Full wwPDB X-ray Structure Validation Report (i)

Jun 18, 2024 – 06:53 AM EDT

PDB ID	:	5W8J
Title	:	Crystal Structure of Lactate Dehydrogenase A in complex with inhibitor compound 29
Authors	:	Lukacs, C.M.; Moulin, A.
Deposited on	:	2017-06-21
Resolution	:	1.55 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:

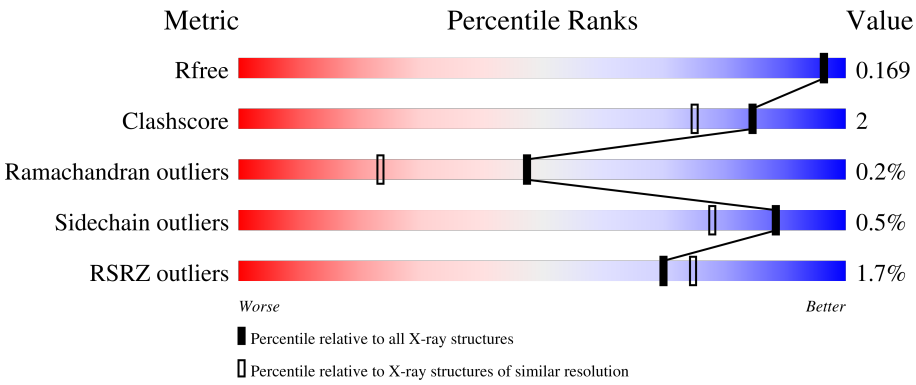
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & 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 1.55 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	1483 (1.56-1.56)
Clashscore	141614	1529 (1.56-1.56)
Ramachandran outliers	138981	1498 (1.56-1.56)
Sidechain outliers	138945	1495 (1.56-1.56)
RSRZ outliers	127900	1465 (1.56-1.56)

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	332	%, 96%, • •
1	B	332	%, 94%, 6%
1	C	332	4%, 93%, 6%
1	D	332	%, 94%, 5% •

2 Entry composition (i)

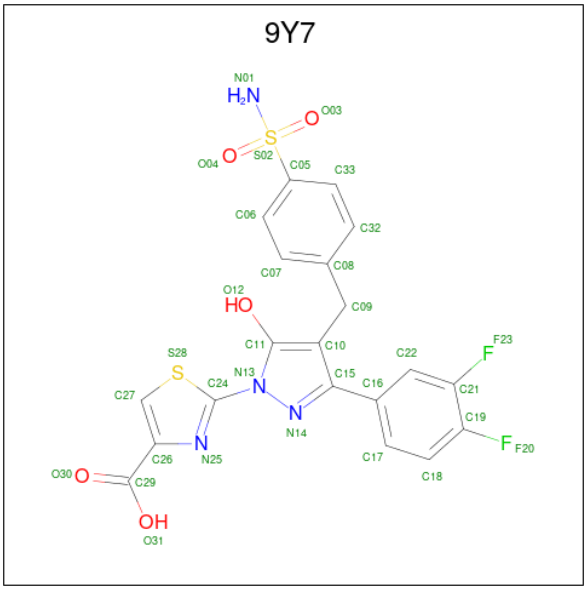
There are 6 unique types of molecules in this entry. The entry contains 12096 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 L-lactate dehydrogenase A chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	329	2600	1662	439	485	14	0	12	0
1	B	331	2669	1703	457	493	16	0	16	0
1	C	331	2609	1667	440	486	16	0	13	0
1	D	331	2625	1676	442	491	16	0	15	0

- Molecule 2 is 2-{3-(3,4-difluorophenyl)-5-hydroxy-4-[(4-sulfamoylphenyl)methyl]-1H-pyrazol-1-yl}-1,3-thiazole-4-carboxylic acid (three-letter code: 9Y7) (formula: $C_{20}H_{14}F_2N_4O_5S_2$).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
			Total	C	F	N	O	S		
2	A	1	33	20	2	4	5	2	0	0
2	A	1	33	20	2	4	5	2	0	0

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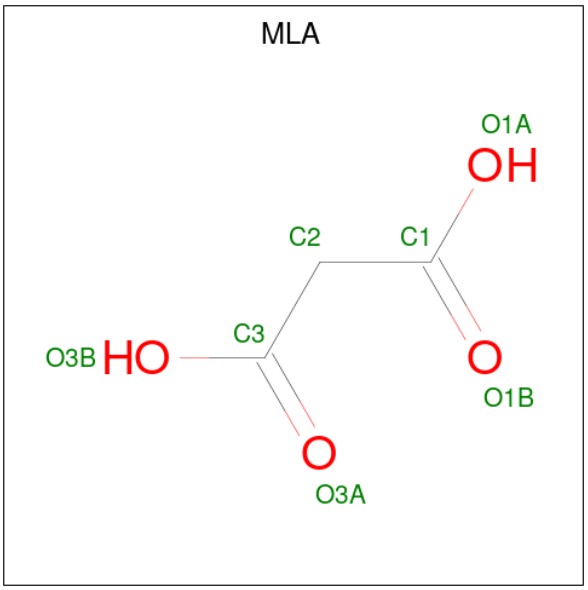
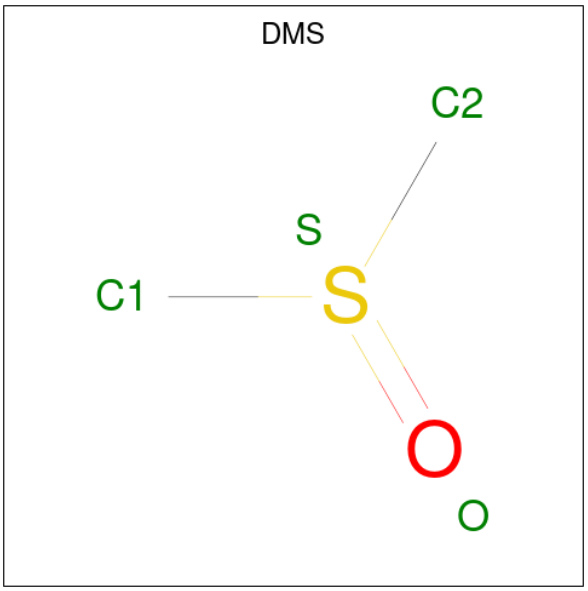
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
			Total	C	F	N	O	S		
2	B	1	33	20	2	4	5	2	0	0
2	C	1	33	20	2	4	5	2	0	0
2	C	1	33	20	2	4	5	2	0	0
2	D	1	33	20	2	4	5	2	0	0

- Molecule 3 is MALONIC ACID (three-letter code: MLA) (formula: $C_3H_4O_4$).



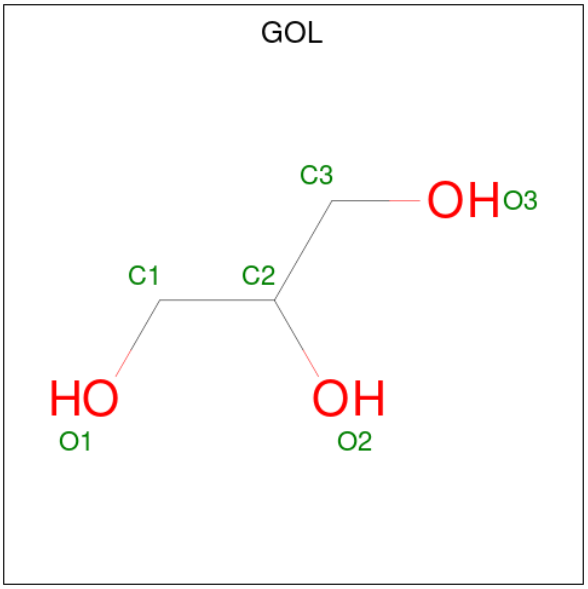
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
3	A	1	7	3	4	0	0
3	B	1	7	3	4	0	0
3	B	1	7	3	4	0	0
3	C	1	7	3	4	0	0
3	D	1	7	3	4	0	0

- Molecule 4 is DIMETHYL SULFOXIDE (three-letter code: DMS) (formula: C_2H_6OS).



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

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 6 is water.

