



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 01:27 AM UTC

PDB ID : 3W7R / pdb\_00003w7r  
Title : Structure of Human dihydroorotate dehydrogenase in complex with mii-4-097  
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Deposited on : 2013-03-06  
Resolution : 1.68 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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

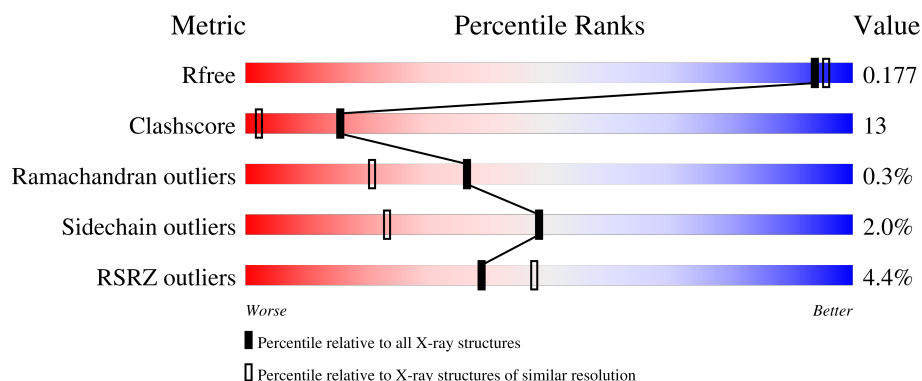
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*


The reported resolution of this entry is 1.68 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))
$R_{free}$	180053	1054 (1.68-1.68)
Clashscore	190562	1078 (1.68-1.68)
Ramachandran outliers	187476	1068 (1.68-1.68)
Sidechain outliers	187428	1067 (1.68-1.68)
RSRZ outliers	180081	1055 (1.68-1.68)

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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	390	

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
6	GOL	A	410	-	X	-	-
6	GOL	A	431	-	-	X	-
8	SO4	A	435	-	-	X	-
9	ACT	A	438	-	-	X	-

## 2 Entry composition

There are 10 unique types of molecules in this entry. The entry contains 3626 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
1	A	367	Total	C	N	O	S	5	16	0
			2944	1837	546	556	5			

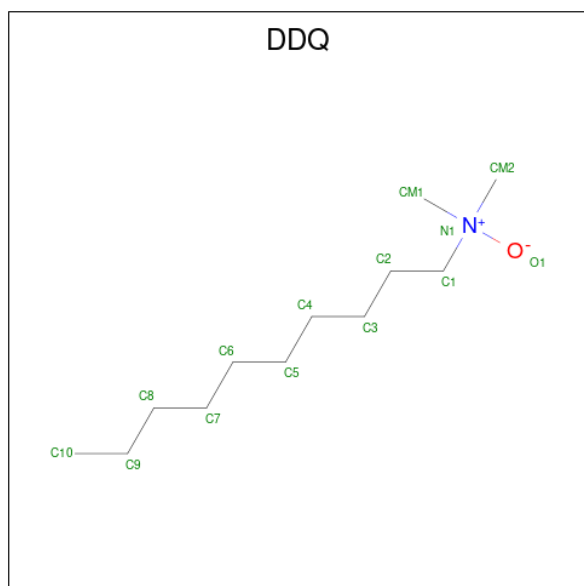
There are 23 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	7	MET	-	expression tag	UNP Q02127
A	8	GLY	-	expression tag	UNP Q02127
A	9	HIS	-	expression tag	UNP Q02127
A	10	HIS	-	expression tag	UNP Q02127
A	11	HIS	-	expression tag	UNP Q02127
A	12	HIS	-	expression tag	UNP Q02127
A	13	HIS	-	expression tag	UNP Q02127
A	14	HIS	-	expression tag	UNP Q02127
A	15	HIS	-	expression tag	UNP Q02127
A	16	HIS	-	expression tag	UNP Q02127
A	17	HIS	-	expression tag	UNP Q02127
A	18	HIS	-	expression tag	UNP Q02127
A	19	SER	-	expression tag	UNP Q02127
A	20	SER	-	expression tag	UNP Q02127
A	21	GLY	-	expression tag	UNP Q02127
A	22	HIS	-	expression tag	UNP Q02127
A	23	ILE	-	expression tag	UNP Q02127
A	24	ASP	-	expression tag	UNP Q02127
A	25	ASP	-	expression tag	UNP Q02127
A	26	ASP	-	expression tag	UNP Q02127
A	27	ASP	-	expression tag	UNP Q02127
A	28	LYS	-	expression tag	UNP Q02127
A	29	HIS	-	expression tag	UNP Q02127

- Molecule 2 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

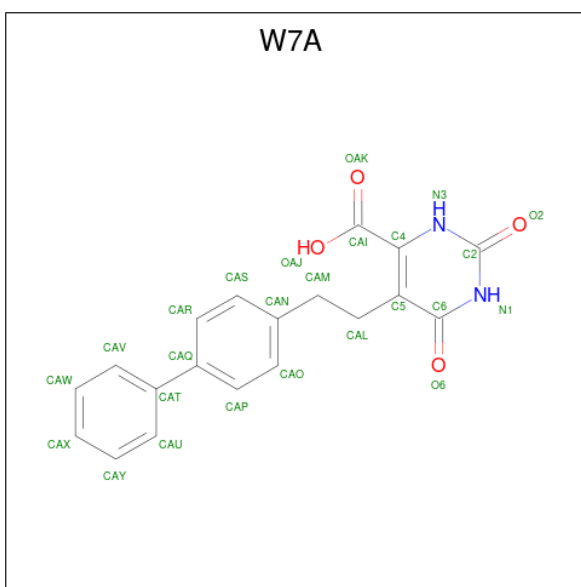
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Cl 1 1	0	0

- Molecule 3 is DECYLAMINE-N,N-DIMETHYL-N-OXIDE (CCD ID: DDQ) (formula:  $C_{12}H_{27}NO$ ).



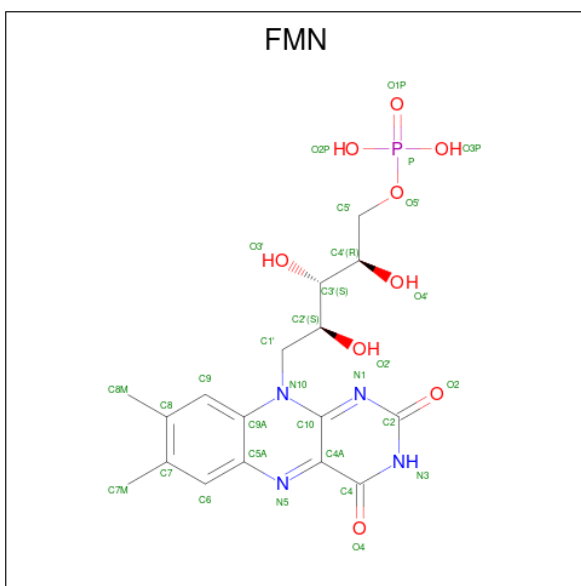
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C N O 14 12 1 1	0	0
3	A	1	Total C N O 14 12 1 1	0	0
3	A	1	Total C N O 14 12 1 1	0	0
3	A	1	Total C N O 14 12 1 1	0	0
3	A	1	Total C N O 14 12 1 1	0	0
3	A	1	Total C N O 14 12 1 1	0	0

- Molecule 4 is 2,6-dioxo-5-[2-(4-phenylphenyl)ethyl]-1,2,3,6- tetrahydropyrimidine-4-carboxylic acid (CCD ID: W7A) (formula:  $C_{19}H_{16}N_2O_4$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	1
			50	38	4	8		

- Molecule 5 is FLAVIN MONONUCLEOTIDE (CCD ID: FMN) (formula:  $C_{17}H_{21}N_4O_9P$ ).



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

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula:  $C_3H_8O_3$ ).



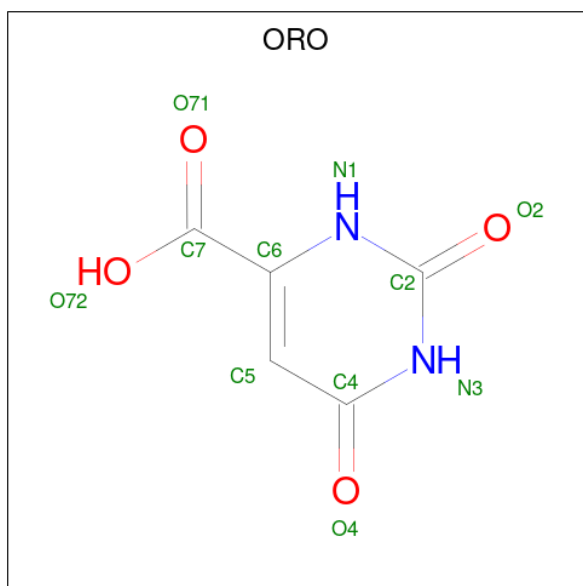
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			6	3	3		
6	A	1	Total	C	O	0	0
			6	3	3		
6	A	1	Total	C	O	0	0
			6	3	3		
6	A	1	Total	C	O	0	0
			6	3	3		
6	A	1	Total	C	O	0	0
			6	3	3		
6	A	1	Total	C	O	0	0
			6	3	3		
6	A	1	Total	C	O	0	0
			6	3	3		
6	A	1	Total	C	O	0	1
			12	6	6		
6	A	1	Total	C	O	0	0
			6	3	3		
6	A	1	Total	C	O	0	0
			6	3	3		
6	A	1	Total	C	O	0	0
			6	3	3		
6	A	1	Total	C	O	0	0
			6	3	3		

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

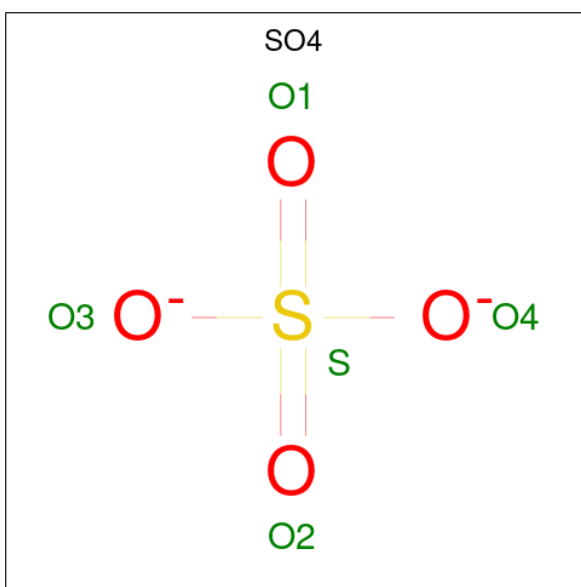
- Molecule 7 is OROTIC ACID (CCD ID: ORO) (formula:  $C_5H_4N_2O_4$ ).



