Full wwPDB X-ray Structure Validation Report (i)

Sep 27, 2023 – 01:32 AM EDT

PDB ID	:	6BW8
Title	:	Mcl-1 complexed with small molecules
Authors	:	Zhao, B.
Deposited on	:	2017-12-14
Resolution	:	2.90 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:

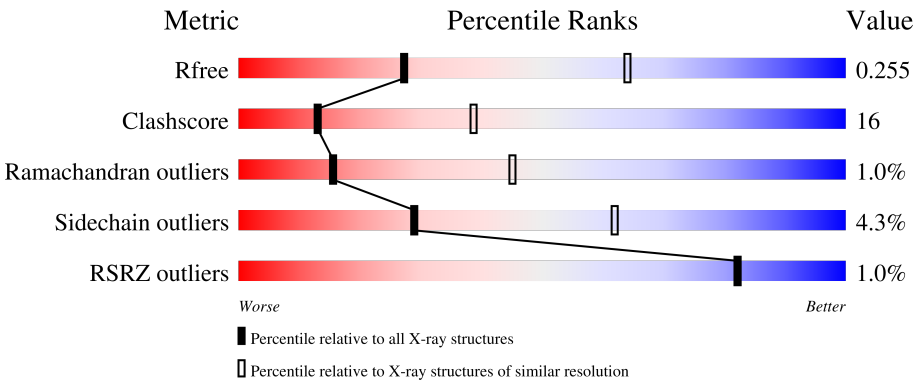
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

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 2.90 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	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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	158	.% 65% 28% • 6%
1	B	158	.% 56% 37% • 6%
1	C	158	.% 58% 31% • 8%
1	D	158	.% 60% 30% • 6%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 4891 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.

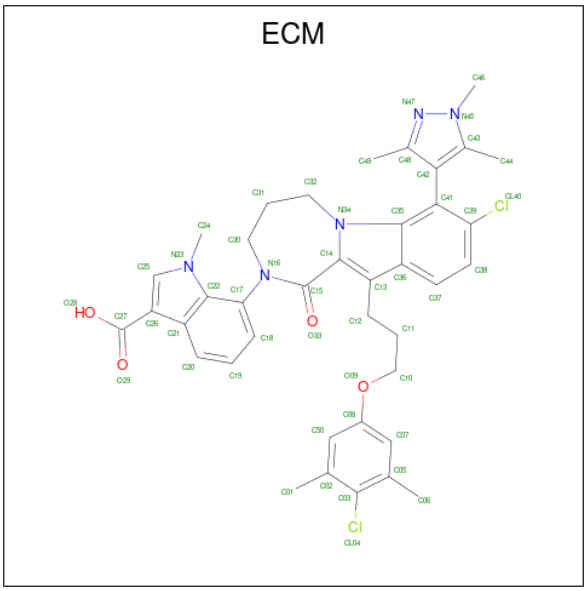
- Molecule 1 is a protein called Induced myeloid leukemia cell differentiation protein Mcl-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	149	1177	738	215	220	4	0	1	0
			Total	C	N	O	S			
1	B	148	1172	739	216	214	3	0	1	0
			Total	C	N	O	S			
1	C	145	1161	729	215	213	4	0	0	0
			Total	C	N	O	S			
1	D	149	1181	744	218	216	3	0	1	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	170	ALA	-	expression tag	UNP Q07820
A	171	ASP	-	expression tag	UNP Q07820
B	170	ALA	-	expression tag	UNP Q07820
B	171	ASP	-	expression tag	UNP Q07820
C	170	ALA	-	expression tag	UNP Q07820
C	171	ASP	-	expression tag	UNP Q07820
D	170	ALA	-	expression tag	UNP Q07820
D	171	ASP	-	expression tag	UNP Q07820

- Molecule 2 is 7-{8-chloro-11-[3-(4-chloro-3,5-dimethylphenoxy)propyl]-1-oxo-7-(1,3,5-trimethyl-1H-pyrazol-4-yl)-4,5-dihydro-1H-[1,4]diazepino[1,2-a]indol-2(3H)-yl}-1-methyl-1H-indole-3-carboxylic acid (three-letter code: ECM) (formula: $C_{39}H_{39}Cl_2N_5O_4$).



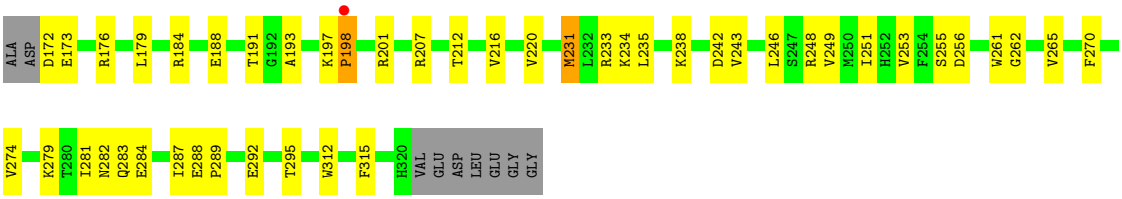
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	Cl	N	O	0	0
			50	39	2	5	4		
2	B	1	Total	C	Cl	N	O	0	0
			50	39	2	5	4		
2	C	1	Total	C	Cl	N	O	0	0
			50	39	2	5	4		
2	D	1	Total	C	Cl	N	O	0	0
			50	39	2	5	4		

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.