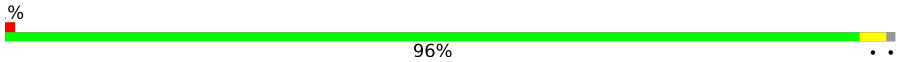
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
6	A	315	315	315	0	0
			Total	O		
6	B	376	376	376	0	0
			Total	O		
6	C	303	303	303	0	0
			Total	O		
6	D	334	334	334	0	0

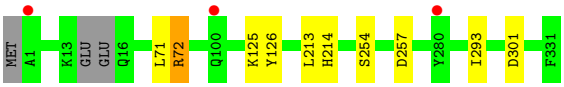
3 Residue-property plots (i)

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: L-lactate dehydrogenase A chain

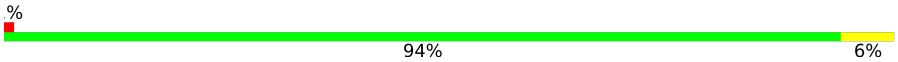
Chain A:





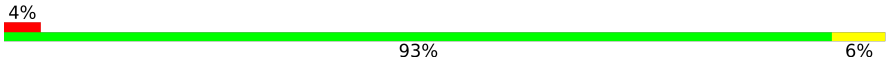
• Molecule 1: L-lactate dehydrogenase A chain

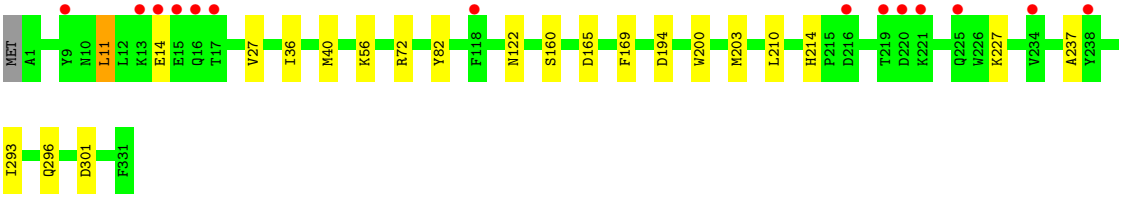
Chain B:



• Molecule 1: L-lactate dehydrogenase A chain

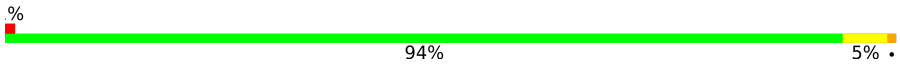
Chain C:

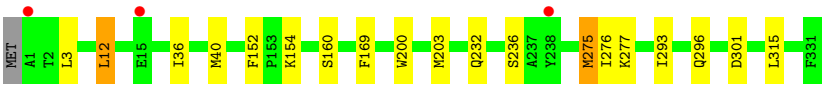




• Molecule 1: L-lactate dehydrogenase A chain

Chain D:





4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	168.53Å 80.77Å 121.09Å 90.00° 118.23° 90.00°	Depositor
Resolution (Å)	46.12 – 1.55 46.12 – 1.55	Depositor EDS
% Data completeness (in resolution range)	99.7 (46.12-1.55) 99.9 (46.12-1.55)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.14 (at 1.55Å)	Xtriage
Refinement program	PHENIX 1.8.4_1496	Depositor
R, R_{free}	0.145 , 0.169 0.145 , 0.169	Depositor DCC
R_{free} test set	10414 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	14.4	Xtriage
Anisotropy	0.294	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 49.7	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	12096	wwPDB-VP
Average B, all atoms (Å^2)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.49% 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: GOL, MLA, DMS, 9Y7

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	0.61	0/2650	0.76	4/3591 (0.1%)
1	B	0.70	0/2723	0.81	7/3685 (0.2%)
1	C	0.60	0/2664	0.74	3/3612 (0.1%)
1	D	0.68	0/2675	0.78	2/3627 (0.1%)
All	All	0.65	0/10712	0.77	16/14515 (0.1%)

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	B	0	1

There are no bond length outliers.

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	72	ARG	NE-CZ-NH1	7.96	124.28	120.30
1	B	156	ARG	NE-CZ-NH1	7.43	124.02	120.30
1	B	268[A]	ARG	NE-CZ-NH1	-7.07	116.77	120.30
1	B	268[B]	ARG	NE-CZ-NH1	-7.07	116.77	120.30
1	B	156	ARG	NE-CZ-NH2	-6.54	117.03	120.30
1	C	11	LEU	CA-CB-CG	6.36	129.92	115.30
1	C	72	ARG	NE-CZ-NH2	-6.29	117.16	120.30
1	B	168	ARG	NE-CZ-NH1	-5.47	117.56	120.30
1	A	72[A]	ARG	NE-CZ-NH1	5.41	123.00	120.30
1	A	72[B]	ARG	NE-CZ-NH1	5.41	123.00	120.30
1	D	12	LEU	CA-CB-CG	5.09	127.02	115.30
1	A	72[A]	ARG	NE-CZ-NH2	-5.07	117.77	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	72[B]	ARG	NE-CZ-NH2	-5.07	117.77	120.30
1	B	268[A]	ARG	NE-CZ-NH2	5.04	122.82	120.30
1	B	268[B]	ARG	NE-CZ-NH2	5.04	122.82	120.30
1	D	152	PHE	CB-CG-CD2	-5.01	117.29	120.80

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	14	GLU	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	2600	0	2638	8	0
1	B	2669	0	2728	16	0
1	C	2609	0	2635	14	0
1	D	2625	0	2660	14	0
2	A	66	0	0	0	0
2	B	33	0	0	0	0
2	C	66	0	0	1	0
2	D	33	0	0	0	0
3	A	7	0	2	0	0
3	B	14	0	4	0	0
3	C	7	0	2	0	0
3	D	7	0	2	0	0
4	A	8	0	12	2	0
4	C	4	0	6	0	0
4	D	8	0	12	0	0
5	A	6	0	8	0	0
5	D	6	0	8	0	0
6	A	315	0	0	1	0
6	B	376	0	0	6	0
6	C	303	0	0	3	0
6	D	334	0	0	4	0
All	All	12096	0	10717	49	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 2.

All (49) 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:72:ARG:NH1	6:B:501:HOH:O	2.00	0.93
1:B:302:LEU:HD13	1:C:11:LEU:HD11	1.68	0.74
1:B:268[B]:ARG:NH1	6:B:502:HOH:O	2.24	0.71
1:C:165[A]:ASP:OD1	6:C:502:HOH:O	2.10	0.69
1:D:200:TRP:CE3	1:D:203[B]:MET:SD	2.88	0.67
1:B:19[A]:GLN:NE2	1:C:296:GLN:OE1	2.21	0.67
1:D:160[B]:SER:OG	6:D:502:HOH:O	2.11	0.67
1:D:169:PHE:HZ	1:D:203[B]:MET:SD	2.19	0.66
1:D:200:TRP:HE3	1:D:203[B]:MET:SD	2.22	0.62
1:B:111[B]:ARG:NE	6:B:503:HOH:O	2.27	0.61
1:D:232:GLN:HG2	6:D:771:HOH:O	2.00	0.61
1:A:214:HIS:HB2	1:B:3:LEU:HD13	1.84	0.60
1:B:111[B]:ARG:NH2	6:B:503:HOH:O	2.33	0.59
1:A:213:LEU:HD23	4:A:505:DMS:C1	2.36	0.56
1:A:71:LEU:O	1:A:72[A]:ARG:HD3	2.06	0.56
1:A:254[A]:SER:O	1:A:257[A]:ASP:HB3	2.06	0.55
1:A:293[A]:ILE:HD12	1:A:301:ASP:HB2	1.87	0.55
1:A:213:LEU:HD23	4:A:505:DMS:H12	1.88	0.55
1:B:327:LYS:HE2	6:B:593:HOH:O	2.07	0.53
1:D:277:LYS:NZ	6:D:506:HOH:O	2.39	0.53
1:D:232:GLN:O	1:D:236[B]:SER:HB2	2.09	0.53
1:B:286:VAL:HG23	1:B:326[B]:GLN:OE1	2.08	0.53
1:D:293[B]:ILE:HD12	1:D:301:ASP:HB2	1.90	0.53
1:A:125:LYS:HE3	1:A:126:TYR:CE2	2.44	0.53
2:C:403:9Y7:O12	2:C:403:9Y7:S28	2.67	0.52
1:C:160[B]:SER:OG	6:C:503:HOH:O	2.18	0.52
1:C:200:TRP:CE3	1:C:203[B]:MET:SD	3.03	0.52
1:B:20:ASN:HA	1:B:89:LYS:HD2	1.92	0.50
1:D:296:GLN:NE2	6:D:505:HOH:O	2.34	0.48
1:B:279:LEU:HD11	1:B:302:LEU:HD23	1.94	0.48
1:C:27:VAL:O	1:C:56:LYS:HE3	2.14	0.48
1:D:169:PHE:CZ	1:D:203[B]:MET:SD	3.04	0.47
1:B:203[B]:MET:SD	1:B:210:LEU:HD12	2.54	0.47
1:D:154:LYS:HE2	1:D:275:MET:HE3	1.96	0.47
1:B:111[B]:ARG:CZ	6:B:503:HOH:O	2.61	0.47
1:C:237:ALA:HB3	6:C:609:HOH:O	2.14	0.47
1:B:203[B]:MET:HG2	1:B:210:LEU:HD12	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:293:ILE:HD12	1:C:301:ASP:HB2	1.96	0.46
1:C:203[A]:MET:SD	1:C:210:LEU:HD12	2.56	0.46
1:A:72[B]:ARG:NH1	6:A:601:HOH:O	2.27	0.44
1:B:19[A]:GLN:O	1:B:89:LYS:HD2	2.18	0.43
1:B:36:ILE:O	1:B:40[B]:MET:HG2	2.19	0.42
1:C:214:HIS:HB2	1:D:3:LEU:HD13	2.02	0.41
1:D:36:ILE:O	1:D:40[B]:MET:HG2	2.20	0.41
1:C:82:TYR:CG	1:C:122:ASN:HB3	2.56	0.41
1:C:169:PHE:HZ	1:C:203[A]:MET:HE1	1.86	0.41
1:C:200:TRP:CZ3	1:C:203[A]:MET:HE1	2.56	0.41
1:D:276:ILE:HD12	1:D:276:ILE:HA	1.90	0.41
1:C:36:ILE:O	1:C:40[B]:MET:HG2	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	337/332 (102%)	333 (99%)	4 (1%)	0	100	100
1	B	345/332 (104%)	335 (97%)	9 (3%)	1 (0%)	41	19
1	C	342/332 (103%)	337 (98%)	4 (1%)	1 (0%)	41	19
1	D	344/332 (104%)	339 (98%)	5 (2%)	0	100	100
All	All	1368/1328 (103%)	1344 (98%)	22 (2%)	2 (0%)	47	26