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

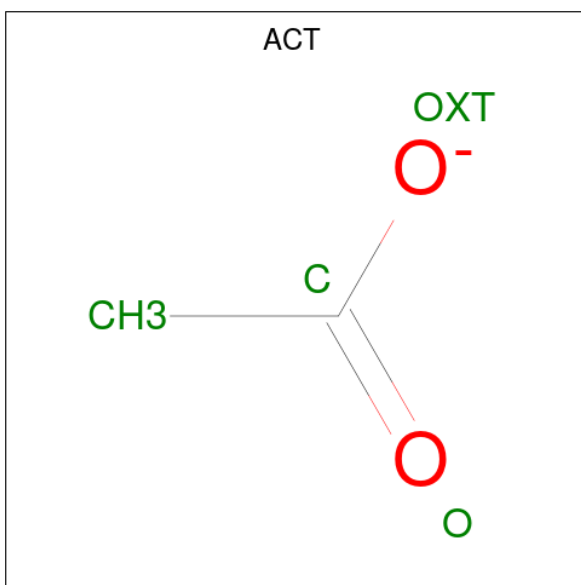
- Molecule 8 is SULFATE ION (CCD ID: SO4) (formula:  $O_4S$ ).





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

- Molecule 9 is ACETATE ION (CCD ID: ACT) (formula:  $C_2H_3O_2$ ).



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

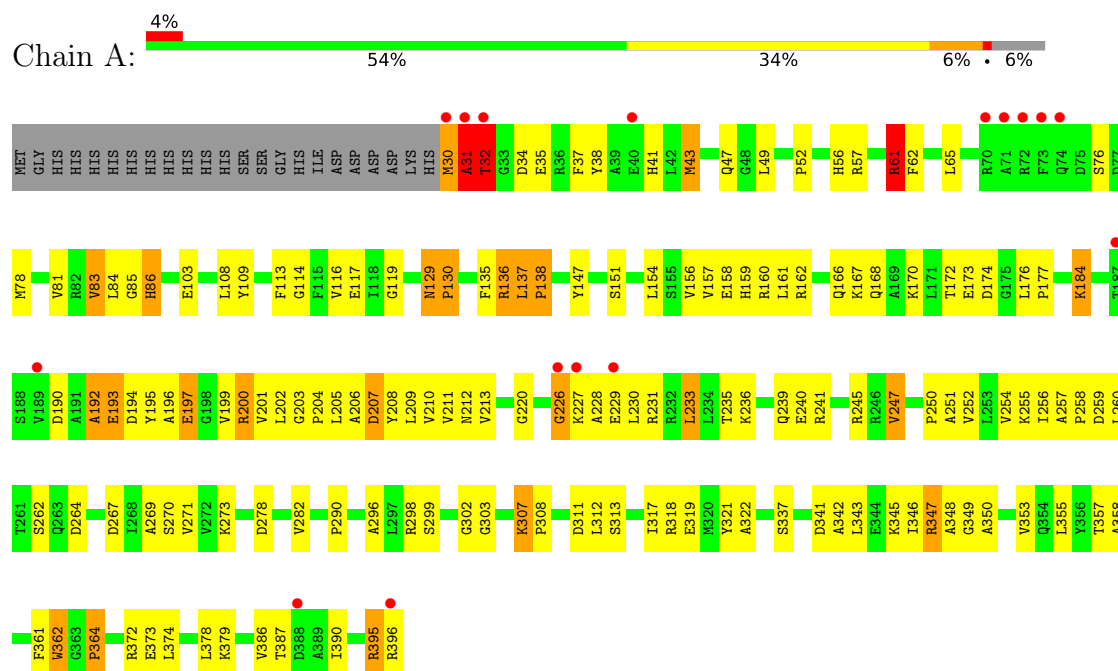
- Molecule 10 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	317	Total O 319 319	0	2

### 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



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	90.45Å 90.45Å 123.06Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	36.34 – 1.68 36.34 – 1.68	Depositor EDS
% Data completeness (in resolution range)	99.9 (36.34-1.68) 99.9 (36.34-1.68)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	5.79 (at 1.68Å)	Xtriage
Refinement program	REFMAC 5.7.0029	Depositor
R, $R_{free}$	0.140 , 0.172 0.148 , 0.177	Depositor DCC
$R_{free}$ test set	3388 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	13.1	Xtriage
Anisotropy	0.018	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 49.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.016 for -h,-k,l	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	3626	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.79% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

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

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: ACT, GOL, ORO, FMN, CL, SO4, W7A, DDQ

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	2.06	135/2991 (4.5%)	1.46	30/4035 (0.7%)