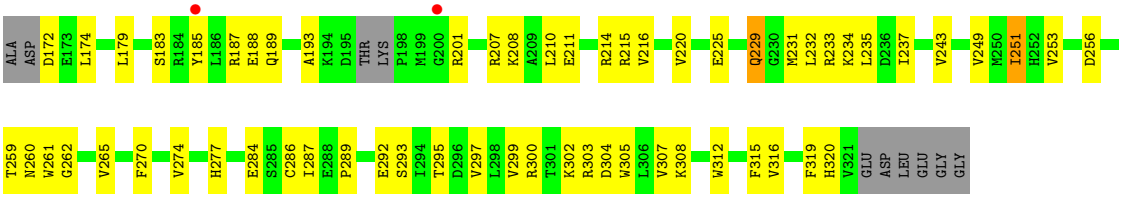
• Molecule 1: Induced myeloid leukemia cell differentiation protein Mcl-1

Chain A:



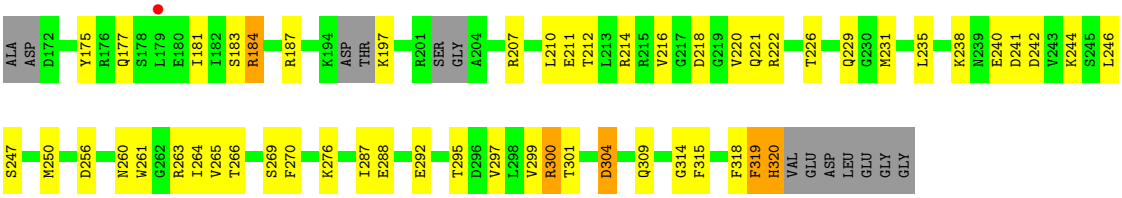
• Molecule 1: Induced myeloid leukemia cell differentiation protein Mcl-1

Chain B:



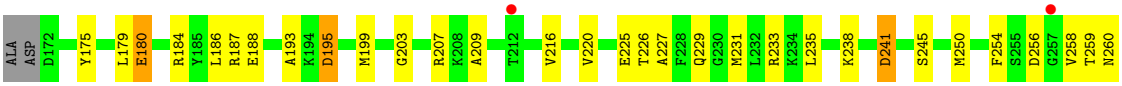
• Molecule 1: Induced myeloid leukemia cell differentiation protein Mcl-1

Chain C:



• Molecule 1: Induced myeloid leukemia cell differentiation protein Mcl-1

Chain D:



W261
G262
R263
I264
V265
S269
F270
V274
E284
I287
E288
A291
E292
R300
W305
L306
V307
K308
Q309
R310
G311
W312
D313
G314
F315
V316
E317
F318
F319
H320
VAL
GLU
ASP
LEU
GLU
GLY
GLY

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	39.18Å 135.40Å 95.75Å 90.00° 90.12° 90.00°	Depositor
Resolution (Å)	40.00 – 2.90 39.18 – 2.80	Depositor EDS
% Data completeness (in resolution range)	89.5 (40.00-2.90) 81.1 (39.18-2.80)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	0.07	Depositor
$< I/\sigma(I) >$ [1]	3.11 (at 2.81Å)	Xtriage
Refinement program	PHENIX (1.12_2829: ???)	Depositor
R, R_{free}	0.235 , 0.251 0.233 , 0.255	Depositor DCC
R_{free} test set	2023 reflections (10.15%)	wwPDB-VP
Wilson B-factor (Å^2)	41.5	Xtriage
Anisotropy	0.071	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 28.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.42$, $< L^2 > = 0.25$	Xtriage
Estimated twinning fraction	0.417 for h,-k,-l	Xtriage
F_o,F_c correlation	0.86	EDS
Total number of atoms	4891	wwPDB-VP
Average B, all atoms (Å^2)	53.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.12% 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: ECM

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	0.33	0/1197	0.53	0/1614
1	B	0.34	0/1191	0.55	0/1603
1	C	0.33	0/1177	0.60	0/1579
1	D	0.39	0/1201	0.59	1/1617 (0.1%)
All	All	0.35	0/4766	0.57	1/6413 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	180	GLU	CA-CB-CG	-5.45	101.42	113.40

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1177	0	1153	27	0
1	B	1172	0	1164	47	0
1	C	1161	0	1145	42	0
1	D	1181	0	1170	44	0
2	A	50	0	0	0	0
2	B	50	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	50	0	0	0	0
2	D	50	0	0	3	0
All	All	4891	0	4632	156	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 16.

