wwPDB X-ray Structure Validation Summary Report (i)

Dec 8, 2022 – 06:18 pm GMT

PDB ID	:	7ZHY
Title	:	Leishmania donovani Glucose 6-Phosphate Dehydrogenase C138S mutant complexed with NADP(H)
Authors	:	Fritz-Wolf, K.; Berneburg, I.
Deposited on	:	2022-04-07
Resolution	:	1.99 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (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 (i)) were used in the production of this report:

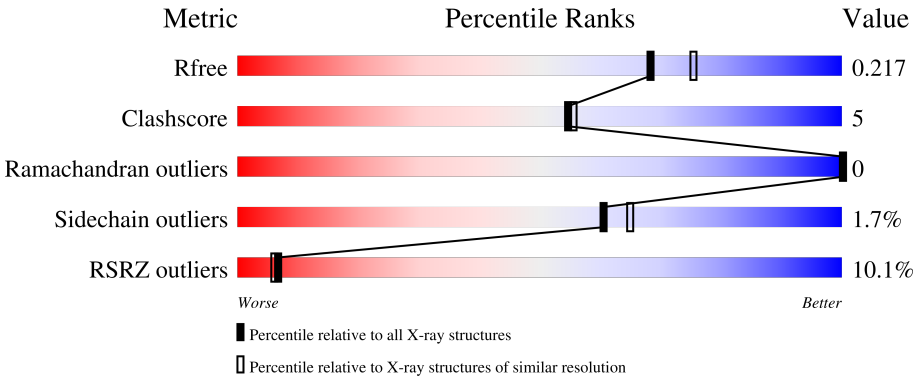
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.31.3
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0267
CCP4	:	7.1.010 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.3

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 1.99 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 <=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	562	10% 84% 10% • 6%
1	B	562	9% 85% 9% • 5%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	EDO	A	602	-	-	-	X
3	EDO	B	601	-	-	X	-
5	PEG	B	609	-	-	-	X

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 9522 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.

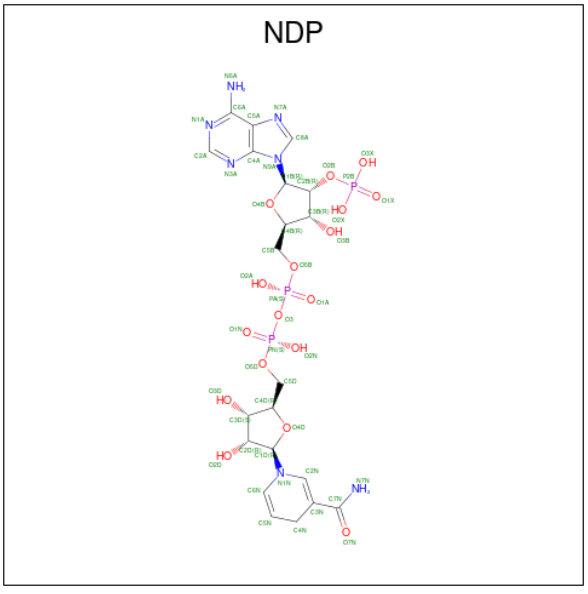
- Molecule 1 is a protein called Glucose-6-phosphate 1-dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	529	Total	C	N	O	S	0	4	0
			4214	2679	724	795	16			
1	B	533	Total	C	N	O	S	0	6	0
			4267	2713	735	803	16			

There are 2 discrepancies between the modelled and reference sequences:

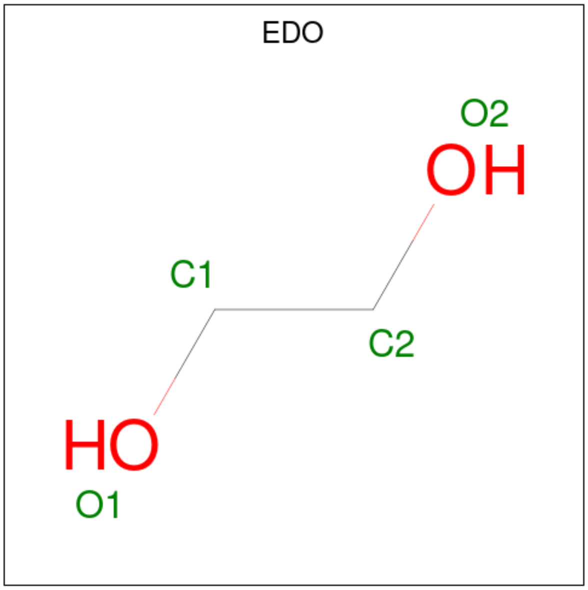
Chain	Residue	Modelled	Actual	Comment	Reference
A	138	SER	CYS	engineered mutation	UNP A2CIL3
B	138	SER	CYS	engineered mutation	UNP A2CIL3

- Molecule 2 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula: $C_{21}H_{30}N_7O_{17}P_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C N O P 48 21 7 17 3	0	0
2	B	1	Total C N O P 48 21 7 17 3	0	0

