Full wwPDB X-ray Structure Validation Report (i)

Jun 23, 2024 – 03:11 AM EDT

PDB ID	:	6ET4
Title	:	HUMAN DIHYDROOROTATE DEHYDROGENASE IN COMPLEX WITH NOVEL INHIBITOR
Authors	:	Hakansson, M.; Walse, B.; Gustavsson, A.-L.; Lain, S.
Deposited on	:	2017-10-25
Resolution	:	1.70 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 (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:

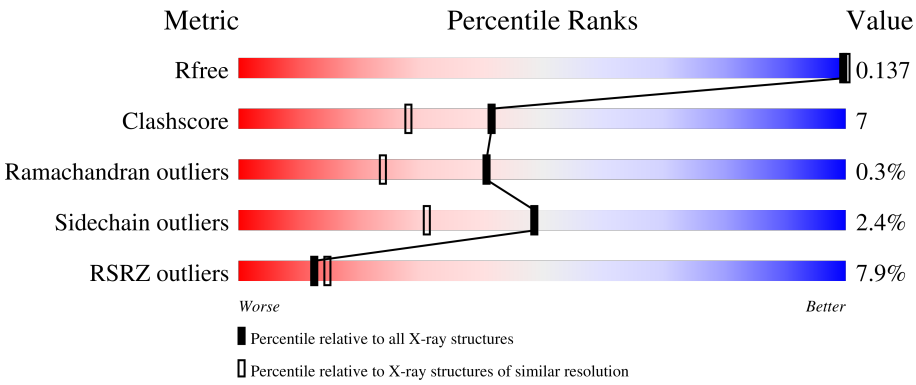
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

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

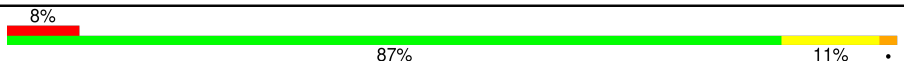
The reported resolution of this entry is 1.70 Å.

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	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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	367	

2 Entry composition (i)

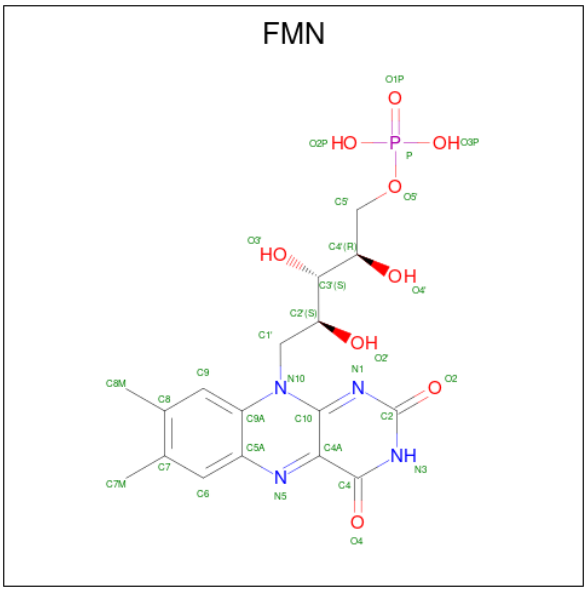
There are 10 unique types of molecules in this entry. The entry contains 3320 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Dihydroorotate dehydrogenase (quinone), mitochondrial.

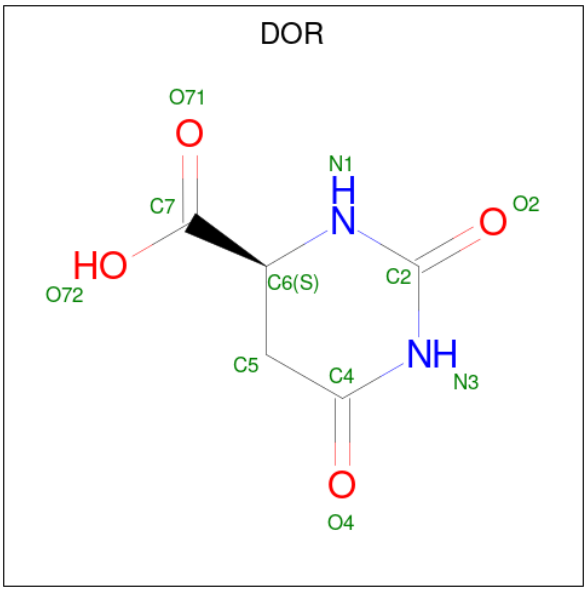
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	367	2932	1846	538	543	5	0	33	0

- Molecule 2 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula: $C_{17}H_{21}N_4O_9P$).