All (156) 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:C:319:PHE:O	1:C:320:HIS:ND1	1.83	1.11
1:B:225:GLU:HG2	1:B:229:GLN:HE22	1.30	0.97
1:B:208:LYS:O	1:B:208:LYS:HD3	1.68	0.93
1:C:241:ASP:HA	1:C:244:LYS:HZ3	1.39	0.87
1:D:261:TRP:HB3	1:D:319:PHE:HE2	1.39	0.86
1:C:241:ASP:HA	1:C:244:LYS:NZ	1.92	0.85
1:D:261:TRP:HB3	1:D:319:PHE:CE2	2.15	0.81
1:A:176:ARG:NH2	1:A:201:ARG:O	2.15	0.80
1:C:276:LYS:N	1:C:276:LYS:CB	2.46	0.79
1:C:276:LYS:CB	1:C:276:LYS:C	2.51	0.78
1:B:225:GLU:HG2	1:B:229:GLN:NE2	1.98	0.78
1:B:225:GLU:CG	1:B:229:GLN:HE22	1.96	0.77
1:C:309:GLN:HB3	1:C:314:GLY:HA3	1.67	0.76
1:B:208:LYS:HD2	1:B:316:VAL:HG13	1.69	0.75
1:D:259:THR:HG22	1:D:260:ASN:H	1.52	0.74
1:A:248:ARG:NH1	1:C:235:LEU:O	2.21	0.74
1:A:238:LYS:N	1:A:242:ASP:OD2	2.17	0.74
1:B:208:LYS:HD3	1:B:208:LYS:C	2.10	0.71
1:C:184:ARG:NH2	1:C:197:LYS:O	2.23	0.71
1:A:243:VAL:HG11	1:A:289:PRO:HB2	1.72	0.70
1:D:184:ARG:NH2	1:D:199:MET:HA	2.08	0.69
1:D:263:ARG:HH12	2:D:400:ECM:C15	2.07	0.67
1:A:312:TRP:O	1:A:315:PHE:HB3	1.95	0.67
1:C:276:LYS:N	1:C:276:LYS:C	2.47	0.67
1:D:187:ARG:NH1	1:D:195:ASP:OD2	2.28	0.67
1:B:188:GLU:OE2	1:B:214:ARG:NH1	2.29	0.66
1:D:225:GLU:O	1:D:229:GLN:HG3	1.96	0.66
1:C:304:ASP:N	1:C:304:ASP:OD1	2.29	0.65
1:B:179:LEU:HB2	1:B:295:THR:HG21	1.77	0.65
1:D:250:MET:O	1:D:254:PHE:HB3	1.95	0.65
1:B:256:ASP:OD1	1:B:256:ASP:N	2.29	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:305:TRP:HA	1:D:308:LYS:HD2	1.79	0.64
1:D:258:VAL:HG22	1:D:305:TRP:CD1	2.35	0.62
1:C:218:ASP:O	1:C:222:ARG:HG3	2.00	0.62
1:D:184:ARG:HH21	1:D:199:MET:HA	1.64	0.61
1:C:314:GLY:O	1:C:318:PHE:HD2	1.85	0.60
1:D:288:GLU:O	1:D:292:GLU:HG3	2.02	0.59
1:A:292:GLU:OE1	1:D:207:ARG:NH2	2.36	0.59
1:B:260:ASN:ND2	2:B:400:ECM:O29	2.37	0.58
1:C:238:LYS:N	1:C:242:ASP:OD2	2.35	0.58
1:C:297:VAL:O	1:C:301:THR:OG1	2.13	0.57
1:C:220:VAL:HG11	1:C:266:THR:HA	1.86	0.57
1:A:216:VAL:O	1:A:220:VAL:HG22	2.03	0.57
1:C:231:MET:O	1:C:235:LEU:HG	2.04	0.57
1:B:208:LYS:HE3	1:B:215:ARG:HH21	1.69	0.57
1:C:300:ARG:NE	1:C:300:ARG:O	2.36	0.57
1:C:247:SER:HA	1:C:250:MET:HE3	1.87	0.57
1:B:208:LYS:CE	1:B:215:ARG:HH21	2.18	0.56
1:D:231:MET:HG2	1:D:270:PHE:CZ	2.40	0.56
1:B:305:TRP:HA	1:B:308:LYS:NZ	2.20	0.56
1:D:265:VAL:O	1:D:269:SER:OG	2.20	0.56
1:B:243:VAL:HG21	1:B:286:CYS:HB3	1.86	0.56
1:A:184:ARG:NH1	1:A:198:PRO:O	2.39	0.56
1:D:186:LEU:HD22	1:D:291:ALA:HB2	1.88	0.56
1:C:210:LEU:O	1:C:214:ARG:HG3	2.04	0.56
1:C:319:PHE:O	1:C:320:HIS:CG	2.58	0.55
1:D:203:GLY:O	1:D:207:ARG:HG3	2.07	0.54
1:B:174:LEU:HD23	1:B:303:ARG:HG3	1.88	0.54
1:B:208:LYS:HD2	1:B:316:VAL:CG1	2.35	0.54
1:B:312:TRP:O	1:B:316:VAL:HG23	2.08	0.54
1:D:175:TYR:CZ	1:D:179:LEU:HD22	2.42	0.53
1:B:261:TRP:CZ3	1:B:315:PHE:HB2	2.43	0.53
1:C:288:GLU:O	1:C:292:GLU:HG3	2.09	0.53
1:C:183:SER:OG	1:C:187:ARG:NH2	2.42	0.53
1:A:234:LYS:O	1:A:234:LYS:NZ	2.30	0.52
1:C:240:GLU:C	1:C:244:LYS:HZ2	2.12	0.52
1:D:261:TRP:HD1	1:D:318:PHE:HD2	1.57	0.52
1:C:261:TRP:O	1:C:265:VAL:HG23	2.08	0.52
1:C:210:LEU:HD23	1:C:214:ARG:HE	1.73	0.52
1:A:261:TRP:O	1:A:265:VAL:HG13	2.09	0.52
1:C:241:ASP:CA	1:C:244:LYS:NZ	2.70	0.52
1:A:212:THR:O	1:A:216:VAL:HG22	2.11	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:179:LEU:HB2	1:A:295:THR:HG21	1.93	0.51
1:B:289:PRO:O	1:B:292:GLU:HB2	2.10	0.51
1:A:270:PHE:O	1:A:274:VAL:HG23	2.11	0.51
1:B:216:VAL:O	1:B:220:VAL:HG23	2.11	0.51
1:D:216:VAL:O	1:D:220:VAL:HG23	2.11	0.51
1:B:211:GLU:O	1:B:215:ARG:HG3	2.11	0.51
1:B:259:THR:HG22	1:B:302:LYS:NZ	2.26	0.51
1:D:241:ASP:N	1:D:241:ASP:OD1	2.43	0.50
1:A:172:ASP:OD1	1:A:173:GLU:N	2.44	0.50
