



wwPDB X-ray Structure Validation Summary Report ⓘ

Jan 29, 2024 – 05:05 PM EST

PDB ID : 1F3T
Title : CRYSTAL STRUCTURE OF TRYPANOSOMA BRUCEI ORNITHINE DE-CARBOXYLASE (ODC) COMPLEXED WITH PUTRESCINE, ODC'S RE-ACTION PRODUCT.
Authors : Jackson, L.K.; Brooks, H.B.; Osterman, A.L.; Goldsmith, E.J.; Phillips, M.A.
Deposited on : 2000-06-06
Resolution : 2.00 Å(reported)

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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
Mogul : 1.8.5 (274361), CSD as541be (2020)
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

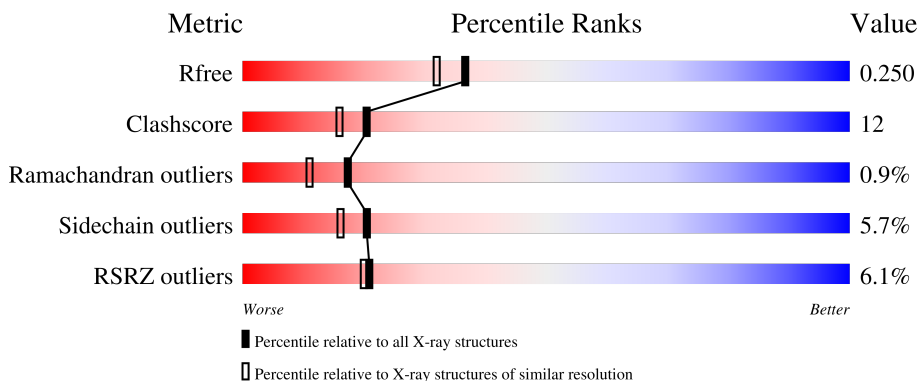
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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	425	 7% 68% 17% • 11%
1	B	425	 5% 68% 19% • 10%
1	C	425	 6% 67% 17% • 13%
1	D	425	 4% 67% 17% • 14%

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 12201 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 ORNITHINE DECARBOXYLASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	378	2965	1905	497	547	16	0	0	0
1	B	381	2987	1918	500	553	16	0	0	0
1	C	370	2906	1866	486	538	16	0	0	0
1	D	367	2879	1852	480	531	16	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

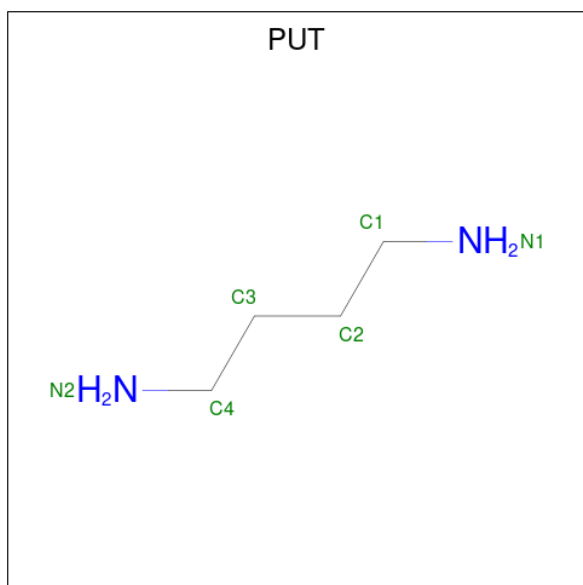
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	GLY	-	cloning artifact	UNP P07805
A	2	ALA	-	cloning artifact	UNP P07805
B	1	GLY	-	cloning artifact	UNP P07805
B	2	ALA	-	cloning artifact	UNP P07805
C	1	GLY	-	cloning artifact	UNP P07805
C	2	ALA	-	cloning artifact	UNP P07805
D	1	GLY	-	cloning artifact	UNP P07805
D	2	ALA	-	cloning artifact	UNP P07805