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	15	GLU
1	C	14	GLU

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	287/288 (100%)	287 (100%)	0	100	100
1	B	296/288 (103%)	296 (100%)	0	100	100
1	C	287/288 (100%)	285 (99%)	2 (1%)	84	69
1	D	290/288 (101%)	287 (99%)	3 (1%)	76	57
All	All	1160/1152 (101%)	1155 (100%)	5 (0%)	88	82

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	194	ASP
1	C	227	LYS
1	D	12	LEU
1	D	275	MET
1	D	315	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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)

18 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	MLA	A	503	-	6,6,6	1.19	0	7,7,7	1.03	0
2	9Y7	C	402	-	30,36,36	1.83	8 (26%)	38,54,54	1.20	4 (10%)
4	DMS	C	404	-	3,3,3	0.76	0	3,3,3	0.96	0
3	MLA	C	401	-	6,6,6	1.18	1 (16%)	7,7,7	1.16	1 (14%)
3	MLA	D	401	-	6,6,6	1.14	0	7,7,7	1.44	2 (28%)
4	DMS	D	403	-	3,3,3	0.64	0	3,3,3	0.85	0
2	9Y7	B	402	-	30,36,36	1.70	9 (30%)	38,54,54	1.26	4 (10%)
4	DMS	D	404	-	3,3,3	0.75	0	3,3,3	0.97	0
2	9Y7	A	501	-	30,36,36	2.00	7 (23%)	38,54,54	1.19	3 (7%)
2	9Y7	D	402	-	30,36,36	1.91	11 (36%)	38,54,54	1.54	8 (21%)
3	MLA	B	403	-	6,6,6	1.06	0	7,7,7	1.58	2 (28%)
4	DMS	A	504	-	3,3,3	0.75	0	3,3,3	0.80	0
5	GOL	A	506	-	5,5,5	0.39	0	5,5,5	0.54	0
2	9Y7	C	403	-	30,36,36	1.65	10 (33%)	38,54,54	1.38	5 (13%)
2	9Y7	A	502	-	30,36,36	2.49	11 (36%)	38,54,54	1.13	5 (13%)
4	DMS	A	505	-	3,3,3	0.52	0	3,3,3	0.81	0
5	GOL	D	405	-	5,5,5	0.32	0	5,5,5	0.93	0
3	MLA	B	401	-	6,6,6	1.20	0	7,7,7	1.77	2 (28%)

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	MLA	A	503	-	-	2/4/4/4	-
2	9Y7	C	402	-	-	2/16/22/22	0/4/4/4
3	MLA	C	401	-	-	2/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	MLA	D	401	-	-	2/4/4/4	-
2	9Y7	B	402	-	-	2/16/22/22	0/4/4/4
2	9Y7	A	501	-	-	2/16/22/22	0/4/4/4
2	9Y7	D	402	-	-	2/16/22/22	0/4/4/4
3	MLA	B	403	-	-	2/4/4/4	-
5	GOL	A	506	-	-	2/4/4/4	-
2	9Y7	C	403	-	-	2/16/22/22	0/4/4/4
2	9Y7	A	502	-	-	2/16/22/22	0/4/4/4
5	GOL	D	405	-	-	2/4/4/4	-
3	MLA	B	401	-	-	2/4/4/4	-

All (57) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	502	9Y7	C26-C29	7.52	1.61	1.50
2	A	501	9Y7	C27-S28	5.36	1.79	1.70
2	A	501	9Y7	C05-S02	-4.98	1.69	1.77
2	C	402	9Y7	C05-S02	-4.71	1.69	1.77
2	A	502	9Y7	C05-S02	-4.49	1.70	1.77
2	A	502	9Y7	C15-N14	4.44	1.38	1.35
2	A	502	9Y7	C27-S28	4.39	1.77	1.70
2	C	402	9Y7	C27-S28	4.38	1.77	1.70
2	A	501	9Y7	C22-C21	4.00	1.44	1.37
2	A	502	9Y7	C16-C15	-3.86	1.44	1.49
2	D	402	9Y7	C05-S02	-3.81	1.71	1.77
2	A	501	9Y7	C15-N14	3.75	1.38	1.35
2	C	403	9Y7	C26-C29	3.64	1.55	1.50
2	D	402	9Y7	C16-C15	-3.60	1.45	1.49
2	B	402	9Y7	C26-C29	3.49	1.55	1.50
2	C	403	9Y7	C22-C21	3.44	1.43	1.37
2	D	402	9Y7	S02-N01	3.39	1.67	1.60
2	B	402	9Y7	S02-N01	3.34	1.67	1.60
2	C	402	9Y7	C22-C21	3.05	1.42	1.37
2	D	402	9Y7	C15-N14	-3.05	1.32	1.35
2	D	402	9Y7	C22-C21	3.04	1.42	1.37
2	B	402	9Y7	C22-C21	2.90	1.42	1.37
2	B	402	9Y7	C27-S28	2.88	1.75	1.70
2	A	502	9Y7	S02-N01	2.77	1.65	1.60
2	C	403	9Y7	C15-N14	2.75	1.37	1.35
2	D	402	9Y7	O31-C29	-2.69	1.22	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	403	9Y7	S02-N01	2.63	1.65	1.60
2	A	501	9Y7	F23-C21	-2.62	1.28	1.35
2	C	402	9Y7	F23-C21	-2.55	1.29	1.35
2	B	402	9Y7	F23-C21	-2.53	1.29	1.35
2	A	501	9Y7	F20-C19	-2.50	1.29	1.35
2	A	502	9Y7	F20-C19	-2.47	1.29	1.35
2	A	502	9Y7	C33-C05	2.45	1.42	1.38
2	B	402	9Y7	F20-C19	-2.43	1.29	1.35
2	C	403	9Y7	F23-C21	-2.42	1.29	1.35
2	D	402	9Y7	F23-C21	-2.41	1.29	1.35
2	C	403	9Y7	C09-C10	-2.40	1.47	1.52
2	C	402	9Y7	F20-C19	-2.39	1.29	1.35
2	B	402	9Y7	C09-C10	-2.37	1.47	1.52
2	D	402	9Y7	C27-S28	2.36	1.74	1.70
2	A	501	9Y7	C09-C10	-2.34	1.47	1.52
2	C	403	9Y7	C16-C15	-2.31	1.46	1.49
2	A	502	9Y7	F23-C21	-2.29	1.29	1.35
2	D	402	9Y7	F20-C19	-2.25	1.29	1.35
2	C	403	9Y7	F20-C19	-2.24	1.29	1.35
2	A	502	9Y7	O31-C29	-2.18	1.23	1.30
2	A	502	9Y7	C22-C21	2.16	1.41	1.37
2	D	402	9Y7	C09-C08	-2.11	1.45	1.52
2	C	403	9Y7	O31-C29	-2.10	1.24	1.30
2	C	402	9Y7	C26-C29	2.10	1.53	1.50
2	C	402	9Y7	C09-C10	-2.09	1.47	1.52
3	C	401	MLA	O3A-C3	2.08	1.29	1.22
2	C	403	9Y7	C05-S02	-2.06	1.73	1.77
2	D	402	9Y7	C33-C05	2.05	1.42	1.38
2	B	402	9Y7	C06-C05	2.04	1.42	1.38
2	C	402	9Y7	C16-C15	2.04	1.51	1.49
2	B	402	9Y7	C05-S02	-2.04	1.73	1.77

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	403	9Y7	O03-S02-C05	4.01	111.83	107.35
2	B	402	9Y7	O30-C29-C26	-3.99	113.16	121.24
2	D	402	9Y7	O30-C29-C26	-3.91	113.31	121.24
3	B	401	MLA	C3-C2-C1	-3.72	99.82	112.87
2	A	501	9Y7	O30-C29-C26	-3.48	114.18	121.24
2	D	402	9Y7	O31-C29-O30	3.46	131.03	123.35
2	C	402	9Y7	O31-C29-O30	3.41	130.92	123.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	402	9Y7	O31-C29-O30	3.35	130.77	123.35
2	C	403	9Y7	O31-C29-O30	3.16	130.35	123.35
2	D	402	9Y7	C16-C15-N14	-3.15	115.38	120.78
2	A	501	9Y7	O31-C29-O30	3.14	130.30	123.35
2	C	403	9Y7	O30-C29-C26	-3.11	114.94	121.24
2	A	502	9Y7	O30-C29-C26	-2.87	115.42	121.24
2	A	502	9Y7	O03-S02-C05	2.84	110.52	107.35
2	C	402	9Y7	O30-C29-C26	-2.80	115.55	121.24
2	B	402	9Y7	O03-S02-C05	2.77	110.44	107.35
2	A	502	9Y7	O31-C29-O30	2.58	129.06	123.35
2	D	402	9Y7	C09-C10-C15	2.52	131.19	127.36
2	B	402	9Y7	C10-C09-C08	2.44	119.64	114.06
2	C	403	9Y7	O04-S02-O03	-2.40	114.81	118.76
3	B	403	MLA	C3-C2-C1	-2.37	104.58	112.87
2	D	402	9Y7	C33-C05-C06	-2.28	117.27	120.44
2	C	402	9Y7	O03-S02-C05	2.23	109.84	107.35
2	D	402	9Y7	C06-C05-S02	2.23	122.96	119.73
2	A	502	9Y7	C10-C09-C08	2.21	119.11	114.06
2	A	502	9Y7	C16-C15-N14	-2.19	117.04	120.78
2	C	402	9Y7	C32-C33-C05	2.17	121.70	119.45
3	C	401	MLA	C3-C2-C1	-2.16	105.31	112.87
2	C	403	9Y7	O04-S02-C05	2.15	109.75	107.35
2	D	402	9Y7	C27-C26-C29	-2.11	122.21	128.42
2	D	402	9Y7	C05-S02-N01	2.11	111.36	108.38
3	D	401	MLA	O1B-C1-C2	-2.10	115.95	122.08
2	A	501	9Y7	O03-S02-C05	2.07	109.66	107.35
3	B	403	MLA	O3A-C3-C2	-2.06	116.06	122.08
3	D	401	MLA	O1A-C1-C2	2.05	121.08	114.54
3	B	401	MLA	O3B-C3-C2	2.02	121.01	114.54