1:A:197:LYS:NZ	1:D:195:ASP:OD1	2.44	0.50
1:D:284:GLU:HG3	1:D:287:ILE:HD12	1.93	0.50
1:B:188:GLU:HB2	1:B:193:ALA:O	2.12	0.50
1:C:187:ARG:HH12	1:C:288:GLU:HB2	1.77	0.50
1:A:231:MET:O	1:A:235:LEU:HG	2.11	0.50
1:D:315:PHE:O	1:D:319:PHE:HD2	1.94	0.50
1:B:188:GLU:HG3	1:B:189:GLN:NE2	2.27	0.49
1:C:240:GLU:HG3	1:C:244:LYS:NZ	2.27	0.49
1:D:260:ASN:HA	1:D:305:TRP:CZ2	2.47	0.49
1:B:172:ASP:N	1:B:303:ARG:HH22	2.09	0.49
1:D:260:ASN:HA	1:D:305:TRP:CH2	2.48	0.49
1:D:250:MET:O	1:D:254:PHE:CB	2.61	0.48
1:D:263:ARG:NH1	2:D:400:ECM:C17	2.76	0.48
1:B:312:TRP:O	1:B:315:PHE:HB3	2.13	0.48
1:C:177:GLN:O	1:C:181:ILE:HG13	2.13	0.48
1:D:314:GLY:O	1:D:318:PHE:HB2	2.13	0.48
1:A:248:ARG:HD3	1:C:246:LEU:HD23	1.95	0.48
1:D:231:MET:O	1:D:235:LEU:HG	2.14	0.48
1:A:191:THR:HG22	1:A:279:LYS:HD2	1.96	0.48
1:B:174:LEU:HB3	1:B:303:ARG:HH21	1.79	0.47
1:D:261:TRP:HD1	1:D:318:PHE:CD2	2.32	0.47
1:D:226:THR:HG23	1:D:227:ALA:H	1.78	0.47
1:B:261:TRP:CH2	1:B:315:PHE:HB2	2.49	0.47
1:C:221:GLN:HG3	1:C:269:SER:HB2	1.97	0.47
1:C:260:ASN:O	1:C:264:ILE:HG12	2.15	0.46
1:B:251:ILE:HD12	1:B:300:ARG:HH21	1.80	0.46
1:A:255:SER:OG	1:A:256:ASP:N	2.48	0.46
1:B:210:LEU:HD23	1:B:214:ARG:NH2	2.31	0.46
1:C:256:ASP:O	1:C:263:ARG:NH2	2.44	0.46
1:D:309:GLN:O	1:D:314:GLY:HA3	2.16	0.46
1:B:207:ARG:O	1:B:211:GLU:HG3	2.15	0.46
1:B:232:LEU:HD21	1:B:277:HIS:HB2	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:185:TYR:CD1	1:B:189:GLN:NE2	2.83	0.46
1:B:284:GLU:HG3	1:B:287:ILE:HD12	1.98	0.46
1:C:211:GLU:HA	1:C:214:ARG:HD2	1.97	0.46
1:D:263:ARG:HH12	2:D:400:ECM:C17	2.29	0.46
1:D:188:GLU:HA	1:D:193:ALA:O	2.16	0.45
1:B:299:VAL:HG13	1:B:303:ARG:HB2	1.98	0.45
1:C:314:GLY:O	1:C:318:PHE:HB3	2.17	0.45
1:C:212:THR:O	1:C:216:VAL:HG12	2.15	0.45
1:A:188:GLU:HB2	1:A:193:ALA:O	2.17	0.45
1:D:265:VAL:CG1	1:D:315:PHE:HE1	2.30	0.44
1:D:258:VAL:HG22	1:D:305:TRP:HD1	1.82	0.44
1:A:251:ILE:O	1:A:255:SER:N	2.41	0.44
1:C:187:ARG:HG2	1:C:287:ILE:HG21	1.99	0.44
1:D:209:ALA:HB2	1:D:316:VAL:HG22	2.00	0.44
1:A:284:GLU:HG3	1:A:287:ILE:HD12	2.00	0.43
1:A:288:GLU:HB3	1:A:289:PRO:HD3	2.01	0.43
1:B:231:MET:HB2	2:B:400:ECM:CL40	2.56	0.43
1:B:315:PHE:O	1:B:319:PHE:HD2	2.01	0.43
1:B:249:VAL:O	1:B:253:VAL:HG23	2.18	0.43
1:D:312:TRP:O	1:D:315:PHE:HB3	2.17	0.43
1:A:249:VAL:O	1:A:253:VAL:HG23	2.18	0.43
1:C:295:THR:O	1:C:299:VAL:HG22	2.19	0.43
1:B:305:TRP:HA	1:B:308:LYS:HZ1	1.84	0.43
1:D:238:LYS:HA	1:D:238:LYS:HD3	1.79	0.43
1:B:235:LEU:HD13	1:B:237:ILE:HD11	2.00	0.42
1:B:293:SER:O	1:B:297:VAL:HG23	2.20	0.42
1:B:183:SER:O	1:B:187:ARG:HG3	2.20	0.42
1:B:188:GLU:HG3	1:B:189:GLN:HE22	1.83	0.42
1:C:226:THR:O	1:C:229:GLN:HG2	2.19	0.42
1:B:262:GLY:HA2	1:B:265:VAL:HG22	2.01	0.42
1:C:231:MET:HG2	1:C:270:PHE:CZ	2.55	0.42
1:D:180:GLU:O	1:D:180:GLU:HG3	2.19	0.42
1:B:270:PHE:O	1:B:274:VAL:HG23	2.20	0.42
1:B:304:ASP:O	1:B:307:VAL:HG12	2.21	0.41
1:C:314:GLY:O	1:C:318:PHE:CD2	2.69	0.41
1:A:262:GLY:O	1:A:265:VAL:HG22	2.20	0.41
1:D:270:PHE:O	1:D:274:VAL:HG23	2.21	0.41
1:D:261:TRP:CZ3	1:D:315:PHE:HB2	2.56	0.41
1:D:306:LEU:O	1:D:310:ARG:N	2.53	0.41
1:A:281:ILE:C	1:A:283:GLN:H	2.24	0.41
1:A:242:ASP:O	1:A:246:LEU:HG	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:259:THR:HG22	1:B:302:LYS:HZ1	1.87	0.40
1:C:261:TRP:CH2	1:C:315:PHE:HB2	2.56	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	147/158 (93%)	139 (95%)	6 (4%)	2 (1%)	11 36
1	B	144/158 (91%)	135 (94%)	9 (6%)	0	100 100
1	C	138/158 (87%)	130 (94%)	8 (6%)	0	100 100
1	D	147/158 (93%)	137 (93%)	6 (4%)	4 (3%)	5 19
All	All	576/632 (91%)	541 (94%)	29 (5%)	6 (1%)	15 45

