

Full wwPDB X-ray Structure Validation Report (i)

Jun 12, 2024 – 01:26 PM EDT

PDB ID : 2XJB

Title : Crystal structure of the D52N variant of cytosolic 5'-nucleotidase II in complex

with deoxyguanosine monophosphate and deoxyadenosine triphosphate

Authors: Wallden, K.; Nordlund, P.

Deposited on : 2010-07-03

Resolution : 2.30 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.orgA user guide is available at

https://www.wwpdb.org/validation/2017/XrayValidationReportHelp with specific help available everywhere you see the (i) 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 (1)) were used in the production of this report:

MolProbity : 4.02b-467

Mogul : 2022.3.0, CSD as543be (2022)

Xtriage (Phenix) : 1.20.1

EDS : 2.36.2

buster-report : 1.1.7 (2018)

Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)

 $Refmac \quad : \quad 5.8.0158$

CCP4 : 7.0.044 (Gargrove)

Ideal geometry (proteins) : Engh & Huber (2001) Ideal geometry (DNA, RNA) : Parkinson et al. (1996)

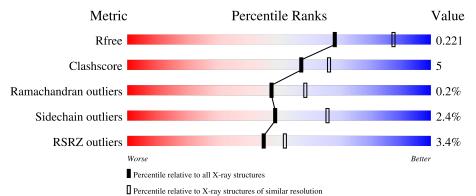
Validation Pipeline (wwPDB-VP) : 2.36.2

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure: X- $RAY\ DIFFRACTION$

The reported resolution of this entry is 2.30 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	Similar resolution			
Metric	$(\# \mathrm{Entries})$	$(\# ext{Entries}, ext{ resolution range}(ext{Å}))$			
R_{free}	130704	5042 (2.30-2.30)			
Clashscore	141614	5643 (2.30-2.30)			
Ramachandran outliers	138981	5575 (2.30-2.30)			
Sidechain outliers	138945	5575 (2.30-2.30)			
RSRZ outliers	127900	4938 (2.30-2.30)			

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 <=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						
			3%						
1	A	554	74%	9%	•	16%			



2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 4188 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 CYTOSOLIC PURINE 5'-NUCLEOTIDASE.

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace		
1	٨	464	Total	С	N	О	S	0	0	0
1	A	404	3852	2484	645	701	22	0	8	

There are 19 discrepancies between the modelled and reference sequences:

Chain	Chain Residue 1		Actual	Comment	Reference
A	-17	GLY	-	expression tag	UNP P49902
A	-16	SER	-	expression tag	UNP P49902
A	-15	SER	-	expression tag	UNP P49902
A	-14	HIS	-	expression tag	UNP P49902
A	-13	HIS	-	expression tag	UNP P49902
A	-12	HIS	-	expression tag	UNP P49902
A	-11	HIS	-	expression tag	UNP P49902
A	-10	HIS	-	expression tag	UNP P49902
A	-9	HIS	-	expression tag	UNP P49902
A	-8	SER	-	expression tag	UNP P49902
A	-7	SER	-	expression tag	UNP P49902
A	-6	GLY	-	expression tag	UNP P49902
A	-5	LEU	-	expression tag	UNP P49902
A	-4	VAL	-	expression tag	UNP P49902
A	-3	PRO	-	expression tag	UNP P49902
A	-2	ARG	-	expression tag	UNP P49902
A	-1	GLY	-	expression tag	UNP P49902
A	0	SER	-	expression tag	UNP P49902
A	52	ASN	ASP	engineered mutation	UNP P49902

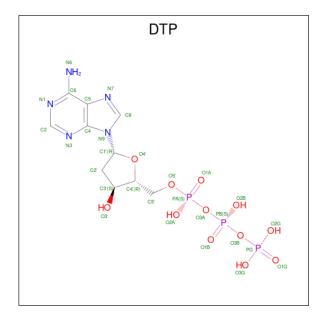
• Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).





Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 6 3 3	0	0
2	A	1	Total C O 6 3 3	0	0
2	A	1	Total C O 6 3 3	0	0

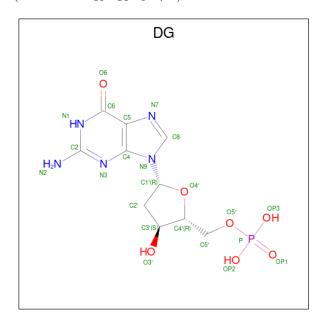
• Molecule 3 is 2'-DEOXYADENOSINE 5'-TRIPHOSPHATE (three-letter code: DTP) (formula: $C_{10}H_{16}N_5O_{12}P_3$).





Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
9	Λ	1	Total	С	N	О	Р	0	0
3	A	1	30	10	5	12	3		

• Molecule 4 is 2'-DEOXYGUANOSINE-5'-MONOPHOSPHATE (three-letter code: DG) (formula: $C_{10}H_{14}N_5O_7P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	٨	1	Total	С	N	О	Р	0	0
4	4 A	1	23	10	5	7	1	U	0

• Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	2	Total Mg 2 2	0	0

• Molecule 6 is water.

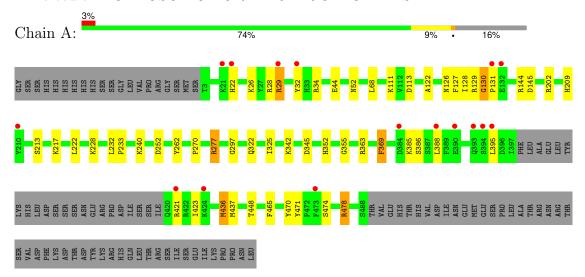
\mathbf{Mol}	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	263	Total O 263 263	0	0



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: CYTOSOLIC PURINE 5'-NUCLEOTIDASE





4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants	91.55Å 127.43Å 130.50Å	Depositor
a, b, c, α , β , γ	90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.68 - 2.30	Depositor
Resolution (A)	45.77 - 2.30	EDS
% Data completeness	99.5 (48.68-2.30)	Depositor
(in resolution range)	99.6 (45.77-2.30)	EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) > 1$	1.89 (at 2.29Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.175 , 0.222	Depositor
it, it free	0.175 , 0.221	DCC
R_{free} test set	1724 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	33.9	Xtriage
Anisotropy	0.354	Xtriage
Bulk solvent $k_{sol}(e/Å^3)$, $B_{sol}(Å^2)$	0.34, 41.0	EDS
L-test for twinning ²	$< L > = 0.49, < L^2> = 0.32$	Xtriage
Estimated twinning fraction	0.021 for -h,-l,-k	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	4188	wwPDB-VP
Average B, all atoms (\mathring{A}^2)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: The largest off-origin peak in the Patterson function is 4.01% of the height of the origin peak. No significant pseudotranslation is detected.

²Theoretical values of <|L|>, $<L^2>$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.



¹Intensities estimated from amplitudes.

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, GOL, DTP

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	Boı	nd lengths	Bond angles		
IVIOI	Chain	RMSZ	# Z > 5	RMSZ	# Z > 5	
1	A	0.82	1/3951 (0.0%)	0.80	3/5331 (0.1%)	

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	\mathbf{Z}	$\operatorname{Observed}(\text{\AA})$	$\operatorname{Ideal}(ext{\AA})$
1	A	436	MET	SD-CE	6.54	2.14	1.77

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	\mathbf{Z}	$Observed(^o)$	$Ideal(^{o})$
1	A	277	ARG	NE-CZ-NH1	7.14	123.87	120.30
1	A	277	ARG	NE-CZ-NH2	-6.17	117.22	120.30
1	A	144	ARG	NE-CZ-NH2	-5.42	117.59	120.30

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	3852	0	3788	36	0
2	A	18	0	24	2	0
3	A	30	0	12	2	0
4	A	23	0	12	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	2	0	0	0	0
6	A	263	0	0	5	0
All	All	4188	0	3836	38	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 5.