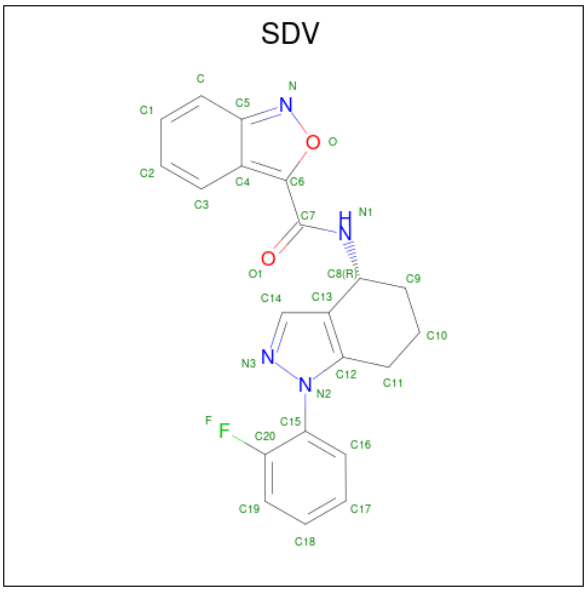
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	31	17	4	9	1	0	0

- Molecule 3 is (4S)-2,6-DIOXOHEXAHYDROPYRIMIDINE-4-CARBOXYLIC ACID (three-letter code: DOR) (formula: $C_5H_6N_2O_4$).



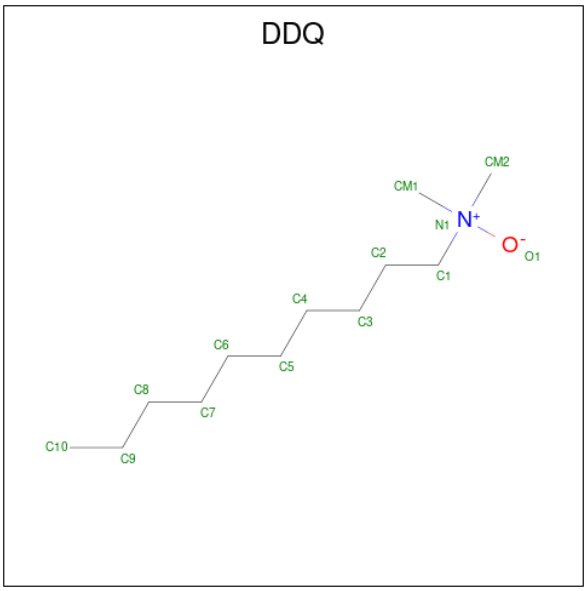
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	11	5	2	4	0	0

- Molecule 4 is N-[(4R)-1-(2-fluorophenyl)-4,5,6,7-tetrahydroindazol-4-yl]-2,1-benzoxazole-3-carboxamide (three-letter code: SDV) (formula: $C_{21}H_{17}FN_4O_2$).



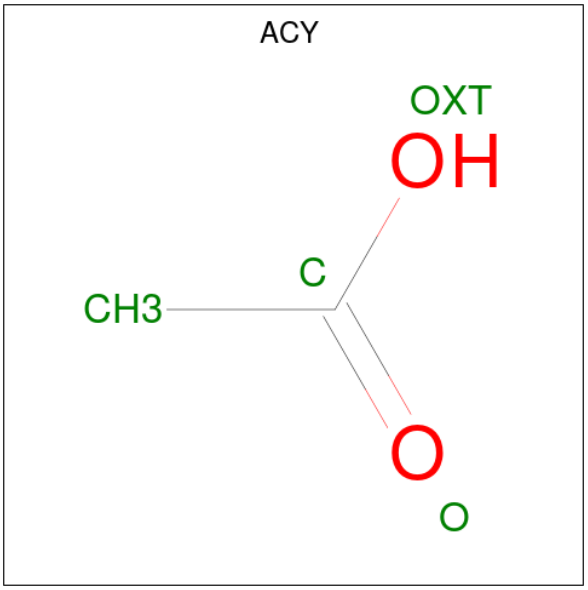
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	F	N	O		
4	A	1	28	21	1	4	2	0	0

- Molecule 5 is DECYLAMINE-N,N-DIMETHYL-N-OXIDE (three-letter code: DDQ) (formula: $C_{12}H_{27}NO$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
5	A	1	14	12	1	1	0	0

- Molecule 6 is ACETIC ACID (three-letter code: ACY) (formula: $C_2H_4O_2$).



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

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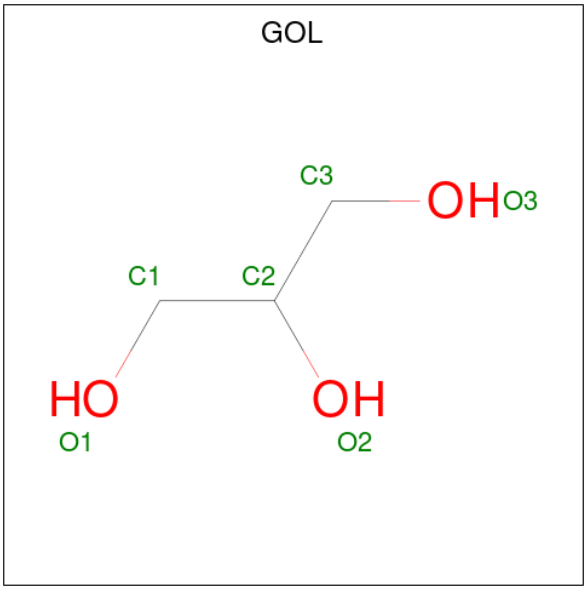
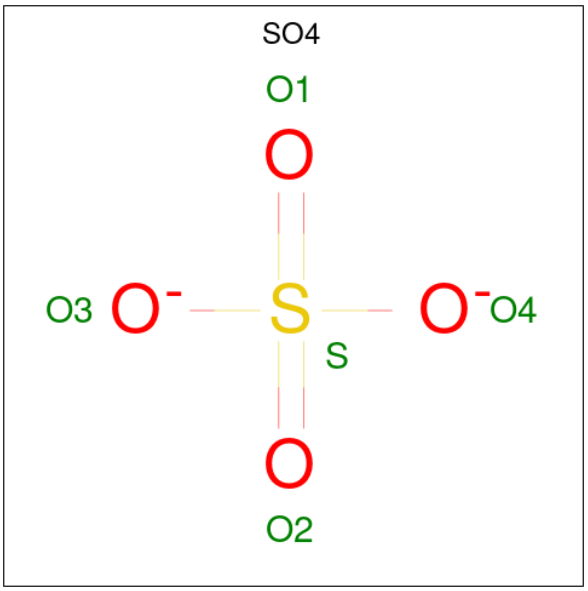
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
6	A	1	4	2	2	0	0