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	245	SER
1	A	282	ASN
1	D	195	ASP
1	D	310	ARG
1	A	198	PRO
1	D	256	ASP

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	123/136 (90%)	120 (98%)	3 (2%)	49	79
1	B	123/136 (90%)	117 (95%)	6 (5%)	25	57
1	C	122/136 (90%)	115 (94%)	7 (6%)	20	51
1	D	123/136 (90%)	118 (96%)	5 (4%)	30	64
All	All	491/544 (90%)	470 (96%)	21 (4%)	29	62

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	207	ARG
1	A	231	MET
1	A	233	ARG
1	B	201	ARG
1	B	229	GLN
1	B	233	ARG
1	B	234	LYS
1	B	251	ILE
1	B	320	HIS
1	C	175	TYR
1	C	184	ARG
1	C	207	ARG
1	C	300	ARG
1	C	304	ASP
1	C	319	PHE
1	C	320	HIS
1	D	233	ARG
1	D	241	ASP
1	D	263	ARG
1	D	300	ARG
1	D	318	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	223	ASN
1	B	189	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains (i)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

4 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	$\#\|Z\| > 2$
2	ECM	A	400	-	49,56,56	2.17	11 (22%)	57,85,85	2.23	11 (19%)
2	ECM	D	400	-	49,56,56	2.19	10 (20%)	57,85,85	2.01	11 (19%)
2	ECM	B	400	-	49,56,56	2.08	10 (20%)	57,85,85	2.08	11 (19%)
2	ECM	C	400	-	49,56,56	2.21	12 (24%)	57,85,85	2.14	12 (21%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	ECM	A	400	-	-	5/17/33/33	0/6/7/7
2	ECM	D	400	-	-	4/17/33/33	0/6/7/7
2	ECM	B	400	-	-	4/17/33/33	0/6/7/7
2	ECM	C	400	-	-	4/17/33/33	0/6/7/7

All (43) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	400	ECM	C42-C41	8.07	1.55	1.50
2	D	400	ECM	C42-C41	7.84	1.55	1.50
2	A	400	ECM	C42-C41	7.72	1.55	1.50
2	C	400	ECM	C42-C41	6.79	1.55	1.50
2	C	400	ECM	C17-N16	5.73	1.50	1.44
2	D	400	ECM	C17-N16	5.36	1.50	1.44
2	A	400	ECM	C17-N16	4.91	1.49	1.44
2	C	400	ECM	C32-N34	-4.88	1.45	1.49
2	D	400	ECM	C15-N16	4.84	1.43	1.37
2	D	400	ECM	C32-N34	-4.74	1.45	1.49
2	A	400	ECM	C15-N16	4.64	1.43	1.37
2	B	400	ECM	C43-N45	-4.35	1.31	1.37
2	B	400	ECM	C32-N34	-4.33	1.46	1.49
2	C	400	ECM	C15-N16	4.25	1.42	1.37
2	A	400	ECM	C32-N34	-4.21	1.46	1.49
2	C	400	ECM	C43-N45	-4.17	1.31	1.37
2	B	400	ECM	C15-N16	4.14	1.42	1.37
2	A	400	ECM	C43-N45	-4.09	1.31	1.37
2	D	400	ECM	C43-N45	-4.06	1.31	1.37
2	A	400	ECM	C30-N16	-3.77	1.42	1.47
2	C	400	ECM	C25-N23	-3.70	1.32	1.38
2	B	400	ECM	C17-N16	3.56	1.48	1.44
2	C	400	ECM	C26-C27	3.50	1.56	1.50
2	B	400	ECM	C30-N16	-3.50	1.42	1.47
2	C	400	ECM	C26-C21	3.49	1.45	1.42
2	A	400	ECM	O09-C08	3.34	1.45	1.37
2	D	400	ECM	C26-C27	3.29	1.55	1.50
2	D	400	ECM	C30-N16	-3.28	1.43	1.47
2	C	400	ECM	C30-N16	-3.24	1.43	1.47
2	B	400	ECM	O09-C08	3.23	1.45	1.37
2	A	400	ECM	C25-N23	-3.12	1.33	1.38
2	C	400	ECM	O09-C08	3.03	1.44	1.37
2	D	400	ECM	O09-C08	2.94	1.44	1.37
2	B	400	ECM	C25-N23	-2.81	1.34	1.38
2	A	400	ECM	C26-C27	2.76	1.55	1.50
2	D	400	ECM	C25-N23	-2.72	1.34	1.38
2	B	400	ECM	C26-C27	2.64	1.54	1.50
2	B	400	ECM	C42-C43	2.32	1.45	1.39
2	A	400	ECM	C42-C43	2.28	1.45	1.39
2	D	400	ECM	C42-C43	2.25	1.45	1.39
2	C	400	ECM	C37-C38	2.16	1.41	1.36
2	A	400	ECM	C37-C38	2.13	1.41	1.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	400	ECM	C06-C05	2.04	1.55	1.51