All (38) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Company	Atom-1	Atom-2	Interatomic	Clash
1:A:252:ASP:HB2 2:A:1493:GOL:H12 1.46 0.93 1:A:478:ARG:NH1 1:A:478:ARG:HB2 1.90 0.86 1:A:386:SER:HA 6:A:2226:HOH:O 1.76 0.85 1:A:478:ARG:HB2 1:A:478:ARG:HH11 1.45 0.81 1:A:322:GLN:O 1:A:325:ILE:HG22 1.82 0.80 1:A:252:ASP:HB2 2:A:1493:GOL:C1 2.19 0.73 1:A:52:ASN:HD21 4:A:1491:DG:P 2.15 0.69 1:A:122:ALA:HB2 1:A:437:MET:HE1 1.77 0.66 1:A:145:ASP:HA 3:A:1490:DTP:H5'1 1.80 0.63 1:A:145:ASP:HA 3:A:1490:DTP:H5'1 1.80 0.63 1:A:122:ALA:CB 1:A:437:MET:HE1 2.28 0.62 1:A:229:HIS:HD2 6:A:2134:HOH:O 1.83 0.61 1:A:229:HSP:HA 1:A:262:TYR:O 2.02 0.59 1:A:297:GLY:HA2 1:A:262:TYR:HB2 1.93 0.51 1:A:395:LEU:HD13 1:A:262:TYR:HB2 1.93 0.51 1:A:111:DYS:HE2 1:A:448:THR:HG21 1.95 0.48			distance (Å)	overlap (Å)
1:A:478:ARG:NH1 1:A:478:ARG:HB2 1.90 0.86 1:A:386:SER:HA 6:A:2226:HOH:O 1.76 0.85 1:A:478:ARG:HB2 1:A:478:ARG:HH11 1.45 0.81 1:A:322:GLN:O 1:A:325:ILE:HG22 1.82 0.80 1:A:252:ASP:HB2 2:A:1493:GOL:C1 2.19 0.73 1:A:52:ASN:HD21 4:A:1491:DG:P 2.15 0.69 1:A:122:ALA:HB2 1:A:437:MET:HE1 1.77 0.66 1:A:478:ARG:HH11 1:A:478:ARG:CB 2.08 0.64 1:A:145:ASP:HA 3:A:1490:DTP:H5'1 1.80 0.63 1:A:122:ALA:CB 1:A:437:MET:HE1 2.28 0.62 1:A:209:HIS:HD2 6:A:2134:HOH:O 1.83 0.61 1:A:228:LVS:HE3 1:A:262:TYR:O 2.02 0.59 1:A:297:GLY:HA2 1:A:363:ARG:HH21 1.73 0.53 1:A:297:GLY:HA2 1:A:262:TYR:HB2 1.93 0.51 1:A:395:LEU:HD13 1:A:262:TYR:HB2 1.93 0.51 1:A:11:LVS:HE2 1:A:448:THR:HG21 1.95 0.48 1:A:28:ARG:HD3 1:A:470:TYR:O 2.14 0.47<				
1:A:386:SER:HA 6:A:2226:HOH:O 1.76 0.85 1:A:478:ARG:HB2 1:A:478:ARG:HH11 1.45 0.81 1:A:322:GLN:O 1:A:325:ILE:HG22 1.82 0.80 1:A:252:ASP:HB2 2:A:1493:GOL:C1 2.19 0.73 1:A:52:ASN:HD21 4:A:1491:DG:P 2.15 0.69 1:A:478:ARG:HH11 1:A:437:MET:HE1 1.77 0.66 1:A:478:ARG:HH11 1:A:478:ARG:CB 2.08 0.64 1:A:445:ASP:HA 3:A:1490:DTP:H5'1 1.80 0.63 1:A:122:ALA:CB 1:A:437:MET:HE1 2.28 0.62 1:A:209:HIS:HD2 6:A:2134:HOH:O 1.83 0.61 1:A:228:LYS:HE3 1:A:262:TYR:O 2.02 0.59 1:A:213:SER:O 1:A:217[A]:LYS:HG3 2.04 0.57 1:A:297:GLY:HA2 1:A:363:ARG:HH21 1.73 0.53 1:A:222:LEU:HD13 1:A:262:TYR:HB2 1.93 0.51 1:A:395:LEU:HD12 1:A:423:ILE:HG13 1.92 0.50 4:A:1491:DG:P 6:A:2263:HOH:O 2.70 0.50 1:A:111:LYS:HE2 1:A:448:THR:HG21 1.95	- '-		1.46	
1:A:478:ARG:HB2 1:A:478:ARG:HH11 1.45 0.81 1:A:322:GLN:O 1:A:325:ILE:HG22 1.82 0.80 1:A:252:ASP:HB2 2:A:1493:GOL:C1 2.19 0.73 1:A:52:ASN:HD21 4:A:1491:DG:P 2.15 0.69 1:A:122:ALA:HB2 1:A:437:MET:HE1 1.77 0.66 1:A:478:ARG:HH11 1:A:478:ARG:CB 2.08 0.64 1:A:445:ASP:HA 3:A:1490:DTP:H5'1 1.80 0.63 1:A:122:ALA:CB 1:A:437:MET:HE1 2.28 0.62 1:A:209:HIS:HD2 6:A:2134:HOH:O 1.83 0.61 1:A:228:LYS:HE3 1:A:262:TYR:O 2.02 0.59 1:A:213:SER:O 1:A:217[A]:LYS:HG3 2.04 0.57 1:A:297:GLY:HA2 1:A:363:ARG:HH21 1.73 0.53 1:A:292:LEU:HD13 1:A:262:TYR:HB2 1.93 0.51 1:A:395:LEU:HD12 1:A:423:ILE:HG13 1.92 0.50 4:A:1491:DG:P 6:A:2263:HOH:O 2.70 0.50 1:A:111:LYS:HE2 1:A:448:THR:HG21 1.95 0.48 1:A:44:GLU:HB3 1:A:474:SER:HB2 1.96	1:A:478:ARG:NH1	1:A:478:ARG:HB2	1.90	0.86
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1:A:126:ASN:ND2 1:A:128:ILE:CD1 2.79 0.45 1:A:26:LYS:O 1:A:29:ARG:HB2 2.17 0.45 1:A:232:LEU:HD13 1:A:465:PHE:CZ 2.52 0.45 1:A:28:ARG:HD2 1:A:471:TYR:CE1 2.52 0.44	1:A:352:HIS:CD2	1:A:355:GLY:H	2.34	0.45
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1:A:28:ARG:HD2 1:A:471:TYR:CE1 2.52 0.44	1:A:26:LYS:O	1:A:29:ARG:HB2	2.17	0.45
	1:A:232:LEU:HD13	1:A:465:PHE:CZ	2.52	0.45
1:A:277:ARG:NE 6:A:2170:HOH:O 2.51 0.43	1:A:28:ARG:HD2	1:A:471:TYR:CE1	2.52	0.44
	1:A:277:ARG:NE	6:A:2170:HOH:O	2.51	0.43