- Molecule 7 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 8 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



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

- Molecule 9 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	3	Total Cl 3 3	0	0

- Molecule 10 is water.

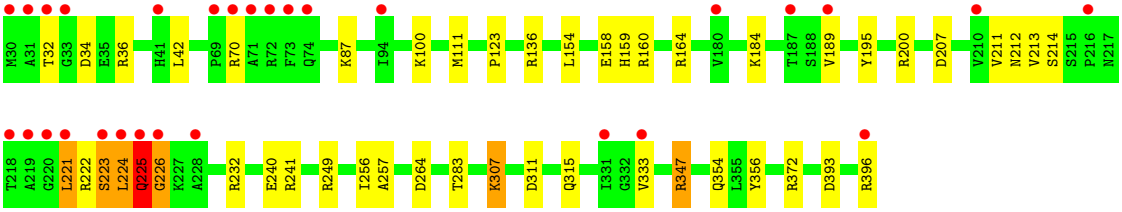
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	257	Total O 257 257	0	18

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: Dihydroorotate dehydrogenase (quinone), mitochondrial

Chain A:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α, β, γ	90.86Å 90.86Å 122.70Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	30.00 – 1.70 29.74 – 1.80	Depositor EDS
% Data completeness (in resolution range)	99.3 (30.00-1.70) 100.0 (29.74-1.80)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	8.07 (at 1.80Å)	Xtriage
Refinement program	REFMAC 5.7.0032	Depositor
R, R_{free}	0.105 , 0.138 0.107 , 0.137	Depositor DCC
R_{free} test set	2777 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å^2)	20.2	Xtriage
Anisotropy	0.088	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.38 , 55.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.026 for -h,-k,l	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	3320	wwPDB-VP
Average B, all atoms (Å^2)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.34% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: FMN, CL, GOL, SDV, DDQ, SO4, ACY, DOR

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	1.00	5/3023 (0.2%)	1.10	21/4082 (0.5%)

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 (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	195	TYR	CE1-CZ	-6.52	1.30	1.38
1	A	226	GLY	N-CA	6.30	1.55	1.46
1	A	100	LYS	CE-NZ	5.29	1.62	1.49
1	A	158	GLU	CD-OE1	-5.25	1.19	1.25
1	A	87	LYS	CE-NZ	-5.21	1.36	1.49

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	136	ARG	NE-CZ-NH1	10.90	125.75	120.30
1	A	249	ARG	NE-CZ-NH2	-9.16	115.72	120.30
1	A	87	LYS	CG-CD-CE	8.26	136.69	111.90
1	A	249	ARG	NE-CZ-NH1	8.11	124.36	120.30
1	A	347[A]	ARG	NE-CZ-NH2	-8.01	116.29	120.30
1	A	347[B]	ARG	NE-CZ-NH2	-8.01	116.29	120.30
1	A	87	LYS	CD-CE-NZ	7.42	128.78	111.70
1	A	34	ASP	CB-CG-OD2	6.97	124.58	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	160	ARG	NE-CZ-NH1	6.76	123.68	120.30
1	A	372	ARG	NE-CZ-NH2	-6.37	117.11	120.30
1	A	225[A]	GLN	CB-CA-C	-6.13	98.15	110.40
1	A	241	ARG	NE-CZ-NH1	5.82	123.21	120.30
1	A	225[A]	GLN	N-CA-C	5.64	126.23	111.00
1	A	136	ARG	NE-CZ-NH2	-5.58	117.51	120.30
1	A	164	ARG	NE-CZ-NH1	5.47	123.04	120.30
1	A	241	ARG	NE-CZ-NH2	-5.37	117.62	120.30
1	A	111	MET	CG-SD-CE	5.32	108.71	100.20
1	A	347[A]	ARG	NE-CZ-NH1	5.23	122.92	120.30
1	A	347[B]	ARG	NE-CZ-NH1	5.23	122.92	120.30
1	A	311	ASP	CB-CG-OD1	5.03	122.83	118.30
1	A	264	ASP	CB-CG-OD2	-5.00	113.80	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	226	GLY	Peptide

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	2932	0	3031	42	0
2	A	31	0	19	0	0
3	A	11	0	4	0	0
4	A	28	0	0	0	0
5	A	14	0	27	0	0
6	A	16	0	12	3	0
7	A	18	0	24	0	0
8	A	10	0	0	0	0
9	A	3	0	0	0	0
10	A	257	0	0	7	0
All	All	3320	0	3117	43	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 7.