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0

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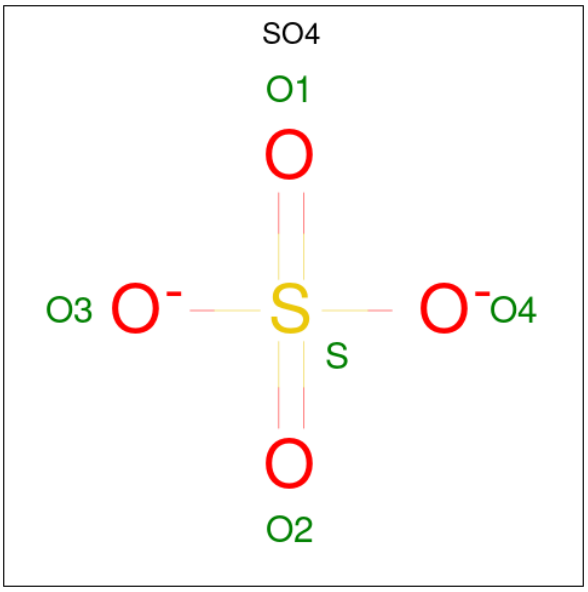
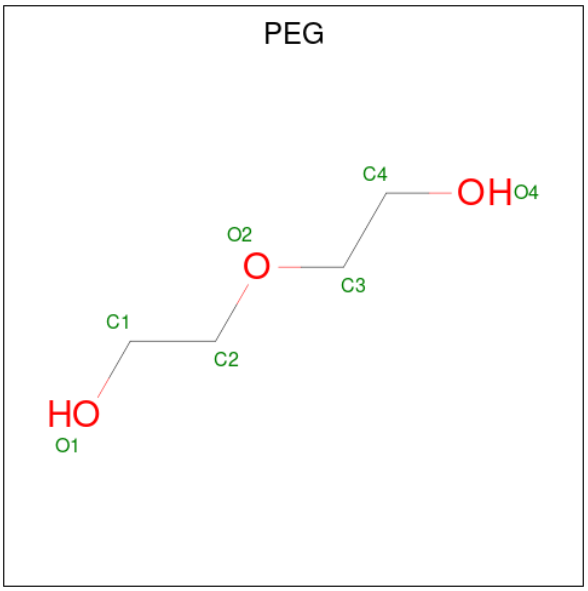
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



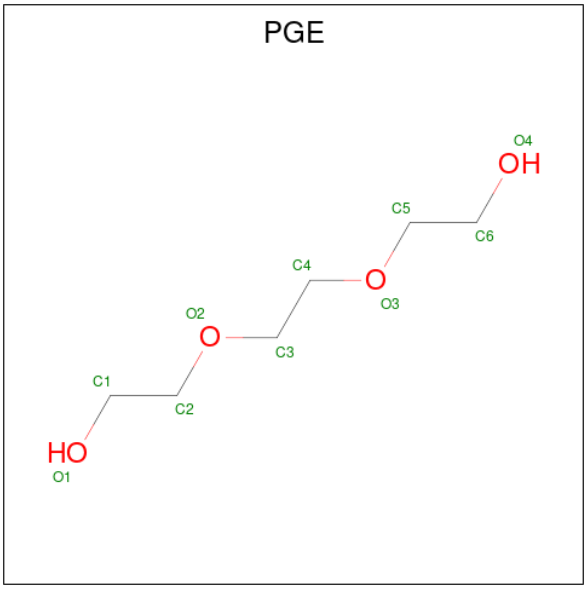
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total O S 5 4 1	0	0
4	A	1	Total O S 5 4 1	0	0
4	A	1	Total O S 5 4 1	0	0
4	A	1	Total O S 5 4 1	0	0
4	B	1	Total O S 5 4 1	0	0
4	B	1	Total O S 5 4 1	0	0
4	B	1	Total O S 5 4 1	0	0

- Molecule 5 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: $C_4H_{10}O_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 7 4 3	0	0
5	A	1	Total C O 7 4 3	0	0
5	A	1	Total C O 7 4 3	0	0
5	B	1	Total C O 7 4 3	0	0
5	B	1	Total C O 7 4 3	0	0

- Molecule 6 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula: $C_6H_{14}O_4$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C O 10 6 4	0	0

- Molecule 7 is water.

