



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 23, 2018 – 08:39 am GMT

PDB ID : 1D7R  
Title : CRYSTAL STRUCTURE OF THE COMPLEX OF 2,2-DIALKYLGLYCINE  
DECARBOXYLASE WITH 5PA  
Authors : Malashkevich, V.N.; Toney, M.D.; Strop, P.; Keller, J.; Jansonius, J.N.  
Deposited on : 1999-10-19  
Resolution : 2.00 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.

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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  
Mogul : 1.7.3 (157068), CSD as539be (2018)  
Xtriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk30686

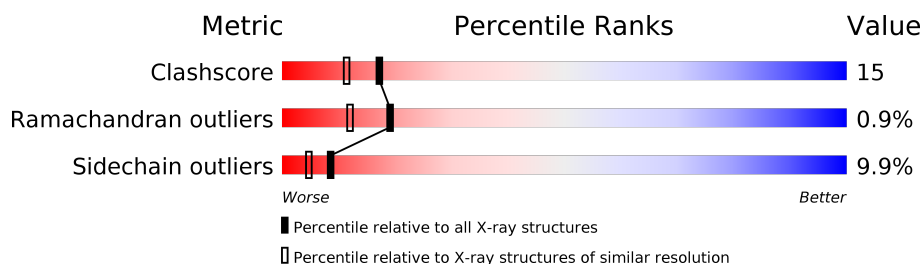
# 1 Overall quality at a glance

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))
Clashscore	122078	8264 (2.00-2.00)
Ramachandran outliers	120005	8163 (2.00-2.00)
Sidechain outliers	119972	8162 (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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	433	

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 3400 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 PROTEIN (2,2-DIALKYLGLYCINE DECARBOXYLASE (PYRUVATE)).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	431	Total	C	N	O	S	0	0	0
			3246	2047	575	606	18			

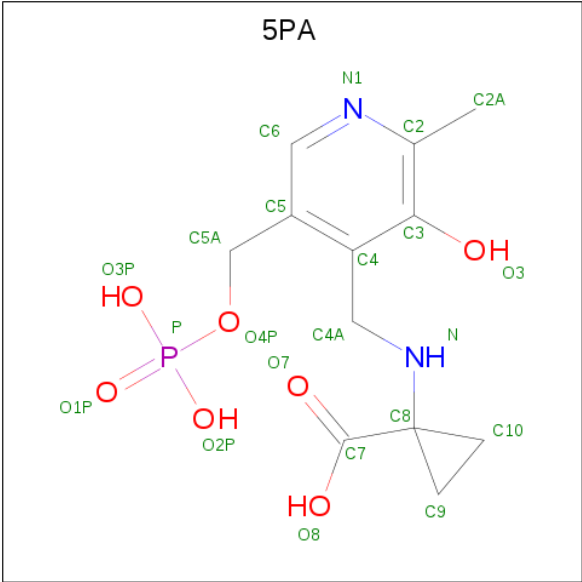
- Molecule 2 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Na	0	0
			1	1		

- Molecule 3 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	K	0	0
			1	1		

- Molecule 4 is N-[3-HYDROXY-2-METHYL-5-PHOSPHONOXYMETHYL-PYRIDIN-4-Y-LMETHYL]-1-AMINO-CYCLOPROPANECARBOXYLIC ACID (three-letter code: 5PA) (formula: C<sub>12</sub>H<sub>17</sub>N<sub>2</sub>O<sub>7</sub>P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			22	12	2	7	1		

- Molecule 5 is water.

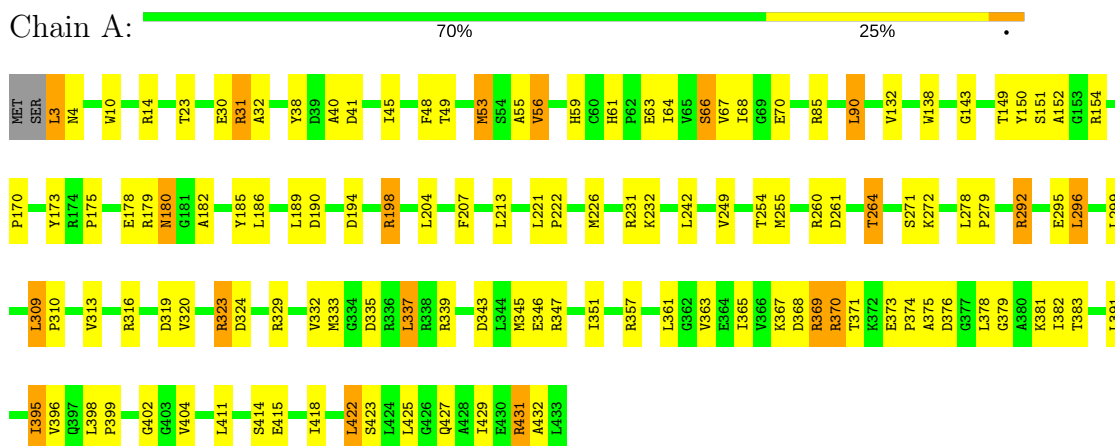
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	130	Total	O	0	0
			130	130		