- Molecule 2 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula: C₈H₁₀NO₆P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	Total	C	N	O	P	0	0
			15	8	1	5	1		
2	B	1	Total	C	N	O	P	0	0
			15	8	1	5	1		
2	C	1	Total	C	N	O	P	0	0
			15	8	1	5	1		
2	D	1	Total	C	N	O	P	0	0
			15	8	1	5	1		

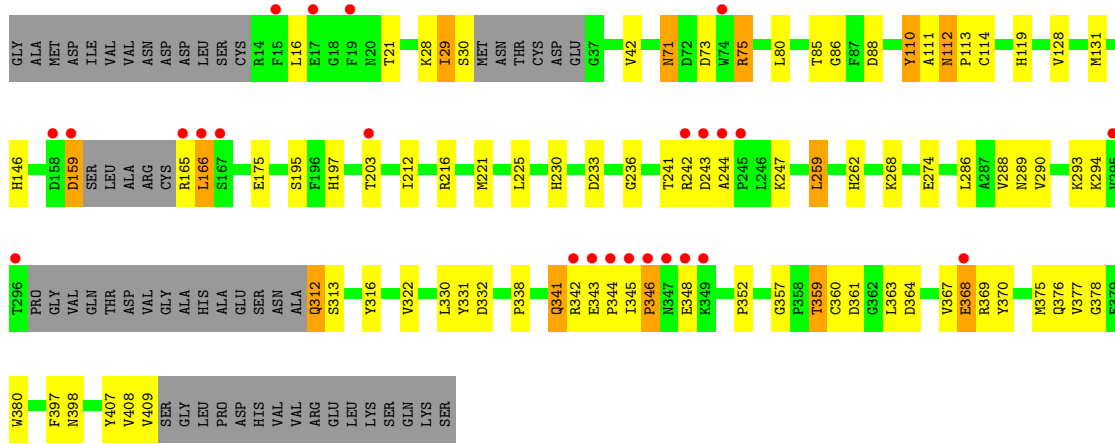
- Molecule 3 is 1,4-DIAMINOBTANE (three-letter code: PUT) (formula: C₄H₁₂N₂).



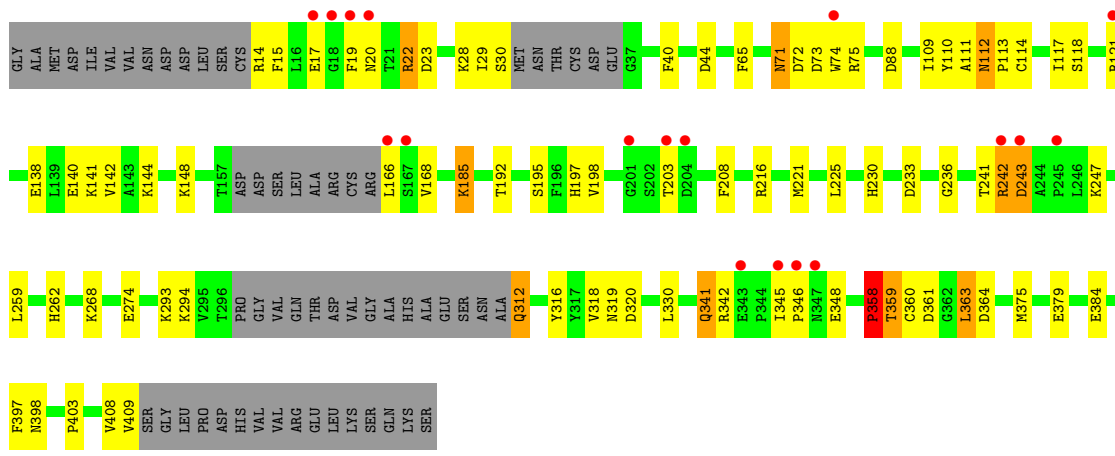
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C N 6 4 2	0	0
3	B	1	Total C N 6 4 2	0	0
3	C	1	Total C N 6 4 2	0	0
3	D	1	Total C N 6 4 2	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	81	Total O 81 81	0	0
4	B	110	Total O 110 110	0	0
4	C	77	Total O 77 77	0	0
4	D	112	Total O 112 112	0	0