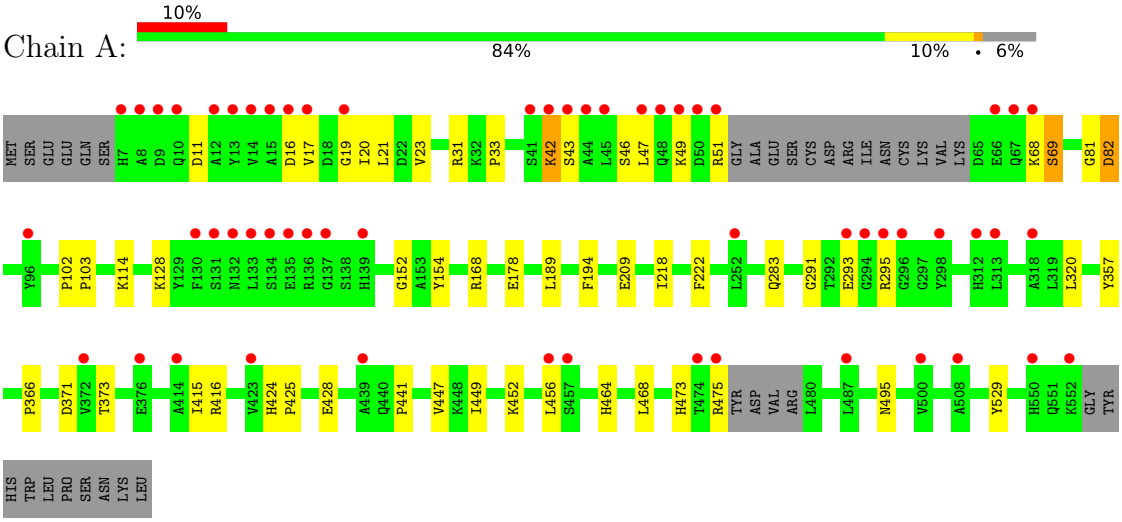
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	391	Total O 391 391	0	0
7	B	362	Total O 362 362	0	0

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.

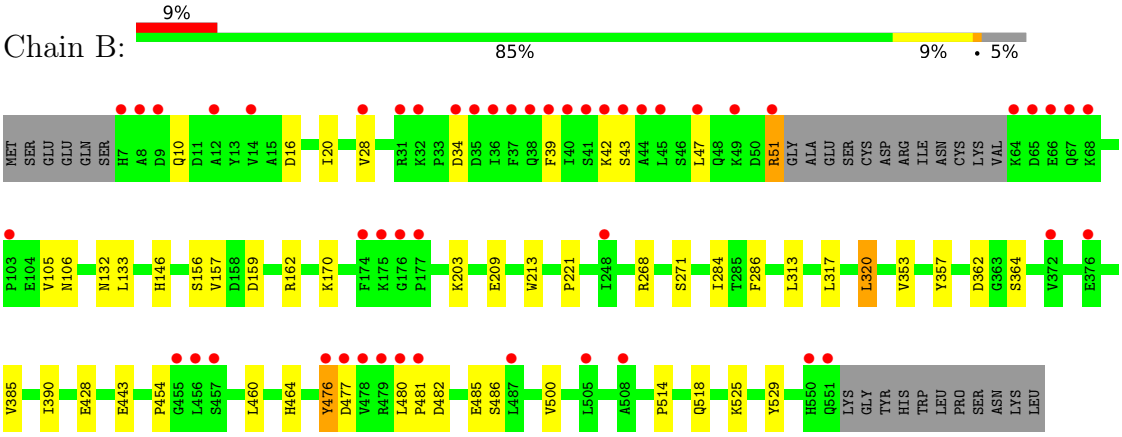
• Molecule 1: Glucose-6-phosphate 1-dehydrogenase

Chain A:



• Molecule 1: Glucose-6-phosphate 1-dehydrogenase

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	223.17Å 65.69Å 119.93Å 90.00° 120.75° 90.00°	Depositor
Resolution (Å)	47.95 – 1.99 47.95 – 1.99	Depositor EDS
% Data completeness (in resolution range)	99.6 (47.95-1.99) 99.6 (47.95-1.99)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.18 (at 2.00Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158, PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.183 , 0.219 0.181 , 0.217	Depositor DCC
R_{free} test set	10212 reflections (10.00%)	wwPDB-VP
Wilson B-factor (Å^2)	40.1	Xtriage
Anisotropy	0.288	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	(Not available) , (Not available)	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.008 for -h-2*l,-k,l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	9522	wwPDB-VP
Average B, all atoms (Å^2)	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.46% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical 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.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: EDO, PGE, PEG, SO4, NDP

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	0.42	0/4307	0.63	0/5825
1	B	1.82	8/4365 (0.2%)	0.72	5/5905 (0.1%)
All	All	1.32	8/8672 (0.1%)	0.68	5/11730 (0.0%)

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	476	TYR	CD1-CE1	61.25	2.31	1.39
1	B	476	TYR	CD2-CE2	59.52	2.28	1.39
1	B	476	TYR	CE2-CZ	45.64	1.97	1.38
1	B	476	TYR	CE1-CZ	42.93	1.94	1.38
1	B	476	TYR	CG-CD1	33.08	1.82	1.39

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	51	ARG	CD-NE-CZ	21.03	153.04	123.60
1	B	51	ARG	NE-CZ-NH1	13.20	126.90	120.30
1	B	51	ARG	CG-CD-NE	9.54	131.84	111.80
1	B	320	LEU	CA-CB-CG	5.09	127.00	115.30
1	B	476	TYR	CB-CG-CD1	-5.05	117.97	121.00

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	A	4214	0	4185	45	0
1	B	4267	0	4242	45	6
2	A	48	0	26	1	0
2	B	48	0	26	0	0
3	A	44	0	66	5	0
3	B	68	0	102	9	0
4	A	20	0	0	1	0
4	B	15	0	0	0	0
5	A	21	0	30	6	0
5	B	14	0	20	1	0
6	A	10	0	14	3	0
7	A	391	0	0	6	1
7	B	362	0	0	4	1
All	All	9522	0	8711	91	7

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.