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

These plots are drawn for all protein, RNA and DNA 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.

Note EDS was not executed.

- Molecule 1: PROTEIN (2,2-DIALKYLGLYCINE DECARBOXYLASE (PYRUVATE))



## 4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 64 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	152.65Å 152.65Å 86.22Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	10.00 – 2.00	Depositor
% Data completeness (in resolution range)	96.6 (10.00-2.00)	Depositor
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	TNT	Depositor
R, $R_{free}$	0.215 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3400	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	33.0	wwPDB-VP

## 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: NA, K, 5PA

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	0.65	0/3302	0.88	1/4468 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	A	255	MET	CG-SD-CE	5.67	109.26	100.20

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	3246	0	3277	98	0
2	A	1	0	0	0	0
3	A	1	0	0	0	0
4	A	22	0	13	3	0
5	A	130	0	0	4	0
All	All	3400	0	3290	98	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 15.

All (98) 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:A:3:LEU:HD12	1:A:4:ASN:H	1.13	1.06
1:A:278:LEU:HD13	1:A:279:PRO:N	1.91	0.85
1:A:3:LEU:HD12	1:A:4:ASN:N	1.90	0.84
1:A:272:LYS:HE3	4:A:500:5PA:H4A2	1.60	0.83
1:A:368:ASP:HB3	1:A:371:THR:HB	1.60	0.83
1:A:278:LEU:HD13	1:A:279:PRO:CD	2.10	0.82
1:A:278:LEU:HD13	1:A:279:PRO:HD2	1.68	0.75
1:A:61:HIS:HB3	1:A:64:ILE:HG12	1.67	0.75
1:A:323:ARG:HH11	1:A:323:ARG:HG2	1.53	0.73
1:A:272:LYS:CE	4:A:500:5PA:H4A2	2.20	0.72
1:A:260:ARG:NH2	1:A:357:ARG:HD3	2.06	0.71
1:A:309:LEU:HD12	1:A:309:LEU:O	1.92	0.70
1:A:323:ARG:NH1	1:A:323:ARG:HG2	2.08	0.69
1:A:374:PRO:HB3	1:A:402:GLY:HA2	1.74	0.69
1:A:3:LEU:HA	1:A:41:ASP:OD1	1.94	0.68
1:A:194:ASP:OD2	1:A:198:ARG:NH1	2.28	0.67
1:A:292:ARG:NH1	1:A:295:GLU:OE2	2.28	0.65
1:A:64:ILE:O	1:A:67:VAL:HG12	1.96	0.65
1:A:254:THR:HG23	1:A:260:ARG:HH11	1.60	0.65
1:A:425:LEU:O	1:A:429:ILE:HG13	1.98	0.63
1:A:423:SER:O	1:A:427:GLN:HG3	2.01	0.61
1:A:194:ASP:CG	1:A:198:ARG:HH11	2.02	0.61
1:A:85:ARG:HG2	5:A:515:HOH:O	2.01	0.61
1:A:337:LEU:HB2	1:A:418:ILE:HD12	1.83	0.59
1:A:226:MET:CE	1:A:242:LEU:HD21	2.34	0.57
1:A:3:LEU:HD13	1:A:41:ASP:OD1	2.05	0.56
1:A:3:LEU:HD13	1:A:41:ASP:OD2	2.05	0.56
1:A:221:LEU:HD12	1:A:226:MET:HE3	1.87	0.56
1:A:61:HIS:CD2	1:A:63:GLU:HG3	2.41	0.55
1:A:30:GLU:HG3	1:A:40:ALA:HA	1.87	0.55
1:A:309:LEU:O	1:A:313:VAL:HG23	2.07	0.55
1:A:323:ARG:CG	1:A:323:ARG:HH11	2.19	0.54
1:A:395:ILE:HG12	1:A:396:VAL:N	2.21	0.54
1:A:278:LEU:HD22	1:A:279:PRO:HD2	1.89	0.54
1:A:232:LYS:HE2	5:A:631:HOH:O	2.08	0.53