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	502	9Y7	C10-C15-C16-C17
2	B	402	9Y7	C10-C15-C16-C17
2	C	403	9Y7	C10-C15-C16-C22
2	C	403	9Y7	C10-C15-C16-C17
5	A	506	GOL	O1-C1-C2-C3
2	A	502	9Y7	C10-C15-C16-C22
2	B	402	9Y7	C10-C15-C16-C22
2	C	402	9Y7	C10-C15-C16-C22

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Mol	Chain	Res	Type	Atoms
2	C	402	9Y7	C10-C15-C16-C17
2	D	402	9Y7	C10-C15-C16-C22
2	D	402	9Y7	C10-C15-C16-C17
5	D	405	GOL	O1-C1-C2-C3
5	A	506	GOL	O1-C1-C2-O2
5	D	405	GOL	O1-C1-C2-O2
3	B	401	MLA	O1A-C1-C2-C3
3	B	401	MLA	O1B-C1-C2-C3
2	A	501	9Y7	N14-C15-C16-C17
3	A	503	MLA	O1B-C1-C2-C3
3	C	401	MLA	O1B-C1-C2-C3
2	A	501	9Y7	N14-C15-C16-C22
3	A	503	MLA	O1A-C1-C2-C3
3	B	403	MLA	C1-C2-C3-O3B
3	C	401	MLA	O1A-C1-C2-C3
3	B	403	MLA	C1-C2-C3-O3A
3	D	401	MLA	O1A-C1-C2-C3
3	D	401	MLA	O1B-C1-C2-C3

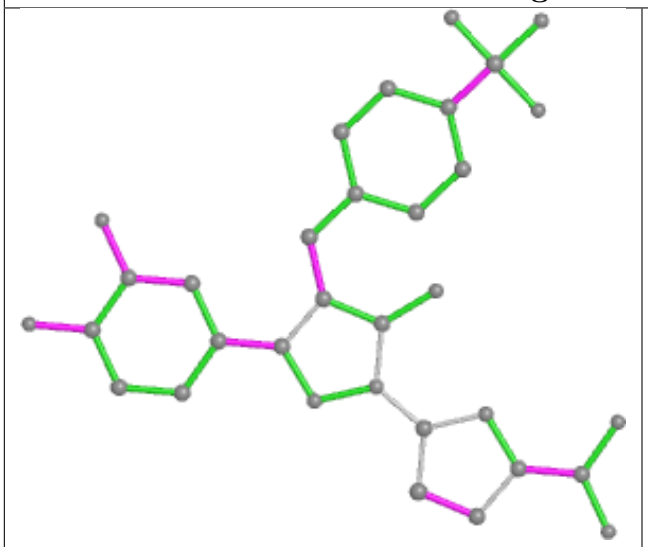
There are no ring outliers.

2 monomers are involved in 3 short contacts:

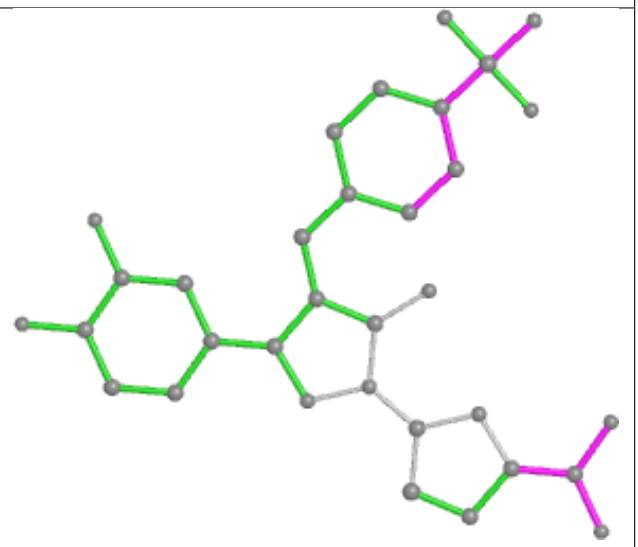
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	403	9Y7	1	0
4	A	505	DMS	2	0

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.

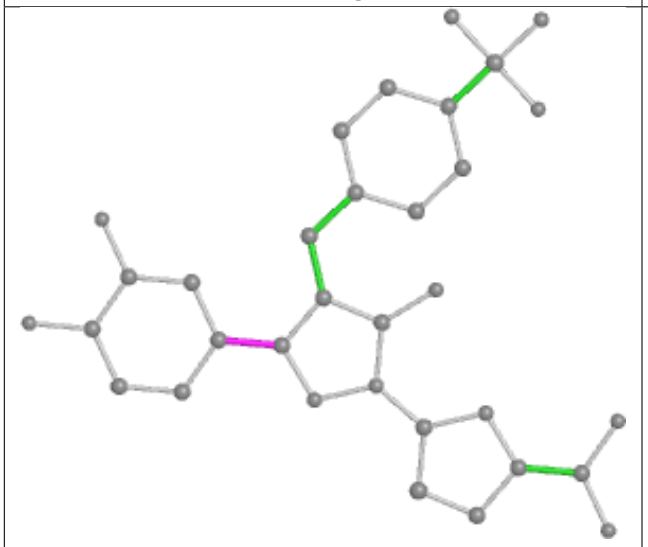
Ligand 9Y7 C 402



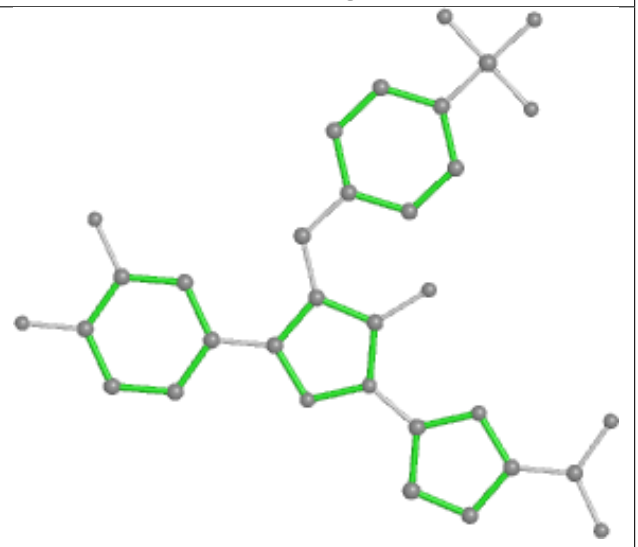
Bond lengths



Bond angles

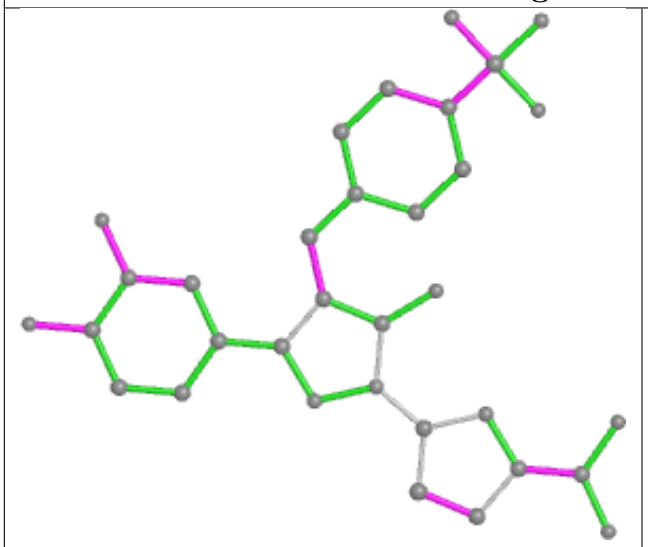


Torsions



Rings

Ligand 9Y7 B 402



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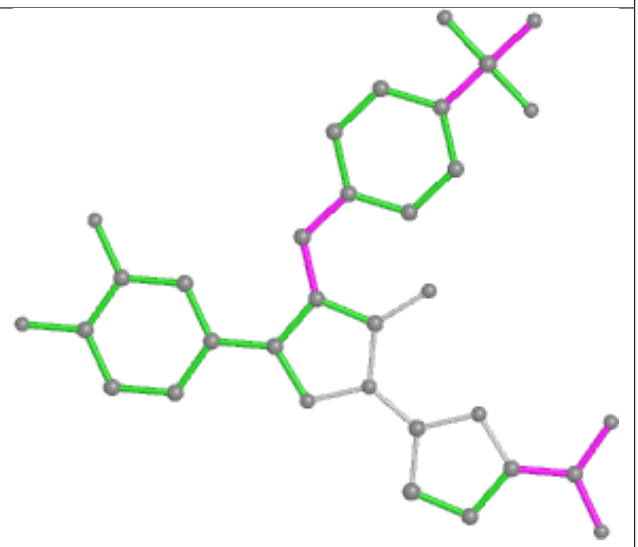