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Atom-1	Atom-2	Interatomic	Clash
		${ m distance}({ m \AA})$	overlap (Å)
1:A:233:PRO:HB2	1:A:270:PRO:HA	2.02	0.42
1:A:130:GLY:HA3	1:A:131:PRO:HD3	1.84	0.42
1:A:113:ASP:OD1	1:A:113:ASP:C	2.58	0.42
1:A:68:LEU:HD11	1:A:217[A]:LYS:HD2	2.01	0.42
1:A:127:PHE:CE2	1:A:437:MET:CE	3.04	0.41
1:A:385:LYS:HD3	1:A:388:LEU:HD13	2.02	0.41
1:A:369:PHE:C	1:A:369:PHE:CD2	2.94	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	468/554 (84%)	455 (97%)	12 (3%)	1 (0%)	47 58

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	130	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	419/496 (84%)	409 (98%)	10 (2%)	49 66



A 11	(10)	residues	with a	non-rotamer	ic side	chain	are	listed	below.
7 7 11	(10 /	TOSIGICS	WIUII a	mon rotanici	ic side	CHAIL	arc	mouca	DCIOW.

Mol	Chain	Res	Type
1	A	22	HIS
1	A	29	ARG
1	A	32	TYR
1	A	34	ARG
1	A	129	ARG
1	A	202	ARG
1	A	240	LYS
1	A	369	PHE
1	A	421	ARG
1	A	478	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	38	ASN
1	A	126	ASN
1	A	209	HIS
1	A	352	HIS

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)

Of 7 ligands modelled in this entry, 2 are monoatomic - leaving 5 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	Trino	Chain	Res	Link	Bo	Bond lengths			Bond angles		
MIOI	Type	Chain	nes	LIIIK	Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2	
2	GOL	A	1493	-	5,5,5	0.60	0	5,5,5	0.93	0	
2	GOL	A	1492	-	5,5,5	0.40	0	5,5,5	0.64	0	
3	DTP	A	1490	5	28,32,32	1.18	3 (10%)	35,50,50	1.54	6 (17%)	
4	DG	A	1491	5	22,25,25	2.05	4 (18%)	26,38,38	2.05	8 (30%)	
2	GOL	A	1489	-	5,5,5	0.74	0	5,5,5	1.00	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
2	GOL	A	1493	-	-	2/4/4/4	-
2	GOL	A	1492	-	-	0/4/4/4	-
3	DTP	A	1490	5	-	6/18/34/34	0/3/3/3
4	DG	A	1491	5	-	1/6/22/22	0/3/3/3
2	GOL	A	1489	-	-	1/4/4/4	-