All (45) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	400	ECM	C31-C32-N34	8.33	117.72	111.18
2	C	400	ECM	C31-C32-N34	8.31	117.70	111.18
2	D	400	ECM	C48-N47-N45	7.60	110.88	104.35
2	A	400	ECM	C48-N47-N45	7.58	110.86	104.35
2	B	400	ECM	C31-C32-N34	7.57	117.12	111.18
2	B	400	ECM	C48-N47-N45	7.52	110.81	104.35
2	C	400	ECM	C48-N47-N45	7.32	110.64	104.35
2	A	400	ECM	C32-C31-C30	-6.16	105.80	112.31
2	D	400	ECM	C18-C17-N16	-5.93	114.52	120.58
2	D	400	ECM	C31-C32-N34	5.39	115.41	111.18
2	B	400	ECM	C18-C17-N16	-5.01	115.46	120.58
2	B	400	ECM	C32-C31-C30	-4.55	107.50	112.31
2	A	400	ECM	C18-C17-N16	-4.22	116.27	120.58
2	C	400	ECM	C18-C17-N16	-3.67	116.83	120.58
2	C	400	ECM	C24-N23-C25	-3.64	118.06	124.90
2	A	400	ECM	C46-N45-C43	-3.42	124.35	128.82
2	C	400	ECM	C49-C48-N47	3.41	127.15	119.78
2	D	400	ECM	C46-N45-C43	-3.31	124.50	128.82
2	D	400	ECM	C24-N23-C25	-3.29	118.72	124.90
2	B	400	ECM	C46-N45-C43	-3.20	124.64	128.82
2	D	400	ECM	C49-C48-N47	3.19	126.66	119.78
2	A	400	ECM	C49-C48-N47	3.18	126.64	119.78
2	C	400	ECM	C46-N45-C43	-3.16	124.70	128.82
2	D	400	ECM	C32-C31-C30	-3.14	108.99	112.31
2	C	400	ECM	C25-C26-C27	-3.13	122.48	127.55
2	A	400	ECM	C24-N23-C25	-3.11	119.06	124.90
2	D	400	ECM	C30-N16-C17	3.08	121.45	115.62
2	B	400	ECM	C49-C48-N47	2.95	126.14	119.78
2	C	400	ECM	O28-C27-C26	2.93	122.69	114.39
2	D	400	ECM	C20-C21-C26	-2.77	131.68	135.63
2	B	400	ECM	C20-C21-C22	2.75	121.86	116.73
2	C	400	ECM	C32-C31-C30	-2.69	109.47	112.31
2	C	400	ECM	C21-C26-C27	2.68	132.00	125.77
2	A	400	ECM	C20-C21-C26	-2.67	131.82	135.63
2	A	400	ECM	C20-C21-C22	2.61	121.61	116.73
2	A	400	ECM	C14-C15-N16	-2.50	115.61	119.53
2	B	400	ECM	C24-N23-C25	-2.47	120.26	124.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	400	ECM	C20-C21-C22	2.47	121.34	116.73
2	B	400	ECM	C20-C21-C26	-2.42	132.17	135.63
2	C	400	ECM	C30-N16-C17	2.36	120.09	115.62
2	B	400	ECM	C14-C15-N16	-2.36	115.83	119.53
2	C	400	ECM	C37-C36-C35	2.07	120.59	116.73
2	A	400	ECM	C37-C36-C35	2.03	120.53	116.73
2	B	400	ECM	C37-C36-C35	2.02	120.50	116.73
2	D	400	ECM	C10-O09-C08	-2.02	112.66	117.93

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	400	ECM	C25-C26-C27-O29
2	B	400	ECM	C25-C26-C27-O29
2	D	400	ECM	C25-C26-C27-O29
2	A	400	ECM	C50-C08-O09-C10
2	A	400	ECM	C07-C08-O09-C10
2	C	400	ECM	C50-C08-O09-C10
2	A	400	ECM	O09-C10-C11-C12
2	C	400	ECM	O09-C10-C11-C12
2	C	400	ECM	C07-C08-O09-C10
2	D	400	ECM	O09-C10-C11-C12
2	B	400	ECM	C50-C08-O09-C10
2	B	400	ECM	O09-C10-C11-C12
2	B	400	ECM	C07-C08-O09-C10
2	D	400	ECM	C10-C11-C12-C13
2	A	400	ECM	C10-C11-C12-C13
2	C	400	ECM	C10-C11-C12-C13
2	D	400	ECM	C18-C17-N16-C15

There are no ring outliers.

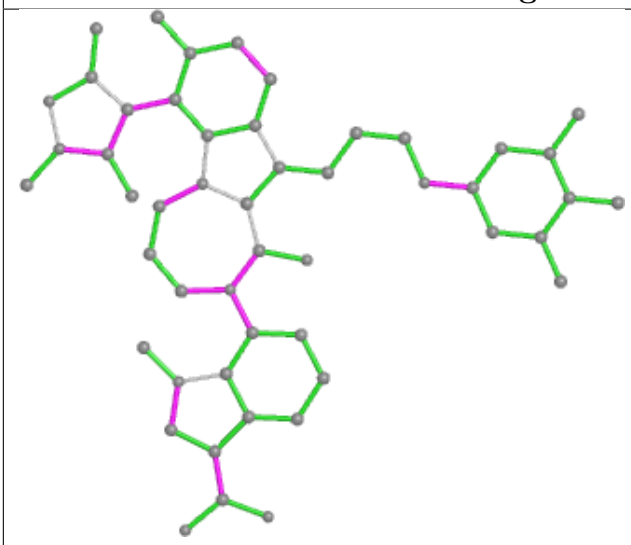
2 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	400	ECM	3	0
2	B	400	ECM	2	0

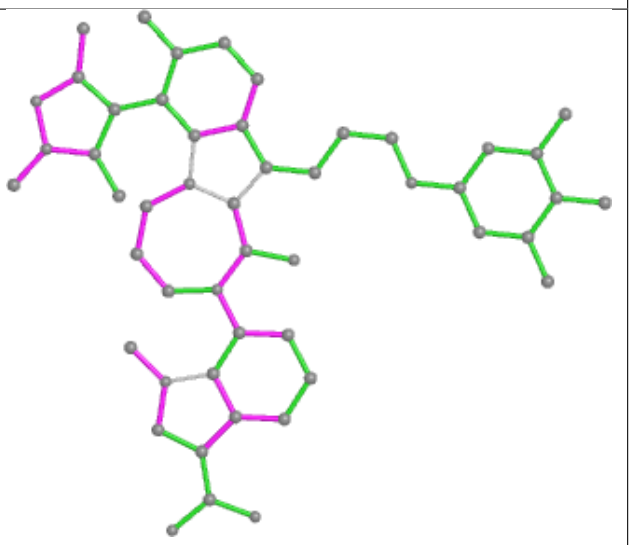
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

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.