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	11

All (135) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	210	VAL	C-O	-10.05	1.13	1.24
1	A	353	VAL	C-O	-9.23	1.13	1.23
1	A	197[A]	GLU	C-N	-8.88	1.22	1.33
1	A	197[B]	GLU	C-N	-8.88	1.22	1.33
1	A	254	VAL	C-O	-8.88	1.14	1.24
1	A	257	ALA	C-N	8.32	1.41	1.33
1	A	390	ILE	C-O	-8.12	1.16	1.24
1	A	342	ALA	C-O	-8.00	1.15	1.24
1	A	313[A]	SER	C-N	-7.95	1.23	1.33
1	A	313[B]	SER	C-N	-7.95	1.23	1.33
1	A	135	PHE	C-O	-7.86	1.15	1.23
1	A	312	LEU	C-N	7.85	1.44	1.33
1	A	116	VAL	C-O	-7.72	1.15	1.24
1	A	156	VAL	C-O	-7.71	1.15	1.24
1	A	257	ALA	C-O	-7.59	1.14	1.23
1	A	176	LEU	C-O	-7.51	1.15	1.24
1	A	213	VAL	N-CA	-7.44	1.37	1.46
1	A	350	ALA	C-O	-7.42	1.15	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	307	LYS	C-O	-7.35	1.17	1.24
1	A	348	ALA	C-O	-7.21	1.14	1.24
1	A	65	LEU	N-CA	6.97	1.55	1.46
1	A	109	TYR	C-O	-6.96	1.16	1.24
1	A	355	LEU	C-O	-6.92	1.15	1.23
1	A	358	ALA	C-O	-6.90	1.16	1.24
1	A	203	GLY	C-O	-6.88	1.17	1.24
1	A	386	VAL	CA-C	-6.85	1.44	1.52
1	A	190	ASP	C-O	-6.80	1.17	1.23
1	A	160	ARG	C-O	-6.78	1.16	1.24
1	A	233	LEU	C-O	-6.77	1.16	1.24
1	A	252	VAL	C-O	-6.75	1.16	1.24
1	A	206	ALA	C-O	-6.69	1.15	1.24
1	A	108	LEU	C-O	-6.69	1.16	1.24
1	A	83	VAL	C-O	-6.50	1.14	1.23
1	A	235	THR	C-O	-6.46	1.16	1.24
1	A	81	VAL	CA-CB	6.43	1.64	1.54
1	A	176	LEU	C-N	6.42	1.41	1.33
1	A	136[A]	ARG	C-O	-6.41	1.16	1.23
1	A	136[B]	ARG	C-O	-6.41	1.16	1.23
1	A	260	LEU	C-O	-6.40	1.15	1.23
1	A	212	ASN	N-CA	-6.37	1.38	1.46
1	A	264	ASP	C-O	-6.35	1.16	1.24
1	A	202	LEU	C-O	-6.29	1.15	1.24
1	A	203	GLY	C-N	6.29	1.41	1.34
1	A	161	LEU	C-O	-6.27	1.16	1.24
1	A	256	ILE	C-O	-6.25	1.16	1.23
1	A	343	LEU	C-O	-6.23	1.16	1.24
1	A	250	PRO	C-O	-6.22	1.16	1.23
1	A	269	ALA	C-O	-6.22	1.16	1.24
1	A	267	ASP	C-O	-6.15	1.17	1.24
1	A	194	ASP	C-O	-6.14	1.17	1.24
1	A	199	VAL	C-O	-6.14	1.17	1.24
1	A	61	ARG	N-CA	6.13	1.53	1.46
1	A	318	ARG	C-O	-6.11	1.17	1.24
1	A	258	PRO	N-CD	6.10	1.56	1.47
1	A	166	GLN	C-O	-6.06	1.16	1.24
1	A	162	ARG	C-O	-6.05	1.16	1.24
1	A	147	TYR	C-O	6.02	1.31	1.24
1	A	255	LYS	C-O	-6.02	1.16	1.24
1	A	317	ILE	C-O	-5.98	1.17	1.24
1	A	86	HIS	C-O	-5.98	1.16	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	349	GLY	C-O	-5.97	1.15	1.23
1	A	258	PRO	C-O	-5.96	1.17	1.24
1	A	159	HIS	C-O	-5.90	1.17	1.24
1	A	251	ALA	C-O	-5.90	1.16	1.23
1	A	103	GLU	C-O	5.87	1.31	1.24
1	A	138	PRO	N-CD	5.85	1.55	1.47
1	A	312	LEU	C-O	-5.84	1.17	1.24
1	A	170	LYS	C-O	-5.83	1.17	1.24
1	A	239	GLN	C-O	-5.82	1.17	1.24
1	A	129	ASN	CA-C	-5.82	1.45	1.52
1	A	208	TYR	C-O	-5.80	1.16	1.23
1	A	177	PRO	N-CD	5.76	1.55	1.47
1	A	200	ARG	C-O	-5.74	1.17	1.24
1	A	245	ARG	C-O	-5.72	1.16	1.23
1	A	205	LEU	C-O	-5.71	1.16	1.24
1	A	290	PRO	CA-C	-5.71	1.45	1.52
1	A	173[A]	GLU	C-O	-5.70	1.17	1.24
1	A	173[B]	GLU	C-O	-5.70	1.17	1.24
1	A	213	VAL	CA-C	5.70	1.59	1.52
1	A	308	PRO	N-CD	5.67	1.55	1.47
1	A	117	GLU	C-O	-5.60	1.17	1.24
1	A	207	ASP	C-O	-5.59	1.17	1.24
1	A	211	VAL	CA-C	-5.56	1.47	1.53
1	A	319	GLU	C-O	-5.56	1.17	1.24
1	A	347	ARG	C-O	-5.56	1.17	1.24
1	A	76	SER	CA-C	-5.55	1.45	1.53
1	A	341	ASP	C-O	-5.55	1.17	1.24
1	A	362[A]	TRP	C-O	-5.53	1.16	1.24
1	A	362[B]	TRP	C-O	-5.53	1.16	1.24
1	A	154	LEU	C-O	-5.53	1.17	1.24
1	A	151	SER	CA-C	5.52	1.59	1.52
1	A	192	ALA	C-O	-5.51	1.17	1.24
1	A	157	VAL	C-O	-5.50	1.17	1.24
1	A	196	ALA	C-O	-5.50	1.17	1.24
1	A	387	THR	N-CA	-5.50	1.39	1.46
1	A	113	PHE	C-O	-5.49	1.17	1.23
1	A	346	ILE	C-O	-5.47	1.18	1.24
1	A	204	PRO	N-CD	5.47	1.55	1.47
1	A	379	LYS	N-CA	5.47	1.52	1.46
1	A	201	VAL	C-O	-5.46	1.18	1.24
1	A	114	GLY	C-O	-5.44	1.17	1.24
1	A	250	PRO	N-CD	5.43	1.55	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	374	LEU	C-O	-5.41	1.17	1.24
1	A	38	TYR	C-O	-5.36	1.18	1.24
1	A	357	THR	C-O	-5.34	1.17	1.24
1	A	278	ASP	N-CA	-5.31	1.39	1.46
1	A	321	TYR	C-O	-5.30	1.18	1.24
1	A	137	LEU	C-O	-5.30	1.18	1.24
1	A	138	PRO	C-O	-5.28	1.17	1.24
1	A	167	LYS	C-O	-5.28	1.18	1.24
1	A	43	MET	C-N	5.27	1.41	1.34
1	A	271	VAL	C-O	-5.26	1.17	1.24
1	A	262	SER	C-O	-5.26	1.18	1.24
1	A	337[A]	SER	C-O	-5.25	1.16	1.24
1	A	337[B]	SER	C-O	-5.25	1.16	1.24
1	A	177	PRO	C-O	-5.24	1.17	1.23
1	A	195	TYR	C-O	-5.22	1.17	1.24
1	A	129	ASN	C-N	5.19	1.40	1.33
1	A	174[A]	ASP	C-O	-5.19	1.17	1.24
1	A	174[B]	ASP	C-O	-5.19	1.17	1.24
1	A	298	ARG	CZ-NH1	5.19	1.40	1.32
1	A	311	ASP	C-O	-5.17	1.17	1.24
1	A	259	ASP	C-O	-5.17	1.17	1.24
1	A	270	SER	C-O	-5.16	1.18	1.24
1	A	302	GLY	C-N	-5.15	1.30	1.33
1	A	299	SER	N-CA	-5.12	1.39	1.46
1	A	61	ARG	CA-C	-5.08	1.46	1.52
1	A	230	LEU	C-O	-5.08	1.18	1.24
1	A	168	GLN	C-O	-5.06	1.18	1.24
1	A	345	LYS	C-O	-5.06	1.18	1.24
1	A	322	ALA	C-O	-5.06	1.18	1.24
1	A	193	GLU	C-O	-5.04	1.18	1.24
1	A	158	GLU	C-O	-5.04	1.18	1.24
1	A	209	LEU	C-O	-5.03	1.17	1.23
1	A	361	PHE	N-CA	-5.02	1.39	1.46

All (30) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	31	ALA	O-C-N	-17.72	99.03	122.59
1	A	226	GLY	O-C-N	-10.77	108.05	122.81
1	A	203	GLY	O-C-N	8.04	123.96	121.07
1	A	130	PRO	CA-C-O	-7.28	113.12	121.56
1	A	290	PRO	CA-C-O	7.19	129.48	121.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	41	HIS	N-CA-C	6.90	121.55	112.72
1	A	364	PRO	N-CA-C	6.82	119.03	110.70
1	A	201	VAL	N-CA-C	6.71	117.33	110.82
1	A	203	GLY	CA-C-O	6.66	124.11	119.65
1	A	395	ARG	O-C-N	-6.60	114.14	122.26
1	A	174[A]	ASP	CA-C-N	6.45	130.42	121.26
1	A	174[A]	ASP	C-N-CA	6.45	130.42	121.26
1	A	174[B]	ASP	CA-C-N	6.45	130.42	121.26
1	A	174[B]	ASP	C-N-CA	6.45	130.42	121.26
1	A	378	LEU	O-C-N	6.06	128.54	122.12
1	A	119	GLY	CA-C-O	-5.79	115.99	122.24
1	A	303	GLY	CA-C-O	5.63	125.32	120.76
1	A	203	GLY	CA-C-N	-5.52	114.13	119.87
1	A	203	GLY	C-N-CA	-5.52	114.13	119.87
1	A	282	VAL	CA-C-N	5.51	131.63	121.70
1	A	282	VAL	C-N-CA	5.51	131.63	121.70
1	A	62	PHE	CA-C-O	5.40	126.28	120.55
1	A	307	LYS	CA-C-N	-5.31	114.19	119.56
1	A	307	LYS	C-N-CA	-5.31	114.19	119.56
1	A	290	PRO	O-C-N	-5.30	116.16	122.89
1	A	257	ALA	O-C-N	5.16	127.07	121.60
1	A	43	MET	CA-C-N	-5.09	113.39	119.05
1	A	43	MET	C-N-CA	-5.09	113.39	119.05
1	A	81	VAL	CB-CA-C	-5.09	102.66	110.50
1	A	196	ALA	CA-C-O	-5.01	115.38	120.69

There are no chirality outliers.

All (11) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	226	GLY	Peptide,Mainchain
1	A	31	ALA	Peptide,Mainchain
1	A	32[B]	THR	Mainchain
1	A	395	ARG	Mainchain

## 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	2944	0	2976	80	0
2	A	1	0	0	0	0
3	A	84	0	162	3	0
4	A	50	0	30	3	0
5	A	31	0	19	0	0
6	A	138	0	184	25	0
7	A	11	0	3	0	0
8	A	20	0	0	6	0
9	A	28	0	21	5	0
10	A	319	0	0	17	0
All	All	3626	0	3395	90	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 13.