All (43) 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:213[A]:VAL:HA	1:A:221[A]:LEU:HD21	1.47	0.94
1:A:307[A]:LYS:HG2	10:A:625:HOH:O	1.87	0.73
1:A:347[A]:ARG:NH2	1:A:396[A]:ARG:HH11	1.88	0.71
1:A:315[A]:GLN:OE1	6:A:506:ACY:OXT	2.13	0.67
1:A:212[A]:ASN:O	10:A:601:HOH:O	2.14	0.66
1:A:221[A]:LEU:HD11	10:A:601:HOH:O	1.96	0.66
1:A:200:ARG:NH1	1:A:240:GLU:OE2	2.30	0.65
1:A:347[A]:ARG:HH21	1:A:396[A]:ARG:NH1	1.94	0.65
1:A:213[A]:VAL:HA	1:A:221[A]:LEU:CD2	2.26	0.64
1:A:225[A]:GLN:HG2	1:A:225[A]:GLN:O	1.98	0.63
1:A:347[A]:ARG:HH21	1:A:396[A]:ARG:HH11	1.45	0.63
1:A:221[A]:LEU:O	1:A:221[A]:LEU:HD23	1.99	0.62
1:A:223[A]:SER:C	1:A:225[A]:GLN:H	2.04	0.61
1:A:214[B]:SER:HB3	1:A:256:ILE:HA	1.85	0.59
1:A:221[A]:LEU:HD23	1:A:224[A]:LEU:HD12	1.85	0.58
1:A:221[A]:LEU:CD2	1:A:221[A]:LEU:C	2.71	0.58
1:A:207:ASP:OD1	6:A:505:ACY:OXT	2.24	0.55
1:A:223[A]:SER:O	1:A:225[A]:GLN:N	2.40	0.54
1:A:159:HIS:HD2	10:A:837:HOH:O	1.89	0.54
1:A:32:THR:O	1:A:36:ARG:HG3	2.09	0.53
1:A:214[B]:SER:HB2	1:A:257:ALA:N	2.24	0.53
1:A:184[A]:LYS:NZ	1:A:221[A]:LEU:HG	2.24	0.53
1:A:200:ARG:HH11	1:A:240:GLU:CD	2.13	0.52
1:A:211[A]:VAL:HG12	1:A:213[A]:VAL:HG13	1.91	0.52
1:A:221[A]:LEU:CD2	1:A:221[A]:LEU:O	2.58	0.50
1:A:347[A]:ARG:NH2	1:A:396[A]:ARG:NH1	2.54	0.50
1:A:393:ASP:OD1	1:A:396[A]:ARG:NH1	2.44	0.50
6:A:508:ACY:C	10:A:608:HOH:O	2.61	0.49
1:A:223[A]:SER:C	1:A:225[A]:GLN:N	2.65	0.47
1:A:213[A]:VAL:CA	1:A:221[A]:LEU:HD21	2.33	0.46
1:A:333[A]:VAL:HG13	1:A:354:GLN:HB2	1.96	0.46
1:A:221[A]:LEU:HD23	1:A:221[A]:LEU:C	2.34	0.46
1:A:213[A]:VAL:O	1:A:222[A]:ARG:HA	2.17	0.45
1:A:200:ARG:NH1	1:A:240:GLU:CD	2.71	0.44
1:A:307[A]:LYS:HE3	1:A:307[A]:LYS:HB3	1.78	0.44
1:A:225[A]:GLN:O	1:A:225[A]:GLN:CG	2.50	0.44
1:A:189:VAL:HG12	1:A:189:VAL:O	2.18	0.43
1:A:222[A]:ARG:O	1:A:225[A]:GLN:NE2	2.51	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:184[A]:LYS:HE3	10:A:825:HOH:O	2.19	0.42
1:A:232:ARG:NH2	10:A:615:HOH:O	2.52	0.42
1:A:123:PRO:HA	1:A:154:LEU:HG	2.02	0.41
1:A:221[A]:LEU:CD2	1:A:224[A]:LEU:HD12	2.48	0.41
1:A:283:THR:O	1:A:333[B]:VAL:HG13	2.21	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	386/367 (105%)	374 (97%)	11 (3%)	1 (0%)	41 24

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	224[A]	LEU

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	318/296 (107%)	310 (98%)	8 (2%)	47 29

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	42	LEU
1	A	70	ARG
1	A	221[A]	LEU
1	A	223[A]	SER
1	A	225[A]	GLN
1	A	307[A]	LYS
1	A	307[B]	LYS
1	A	356	TYR