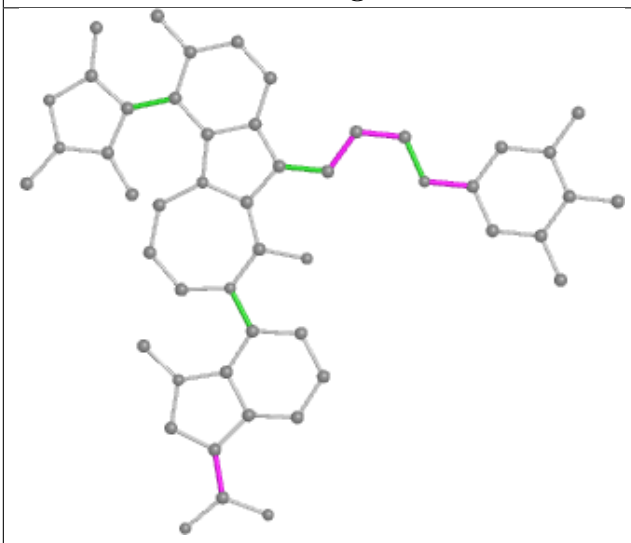
Ligand ECM A 400



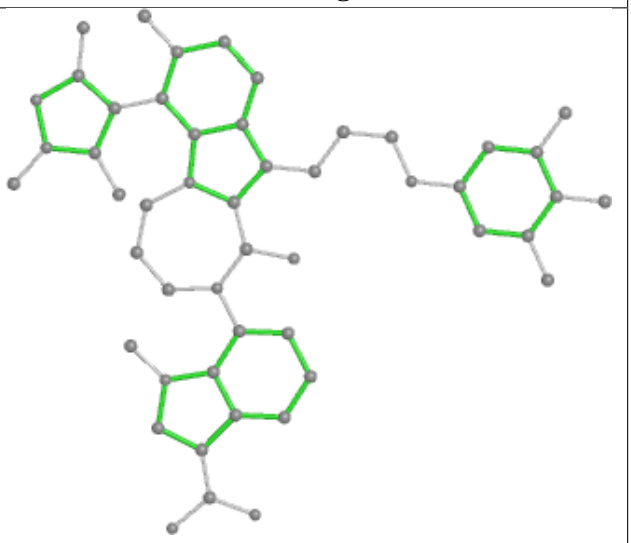
Bond lengths



Bond angles

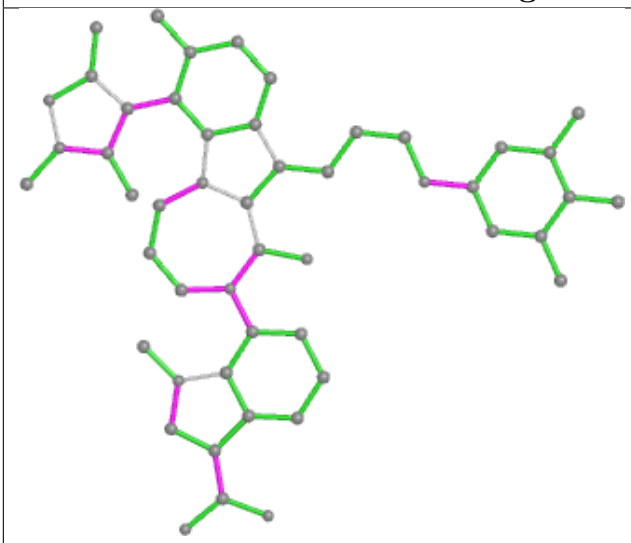


Torsions



Rings

Ligand ECM D 400



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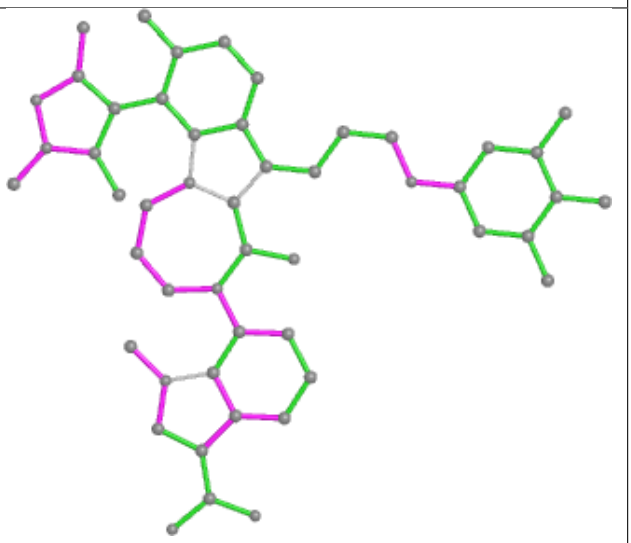

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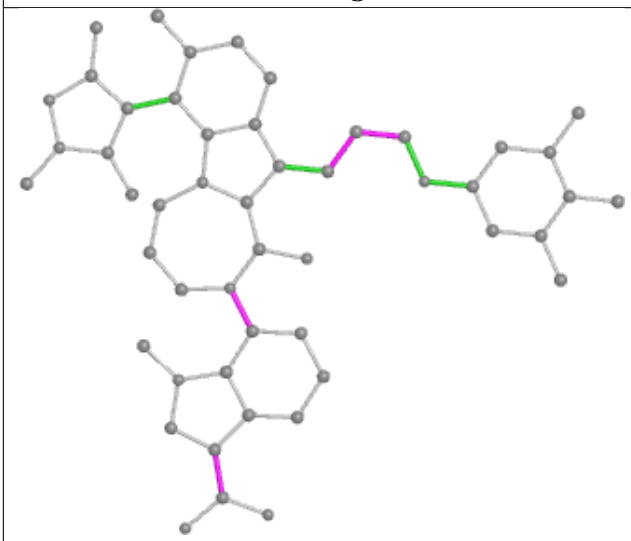