All (90) 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:362[B]:TRP:CZ2	6:A:431:GOL:H2	1.84	1.11
1:A:362[B]:TRP:HZ2	6:A:431:GOL:H2	0.92	1.08
1:A:227[B]:LYS:HG2	1:A:228:ALA:N	1.39	1.03
1:A:30:MET:HG3	1:A:31:ALA:H	1.23	0.99
1:A:362[B]:TRP:HZ2	6:A:431:GOL:C2	1.78	0.96
1:A:227[B]:LYS:CG	1:A:228:ALA:N	2.12	0.84
1:A:307:LYS:HD3	10:A:614:HOH:O	1.80	0.81
1:A:85:GLY:HA2	8:A:435:SO4:O4	1.81	0.79
1:A:273:LYS:HA	6:A:427:GOL:H2	1.64	0.79
1:A:307:LYS:CD	10:A:614:HOH:O	2.33	0.76
1:A:372:ARG:HG2	6:A:430:GOL:H12	1.68	0.75
1:A:56:HIS:CE1	10:A:690:HOH:O	2.40	0.74
1:A:84:LEU:N	8:A:435:SO4:O1	2.24	0.71
1:A:227[B]:LYS:HZ3	1:A:229:GLU:H	1.40	0.70
1:A:32[A]:THR:HG22	1:A:35:GLU:HG3	1.74	0.69
1:A:227[B]:LYS:HG2	1:A:228:ALA:CA	2.23	0.68
1:A:85:GLY:CA	8:A:435:SO4:O4	2.42	0.68
1:A:37:PHE:HA	3:A:406:DDQ:HM12	1.77	0.67
1:A:184:LYS:HE2	10:A:714:HOH:O	1.94	0.66
4:A:408[B]:W7A:OAJ	4:A:408[B]:W7A:H5	1.93	0.66
1:A:227[B]:LYS:N	1:A:227[B]:LYS:HD3	2.11	0.66
1:A:227[B]:LYS:HD3	1:A:227[B]:LYS:H	1.60	0.66
1:A:30:MET:HG3	1:A:31:ALA:N	2.01	0.65
1:A:347:ARG:NH2	1:A:396[B]:ARG:NH1	2.44	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:30:MET:CG	1:A:31:ALA:H	2.04	0.63
1:A:241:ARG:NH1	6:A:419[B]:GOL:H31	2.13	0.63
1:A:85:GLY:N	8:A:435:SO4:O4	2.31	0.63
1:A:56:HIS:HE1	10:A:690:HOH:O	1.78	0.62
6:A:412:GOL:H11	10:A:674:HOH:O	2.01	0.61
1:A:231:ARG:HH22	6:A:428:GOL:H2	1.66	0.61
1:A:347:ARG:HH21	1:A:396[B]:ARG:NH1	1.98	0.61
1:A:200:ARG:NH1	1:A:240[A]:GLU:CD	2.60	0.60
1:A:57:ARG:HH12	6:A:413:GOL:H2	1.67	0.59
1:A:200:ARG:HH11	1:A:240[A]:GLU:CD	2.11	0.59
1:A:57:ARG:NH1	6:A:413:GOL:H2	2.18	0.59
1:A:220:GLY:H	6:A:415:GOL:H11	1.67	0.59
6:A:420:GOL:H2	10:A:783:HOH:O	2.02	0.59
1:A:207:ASP:OD1	9:A:438:ACT:CH3	2.52	0.58
1:A:207:ASP:OD1	9:A:438:ACT:H2	2.04	0.57
1:A:227[B]:LYS:HG2	1:A:228:ALA:CB	2.35	0.56
1:A:30:MET:HE3	6:A:423:GOL:H2	1.88	0.56
1:A:61:ARG:HD3	6:A:414:GOL:H2	1.88	0.55
1:A:86:HIS:HA	6:A:421:GOL:H2	1.90	0.54
3:A:406:DDQ:HM21	3:A:406:DDQ:C3	2.37	0.54
1:A:172:THR:O	6:A:421:GOL:H12	2.09	0.53
1:A:307:LYS:HG2	10:A:614:HOH:O	2.09	0.52
1:A:30:MET:HB3	1:A:372:ARG:HD2	1.92	0.52
1:A:362[B]:TRP:HE3	10:A:774:HOH:O	1.93	0.52
1:A:32[A]:THR:HG22	1:A:35:GLU:CG	2.41	0.51
1:A:30:MET:O	1:A:31:ALA:HB2	2.11	0.50
3:A:406:DDQ:HM21	3:A:406:DDQ:H32	1.94	0.50
1:A:200:ARG:NH1	1:A:240[A]:GLU:OE1	2.45	0.50
1:A:373:GLU:HG2	6:A:430:GOL:H31	1.93	0.49
1:A:307:LYS:CG	10:A:614:HOH:O	2.61	0.49
9:A:439:ACT:H2	10:A:583:HOH:O	2.12	0.48
1:A:347:ARG:NH2	1:A:396[B]:ARG:HH11	2.09	0.48
1:A:83:VAL:C	8:A:435:SO4:O1	2.57	0.47
1:A:236:LYS:HE3	10:A:649:HOH:O	2.14	0.47
1:A:227[B]:LYS:HG3	10:A:790:HOH:O	2.14	0.47
6:A:418:GOL:O3	10:A:776:HOH:O	2.20	0.46
1:A:227[B]:LYS:N	1:A:227[B]:LYS:CD	2.74	0.46
1:A:32[A]:THR:HG21	10:A:711:HOH:O	2.14	0.46
1:A:362[B]:TRP:CZ2	6:A:431:GOL:C2	2.69	0.46
4:A:408[A]:W7A:OAJ	4:A:408[A]:W7A:H4	2.17	0.45
8:A:435:SO4:O2	9:A:442:ACT:O	2.35	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:227[B]:LYS:NZ	1:A:229:GLU:H	2.13	0.45
1:A:396[A]:ARG:NH2	1:A:396[A]:ARG:HG2	2.32	0.45
1:A:247:VAL:HB	10:A:578:HOH:O	2.16	0.44
1:A:43:MET:O	1:A:47[A]:GLN:HG3	2.18	0.44
1:A:220:GLY:H	6:A:415:GOL:H32	1.82	0.44
1:A:32[A]:THR:HG23	1:A:34:ASP:H	1.82	0.44
1:A:364:PRO:O	6:A:425:GOL:H11	2.17	0.44
1:A:52:PRO:HB3	4:A:408[B]:W7A:O2	2.19	0.43
1:A:52:PRO:HG3	1:A:136[A]:ARG:HG3	2.01	0.43
1:A:193:GLU:O	1:A:197[B]:GLU:HG3	2.19	0.43
1:A:32[A]:THR:CG2	1:A:35:GLU:H	2.31	0.42
1:A:241:ARG:CZ	6:A:419[B]:GOL:H31	2.49	0.42
1:A:296:ALA:HB2	6:A:417:GOL:H11	2.00	0.42
1:A:32[A]:THR:HG23	1:A:34:ASP:N	2.34	0.42
1:A:136[B]:ARG:C	1:A:137:LEU:HD12	2.45	0.41
6:A:420:GOL:O1	9:A:438:ACT:H1	2.20	0.41
1:A:129:ASN:HB3	1:A:130:PRO:HD2	2.02	0.41
1:A:192:ALA:HA	1:A:233:LEU:CD1	2.51	0.41
1:A:138:PRO:CD	6:A:418:GOL:H2	2.51	0.41
1:A:78:MET:HE2	1:A:78:MET:HB3	1.94	0.41
1:A:78:MET:HG3	10:A:747:HOH:O	2.21	0.41
1:A:136[A]:ARG:C	1:A:137:LEU:HD12	2.46	0.41

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	380/390 (97%)	368 (97%)	11 (3%)	1 (0%)	36 21

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	31	ALA

### 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	312/317 (98%)	305 (98%)	7 (2%)	45 19

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	30	MET
1	A	32[A]	THR
1	A	32[B]	THR
1	A	49	LEU
1	A	61	ARG
1	A	184	LYS
1	A	247	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	141	GLN
1	A	239	GLN
1	A	340	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 oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 45 ligands modelled in this entry, 1 is monoatomic - leaving 44 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$
8	SO4	A	436	-	4,4,4	0.51	0	6,6,6	0.93	0
6	GOL	A	410	-	5,5,5	1.26	1 (20%)	5,5,5	2.79	3 (60%)
6	GOL	A	417	-	5,5,5	1.18	0	5,5,5	1.32	1 (20%)
6	GOL	A	411	-	5,5,5	0.50	0	5,5,5	1.10	0
6	GOL	A	426	-	5,5,5	1.32	1 (20%)	5,5,5	1.40	1 (20%)
3	DDQ	A	405	-	11,13,13	2.22	1 (9%)	12,15,15	0.90	1 (8%)
3	DDQ	A	402	-	11,13,13	1.84	1 (9%)	12,15,15	0.45	0
9	ACT	A	443	-	3,3,3	1.26	0	3,3,3	1.31	0
6	GOL	A	420	-	5,5,5	0.96	0	5,5,5	1.35	1 (20%)
6	GOL	A	419[A]	-	5,5,5	0.36	0	5,5,5	0.51	0
9	ACT	A	442	-	3,3,3	0.82	0	3,3,3	0.74	0
9	ACT	A	441	-	3,3,3	0.87	0	3,3,3	0.50	0
6	GOL	A	427	-	5,5,5	1.20	1 (20%)	5,5,5	1.30	1 (20%)
6	GOL	A	430	-	5,5,5	0.32	0	5,5,5	1.19	0
6	GOL	A	423	-	5,5,5	0.63	0	5,5,5	0.59	0
6	GOL	A	429	-	5,5,5	0.91	0	5,5,5	1.04	0
8	SO4	A	434	-	4,4,4	0.70	0	6,6,6	0.75	0
3	DDQ	A	407	-	11,13,13	2.42	1 (9%)	12,15,15	2.76	3 (25%)
6	GOL	A	419[B]	-	5,5,5	0.40	0	5,5,5	0.47	0
8	SO4	A	435	-	4,4,4	0.59	0	6,6,6	0.41	0
9	ACT	A	440	-	3,3,3	0.67	0	3,3,3	1.43	0
6	GOL	A	431	-	5,5,5	0.58	0	5,5,5	1.07	0
8	SO4	A	433	-	4,4,4	0.80	0	6,6,6	0.62	0
6	GOL	A	416	-	5,5,5	0.59	0	5,5,5	0.63	0
6	GOL	A	418	-	5,5,5	0.71	0	5,5,5	0.56	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	DDQ	A	403	-	11,13,13	2.19	2 (18%)	12,15,15	0.37	0
6	GOL	A	421	-	5,5,5	0.71	0	5,5,5	2.07	1 (20%)
6	GOL	A	422	-	5,5,5	0.15	0	5,5,5	1.40	1 (20%)
6	GOL	A	412	-	5,5,5	0.34	0	5,5,5	0.61	0
4	W7A	A	408[A]	-	27,27,27	2.35	9 (33%)	35,37,37	2.43	12 (34%)
6	GOL	A	428	-	5,5,5	0.48	0	5,5,5	0.65	0
7	ORO	A	432	-	11,11,11	1.50	1 (9%)	14,15,15	1.21	1 (7%)
6	GOL	A	413	-	5,5,5	0.93	0	5,5,5	1.57	1 (20%)
6	GOL	A	424	-	5,5,5	0.52	0	5,5,5	1.12	0
9	ACT	A	437	-	3,3,3	1.08	0	3,3,3	0.31	0
9	ACT	A	438	-	3,3,3	0.71	0	3,3,3	1.22	0
5	FMN	A	409	-	33,33,33	1.59	8 (24%)	48,50,50	1.58	9 (18%)
6	GOL	A	414	-	5,5,5	0.26	0	5,5,5	0.44	0
4	W7A	A	408[B]	-	27,27,27	3.04	12 (44%)	35,37,37	2.77	9 (25%)
6	GOL	A	415	-	5,5,5	0.36	0	5,5,5	1.24	1 (20%)
6	GOL	A	425	-	5,5,5	0.44	0	5,5,5	2.95	2 (40%)
3	DDQ	A	404	-	11,13,13	2.21	2 (18%)	12,15,15	0.79	1 (8%)
9	ACT	A	439	-	3,3,3	0.64	0	3,3,3	1.14	0
3	DDQ	A	406	-	11,13,13	2.00	2 (18%)	12,15,15	0.94	1 (8%)