The worst 5 of 91 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:476:TYR:CG	1:B:476:TYR:CD1	1.82	1.64
1:B:476:TYR:CG	1:B:476:TYR:CD2	1.80	1.60
1:B:51:ARG:CD	1:B:51:ARG:NE	1.68	1.53
1:B:476:TYR:CE2	1:B:476:TYR:CZ	1.97	1.52
1:B:476:TYR:CZ	1:B:476:TYR:CE1	1.94	1.50

The worst 5 of 7 symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:51:ARG:NE	1:B:476:TYR:CD1[2_556]	1.87	0.33
1:B:51:ARG:NE	1:B:476:TYR:CE1[2_556]	1.95	0.25
1:B:51:ARG:NE	1:B:476:TYR:CG[2_556]	2.00	0.20
1:B:51:ARG:NE	1:B:476:TYR:CD2[2_556]	2.05	0.15
1:B:51:ARG:NE	1:B:476:TYR:CZ[2_556]	2.11	0.09

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	527/562 (94%)	512 (97%)	15 (3%)	0	100	100
1	B	535/562 (95%)	521 (97%)	14 (3%)	0	100	100
All	All	1062/1124 (94%)	1033 (97%)	29 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	456/482 (95%)	449 (98%)	7 (2%)	65	69
1	B	462/482 (96%)	454 (98%)	8 (2%)	60	65
All	All	918/964 (95%)	903 (98%)	15 (2%)	60	67

5 of 15 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	10	GLN
1	B	480	LEU
1	B	34	ASP
1	B	525	LYS
1	B	464	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	27	GLN
1	A	38	GLN
1	A	283	GLN
1	A	473	HIS
1	B	283	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)

43 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	EDO	A	613	-	3,3,3	0.48	0	2,2,2	0.34	0
4	SO4	A	618	-	4,4,4	0.19	0	6,6,6	0.35	0
3	EDO	B	614	-	3,3,3	0.39	0	2,2,2	0.57	0
4	SO4	B	607	-	4,4,4	0.21	0	6,6,6	0.38	0
3	EDO	A	602	-	3,3,3	0.45	0	2,2,2	0.27	0
3	EDO	B	611	-	3,3,3	0.49	0	2,2,2	0.08	0
3	EDO	A	615	-	3,3,3	0.46	0	2,2,2	0.28	0
3	EDO	B	605	-	3,3,3	0.49	0	2,2,2	0.03	0
3	EDO	A	617	-	3,3,3	0.47	0	2,2,2	0.27	0
3	EDO	A	616	-	3,3,3	0.53	0	2,2,2	0.38	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
3	EDO	A	608	-	3,3,3	0.50	0	2,2,2	0.36	0
4	SO4	A	603	-	4,4,4	0.19	0	6,6,6	0.33	0
4	SO4	A	620	-	4,4,4	0.11	0	6,6,6	0.31	0
3	EDO	B	620	-	3,3,3	0.48	0	2,2,2	0.51	0
4	SO4	B	623	-	4,4,4	0.16	0	6,6,6	0.28	0
5	PEG	A	605	-	6,6,6	0.94	0	5,5,5	0.37	0
5	PEG	B	612	-	6,6,6	0.81	0	5,5,5	0.47	0
3	EDO	A	610	-	3,3,3	0.49	0	2,2,2	0.22	0
2	NDP	A	601	-	45,52,52	4.04	18 (40%)	53,80,80	1.99	5 (9%)
3	EDO	B	618	-	3,3,3	0.49	0	2,2,2	0.43	0
6	PGE	A	614	-	9,9,9	0.37	0	8,8,8	0.34	0
2	NDP	B	602	-	45,52,52	3.99	18 (40%)	53,80,80	2.02	5 (9%)
3	EDO	B	621	-	3,3,3	0.43	0	2,2,2	0.25	0
3	EDO	A	609	-	3,3,3	0.45	0	2,2,2	0.46	0
3	EDO	B	608	-	3,3,3	0.44	0	2,2,2	0.28	0
3	EDO	B	601	-	3,3,3	0.47	0	2,2,2	0.39	0
3	EDO	B	616	-	3,3,3	0.50	0	2,2,2	0.25	0
3	EDO	B	617	-	3,3,3	0.43	0	2,2,2	0.29	0
3	EDO	B	619	-	3,3,3	0.50	0	2,2,2	0.04	0
4	SO4	B	604	-	4,4,4	0.18	0	6,6,6	0.35	0
5	PEG	B	609	-	6,6,6	0.82	0	5,5,5	0.24	0
3	EDO	B	615	-	3,3,3	0.47	0	2,2,2	0.29	0
3	EDO	B	622	-	3,3,3	0.45	0	2,2,2	0.58	0
3	EDO	A	612	-	3,3,3	0.41	0	2,2,2	0.27	0
3	EDO	B	613	-	3,3,3	0.44	0	2,2,2	0.48	0
5	PEG	A	611	-	6,6,6	0.93	0	5,5,5	0.66	0
3	EDO	B	610	-	3,3,3	0.42	0	2,2,2	0.36	0
3	EDO	B	606	-	3,3,3	0.45	0	2,2,2	0.14	0
3	EDO	B	603	-	3,3,3	0.46	0	2,2,2	0.44	0
5	PEG	A	607	-	6,6,6	0.92	0	5,5,5	0.93	0
4	SO4	A	619	-	4,4,4	0.16	0	6,6,6	0.16	0
3	EDO	A	606	-	3,3,3	0.42	0	2,2,2	0.54	0
3	EDO	A	604	-	3,3,3	0.49	0	2,2,2	0.17	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	EDO	A	613	-	-	0/1/1/1	-
3	EDO	B	614	-	-	1/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	A	602	-	-	0/1/1/1	-
3	EDO	B	611	-	-	0/1/1/1	-
3	EDO	A	615	-	-	0/1/1/1	-
3	EDO	B	605	-	-	0/1/1/1	-
3	EDO	A	617	-	-	1/1/1/1	-
3	EDO	A	616	-	-	1/1/1/1	-
3	EDO	A	608	-	-	0/1/1/1	-
3	EDO	B	620	-	-	1/1/1/1	-
5	PEG	A	605	-	-	2/4/4/4	-
5	PEG	B	612	-	-	2/4/4/4	-
3	EDO	A	610	-	-	0/1/1/1	-
2	NDP	A	601	-	-	7/30/77/77	0/5/5/5
3	EDO	B	618	-	-	0/1/1/1	-
6	PGE	A	614	-	-	3/7/7/7	-
2	NDP	B	602	-	-	7/30/77/77	0/5/5/5
3	EDO	B	621	-	-	0/1/1/1	-
3	EDO	A	609	-	-	1/1/1/1	-
3	EDO	B	608	-	-	0/1/1/1	-
3	EDO	B	601	-	-	1/1/1/1	-
3	EDO	B	616	-	-	1/1/1/1	-
3	EDO	B	617	-	-	1/1/1/1	-
3	EDO	B	619	-	-	1/1/1/1	-
5	PEG	B	609	-	-	2/4/4/4	-
3	EDO	B	615	-	-	0/1/1/1	-
3	EDO	B	622	-	-	0/1/1/1	-
3	EDO	A	612	-	-	1/1/1/1	-
3	EDO	B	613	-	-	1/1/1/1	-
5	PEG	A	611	-	-	2/4/4/4	-
3	EDO	B	610	-	-	1/1/1/1	-
3	EDO	B	606	-	-	0/1/1/1	-
3	EDO	B	603	-	-	0/1/1/1	-
5	PEG	A	607	-	-	2/4/4/4	-
3	EDO	A	606	-	-	0/1/1/1	-
3	EDO	A	604	-	-	0/1/1/1	-