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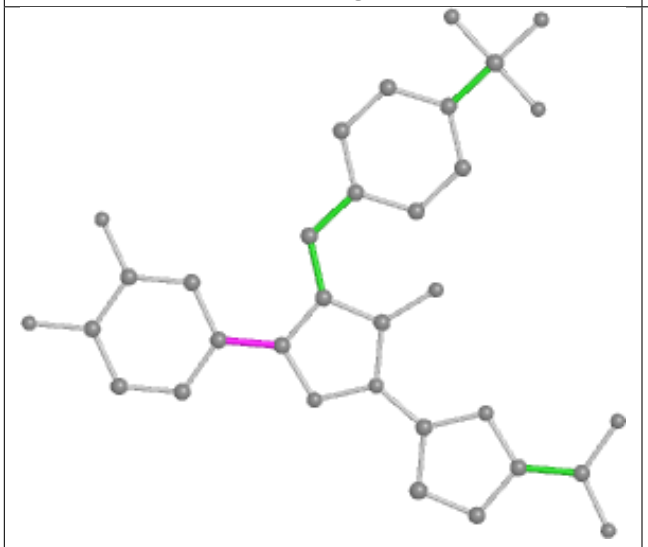

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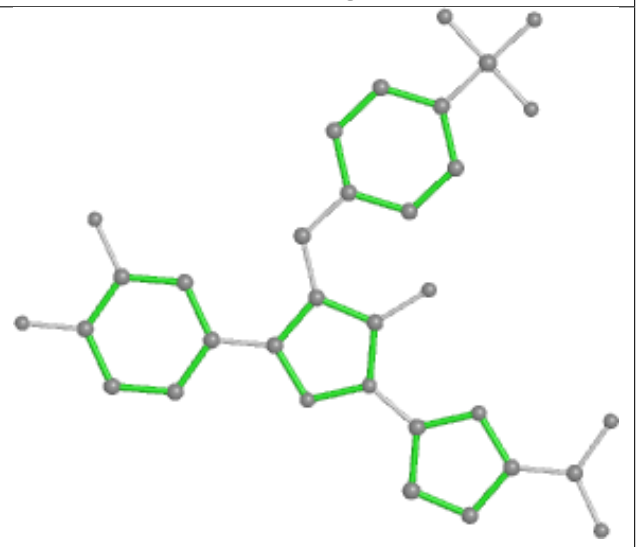
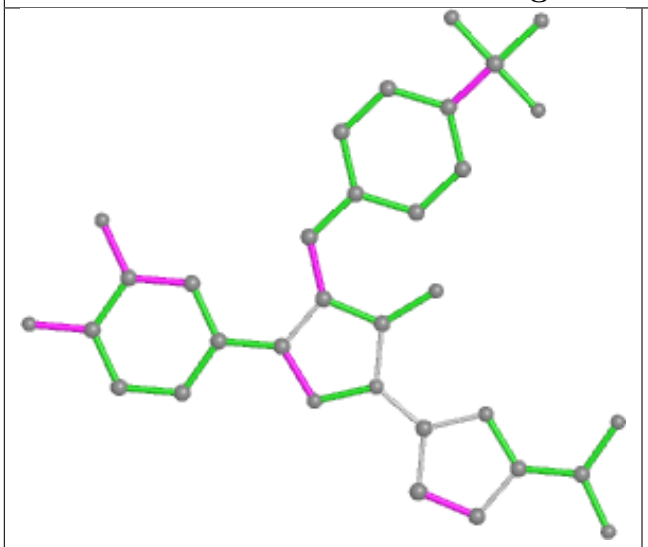
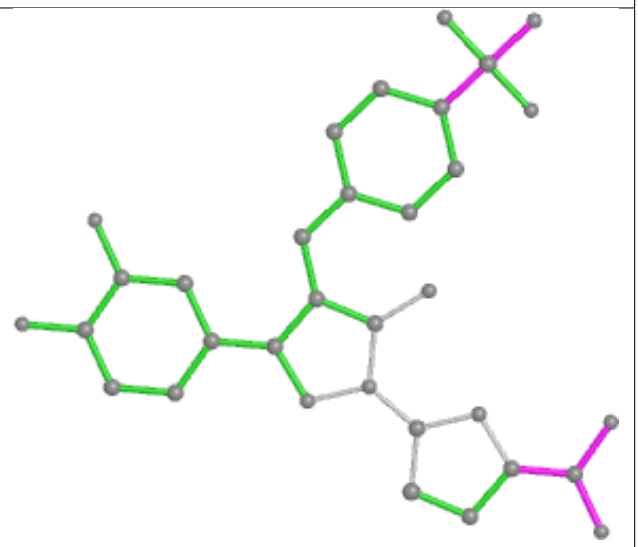