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
6	GOL	A	410	-	-	2/4/4/4	-
6	GOL	A	417	-	-	0/4/4/4	-
6	GOL	A	411	-	-	4/4/4/4	-
6	GOL	A	426	-	-	3/4/4/4	-
3	DDQ	A	405	-	-	6/11/11/11	-
3	DDQ	A	402	-	-	5/11/11/11	-
6	GOL	A	420	-	-	4/4/4/4	-
6	GOL	A	419[A]	-	-	4/4/4/4	-
6	GOL	A	427	-	-	2/4/4/4	-
6	GOL	A	430	-	-	4/4/4/4	-
6	GOL	A	423	-	-	1/4/4/4	-
6	GOL	A	429	-	-	4/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	DDQ	A	407	-	-	4/11/11/11	-
6	GOL	A	419[B]	-	-	4/4/4/4	-
6	GOL	A	431	-	-	0/4/4/4	-
6	GOL	A	416	-	-	0/4/4/4	-
6	GOL	A	418	-	-	3/4/4/4	-
3	DDQ	A	403	-	-	4/11/11/11	-
6	GOL	A	421	-	-	2/4/4/4	-
6	GOL	A	422	-	-	2/4/4/4	-
6	GOL	A	412	-	-	4/4/4/4	-
4	W7A	A	408[A]	-	-	1/13/13/13	0/3/3/3
6	GOL	A	428	-	-	1/4/4/4	-
7	ORO	A	432	-	-	2/4/4/4	0/1/1/1
6	GOL	A	413	-	-	0/4/4/4	-
6	GOL	A	424	-	-	4/4/4/4	-
5	FMN	A	409	-	-	4/18/18/18	0/3/3/3
6	GOL	A	414	-	-	2/4/4/4	-
4	W7A	A	408[B]	-	-	1/13/13/13	0/3/3/3
6	GOL	A	415	-	-	2/4/4/4	-
6	GOL	A	425	-	-	0/4/4/4	-
3	DDQ	A	404	-	-	5/11/11/11	-
3	DDQ	A	406	-	-	7/11/11/11	-

All (42) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	408[B]	W7A	CAL-C5	-8.93	1.28	1.51
3	A	407	DDQ	O1-N1	-7.81	1.23	1.42
3	A	405	DDQ	O1-N1	-6.96	1.25	1.42
3	A	404	DDQ	O1-N1	-6.67	1.25	1.42
3	A	403	DDQ	O1-N1	-6.48	1.26	1.42
3	A	406	DDQ	O1-N1	-6.09	1.27	1.42
4	A	408[B]	W7A	CAM-CAN	-5.84	1.35	1.51
3	A	402	DDQ	O1-N1	-5.75	1.28	1.42
4	A	408[A]	W7A	C4-CAI	-5.48	1.39	1.48
4	A	408[B]	W7A	CAT-CAQ	-5.46	1.36	1.49
4	A	408[A]	W7A	CAT-CAQ	-4.97	1.37	1.49
4	A	408[A]	W7A	C4-N3	-4.95	1.29	1.38
4	A	408[B]	W7A	C6-N1	-4.47	1.30	1.38
4	A	408[A]	W7A	OAJ-CAI	-4.18	1.19	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	408[B]	W7A	C4-CAI	-4.04	1.42	1.48
4	A	408[B]	W7A	C2-N1	-4.02	1.30	1.37
5	A	409	FMN	C4A-N5	3.91	1.39	1.30
7	A	432	ORO	C2-N3	-3.65	1.31	1.37
4	A	408[B]	W7A	C2-N3	3.23	1.42	1.37
3	A	403	DDQ	C1-N1	-3.15	1.48	1.51
4	A	408[A]	W7A	O6-C6	-3.07	1.17	1.23
4	A	408[A]	W7A	CAM-CAN	-2.96	1.43	1.51
5	A	409	FMN	C5'-C4'	2.96	1.55	1.51
3	A	404	DDQ	C1-N1	-2.87	1.48	1.51
5	A	409	FMN	C6-C7	-2.81	1.35	1.39
4	A	408[B]	W7A	CAR-CAS	-2.78	1.34	1.38
4	A	408[B]	W7A	OAJ-CAI	-2.75	1.23	1.30
5	A	409	FMN	C4-N3	-2.60	1.34	1.38
6	A	426	GOL	O2-C2	2.57	1.50	1.43
5	A	409	FMN	O3'-C3'	2.41	1.48	1.43
5	A	409	FMN	O4-C4	2.39	1.28	1.23
4	A	408[B]	W7A	O2-C2	-2.38	1.18	1.23
4	A	408[A]	W7A	C4-C5	2.32	1.41	1.37
4	A	408[A]	W7A	C2-N1	-2.29	1.33	1.37
3	A	406	DDQ	C1-N1	-2.25	1.49	1.51
6	A	427	GOL	C3-C2	2.19	1.60	1.51
5	A	409	FMN	O2-C2	-2.12	1.20	1.24
5	A	409	FMN	C7M-C7	2.12	1.55	1.51
4	A	408[B]	W7A	CAV-CAT	-2.12	1.35	1.39
6	A	410	GOL	O1-C1	2.03	1.50	1.42
4	A	408[A]	W7A	CAL-C5	-2.01	1.46	1.51
4	A	408[B]	W7A	CAR-CAQ	-2.00	1.35	1.39

All (50) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	408[B]	W7A	C5-C6-N1	11.54	124.47	115.70
4	A	408[A]	W7A	C5-C6-N1	7.81	121.64	115.70
3	A	407	DDQ	CM2-N1-C1	-6.25	97.10	110.23
4	A	408[B]	W7A	C6-N1-C2	-6.16	117.89	126.37
6	A	425	GOL	C3-C2-C1	-5.90	90.16	111.80
3	A	407	DDQ	O1-N1-C1	-5.03	96.93	109.27
3	A	407	DDQ	CM1-N1-C1	-4.83	100.08	110.23
5	A	409	FMN	C9A-C5A-N5	-4.61	117.57	122.45
4	A	408[A]	W7A	CAP-CAO-CAN	4.60	127.04	121.00
4	A	408[A]	W7A	CAO-CAN-CAS	-4.51	111.53	118.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	421	GOL	O1-C1-C2	4.36	130.00	110.38
6	A	410	GOL	O1-C1-C2	-4.27	91.14	110.38
4	A	408[B]	W7A	N1-C2-N3	4.23	122.40	115.74
4	A	408[B]	W7A	OAJ-CAI-C4	4.19	123.37	116.73
5	A	409	FMN	C5A-C9A-N10	3.91	121.51	117.97
4	A	408[B]	W7A	O6-C6-N1	-3.90	112.78	120.11
5	A	409	FMN	C4-C4A-N5	3.80	123.46	118.21
4	A	408[A]	W7A	C6-N1-C2	-3.72	121.25	126.37
4	A	408[A]	W7A	CAI-C4-C5	3.55	129.26	123.88
4	A	408[A]	W7A	CAL-CAM-CAN	3.22	124.01	112.70
6	A	413	GOL	O2-C2-C3	3.15	122.22	109.18
6	A	410	GOL	O3-C3-C2	-3.10	96.41	110.38
6	A	410	GOL	O2-C2-C3	-3.07	96.45	109.18
3	A	406	DDQ	CM2-N1-C1	2.91	116.34	110.23
6	A	427	GOL	O2-C2-C3	2.73	120.46	109.18
4	A	408[B]	W7A	OAK-CAI-C4	-2.72	115.46	120.20
4	A	408[A]	W7A	CAL-C5-C6	2.72	120.29	116.64
6	A	417	GOL	O3-C3-C2	2.67	122.39	110.38
5	A	409	FMN	O4-C4-C4A	-2.60	119.67	126.53
6	A	425	GOL	O2-C2-C1	2.59	119.92	109.18
4	A	408[A]	W7A	CAL-C5-C4	2.57	124.67	119.56
4	A	408[A]	W7A	OAJ-CAI-C4	2.56	120.79	116.73
4	A	408[B]	W7A	CAL-C5-C6	2.42	119.88	116.64
6	A	415	GOL	O3-C3-C2	2.41	121.23	110.38
6	A	420	GOL	O1-C1-C2	-2.39	99.61	110.38
4	A	408[A]	W7A	O6-C6-N1	-2.39	115.63	120.11
6	A	422	GOL	O3-C3-C2	-2.35	99.78	110.38
3	A	405	DDQ	CM2-N1-C1	2.34	115.14	110.23
4	A	408[B]	W7A	CAP-CAO-CAN	2.23	123.92	121.00
4	A	408[A]	W7A	OAK-CAI-C4	-2.19	116.39	120.20
4	A	408[A]	W7A	CAS-CAR-CAQ	2.16	123.89	121.12
6	A	426	GOL	O2-C2-C3	2.15	118.09	109.18
5	A	409	FMN	C9-C9A-C5A	-2.15	116.23	120.03
5	A	409	FMN	C4-C4A-C10	-2.13	113.27	116.93
5	A	409	FMN	C10-N1-C2	2.12	121.44	116.85
5	A	409	FMN	C4A-C10-N10	-2.10	113.47	116.48
3	A	404	DDQ	CM1-N1-C1	2.09	114.63	110.23
7	A	432	ORO	O2-C2-N1	-2.07	118.18	121.86
4	A	408[B]	W7A	CAO-CAP-CAQ	-2.05	118.50	121.12
5	A	409	FMN	C6-C5A-C9A	2.02	121.82	119.05