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

Mol	Chain	Res	Type
1	A	159	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 16 ligands modelled in this entry, 3 are monoatomic - leaving 13 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	SDV	A	503	-	26,32,32	2.67	10 (38%)	28,46,46	3.46	13 (46%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
7	GOL	A	509	-	5,5,5	0.65	0	5,5,5	0.50	0
8	SO4	A	513	-	4,4,4	0.53	0	6,6,6	0.48	0
2	FMN	A	501	-	33,33,33	1.22	4 (12%)	48,50,50	1.22	3 (6%)
7	GOL	A	510	-	5,5,5	0.77	0	5,5,5	2.56	3 (60%)
6	ACY	A	507	-	3,3,3	0.76	0	3,3,3	0.78	0
8	SO4	A	512	-	4,4,4	0.76	0	6,6,6	0.65	0
5	DDQ	A	504	-	11,13,13	2.14	2 (18%)	12,15,15	0.53	0
7	GOL	A	511	-	5,5,5	0.99	0	5,5,5	1.29	0
6	ACY	A	506	-	3,3,3	0.74	0	3,3,3	1.47	0
6	ACY	A	505	-	3,3,3	0.94	0	3,3,3	1.55	1 (33%)
3	DOR	A	502	-	11,11,11	2.15	5 (45%)	12,15,15	3.09	6 (50%)
6	ACY	A	508	-	3,3,3	0.60	0	3,3,3	0.93	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
4	SDV	A	503	-	-	0/8/22/22	0/5/5/5
7	GOL	A	509	-	-	0/4/4/4	-
2	FMN	A	501	-	-	4/18/18/18	0/3/3/3
7	GOL	A	510	-	-	0/4/4/4	-
5	DDQ	A	504	-	-	4/11/11/11	-
7	GOL	A	511	-	-	4/4/4/4	-
3	DOR	A	502	-	-	0/4/16/16	0/1/1/1

All (21) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	503	SDV	C2-C3	7.03	1.51	1.36
4	A	503	SDV	C13-C8	-6.54	1.46	1.52
5	A	504	DDQ	O1-N1	-6.48	1.26	1.42
4	A	503	SDV	C2-C1	4.60	1.48	1.38
4	A	503	SDV	C1-C	4.41	1.45	1.36
3	A	502	DOR	C6-N1	-4.22	1.39	1.46
4	A	503	SDV	C7-N1	-3.34	1.26	1.34
2	A	501	FMN	C4A-N5	3.14	1.37	1.30
4	A	503	SDV	C3-C4	2.93	1.48	1.42
2	A	501	FMN	C10-N1	2.74	1.38	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	504	DDQ	C1-N1	-2.70	1.48	1.51
3	A	502	DOR	C5-C6	-2.59	1.46	1.53
4	A	503	SDV	C17-C16	2.48	1.43	1.38
4	A	503	SDV	C-C5	2.43	1.45	1.41
2	A	501	FMN	C2-N3	-2.42	1.33	1.39
3	A	502	DOR	C6-C7	-2.32	1.46	1.52
3	A	502	DOR	C4-N3	-2.25	1.33	1.37
4	A	503	SDV	C18-C19	-2.16	1.35	1.38
3	A	502	DOR	O72-C7	-2.11	1.23	1.30
2	A	501	FMN	C4-N3	-2.09	1.34	1.38
4	A	503	SDV	C6-C7	-2.01	1.46	1.49

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	503	SDV	C13-C12-N2	-8.51	104.94	110.06
4	A	503	SDV	C2-C3-C4	-6.66	111.91	120.91
4	A	503	SDV	C3-C4-C5	6.41	126.67	118.17
4	A	503	SDV	F-C20-C15	-6.03	114.10	120.97
4	A	503	SDV	C14-C13-C12	5.94	107.67	104.68
3	A	502	DOR	C4-N3-C2	-5.25	121.25	125.69
3	A	502	DOR	C7-C6-N1	5.17	118.22	110.06
3	A	502	DOR	N3-C2-N1	4.69	120.77	116.06
4	A	503	SDV	C1-C-C5	-4.41	114.05	120.09
4	A	503	SDV	C20-C15-N2	3.91	122.66	117.99
2	A	501	FMN	O2-C2-N1	-3.75	115.57	121.80
4	A	503	SDV	C2-C1-C	3.54	125.13	120.40
7	A	510	GOL	O3-C3-C2	-3.51	94.56	110.38
7	A	510	GOL	C3-C2-C1	3.32	123.96	111.80
3	A	502	DOR	C5-C6-C7	3.15	119.37	112.06
4	A	503	SDV	C19-C20-C15	3.14	122.97	120.19
2	A	501	FMN	C4-C4A-N5	2.99	122.33	118.21
4	A	503	SDV	C6-C4-C5	-2.98	103.89	107.34
7	A	510	GOL	O2-C2-C3	-2.97	96.89	109.18
4	A	503	SDV	C9-C8-N1	-2.91	107.82	110.64
3	A	502	DOR	C5-C4-N3	2.82	119.34	115.92
4	A	503	SDV	C9-C8-C13	-2.76	107.89	111.83
3	A	502	DOR	O4-C4-C5	-2.66	117.54	122.62
2	A	501	FMN	O4-C4-C4A	-2.42	120.14	126.53
4	A	503	SDV	O1-C7-N1	2.35	126.92	122.47
6	A	505	ACY	OXT-C-CH3	2.17	124.14	115.05

There are no chirality outliers.