The worst 5 of 36 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	601	NDP	O4B-C1B	14.07	1.60	1.41
2	B	602	NDP	O4B-C1B	13.78	1.60	1.41
2	A	601	NDP	C6N-C5N	12.54	1.55	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	602	NDP	C6N-C5N	12.42	1.55	1.33
2	A	601	NDP	O4D-C1D	8.24	1.61	1.42

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	602	NDP	C5A-C6A-N6A	8.41	133.14	120.35
2	A	601	NDP	C5A-C6A-N6A	8.29	132.96	120.35
2	B	602	NDP	C1B-N9A-C4A	-7.04	114.26	126.64
2	A	601	NDP	C1B-N9A-C4A	-6.41	115.37	126.64
2	B	602	NDP	N6A-C6A-N1A	-5.82	106.50	118.57

There are no chirality outliers.

5 of 39 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	601	NDP	C2B-O2B-P2B-O1X
2	A	601	NDP	O4D-C1D-N1N-C6N
2	A	601	NDP	C2N-C3N-C7N-N7N
2	B	602	NDP	C2B-O2B-P2B-O1X
5	A	611	PEG	C1-C2-O2-C3

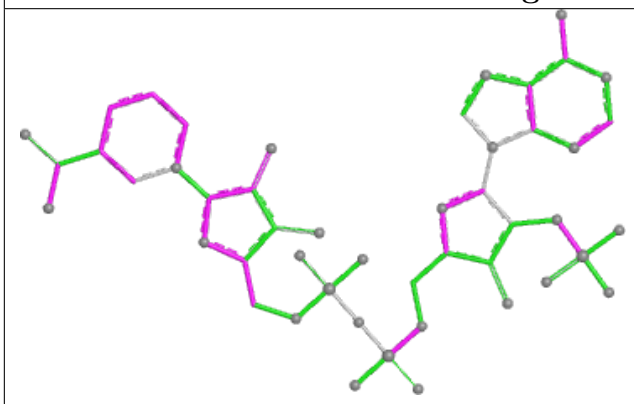
There are no ring outliers.