There are no chirality outliers.

All (91) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	405	DDQ	C2-C1-N1-CM1
3	A	407	DDQ	C2-C1-N1-CM2
6	A	411	GOL	O1-C1-C2-C3
6	A	412	GOL	C1-C2-C3-O3
6	A	415	GOL	O1-C1-C2-O2
6	A	415	GOL	O1-C1-C2-C3
6	A	418	GOL	C1-C2-C3-O3
6	A	419[A]	GOL	O1-C1-C2-C3
6	A	419[B]	GOL	O1-C1-C2-C3
6	A	419[B]	GOL	C1-C2-C3-O3
6	A	420	GOL	O1-C1-C2-C3
6	A	420	GOL	C1-C2-C3-O3
6	A	421	GOL	O1-C1-C2-O2
6	A	421	GOL	O1-C1-C2-C3
6	A	422	GOL	C1-C2-C3-O3
6	A	424	GOL	O1-C1-C2-C3
6	A	424	GOL	C1-C2-C3-O3
6	A	427	GOL	O1-C1-C2-C3
6	A	429	GOL	C1-C2-C3-O3
6	A	429	GOL	O2-C2-C3-O3
6	A	430	GOL	O1-C1-C2-C3
7	A	432	ORO	N1-C6-C7-O71
7	A	432	ORO	N1-C6-C7-O72
6	A	412	GOL	O2-C2-C3-O3
6	A	430	GOL	O2-C2-C3-O3
3	A	405	DDQ	C4-C5-C6-C7
5	A	409	FMN	O3'-C3'-C4'-C5'
5	A	409	FMN	O3'-C3'-C4'-O4'
6	A	410	GOL	O1-C1-C2-C3
6	A	411	GOL	C1-C2-C3-O3
6	A	412	GOL	O1-C1-C2-C3
6	A	414	GOL	C1-C2-C3-O3
6	A	419[A]	GOL	C1-C2-C3-O3
6	A	426	GOL	C1-C2-C3-O3
6	A	430	GOL	C1-C2-C3-O3
3	A	407	DDQ	C5-C6-C7-C8
6	A	411	GOL	O1-C1-C2-O2
6	A	418	GOL	O2-C2-C3-O3
6	A	419[A]	GOL	O1-C1-C2-O2
6	A	419[B]	GOL	O1-C1-C2-O2
6	A	419[B]	GOL	O2-C2-C3-O3
6	A	420	GOL	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
6	A	420	GOL	O2-C2-C3-O3
6	A	422	GOL	O2-C2-C3-O3
6	A	426	GOL	O2-C2-C3-O3
6	A	427	GOL	O1-C1-C2-O2
6	A	430	GOL	O1-C1-C2-O2
3	A	406	DDQ	C3-C4-C5-C6
3	A	403	DDQ	C6-C7-C8-C9
3	A	405	DDQ	C7-C8-C9-C10
3	A	404	DDQ	C6-C7-C8-C9
3	A	404	DDQ	C3-C4-C5-C6
3	A	406	DDQ	C4-C5-C6-C7
3	A	405	DDQ	C6-C7-C8-C9
6	A	411	GOL	O2-C2-C3-O3
6	A	424	GOL	O1-C1-C2-O2
6	A	424	GOL	O2-C2-C3-O3
6	A	429	GOL	O1-C1-C2-O2
4	A	408[B]	W7A	C5-CAL-CAM-CAN
5	A	409	FMN	C2'-C3'-C4'-O4'
3	A	403	DDQ	C4-C5-C6-C7
3	A	406	DDQ	C5-C6-C7-C8
3	A	404	DDQ	C1-C2-C3-C4
6	A	418	GOL	O1-C1-C2-O2
3	A	404	DDQ	C2-C3-C4-C5
4	A	408[A]	W7A	C5-CAL-CAM-CAN
6	A	428	GOL	O1-C1-C2-O2
3	A	406	DDQ	C6-C7-C8-C9
3	A	402	DDQ	C2-C3-C4-C5
3	A	402	DDQ	C2-C1-N1-CM1
3	A	405	DDQ	C2-C1-N1-CM2
3	A	407	DDQ	C2-C1-N1-CM1
3	A	406	DDQ	C1-C2-C3-C4
6	A	410	GOL	O2-C2-C3-O3
3	A	405	DDQ	C2-C1-N1-O1
5	A	409	FMN	C4'-C5'-O5'-P
6	A	414	GOL	O2-C2-C3-O3
3	A	406	DDQ	C7-C8-C9-C10
3	A	402	DDQ	C1-C2-C3-C4
6	A	426	GOL	O1-C1-C2-O2
6	A	429	GOL	O1-C1-C2-C3
6	A	412	GOL	O1-C1-C2-O2
6	A	423	GOL	O1-C1-C2-O2
3	A	402	DDQ	C5-C6-C7-C8

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Mol	Chain	Res	Type	Atoms
6	A	419[A]	GOL	O2-C2-C3-O3
3	A	404	DDQ	C4-C5-C6-C7
3	A	402	DDQ	C2-C1-N1-CM2
3	A	403	DDQ	C2-C1-N1-CM1
3	A	403	DDQ	C2-C1-N1-CM2
3	A	406	DDQ	C2-C3-C4-C5
3	A	407	DDQ	C6-C7-C8-C9

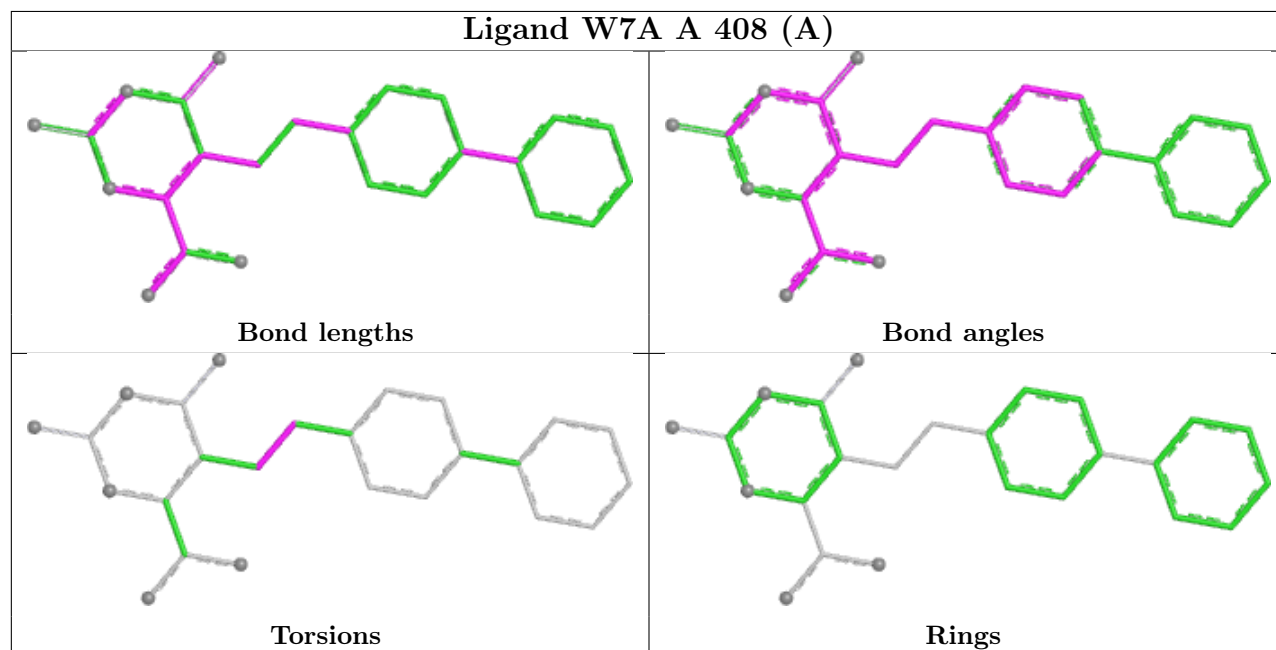
There are no ring outliers.