Rings

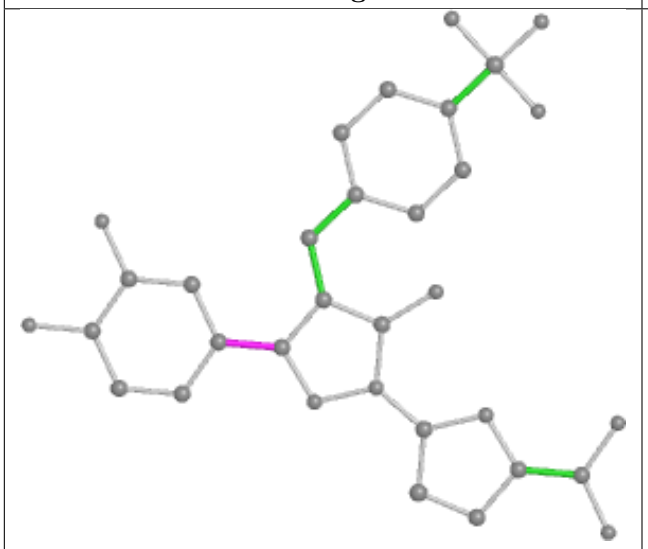
Ligand 9Y7 A 501



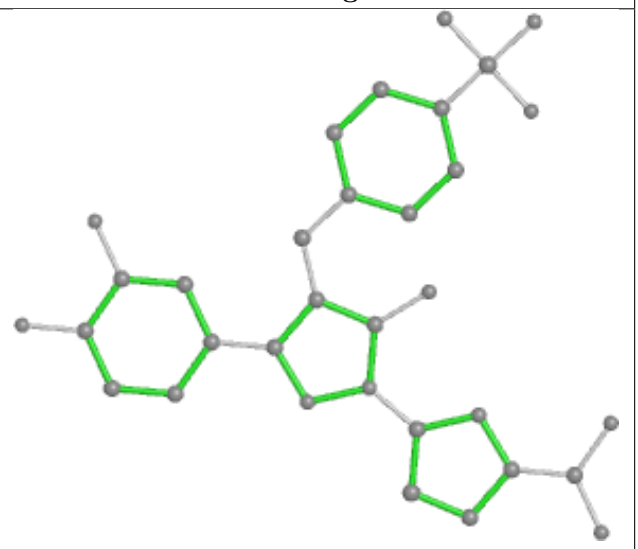
Bond lengths



Bond angles

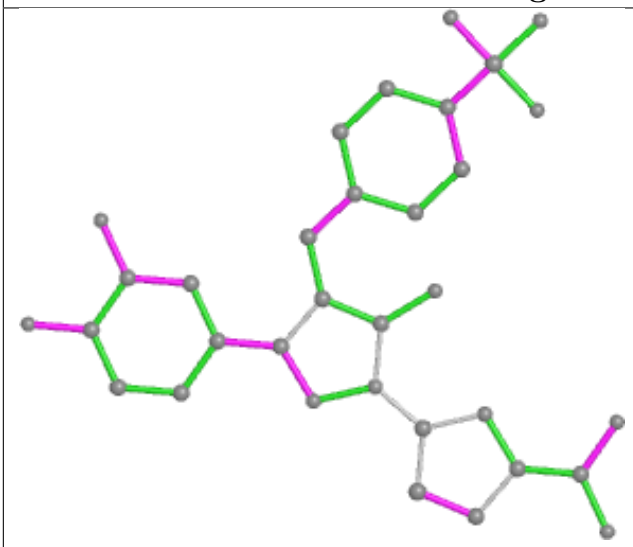


Torsions



Rings

Ligand 9Y7 D 402



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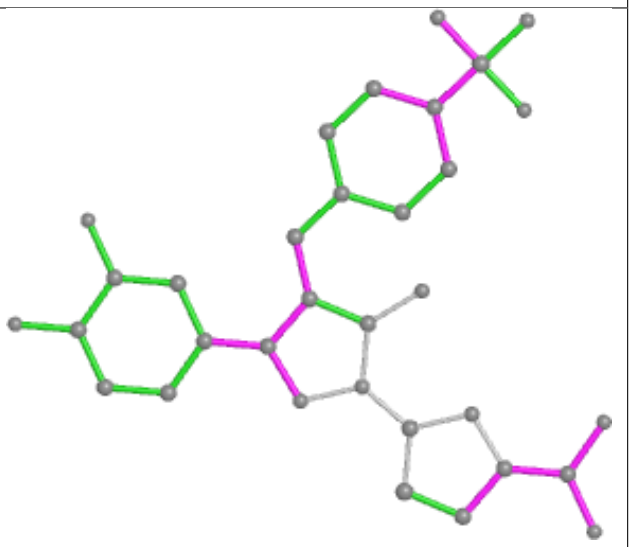
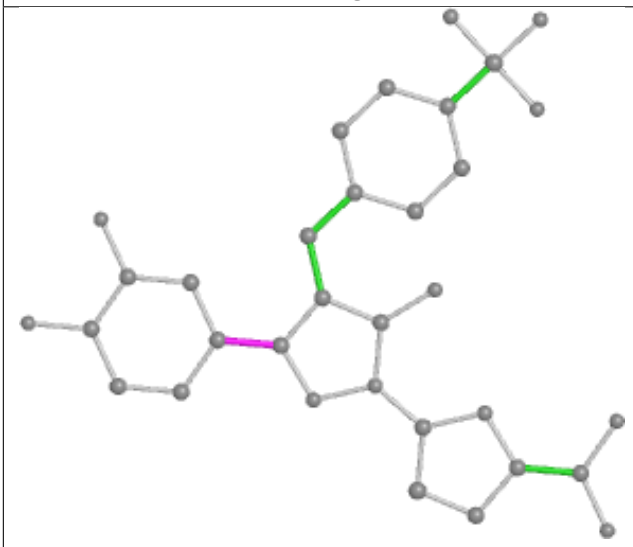
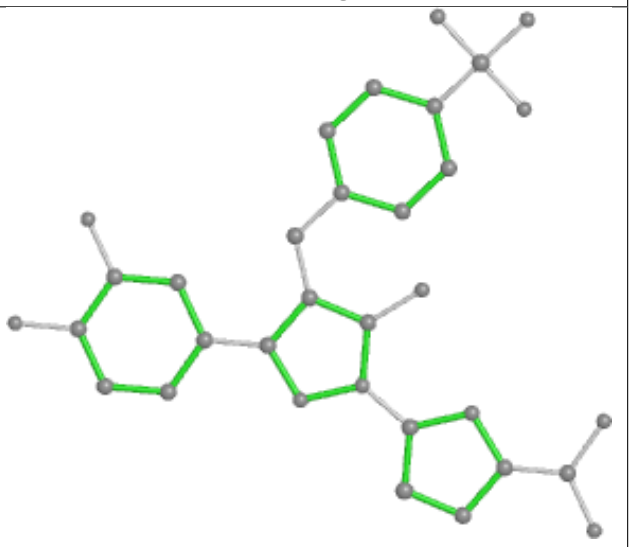