All (12) torsion outliers are listed below:

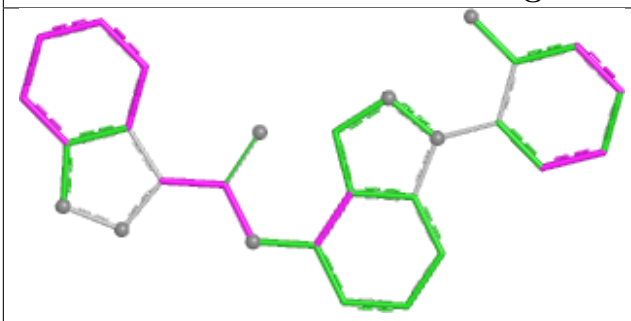
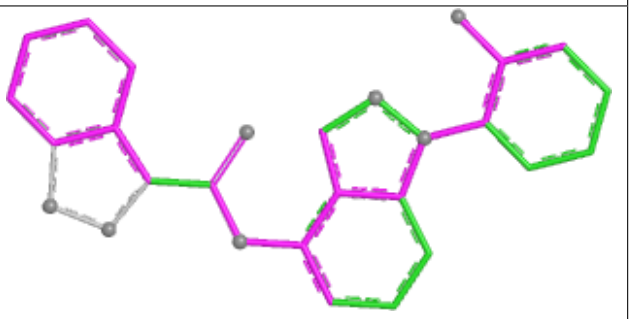
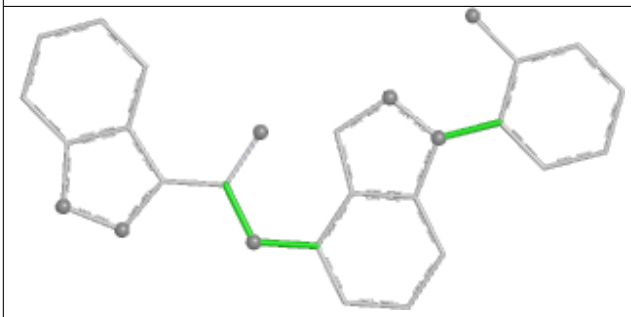
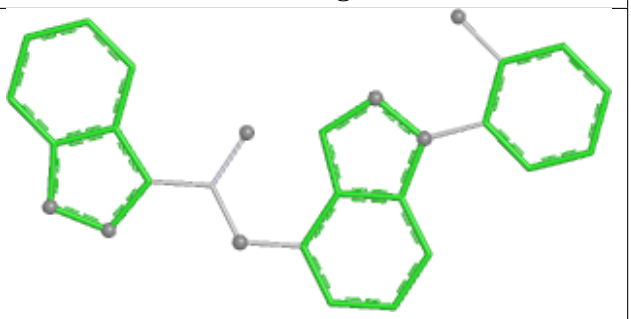
Mol	Chain	Res	Type	Atoms
7	A	511	GOL	O1-C1-C2-C3
7	A	511	GOL	C1-C2-C3-O3
7	A	511	GOL	O2-C2-C3-O3
7	A	511	GOL	O1-C1-C2-O2
2	A	501	FMN	C2'-C3'-C4'-O4'
2	A	501	FMN	O3'-C3'-C4'-O4'
5	A	504	DDQ	C2-C1-N1-CM1
2	A	501	FMN	C4'-C5'-O5'-P
5	A	504	DDQ	C1-C2-C3-C4
5	A	504	DDQ	C5-C6-C7-C8
5	A	504	DDQ	C2-C1-N1-CM2
2	A	501	FMN	O3'-C3'-C4'-C5'

There are no ring outliers.

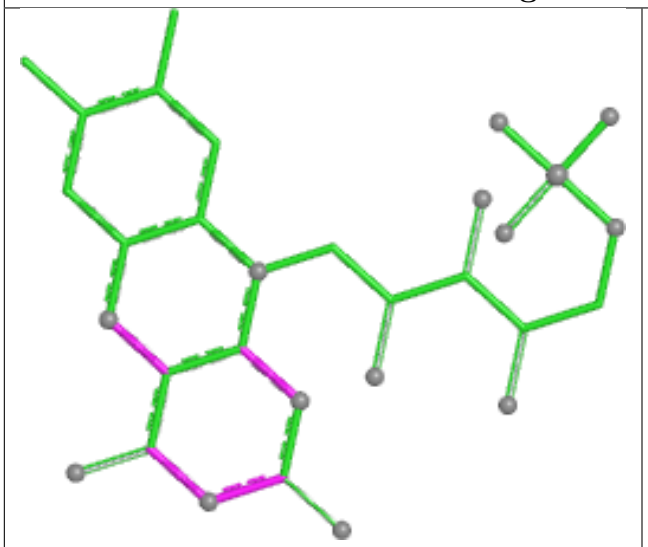
3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	506	ACY	1	0
6	A	505	ACY	1	0
6	A	508	ACY	1	0