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	\mathbf{Z}	$\operatorname{Observed}(\mathring{\mathbf{A}})$	Ideal(A)
4	A	1491	DG	P-OP1	5.07	1.66	1.50
4	A	1491	DG	C5-C6	-4.86	1.37	1.47
4	A	1491	DG	P-OP2	4.74	1.72	1.54
3	A	1490	DTP	PA-O3A	3.80	1.63	1.59
3	A	1490	DTP	C4-N3	2.63	1.39	1.35
4	A	1491	DG	P-O5'	2.42	1.68	1.60
3	A	1490	DTP	C2-N3	2.23	1.35	1.32

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	\mathbf{Z}	$Observed(^o)$	$\operatorname{Ideal}(^{o})$
4	A	1491	DG	OP2-P-O5'	5.86	121.95	106.67
3	A	1490	DTP	N3-C2-N1	-5.03	121.85	128.67
4	A	1491	DG	O4'-C1'-N9	-3.98	103.47	108.75
3	A	1490	DTP	O3A-PB-O1B	-3.03	101.59	110.70
4	A	1491	DG	C2-N1-C6	-2.92	119.77	125.11

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Mol	Chain	Res	Type	Atoms	\mathbf{Z}	$\mathbf{Observed}(^o)$	$\mathbf{Ideal}(^{o})$
4	A	1491	DG	C8-N7-C5	2.83	107.37	102.55
4	A	1491	DG	C5-C6-N1	2.61	119.06	114.07
4	A	1491	DG	OP3-P-OP1	2.56	120.80	110.83
3	A	1490	DTP	O4'-C4'-C5'	2.39	117.00	109.33
3	A	1490	DTP	N6-C6-N1	2.31	123.28	118.33
4	A	1491	DG	O6-C6-C5	-2.22	119.91	124.32
4	A	1491	DG	O5'-P-OP1	-2.12	100.71	106.44
3	A	1490	DTP	C2'-C3'-C4'	2.06	106.98	102.80
3	A	1490	DTP	O3'-C3'-C4'	-2.05	102.29	110.07

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1493	GOL	O1-C1-C2-C3
3	A	1490	DTP	C5'-O5'-PA-O2A
2	A	1493	GOL	O1-C1-C2-O2
2	A	1489	GOL	O2-C2-C3-O3
3	A	1490	DTP	C3'-C4'-C5'-O5'
3	A	1490	DTP	C5'-O5'-PA-O1A
3	A	1490	DTP	C5'-O5'-PA-O3A
3	A	1490	DTP	O4'-C4'-C5'-O5'
3	A	1490	DTP	C4'-C5'-O5'-PA
4	A	1491	DG	C3'-C4'-C5'-O5'

There are no ring outliers.

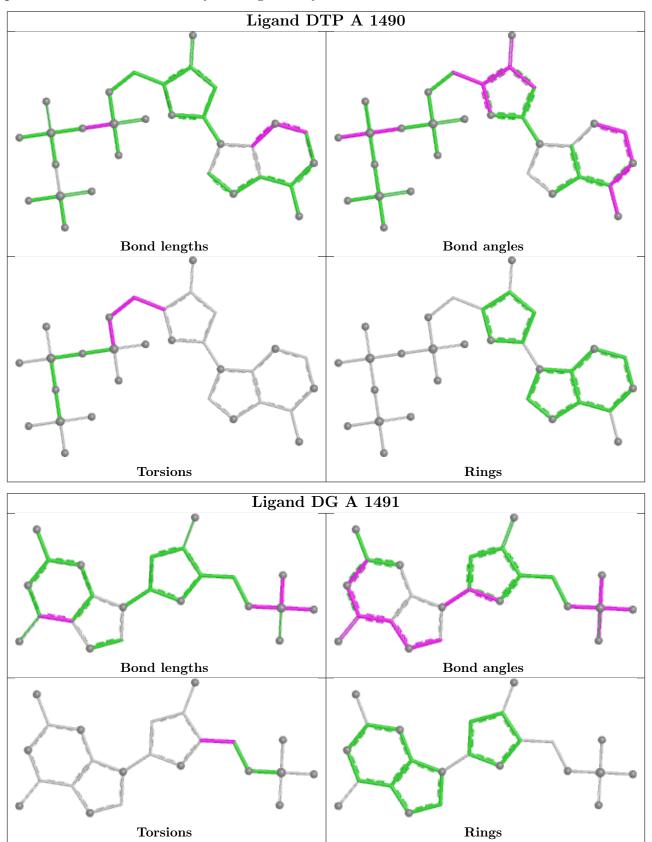
3 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1493	GOL	2	0
3	A	1490	DTP	2	0
4	A	1491	DG	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and



any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





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, 95^{th} 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.