• Molecule 1: ORNITHINE DECARBOXYLASE



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	67.29Å 151.60Å 86.41Å 90.00° 103.18° 90.00°	Depositor
Resolution (Å)	8.00 – 2.00 19.91 – 1.90	Depositor EDS
% Data completeness (in resolution range)	99.3 (8.00-2.00) 89.6 (19.91-1.90)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.53 (at 1.90Å)	Xtrriage
Refinement program	CNS 0.9	Depositor
R, R_{free}	0.237 , 0.280 0.215 , 0.250	Depositor DCC
R_{free} test set	2512 reflections (1.98%)	wwPDB-VP
Wilson B-factor (Å ²)	21.1	Xtrriage
Anisotropy	0.585	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 54.8	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	0.95	EDS
Total number of atoms	12201	wwPDB-VP
Average B, all atoms (Å ²)	29.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 46.34 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.1616e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: PLP, PUT

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	0.46	0/3036	0.69	0/4115
1	B	0.50	1/3058 (0.0%)	0.75	2/4145 (0.0%)
1	C	0.45	0/2975	0.67	0/4032
1	D	0.47	0/2948	0.72	1/3996 (0.0%)
All	All	0.47	1/12017 (0.0%)	0.71	3/16288 (0.0%)

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	A	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	358	PRO	N-CA	5.00	1.55	1.47

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	358	PRO	CA-N-CD	-11.61	95.25	111.50
1	D	358	PRO	CA-N-CD	-8.53	99.56	111.50
1	B	18	GLY	N-CA-C	-7.26	94.94	113.10

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	345	ILE	Mainchain

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	2965	0	2931	81	0
1	B	2987	0	2951	70	0
1	C	2906	0	2865	76	0
1	D	2879	0	2844	67	0
2	A	15	0	7	1	0
2	B	15	0	7	1	0
2	C	15	0	7	1	0
2	D	15	0	7	1	0
3	A	6	0	10	1	0
3	B	6	0	10	0	0
3	C	6	0	10	1	0
3	D	6	0	10	1	0
4	A	81	0	0	5	0
4	B	110	0	0	6	0
4	C	77	0	0	2	0
4	D	112	0	0	4	0
All	All	12201	0	11659	292	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 12.

The worst 5 of 292 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:318:VAL:O	1:B:358:PRO:HD3	1.37	1.18
1:D:318:VAL:O	1:D:358:PRO:HD3	1.55	1.05
1:A:312:GLN:HE21	1:A:312:GLN:HA	1.25	1.01
1:A:409:VAL:HG21	1:A:419:GLU:OE1	1.62	0.98
1:C:359:THR:HG23	1:C:361:ASP:H	1.31	0.96

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	370/425 (87%)	351 (95%)	16 (4%)	3 (1%)	19	13
1	B	373/425 (88%)	356 (95%)	13 (4%)	4 (1%)	14	8
1	C	362/425 (85%)	341 (94%)	17 (5%)	4 (1%)	14	8
1	D	359/425 (84%)	345 (96%)	12 (3%)	2 (1%)	25	19
All	All	1464/1700 (86%)	1393 (95%)	58 (4%)	13 (1%)	17	11

5 of 13 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	242	ARG
1	A	346	PRO
1	B	346	PRO
1	C	346	PRO
1	D	242	ARG

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	323/362 (89%)	305 (94%)	18 (6%)	21	17
1	B	326/362 (90%)	304 (93%)	22 (7%)	16	11
1	C	316/362 (87%)	298 (94%)	18 (6%)	20	16
1	D	313/362 (86%)	298 (95%)	15 (5%)	25	22
All	All	1278/1448 (88%)	1205 (94%)	73 (6%)	20	16

5 of 73 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	409	VAL
1	D	359	THR
1	D	71	ASN
1	D	243	ASP
1	B	119	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 44 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	197	HIS
1	D	71	ASN
1	C	210	GLN
1	C	262	HIS
1	D	116	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