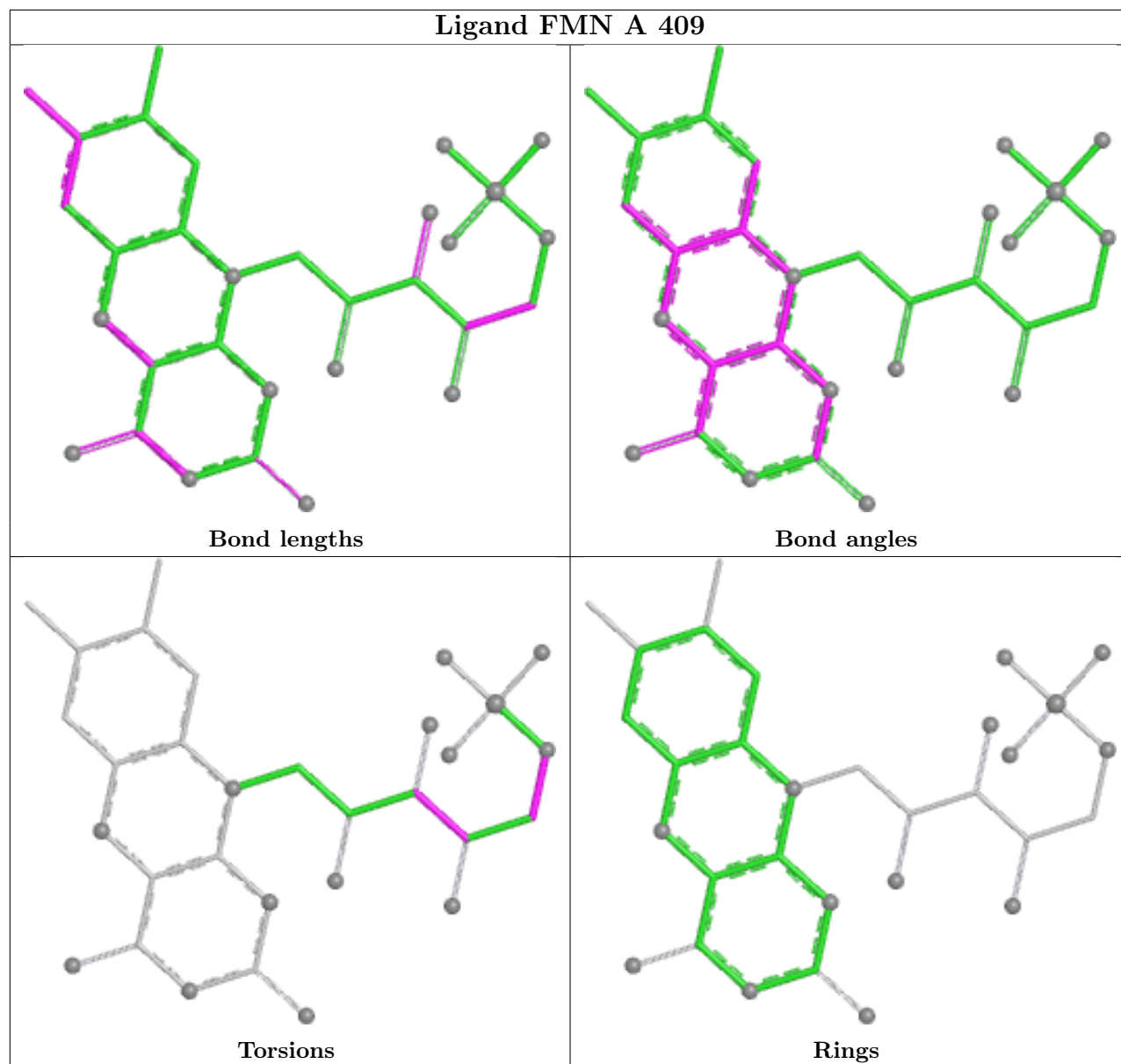
22 monomers are involved in 40 short contacts:

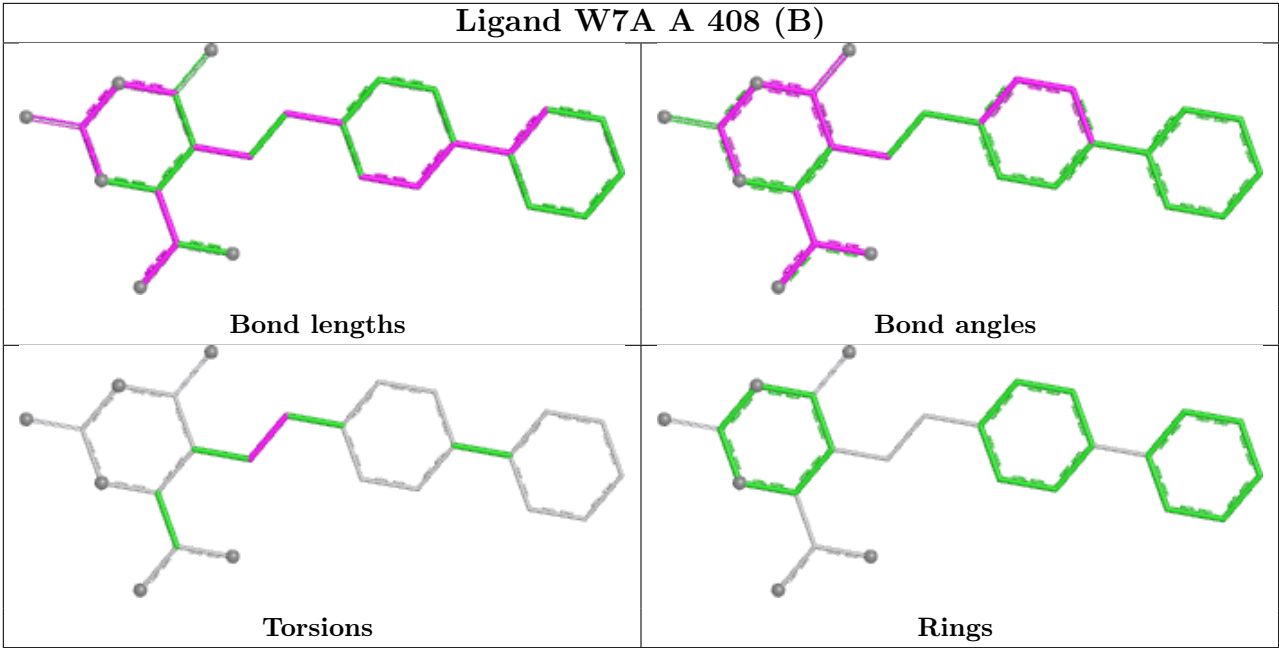
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	417	GOL	1	0
6	A	420	GOL	2	0
9	A	442	ACT	1	0
6	A	427	GOL	1	0
6	A	430	GOL	2	0
6	A	423	GOL	1	0
6	A	419[B]	GOL	2	0
8	A	435	SO4	6	0
6	A	431	GOL	4	0
6	A	418	GOL	2	0
6	A	421	GOL	2	0
6	A	412	GOL	1	0
4	A	408[A]	W7A	1	0
6	A	428	GOL	1	0
6	A	413	GOL	2	0
9	A	438	ACT	3	0
6	A	414	GOL	1	0
4	A	408[B]	W7A	2	0
6	A	415	GOL	2	0
6	A	425	GOL	1	0
9	A	439	ACT	1	0
3	A	406	DDQ	3	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 than 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](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	196:ALA	C	197[A]:GLU	N	1.17



## 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<sup>th</sup> 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 <sup>2</sup> )	Q < 0.9
1	A	367/390 (94%)	0.00	16 (4%)	39 47	3, 12, 33, 86	17 (4%)

All (16) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	31	ALA	4.8
1	A	30	MET	4.5
1	A	73	PHE	4.2
1	A	72	ARG	4.1
1	A	227[A]	LYS	4.1
1	A	396[A]	ARG	4.0
1	A	71	ALA	3.9
1	A	189	VAL	3.5
1	A	70	ARG	2.8
1	A	229	GLU	2.7
1	A	226	GLY	2.6
1	A	32[A]	THR	2.5
1	A	74	GLN	2.2
1	A	40	GLU	2.2
1	A	388	ASP	2.1
1	A	187	THR	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 oligosaccharides 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<sup>th</sup> 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.