Mo	l Chain	Analysed	<RSRZ $>$	# RSRZ > 2		$OWAB(A^2)$	Q<0.9	
1	A	464/554 (83%)	-0.16	16 (3%)	45	52	21, 35, 80, 131	0

All (16) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	29	ARG	4.2
1	A	473	PHE	3.5
1	A	394	SER	3.5
1	A	395	LEU	3.4
1	A	22	HIS	3.0
1	A	388	LEU	2.9
1	A	393	GLN	2.9
1	A	390	GLU	2.8
1	A	421	ARG	2.7
1	A	384	ASP	2.6
1	A	32	TYR	2.4
1	A	132	GLU	2.1
1	A	210	TYR	2.1
1	A	424	LYS	2.0
1	A	21	LYS	2.0
1	A	131	PRO	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.

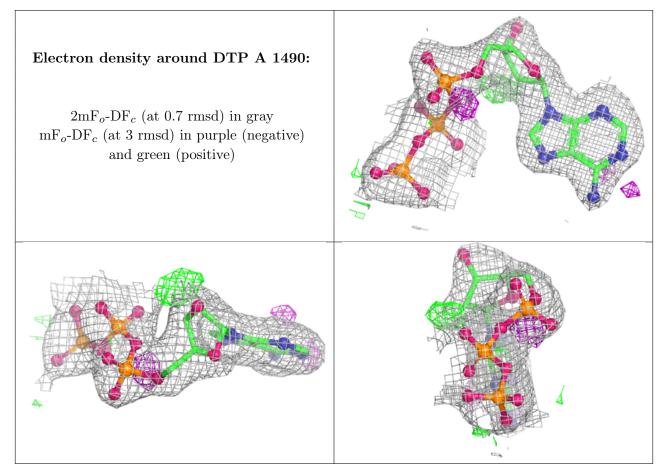


6.4 Ligands (i)

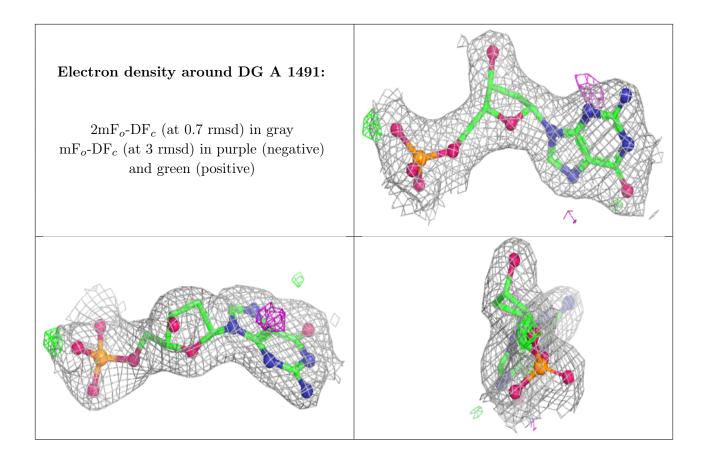
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	$\mathbf{B} ext{-}\mathbf{factors}(\mathbf{\mathring{A}}^2)$	Q < 0.9
2	GOL	A	1489	6/6	0.66	0.34	52,58,59,60	0
2	GOL	A	1493	6/6	0.85	0.18	36,44,45,48	0
2	GOL	A	1492	6/6	0.89	0.21	61,62,63,63	0
3	DTP	A	1490	30/30	0.96	0.11	36,47,53,55	0
5	MG	A	1494	1/1	0.97	0.07	31,31,31,31	0
4	DG	A	1491	23/23	0.98	0.08	28,34,35,37	0
5	MG	A	1495	1/1	0.98	0.09	36,36,36,36	1

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.







6.5 Other polymers (i)

There are no such residues in this entry.