15 monomers are involved in 26 short contacts:

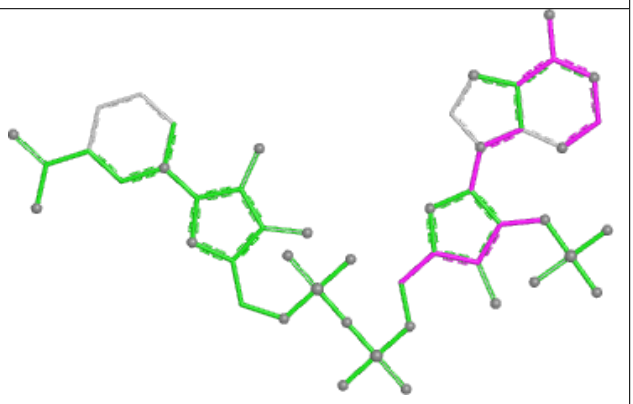
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	615	EDO	1	0
3	B	605	EDO	1	0
5	A	605	PEG	1	0
5	B	612	PEG	1	0
2	A	601	NDP	1	0
3	B	618	EDO	2	0
6	A	614	PGE	3	0
3	B	621	EDO	1	0
3	B	601	EDO	4	0
3	B	615	EDO	1	0
3	A	612	EDO	3	0
5	A	611	PEG	2	0
5	A	607	PEG	3	0
4	A	619	SO4	1	0
3	A	606	EDO	2	0

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.