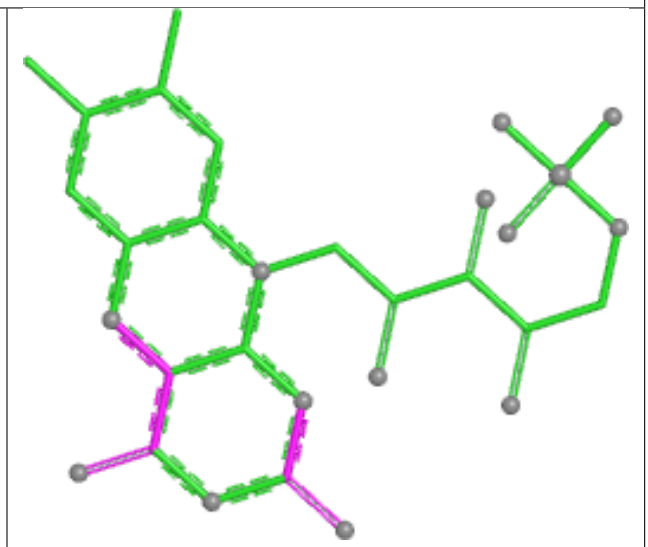
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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 SDV A 503	
 Bond lengths	 Bond angles
 Torsions	 Rings

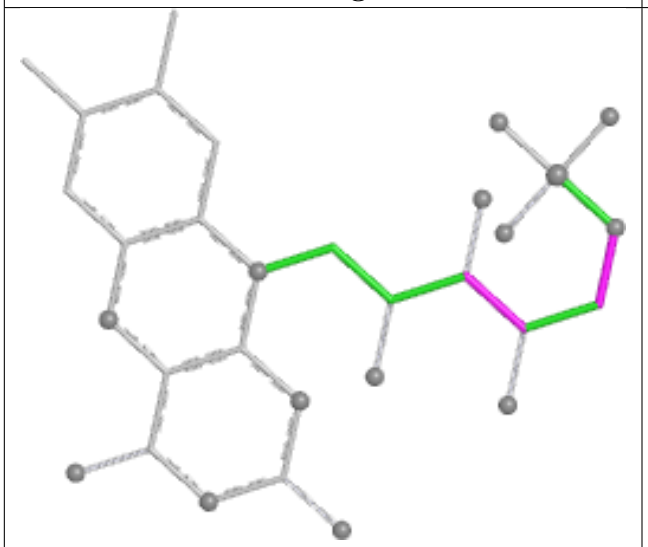
Ligand FMN A 501



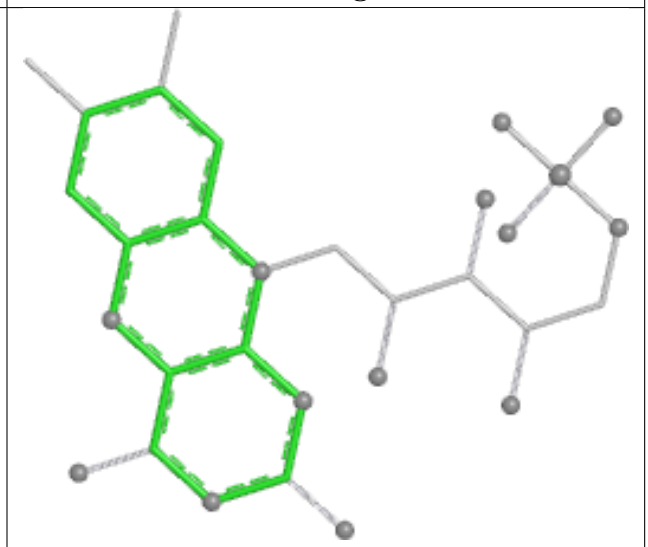
Bond lengths



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 (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	367/367 (100%)	0.12	29 (7%) 12 14	12, 20, 48, 117	10 (2%)

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	72	ARG	8.5
1	A	226	GLY	8.3
1	A	30	MET	7.5
1	A	70	ARG	6.8
1	A	71	ALA	5.5
1	A	31	ALA	5.4
1	A	189	VAL	5.4
1	A	73	PHE	5.1
1	A	228	ALA	4.8
1	A	219[A]	ALA	4.7
1	A	224[A]	LEU	4.5
1	A	221[A]	LEU	4.4
1	A	32	THR	4.4
1	A	74	GLN	4.1
1	A	223[A]	SER	3.5
1	A	225[A]	GLN	3.2
1	A	220[A]	GLY	3.0
1	A	218[A]	THR	2.9
1	A	94	ILE	2.9
1	A	69	PRO	2.7
1	A	187	THR	2.7
1	A	33	GLY	2.6
1	A	396[A]	ARG	2.4
1	A	210	VAL	2.4
1	A	216[A]	PRO	2.3
1	A	333[A]	VAL	2.2
1	A	41	HIS	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	180	VAL	2.0
1	A	331	ILE	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)