8 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	PUT	C	1006	2	5,5,5	0.35	0	4,4,4	0.65	0
3	PUT	A	1002	2	5,5,5	0.50	0	4,4,4	0.48	0
3	PUT	B	1004	2	5,5,5	0.40	0	4,4,4	0.51	0
2	PLP	C	1005	3	15,15,16	2.76	4 (26%)	20,22,23	1.32	4 (20%)
2	PLP	A	1001	3	15,15,16	2.36	5 (33%)	20,22,23	1.24	4 (20%)
2	PLP	D	1007	3	15,15,16	2.19	4 (26%)	20,22,23	1.58	2 (10%)
2	PLP	B	1003	3	15,15,16	2.02	3 (20%)	20,22,23	1.10	3 (15%)
3	PUT	D	1008	2	5,5,5	0.33	0	4,4,4	0.55	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	PUT	C	1006	2	-	0/3/3/3	-
3	PUT	A	1002	2	-	0/3/3/3	-
3	PUT	B	1004	2	-	0/3/3/3	-
2	PLP	C	1005	3	-	0/6/6/8	0/1/1/1
2	PLP	A	1001	3	-	0/6/6/8	0/1/1/1
2	PLP	D	1007	3	-	0/6/6/8	0/1/1/1
2	PLP	B	1003	3	-	0/6/6/8	0/1/1/1
3	PUT	D	1008	2	-	0/3/3/3	-

The worst 5 of 16 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	1005	PLP	C5-C4	7.71	1.49	1.40
2	A	1001	PLP	C5-C4	7.09	1.48	1.40
2	D	1007	PLP	C5-C4	5.70	1.46	1.40
2	B	1003	PLP	C5-C4	5.34	1.46	1.40
2	C	1005	PLP	C3-C2	4.61	1.45	1.40

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	1007	PLP	C4A-C4-C5	4.55	125.62	120.94
2	D	1007	PLP	C4A-C4-C3	-2.90	115.58	120.50
2	C	1005	PLP	O3-C3-C2	2.40	122.72	117.49
2	B	1003	PLP	C6-N1-C2	2.32	123.47	119.17
2	C	1005	PLP	C5-C6-N1	-2.26	120.05	123.82

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

7 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	1006	PUT	1	0
3	A	1002	PUT	1	0
2	C	1005	PLP	1	0
2	A	1001	PLP	1	0
2	D	1007	PLP	1	0
2	B	1003	PLP	1	0
3	D	1008	PUT	1	0

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	378/425 (88%)	0.04	28 (7%) 14 13	13, 25, 64, 83	0
1	B	381/425 (89%)	0.02	21 (5%) 25 24	10, 23, 55, 85	0
1	C	370/425 (87%)	0.09	25 (6%) 17 16	13, 26, 63, 88	0
1	D	367/425 (86%)	0.01	18 (4%) 29 28	11, 25, 54, 81	0
All	All	1496/1700 (88%)	0.04	92 (6%) 21 20	10, 25, 60, 88	0

The worst 5 of 92 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	19	PHE	13.6
1	D	19	PHE	9.1
1	B	18	GLY	8.2
1	A	347	ASN	6.8
1	D	166	LEU	6.0

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](#)

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(\AA^2)	Q<0.9
3	PUT	D	1008	6/6	0.61	0.25	43,50,54,55	0
3	PUT	A	1002	6/6	0.65	0.32	40,46,48,51	0
3	PUT	B	1004	6/6	0.68	0.33	44,51,55,59	0
3	PUT	C	1006	6/6	0.76	0.27	43,49,53,53	0
2	PLP	C	1005	15/16	0.97	0.08	16,22,31,34	0
2	PLP	D	1007	15/16	0.97	0.08	13,23,28,34	0
2	PLP	B	1003	15/16	0.97	0.10	14,22,30,34	0
2	PLP	A	1001	15/16	0.98	0.09	15,23,29,31	0

6.5 Other polymers [i](#)

There are no such residues in this entry.