1:A:368:ASP:OD1	1:A:370:ARG:HB2	2.08	0.53
1:A:309:LEU:HD12	1:A:309:LEU:C	2.29	0.52
1:A:204:LEU:HB2	5:A:583:HOH:O	2.08	0.52
1:A:66:SER:O	1:A:70:GLU:HB2	2.09	0.52
1:A:3:LEU:HD13	1:A:41:ASP:CG	2.30	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:264:THR:HG22	5:A:559:HOH:O	2.10	0.51
1:A:64:ILE:HG22	1:A:68:ILE:HD12	1.92	0.50
1:A:368:ASP:C	1:A:370:ARG:H	2.15	0.50
1:A:278:LEU:CD1	1:A:279:PRO:HD2	2.40	0.50
1:A:398:LEU:HB3	1:A:399:PRO:HD2	1.93	0.49
1:A:190:ASP:OD1	1:A:232:LYS:NZ	2.39	0.49
1:A:272:LYS:HE3	4:A:500:5PA:C4A	2.37	0.49
1:A:309:LEU:HB3	1:A:310:PRO:HD3	1.95	0.49
1:A:368:ASP:OD1	1:A:370:ARG:N	2.45	0.48
1:A:343:ASP:O	1:A:346:GLU:HB2	2.13	0.48
1:A:367:LYS:N	1:A:373:GLU:O	2.36	0.48
1:A:368:ASP:OD1	1:A:371:THR:N	2.44	0.47
1:A:316:ARG:O	1:A:320:VAL:HG13	2.14	0.47
1:A:333:MET:HA	1:A:333:MET:CE	2.44	0.47
1:A:32:ALA:HB1	1:A:59:HIS:CG	2.50	0.47
1:A:150:TYR:CE2	1:A:154:ARG:CZ	2.98	0.47
1:A:31:ARG:HG3	1:A:32:ALA:N	2.30	0.46
1:A:368:ASP:CB	1:A:371:THR:HB	2.40	0.46
1:A:368:ASP:CG	1:A:371:THR:H	2.19	0.46
1:A:337:LEU:HG	1:A:418:ILE:CD1	2.45	0.46
1:A:335:ASP:CG	1:A:339:ARG:HE	2.19	0.46
1:A:226:MET:HE1	1:A:242:LEU:HD21	1.97	0.46
1:A:132:VAL:O	1:A:207:PHE:HA	2.16	0.46
1:A:381:LYS:HB3	1:A:432:ALA:HB1	1.97	0.46
1:A:31:ARG:HG2	1:A:38:TYR:CD1	2.51	0.45
1:A:418:ILE:O	1:A:422:LEU:HD22	2.16	0.45
1:A:56:VAL:HG22	1:A:411:LEU:HG	1.98	0.45
1:A:45:ILE:N	1:A:45:ILE:HD12	2.31	0.45
1:A:151:SER:O	1:A:152:ALA:HB2	2.15	0.45
1:A:179:ARG:O	1:A:180:ASN:ND2	2.50	0.45
1:A:431:ARG:HE	1:A:431:ARG:HB2	1.29	0.45
1:A:369:ARG:HG2	1:A:369:ARG:O	2.16	0.44
1:A:185:TYR:CZ	1:A:222:PRO:HB2	2.52	0.44
1:A:345:MET:O	1:A:369:ARG:NH2	2.42	0.44
1:A:395:ILE:HA	1:A:404:VAL:O	2.18	0.44
1:A:379:GLY:O	1:A:383:THR:OG1	2.30	0.44
1:A:138:TRP:HA	1:A:149:THR:HG23	2.00	0.44
1:A:371:THR:O	1:A:371:THR:HG22	2.17	0.43
1:A:61:HIS:HB3	1:A:64:ILE:CG1	2.42	0.43
1:A:332:VAL:HG12	1:A:333:MET:HE3	2.01	0.43
1:A:337:LEU:HG	1:A:418:ILE:HD13	2.00	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:249:VAL:O	1:A:249:VAL:HG12	2.19	0.42
1:A:333:MET:HA	1:A:333:MET:HE2	2.01	0.42
1:A:173:TYR:O	1:A:175:PRO:HD3	2.19	0.42
1:A:292:ARG:HG3	1:A:296:LEU:HD22	2.01	0.42
1:A:213:LEU:N	1:A:213:LEU:HD12	2.35	0.42
1:A:49:THR:O	1:A:53:MET:HA	2.20	0.41
1:A:180:ASN:C	1:A:182:ALA:H	2.24	0.41
1:A:170:PRO:HG2	1:A:222:PRO:HD3	2.02	0.41
1:A:323:ARG:NH1	1:A:324:ASP:OD1	2.51	0.41
1:A:427:GLN:O	1:A:431:ARG:HB3	2.20	0.41
1:A:90:LEU:HA	1:A:90:LEU:HD23	1.90	0.41
1:A:292:ARG:O	1:A:292:ARG:HG3	2.21	0.41
1:A:351:ILE:HG23	1:A:363:VAL:CG1	2.51	0.41
1:A:378:LEU:O	1:A:382:ILE:HG13	2.21	0.40
1:A:316:ARG:O	1:A:319:ASP:HB2	2.21	0.40
1:A:10:TRP:O	1:A:14:ARG:HB2	2.21	0.40
1:A:365:ILE:HG22	1:A:375:ALA:HB3	2.03	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	429/433 (99%)	400 (93%)	25 (6%)	4 (1%)	19	12