Bond angles

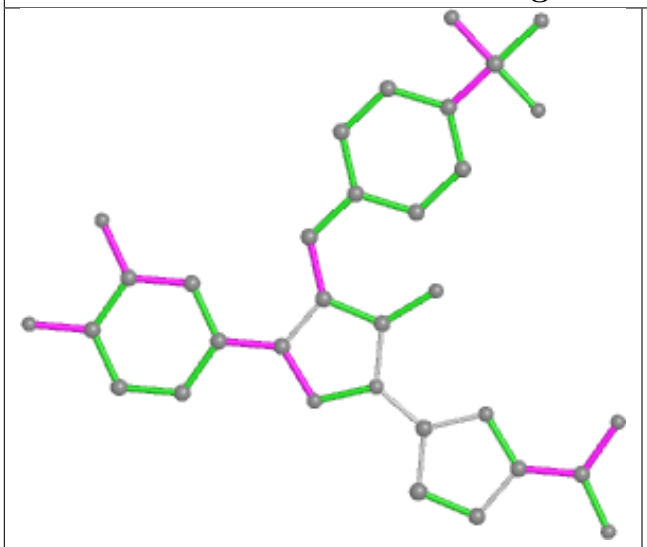


Torsions

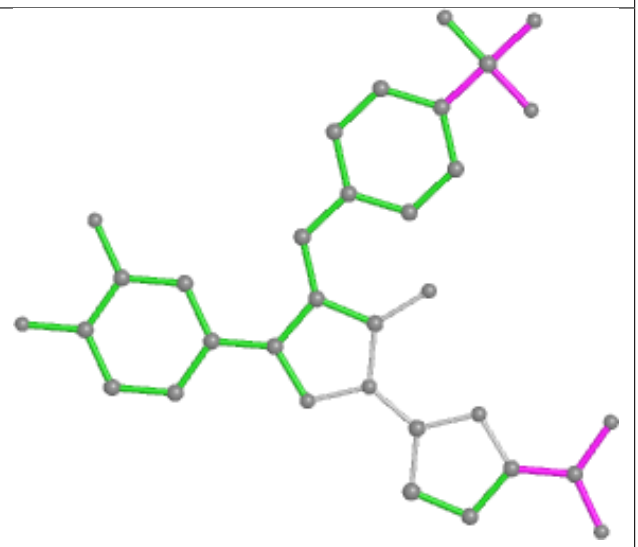


Rings

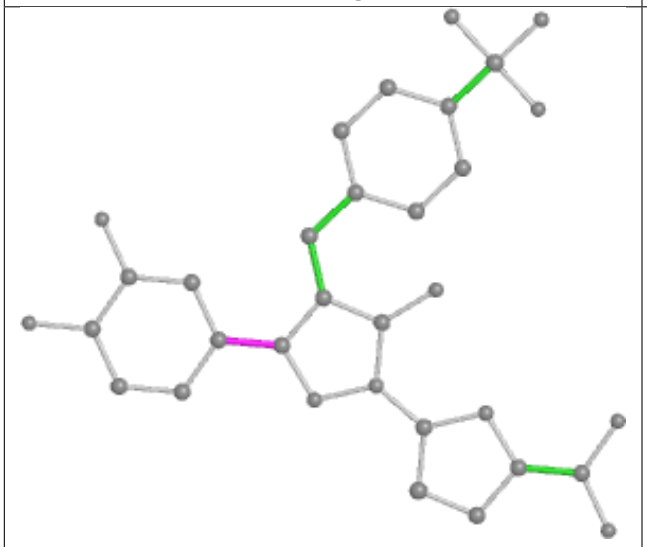
Ligand 9Y7 C 403



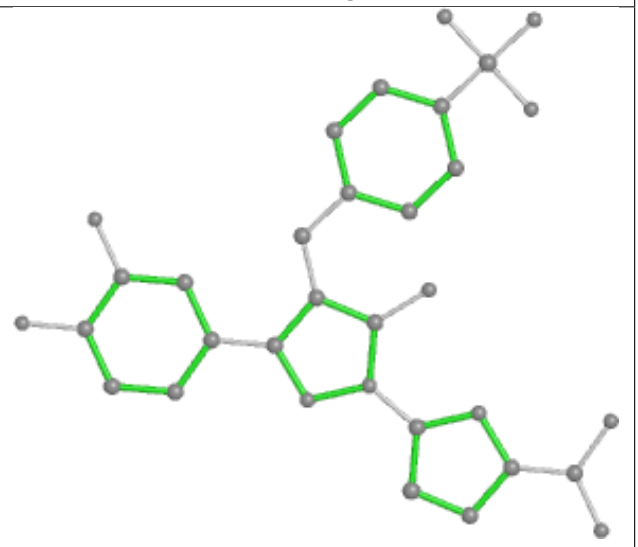
Bond lengths



Bond angles

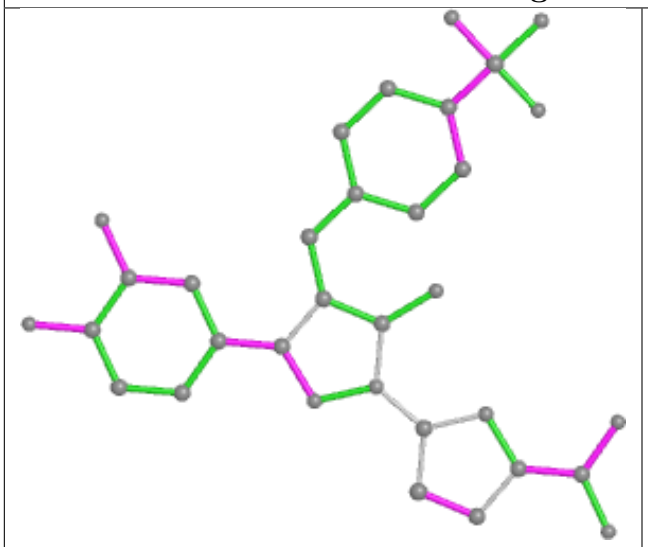


Torsions

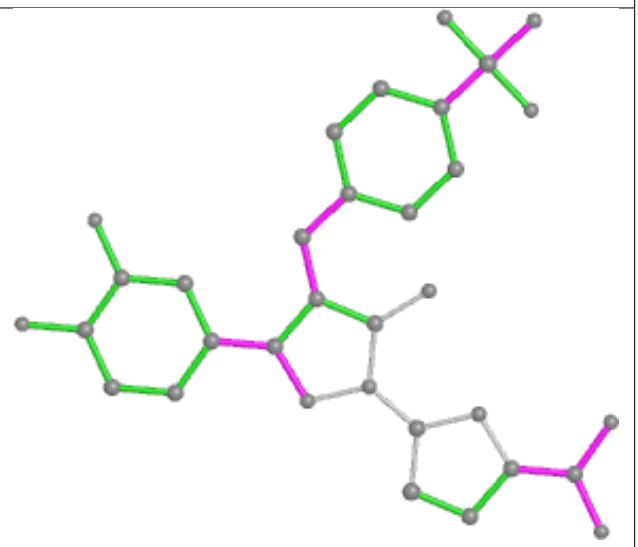


Rings

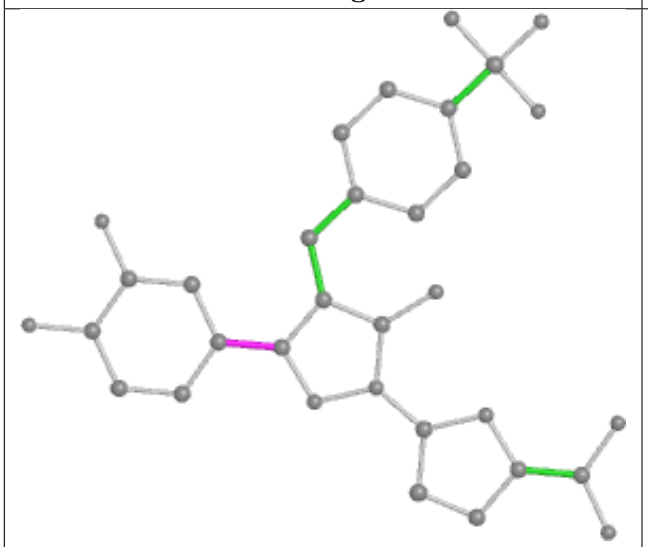
Ligand 9Y7 A 502



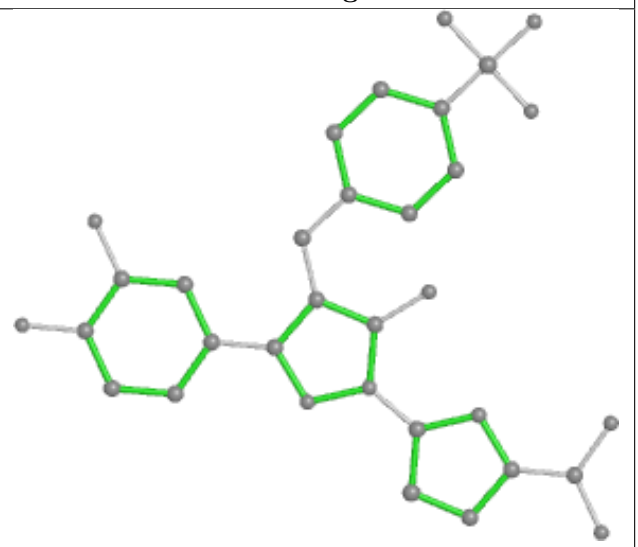
Bond lengths



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	329/332 (99%)	-0.45	3 (0%)	84	87	9, 17, 35, 47	0
1	B	331/332 (99%)	-0.62	2 (0%)	89	92	8, 13, 26, 46	0
1	C	331/332 (99%)	-0.32	14 (4%)	36	41	9, 18, 36, 51	0
1	D	331/332 (99%)	-0.49	3 (0%)	84	87	9, 14, 31, 50	0
All	All	1322/1328 (99%)	-0.47	22 (1%)	70	75	8, 15, 33, 51	0

All (22) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	15	GLU	3.7
1	C	238[A]	TYR	3.6
1	D	1	ALA	3.5
1	B	331	PHE	3.4
1	A	100	GLN	2.9
1	D	238	TYR	2.8
1	C	15	GLU	2.7
1	C	16	GLN	2.7
1	C	220	ASP	2.6
1	B	330	GLN	2.5
1	C	9	TYR	2.5
1	C	221	LYS	2.5
1	C	17	THR	2.5
1	C	118[A]	PHE	2.4
1	C	234	VAL	2.4
1	C	225	GLN	2.2
1	C	13	LYS	2.2
1	A	1	ALA	2.1
1	C	216	ASP	2.1
1	C	219	THR	2.1
1	A	280	TYR	2.1
1	C	14	GLU	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)

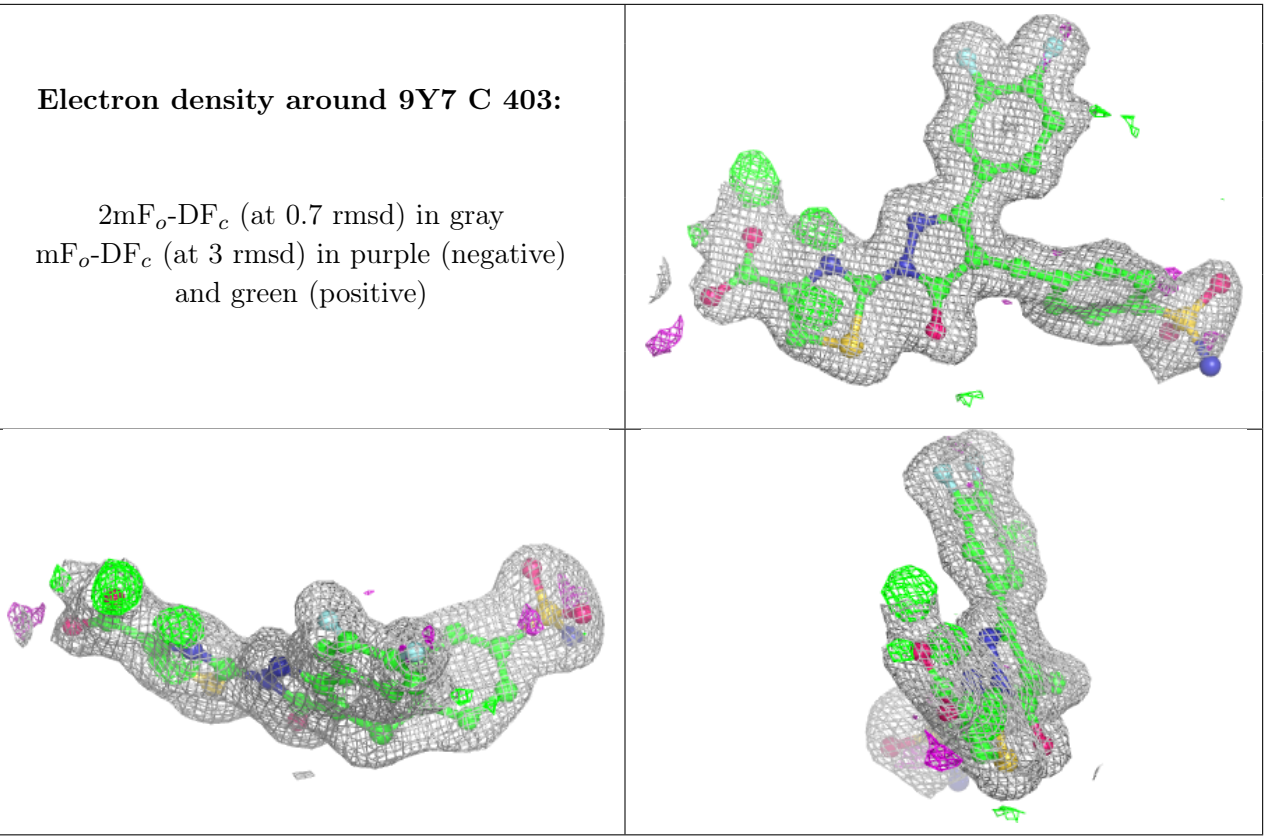
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	DMS	C	404	4/4	0.84	0.24	40,54,56,61	0
5	GOL	A	506	6/6	0.88	0.10	30,35,40,44	0
2	9Y7	C	403	33/33	0.90	0.11	17,27,47,59	0
2	9Y7	A	502	33/33	0.91	0.15	19,25,45,58	0
4	DMS	A	505	4/4	0.93	0.20	38,41,58,61	0
3	MLA	A	503	7/7	0.93	0.07	19,19,25,26	0
3	MLA	B	403	7/7	0.93	0.07	17,19,26,28	0
5	GOL	D	405	6/6	0.93	0.12	17,30,35,36	0
2	9Y7	B	402	33/33	0.94	0.15	15,25,40,46	0
4	DMS	A	504	4/4	0.94	0.19	27,31,38,38	0
2	9Y7	A	501	33/33	0.95	0.17	17,22,40,43	0
3	MLA	D	401	7/7	0.96	0.06	14,15,19,21	0
2	9Y7	C	402	33/33	0.96	0.11	17,21,33,40	0
3	MLA	C	401	7/7	0.96	0.06	16,19,24,25	0
4	DMS	D	403	4/4	0.97	0.16	21,24,38,39	0
4	DMS	D	404	4/4	0.97	0.18	26,34,34,39	0
2	9Y7	D	402	33/33	0.97	0.10	13,16,27,31	0
3	MLA	B	401	7/7	0.97	0.07	11,13,22,23	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.