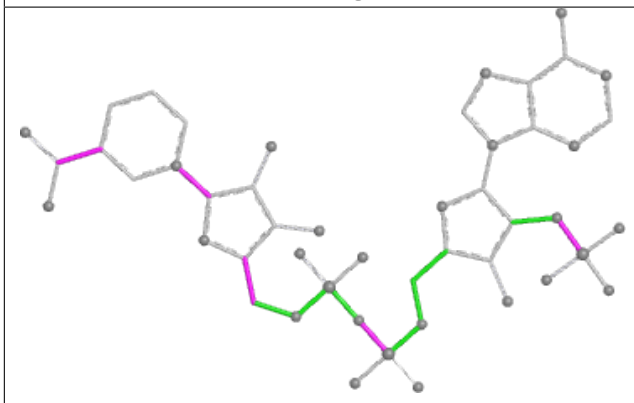
Ligand NDP A 601



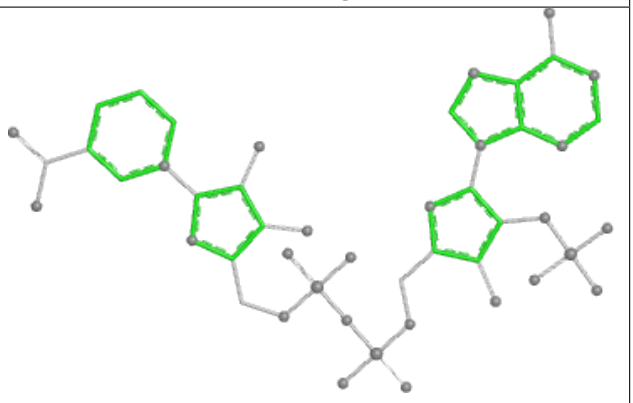
Bond lengths



Bond angles

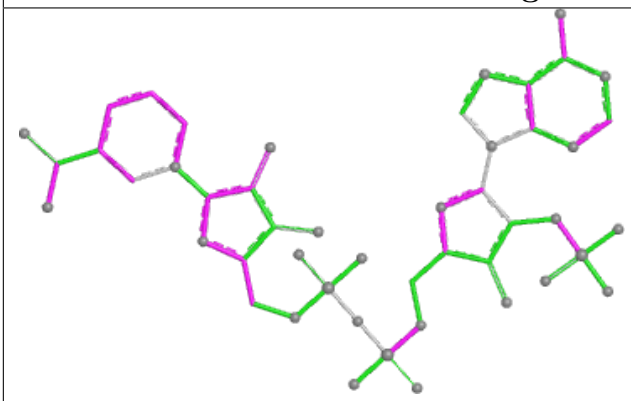


Torsions

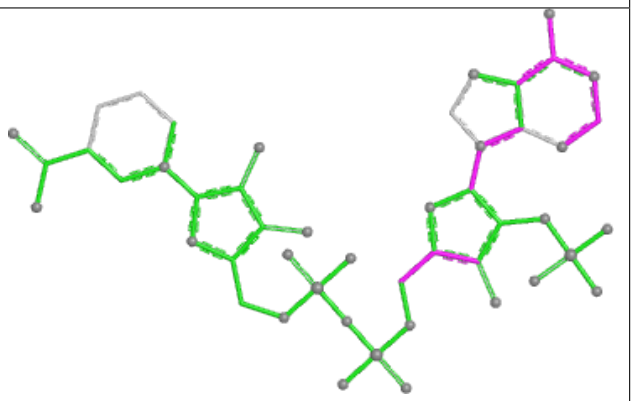


Rings

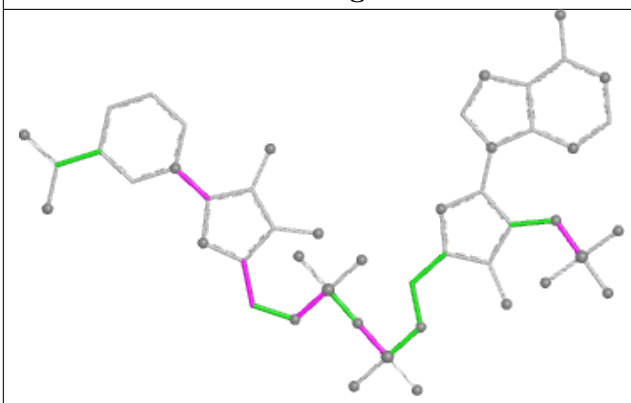
Ligand NDP B 602



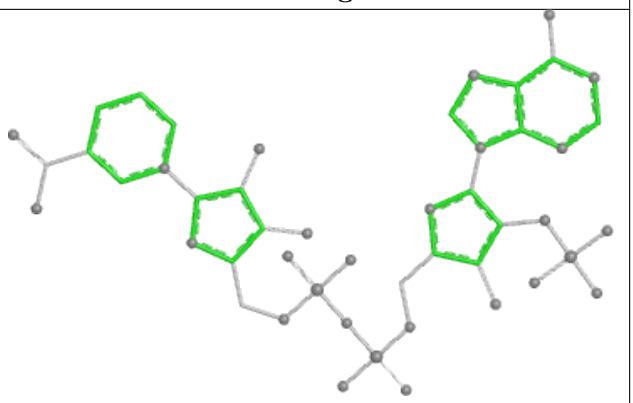
Bond lengths



Bond angles



Torsions



Rings

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, 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.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
1	A	529/562 (94%)	0.58	57 (10%) 5 5	28, 39, 80, 117	0
1	B	533/562 (94%)	0.54	50 (9%) 8 8	28, 41, 85, 109	0
All	All	1062/1124 (94%)	0.56	107 (10%) 7 6	28, 40, 83, 117	0

The worst 5 of 107 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	67	GLN	7.9
1	B	480	LEU	7.9
1	B	481	PRO	7.8
1	B	65	ASP	7.4
1	A	133	LEU	7.4

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 monosaccharides in this entry.

6.4 Ligands

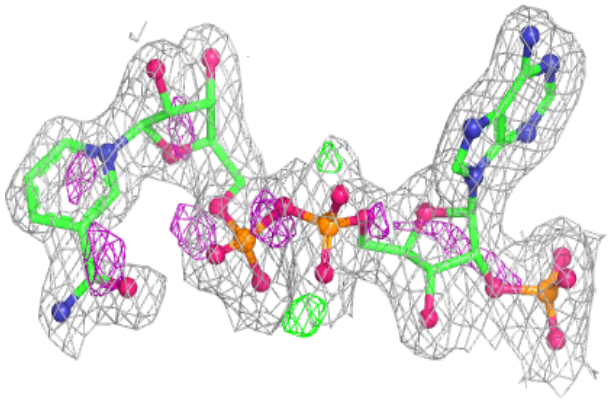
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

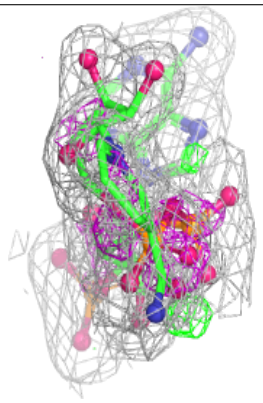
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	PEG	B	609	7/7	0.45	0.50	64,71,79,90	0
3	EDO	A	609	4/4	0.46	0.28	58,58,63,65	0
3	EDO	A	602	4/4	0.54	0.49	61,70,72,72	0
5	PEG	B	612	7/7	0.70	0.19	48,57,61,64	0
5	PEG	A	607	7/7	0.71	0.27	37,49,61,69	0
6	PGE	A	614	10/10	0.71	0.20	43,56,63,64	0
5	PEG	A	605	7/7	0.73	0.25	37,50,52,66	0
5	PEG	A	611	7/7	0.74	0.19	37,43,51,54	0
3	EDO	B	605	4/4	0.74	0.23	51,54,58,62	0
3	EDO	B	617	4/4	0.76	0.14	59,62,63,63	0
3	EDO	B	601	4/4	0.77	0.15	66,66,70,79	0
3	EDO	B	608	4/4	0.79	0.19	43,46,46,47	0
3	EDO	B	621	4/4	0.80	0.28	54,54,59,60	0
3	EDO	B	618	4/4	0.81	0.15	70,72,72,75	0
3	EDO	B	606	4/4	0.87	0.13	47,48,48,50	0
3	EDO	B	614	4/4	0.88	0.19	56,56,62,76	0
3	EDO	A	608	4/4	0.88	0.14	38,44,48,49	0
3	EDO	B	610	4/4	0.89	0.12	56,68,70,70	0
3	EDO	A	612	4/4	0.90	0.11	38,46,48,53	0
3	EDO	A	615	4/4	0.90	0.10	46,49,51,58	0
3	EDO	B	615	4/4	0.90	0.26	31,42,43,48	0
3	EDO	B	620	4/4	0.91	0.19	32,50,51,54	0
3	EDO	B	616	4/4	0.91	0.20	45,45,52,55	0
3	EDO	A	613	4/4	0.91	0.22	39,49,57,59	0
3	EDO	B	613	4/4	0.91	0.16	41,43,44,57	0
3	EDO	A	606	4/4	0.93	0.15	43,48,51,56	0
3	EDO	A	616	4/4	0.93	0.14	40,46,49,58	0
3	EDO	A	610	4/4	0.93	0.18	33,35,39,43	0
2	NDP	B	602	48/48	0.94	0.10	36,45,56,58	0
3	EDO	B	603	4/4	0.94	0.10	31,38,38,40	0
2	NDP	A	601	48/48	0.94	0.09	36,46,54,55	0
3	EDO	A	617	4/4	0.94	0.05	57,62,65,65	0
3	EDO	B	622	4/4	0.95	0.10	50,54,54,55	0
3	EDO	B	619	4/4	0.96	0.12	39,40,41,42	0
3	EDO	A	604	4/4	0.96	0.10	34,38,39,40	0
4	SO4	B	607	5/5	0.96	0.11	46,53,57,58	0
4	SO4	A	603	5/5	0.97	0.12	42,48,52,59	0
4	SO4	A	618	5/5	0.98	0.08	53,57,60,64	0
4	SO4	A	619	5/5	0.98	0.08	51,51,53,54	0
4	SO4	A	620	5/5	0.98	0.09	53,59,62,67	0
4	SO4	B	604	5/5	0.98	0.09	43,45,54,55	0
3	EDO	B	611	4/4	0.98	0.07	38,40,41,41	0
4	SO4	B	623	5/5	0.98	0.11	45,45,47,49	0