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	143	GLY
1	A	271	SER
1	A	55	ALA
1	A	369	ARG

### 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	A	333/335 (99%)	300 (90%)	33 (10%)	8 5

All (33) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	LEU
1	A	23	THR
1	A	31	ARG
1	A	48	PHE
1	A	53	MET
1	A	56	VAL
1	A	66	SER
1	A	90	LEU
1	A	178	GLU
1	A	180	ASN
1	A	186	LEU
1	A	189	LEU
1	A	198	ARG
1	A	231	ARG
1	A	261	ASP
1	A	264	THR
1	A	292	ARG
1	A	296	LEU
1	A	299	LEU
1	A	309	LEU
1	A	323	ARG
1	A	329	ARG
1	A	337	LEU
1	A	347	ARG
1	A	361	LEU
1	A	370	ARG
1	A	376	ASP
1	A	391	LEU
1	A	395	ILE
1	A	414	SER

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Mol	Chain	Res	Type
1	A	415	GLU
1	A	422	LEU
1	A	431	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	180	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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 3 ligands modelled in this entry, 2 are monoatomic - leaving 1 for Mogul analysis.

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$
4	5PA	A	500	-	17,23,23	1.96	4 (23%)	24,35,35	3.14	12 (50%)

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
4	5PA	A	500	-	-	0/9/22/22	0/1/2/2

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	500	5PA	C4A-C4	-3.66	1.47	1.51
4	A	500	5PA	C4A-N	-2.99	1.30	1.45
4	A	500	5PA	C5-C4	3.09	1.44	1.40
4	A	500	5PA	C3-C2	4.72	1.44	1.40

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	500	5PA	C9-C8-N	-9.10	108.45	117.30
4	A	500	5PA	C3-C4-C5	-3.61	115.17	118.73
4	A	500	5PA	C5A-C5-C6	-3.26	113.86	119.34
4	A	500	5PA	C5-C6-N1	-2.85	119.01	123.83
4	A	500	5PA	C10-C8-C9	-2.57	56.64	59.07
4	A	500	5PA	O3P-P-O4P	-2.20	100.87	106.73
4	A	500	5PA	C2A-C2-C3	2.49	123.93	120.96
4	A	500	5PA	O3P-P-O1P	2.81	121.56	110.60
4	A	500	5PA	C10-C8-N	2.83	120.05	117.30
4	A	500	5PA	C7-C8-N	3.06	121.56	116.70
4	A	500	5PA	C4A-C4-C5	4.17	124.49	119.71
4	A	500	5PA	C6-C5-C4	7.04	123.28	118.14

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	500	5PA	3	0

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

### 6.4 Ligands

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers

EDS was not executed - this section is therefore empty.