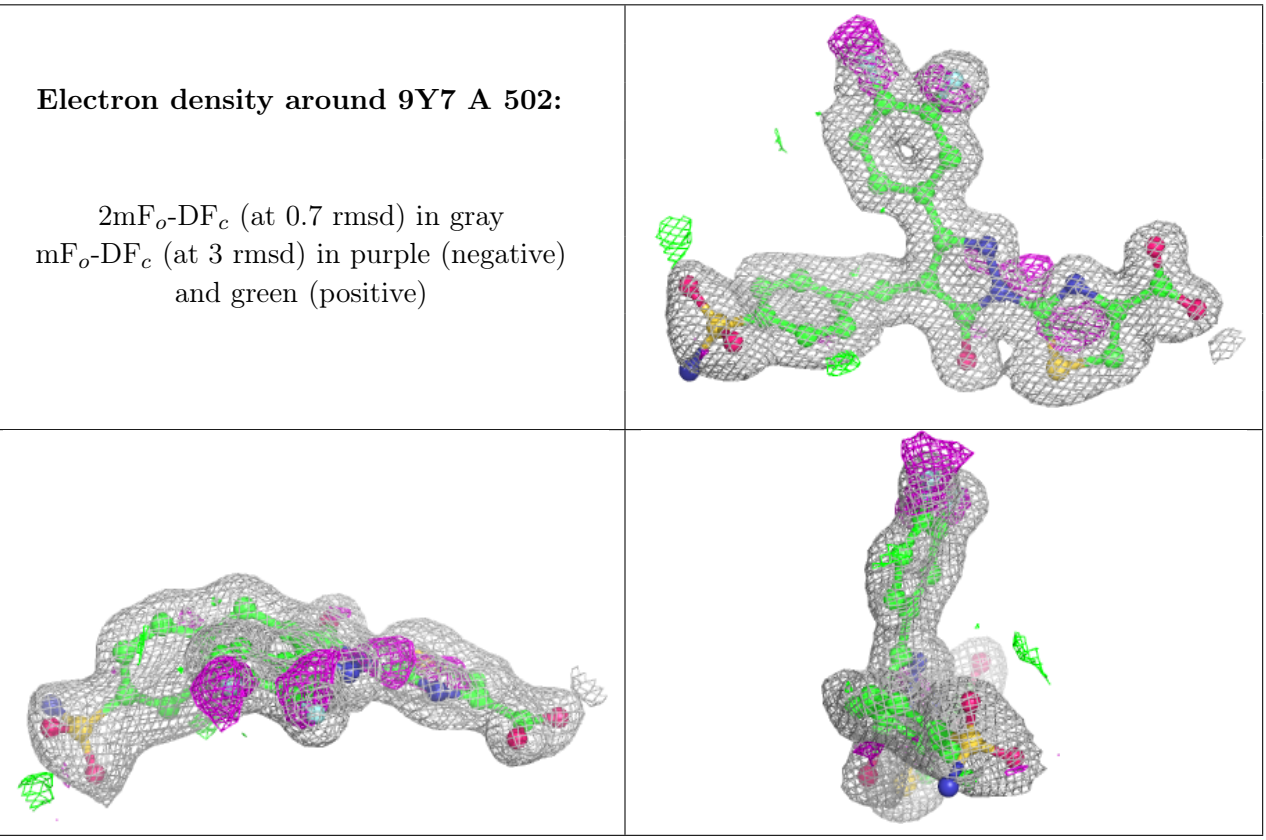
Electron density around 9Y7 C 403:

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



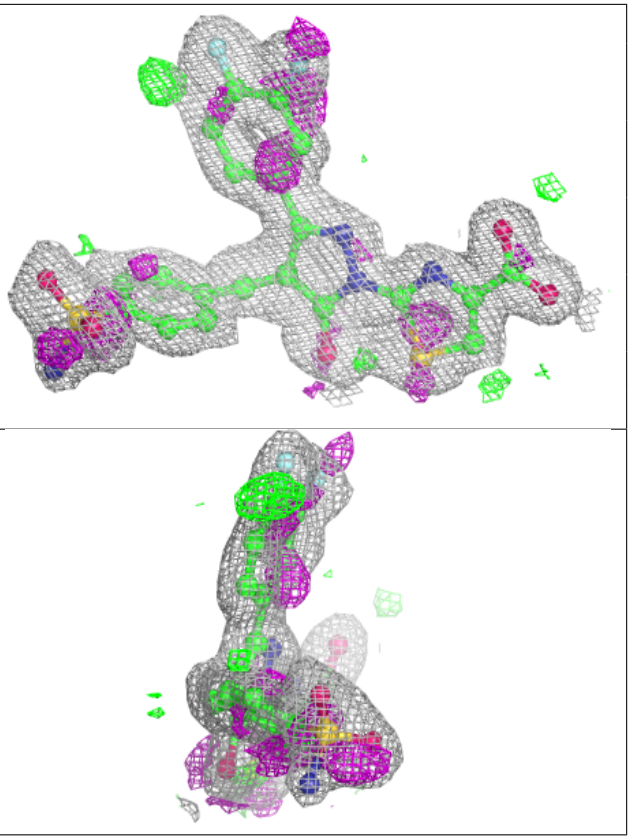
Electron density around 9Y7 A 502:

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



Electron density around 9Y7 B 402:

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



Electron density around 9Y7 A 501:

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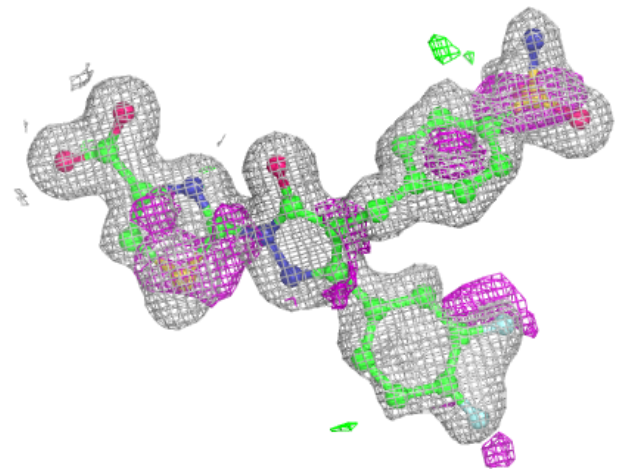
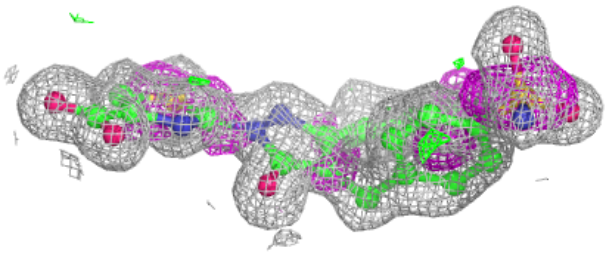
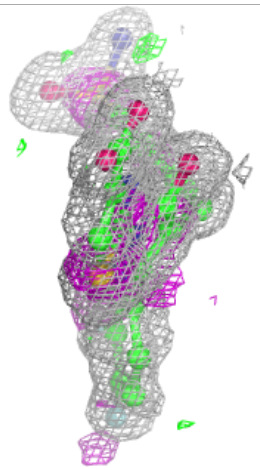
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

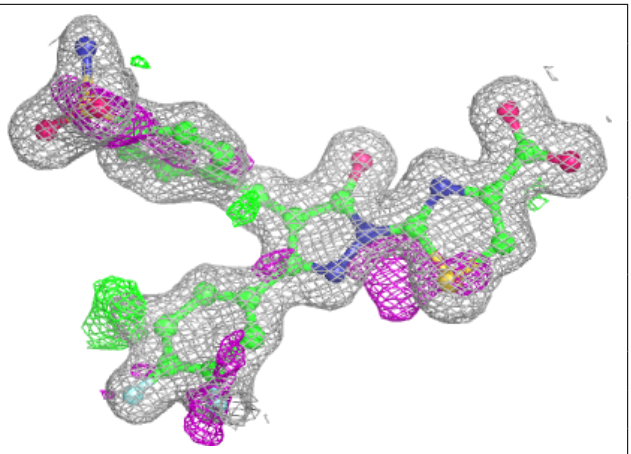


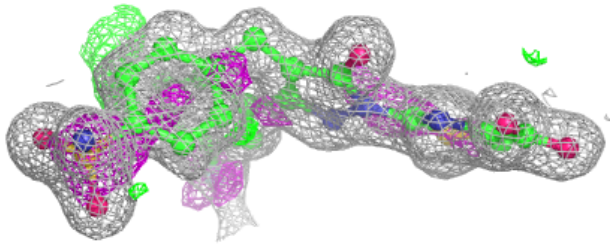


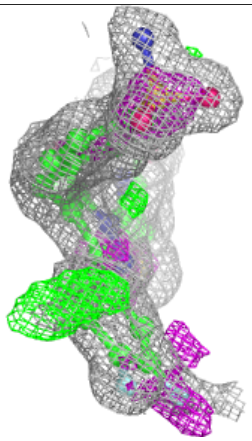


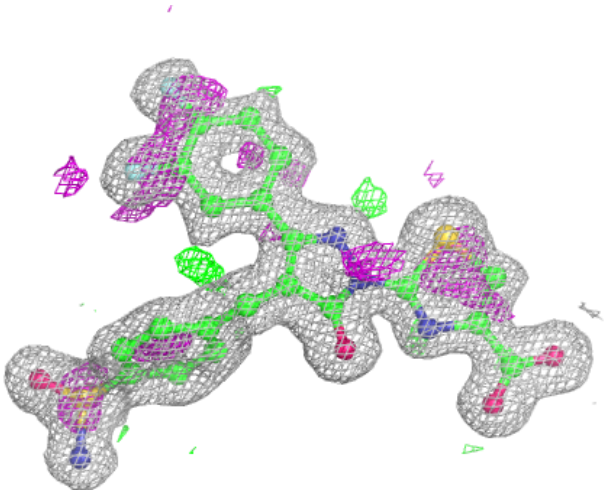
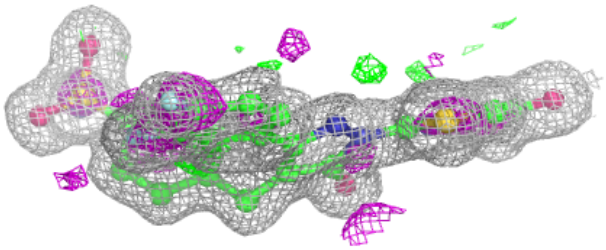
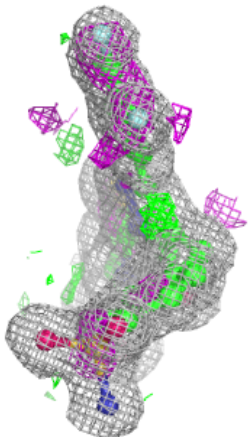
Electron density around 9Y7 C 402:

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







Electron density around 9Y7 D 402: 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.