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.

Electron density around NDP B 602:

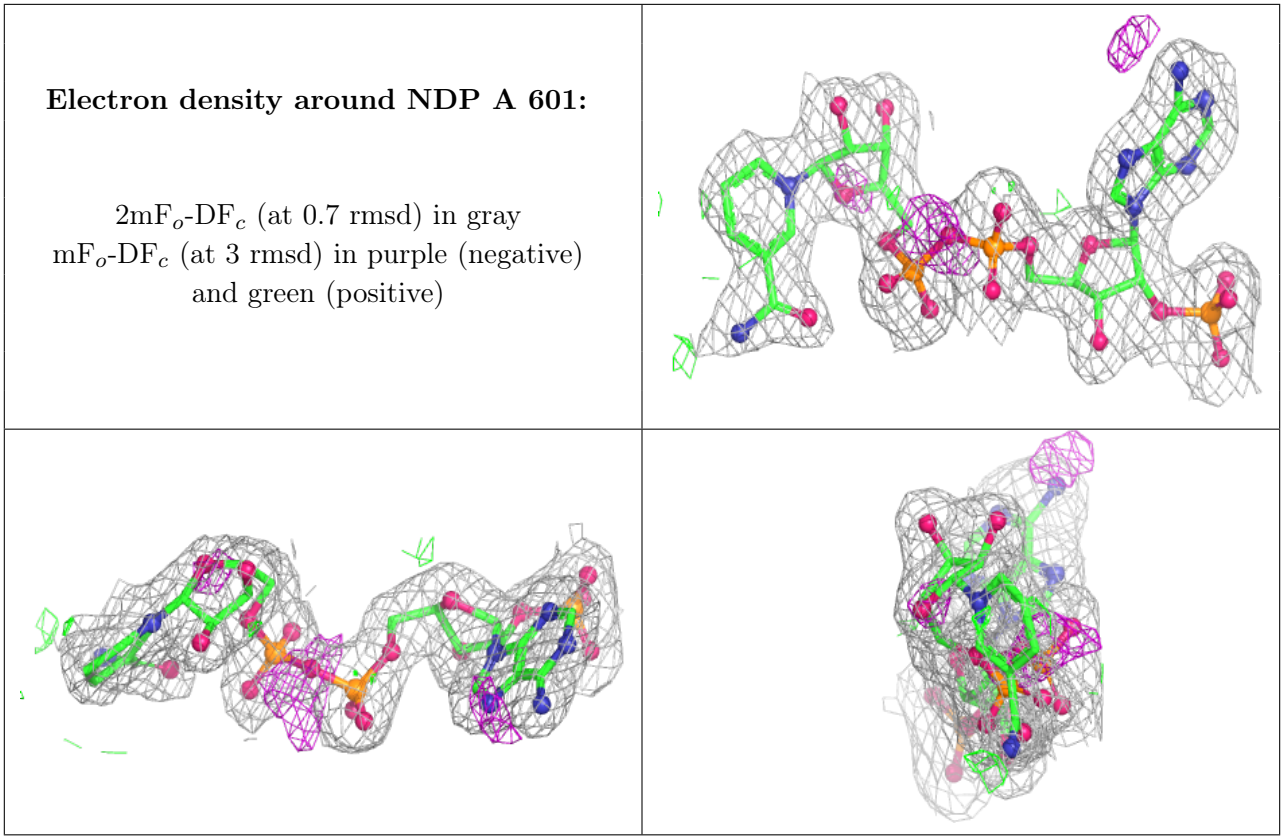
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)





Electron density around NDP A 601:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)



6.5 Other polymers (i)

There are no such residues in this entry.