE:HB3	1.93	0.49
1:BBB:62:ILE:HD11	1:BBB:64[B]:ARG:HG2	1.95	0.49
1:BBB:62:ILE:HD11	1:BBB:64[A]:ARG:NH2	2.28	0.49
1:BBB:99[B]:MET:HA	1:BBB:99[B]:MET:HE2	1.95	0.49
1:BBB:62:ILE:HD11	1:BBB:64[A]:ARG:HG2	1.94	0.48
1:AAA:197[B]:HIS:HD2	1:AAA:221:ARG:H	1.61	0.48
1:AAA:339:THR:O	1:AAA:343:GLN:HA	2.13	0.48
1:AAA:175:ASN:OD1	1:BBB:356:ASN:HA	2.14	0.48
1:BBB:339:THR:O	1:BBB:343:GLN:HA	2.15	0.47
1:AAA:72:ILE:HG13	1:AAA:81:ALA:HB3	1.96	0.46
1:BBB:248:VAL:HG21	1:BBB:290:GLY:O	2.15	0.46
1:BBB:62:ILE:CD1	1:BBB:64[A]:ARG:CZ	2.91	0.46
1:BBB:265:GLN:HB3	5:BBB:654:HOH:O	2.16	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:BBB:179:GLY:HA3	1:BBB:196:GLY:O	2.15	0.46
1:AAA:44:VAL:HG23	1:AAA:44:VAL:O	2.16	0.45
1:AAA:30:LEU:C	1:AAA:30:LEU:HD23	2.43	0.43
1:BBB:62:ILE:HD11	1:BBB:64[A]:ARG:CG	2.48	0.43
1:AAA:253:PRO:HD3	1:AAA:295[B]:MET:HE1	2.00	0.43
1:BBB:59:SER:O	1:BBB:61:PRO:HD2	2.18	0.43
1:AAA:281:TYR:CZ	1:AAA:297:ARG:HD2	2.53	0.43
1:BBB:281:TYR:CZ	1:BBB:297:ARG:HD2	2.54	0.43
1:AAA:179:GLY:HA3	1:AAA:196:GLY:O	2.19	0.43
1:BBB:62:ILE:CG1	1:BBB:64[A]:ARG:NH2	2.82	0.42
1:AAA:83:LYS:HA	1:AAA:87:THR:O	2.20	0.42
1:BBB:335:ILE:HB	1:BBB:336:PRO:HD3	2.01	0.41
1:AAA:232:GLU:HB2	1:AAA:243:PHE:HB3	2.02	0.41
1:AAA:248:VAL:HG21	1:AAA:290:GLY:O	2.21	0.41
1:BBB:30:LEU:C	1:BBB:30:LEU:HD23	2.46	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	AAA	364/364 (100%)	359 (99%)	5 (1%)	0	100	100
1	BBB	363/364 (100%)	358 (99%)	5 (1%)	0	100	100
2	CCC	6/17 (35%)	6 (100%)	0	0	100	100
2	DDD	5/17 (29%)	5 (100%)	0	0	100	100
All	All	738/762 (97%)	728 (99%)	10 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	AAA	314/311 (101%)	307 (98%)	7 (2%)	45	40
1	BBB	313/311 (101%)	304 (97%)	9 (3%)	37	29
2	CCC	8/17 (47%)	8 (100%)	0	100	100
2	DDD	7/17 (41%)	5 (71%)	2 (29%)	0	0
All	All	642/656 (98%)	624 (97%)	18 (3%)	38	30

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	AAA	59	SER
1	AAA	62	ILE
1	AAA	111	TRP
1	AAA	173	GLN
1	AAA	175	ASN
1	AAA	343	GLN
1	AAA	346	ASP
1	BBB	62	ILE
1	BBB	78	LYS
1	BBB	100	LYS
1	BBB	111	TRP
1	BBB	173	GLN
1	BBB	175	ASN
1	BBB	325	LEU
1	BBB	343	GLN
1	BBB	346	ASP
2	DDD	1769	VAL
2	DDD	1775	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	SO4	AAA	401	-	4,4,4	0.33	0	6,6,6	0.09	0
4	PO4	BBB	401	-	4,4,4	1.52	1 (25%)	6,6,6	0.60	0

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	BBB	401	PO4	P-O1	3.02	1.57	1.50

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	AAA	361/364 (99%)	0.33	26 (7%)	21 25	15, 33, 59, 99	5 (1%)
1	BBB	361/364 (99%)	0.31	17 (4%)	36 42	16, 33, 57, 106	4 (1%)
2	CCC	8/17 (47%)	0.48	1 (12%)	8 9	27, 34, 63, 90	0
2	DDD	7/17 (41%)	1.01	2 (28%)	1 1	28, 36, 47, 76	0
All	All	737/762 (96%)	0.33	46 (6%)	26 31	15, 33, 61, 106	9 (1%)

All (46) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	BBB	363	LEU	7.5
1	AAA	363	LEU	6.7
1	AAA	360	ALA	6.3
1	BBB	360	ALA	6.1
1	AAA	224	ALA	5.7
1	BBB	361	GLU	4.6
1	BBB	302	THR	4.2
1	BBB	224	ALA	4.1
1	AAA	361	GLU	3.9
1	BBB	362	GLU	3.9
1	BBB	359	GLY	3.8
1	AAA	302	THR	3.7
2	DDD	1769	VAL	3.6
1	AAA	174	GLN	3.5
1	BBB	44	VAL	3.4
1	AAA	359	GLY	3.4
1	AAA	3	GLN	3.2
2	CCC	1775	ASP	3.1
1	AAA	43	LYS	3.0
1	BBB	343	GLN	2.9
1	BBB	45	GLY	2.9

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Mol	Chain	Res	Type	RSRZ
2	DDD	1775	ASP	2.8
1	BBB	3	GLN	2.8
1	AAA	9	PHE	2.7
1	AAA	298	ILE	2.7
1	BBB	298	ILE	2.6
1	AAA	358	ALA	2.5
1	BBB	358	ALA	2.5
1	AAA	295[A]	MET	2.5
1	BBB	47	GLN	2.5
1	AAA	223	GLN	2.4
1	AAA	4	ILE	2.4
1	BBB	43	LYS	2.4
1	BBB	325	LEU	2.3
1	AAA	362	GLU	2.3
1	AAA	124	ASP	2.2
1	AAA	303	ILE	2.2
1	AAA	46	GLU	2.2
1	AAA	44	VAL	2.2
1	AAA	59	SER	2.2
1	AAA	18	LEU	2.1
1	BBB	4	ILE	2.1
1	AAA	5	LEU	2.1
1	AAA	62	ILE	2.1
1	AAA	300	GLY	2.1
1	AAA	262	VAL	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

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($\text{\AA}^2$)	Q<0.9
3	SO4	AAA	401	5/5	0.80	0.13	84,91,104,107	0
4	PO4	BBB	401	5/5	0.94	0.15	40,45,50,51	0

6.5 Other polymers [i](#)

There are no such residues in this entry.