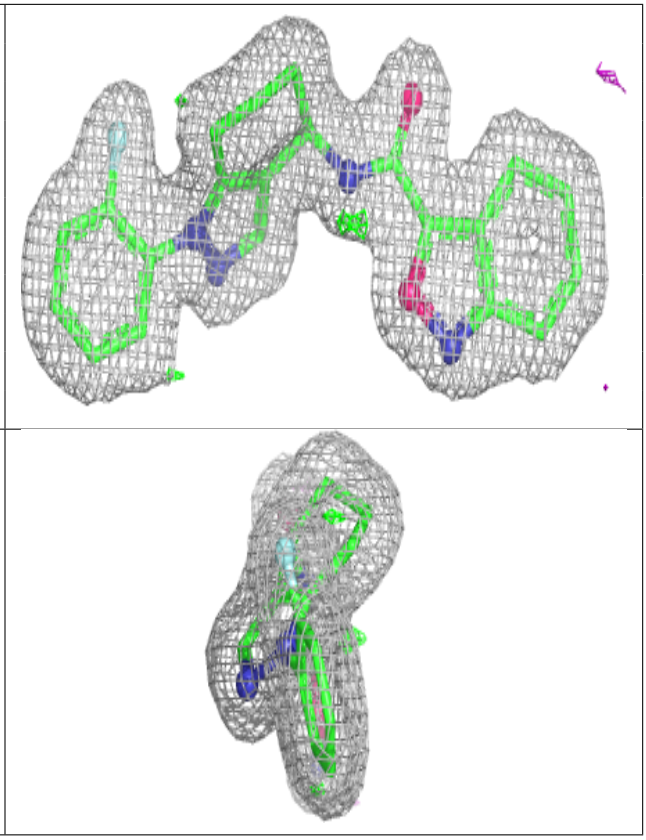
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	DDQ	A	504	14/14	0.79	0.21	60,69,107,108	0
7	GOL	A	511	6/6	0.82	0.25	55,59,62,75	0
7	GOL	A	509	6/6	0.85	0.19	65,70,77,84	0
6	ACY	A	508	4/4	0.87	0.14	39,48,54,69	0
7	GOL	A	510	6/6	0.92	0.20	50,58,73,80	0
6	ACY	A	507	4/4	0.92	0.11	51,52,54,65	0
6	ACY	A	506	4/4	0.94	0.06	31,32,33,39	0
6	ACY	A	505	4/4	0.94	0.15	30,32,38,42	0
9	CL	A	516	1/1	0.94	0.14	62,62,62,62	0
9	CL	A	515	1/1	0.95	0.25	71,71,71,71	0
4	SDV	A	503	28/28	0.97	0.06	17,20,23,26	0
3	DOR	A	502	11/11	0.98	0.05	16,19,23,24	0
8	SO4	A	513	5/5	0.98	0.28	60,64,82,94	0
8	SO4	A	512	5/5	0.99	0.14	29,30,39,48	0
2	FMN	A	501	31/31	0.99	0.11	10,12,14,14	0
9	CL	A	514	1/1	1.00	0.03	25,25,25,25	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.

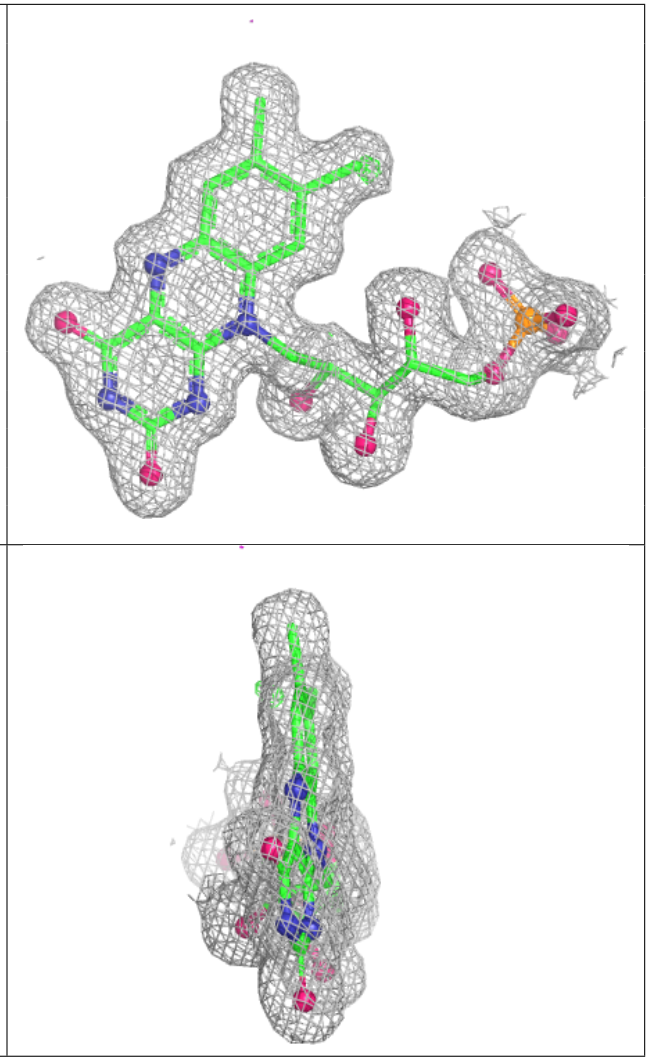
Electron density around SDV A 503:

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



Electron density around FMN A 501:

$2mF_o$-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.