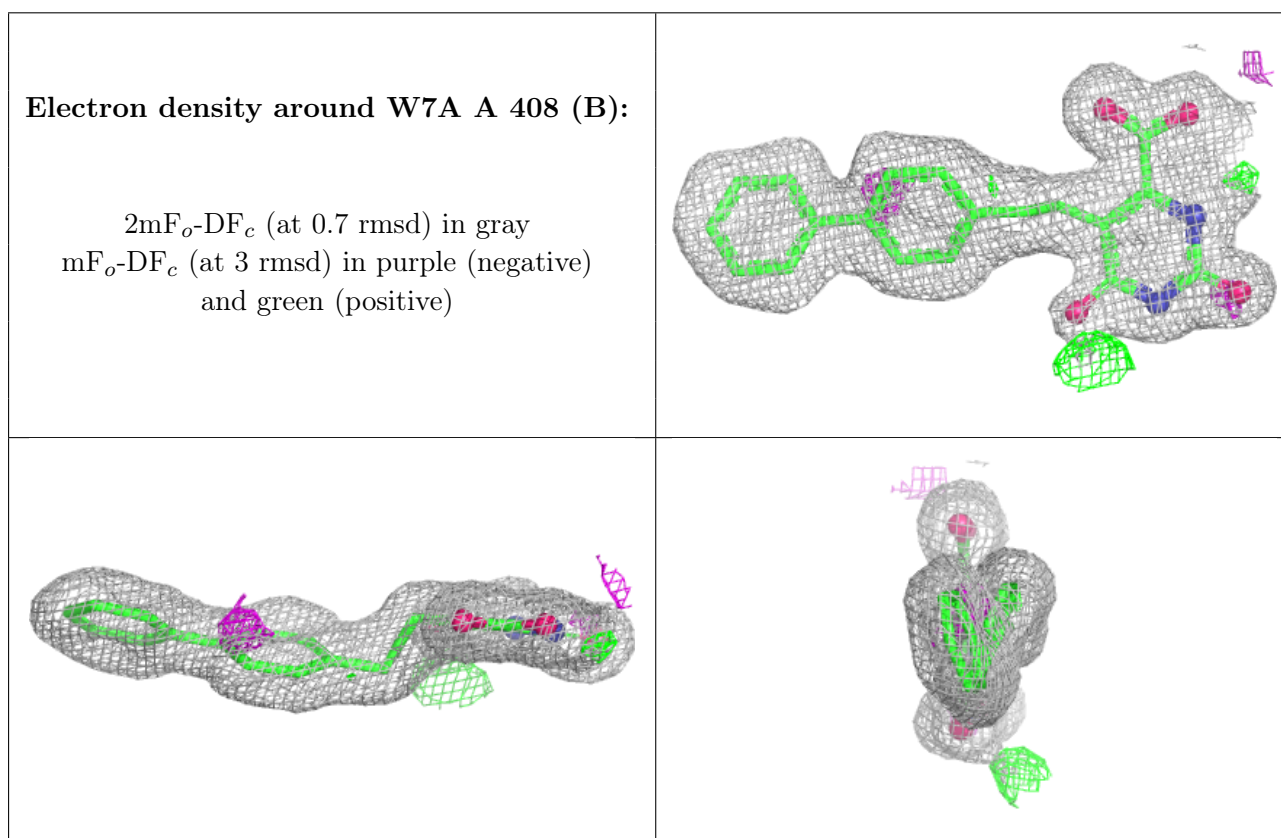
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
9	ACT	A	442	4/4	0.44	0.33	54,55,60,61	0
3	DDQ	A	405	14/14	0.54	0.33	59,65,82,86	0
9	ACT	A	443	4/4	0.55	0.21	39,42,43,50	0
3	DDQ	A	406	14/14	0.58	0.34	45,66,81,82	0
6	GOL	A	423	6/6	0.60	0.25	61,68,75,79	0
9	ACT	A	440	4/4	0.60	0.33	41,53,55,57	0
3	DDQ	A	403	14/14	0.62	0.34	62,74,86,95	0
8	SO4	A	435	5/5	0.64	0.21	46,51,68,71	0
9	ACT	A	439	4/4	0.70	0.26	39,42,49,55	0
6	GOL	A	418	6/6	0.71	0.23	33,51,54,59	0
3	DDQ	A	402	14/14	0.73	0.25	52,59,70,71	0
6	GOL	A	419[A]	6/6	0.73	0.20	36,43,44,45	6
6	GOL	A	419[B]	6/6	0.73	0.20	55,57,59,59	6
6	GOL	A	415	6/6	0.74	0.24	37,51,59,60	0
6	GOL	A	422	6/6	0.74	0.23	33,52,57,61	0
3	DDQ	A	404	14/14	0.75	0.33	75,87,96,96	0
9	ACT	A	441	4/4	0.75	0.26	56,61,64,65	0
9	ACT	A	437	4/4	0.78	0.24	33,50,50,58	0
6	GOL	A	414	6/6	0.78	0.21	53,56,60,65	0
6	GOL	A	424	6/6	0.78	0.23	46,50,54,58	0
6	GOL	A	428	6/6	0.78	0.20	49,57,58,58	0
8	SO4	A	434	5/5	0.78	0.14	50,57,63,68	0
6	GOL	A	410	6/6	0.78	0.17	21,27,29,32	0
6	GOL	A	426	6/6	0.79	0.19	33,45,54,57	0
6	GOL	A	412	6/6	0.80	0.21	61,61,68,70	0
6	GOL	A	421	6/6	0.81	0.18	29,43,50,55	0
6	GOL	A	430	6/6	0.81	0.20	51,54,58,61	0
8	SO4	A	436	5/5	0.82	0.12	48,50,61,61	0
6	GOL	A	427	6/6	0.83	0.15	31,37,44,46	0
6	GOL	A	420	6/6	0.83	0.18	33,41,48,51	0
6	GOL	A	416	6/6	0.83	0.16	33,42,49,51	0
6	GOL	A	413	6/6	0.83	0.18	26,42,43,45	0
6	GOL	A	429	6/6	0.84	0.21	28,38,52,53	0
6	GOL	A	431	6/6	0.85	0.16	25,41,50,51	0
6	GOL	A	425	6/6	0.86	0.15	26,35,41,42	0
3	DDQ	A	407	14/14	0.86	0.17	27,39,72,72	0
6	GOL	A	411	6/6	0.87	0.17	35,43,45,51	0

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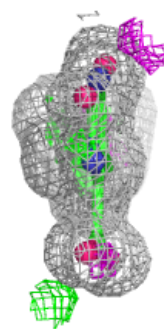
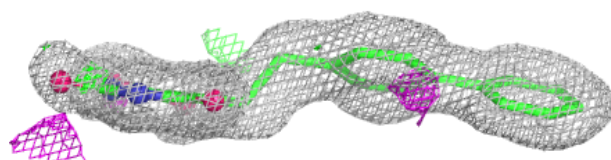
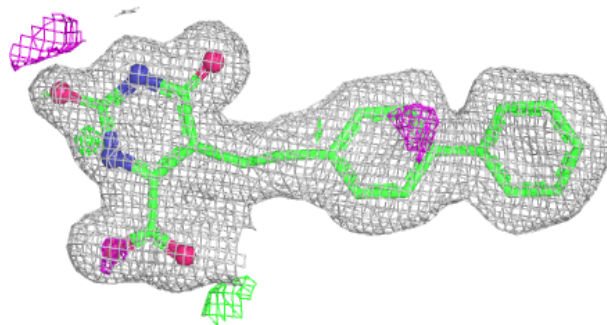
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	GOL	A	417	6/6	0.87	0.15	22,40,46,47	0
9	ACT	A	438	4/4	0.92	0.14	20,28,35,35	0
4	W7A	A	408[B]	25/25	0.94	0.08	13,16,19,21	25
4	W7A	A	408[A]	25/25	0.94	0.08	11,13,20,22	25
8	SO4	A	433	5/5	0.98	0.09	23,23,28,32	0
7	ORO	A	432	11/11	0.99	0.03	6,7,8,10	0
5	FMN	A	409	31/31	0.99	0.03	5,6,8,9	0
2	CL	A	401	1/1	0.99	0.05	17,17,17,17	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.



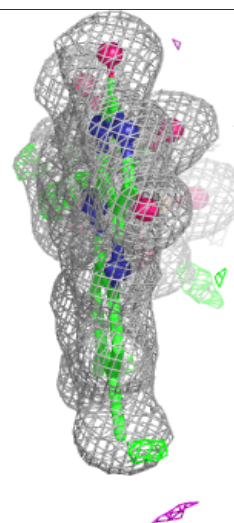
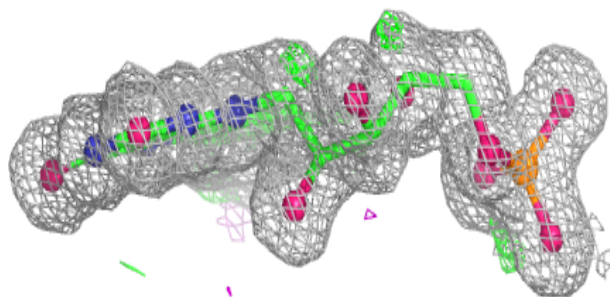
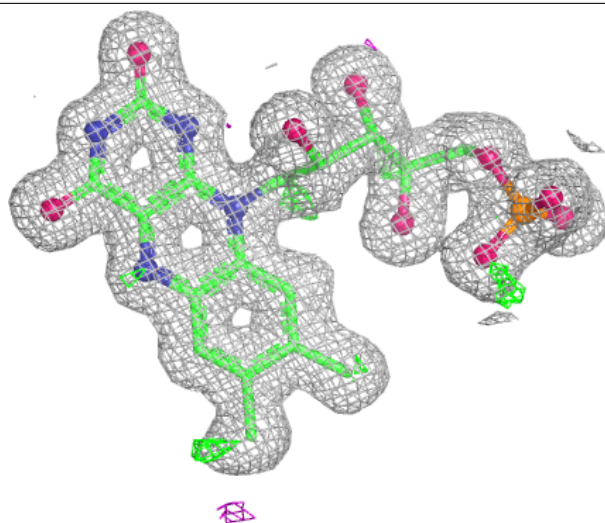
**Electron density around W7A A 408 (A):**

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



**Electron density around FMN A 409:**

$2mF_o-DF_c$  (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.