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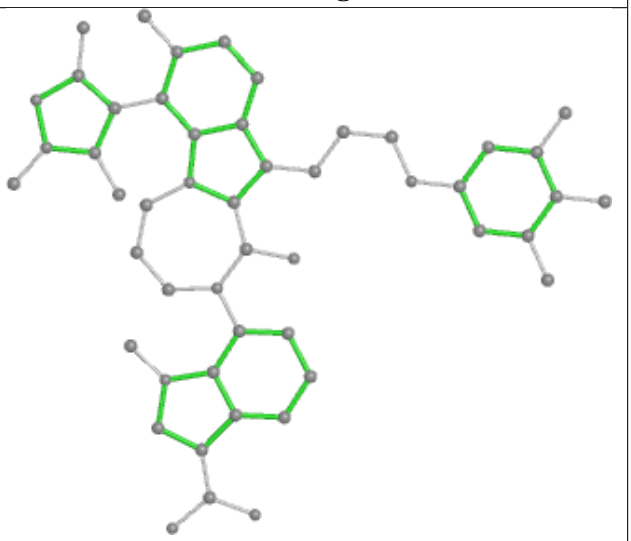
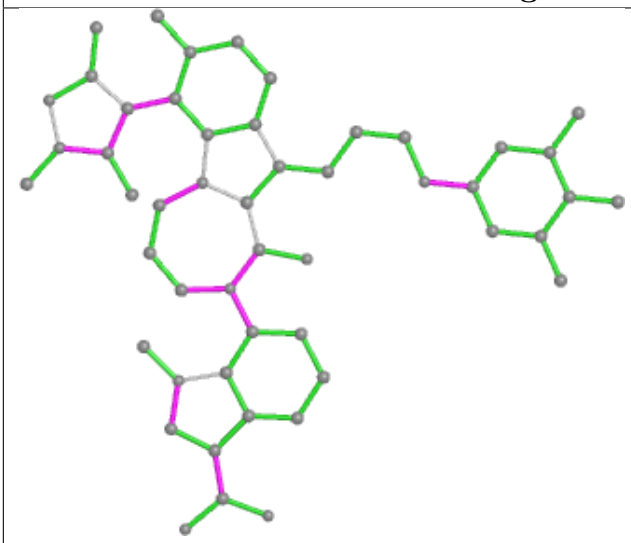
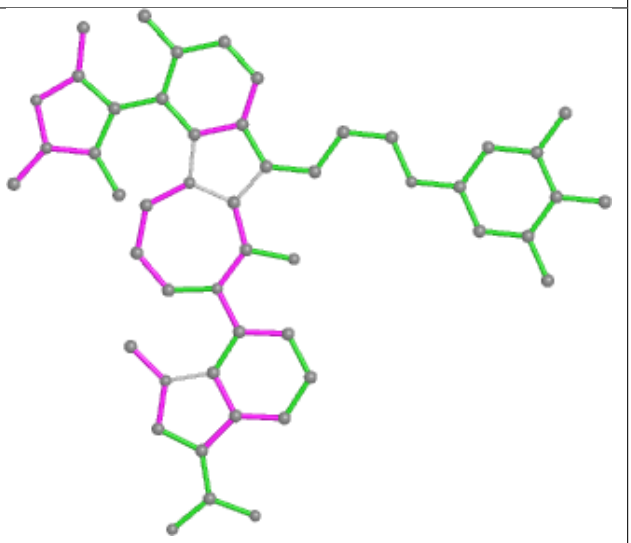


Rings

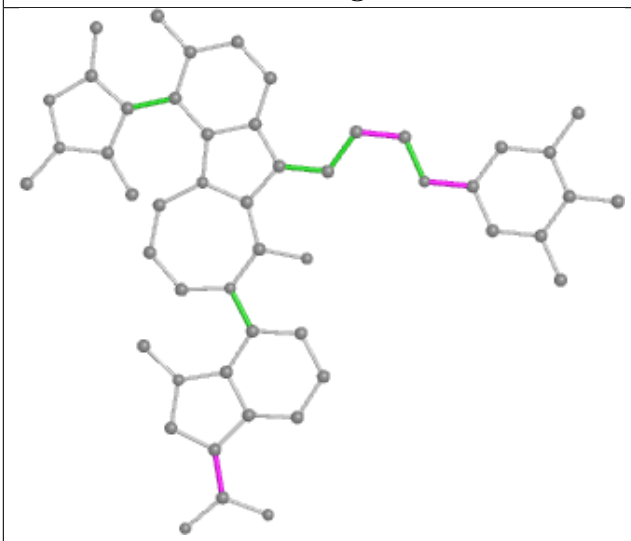
Ligand ECM B 400



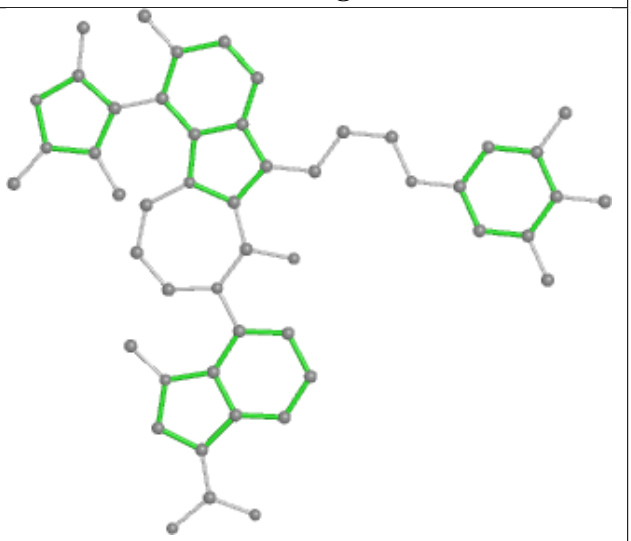
Bond lengths



Bond angles

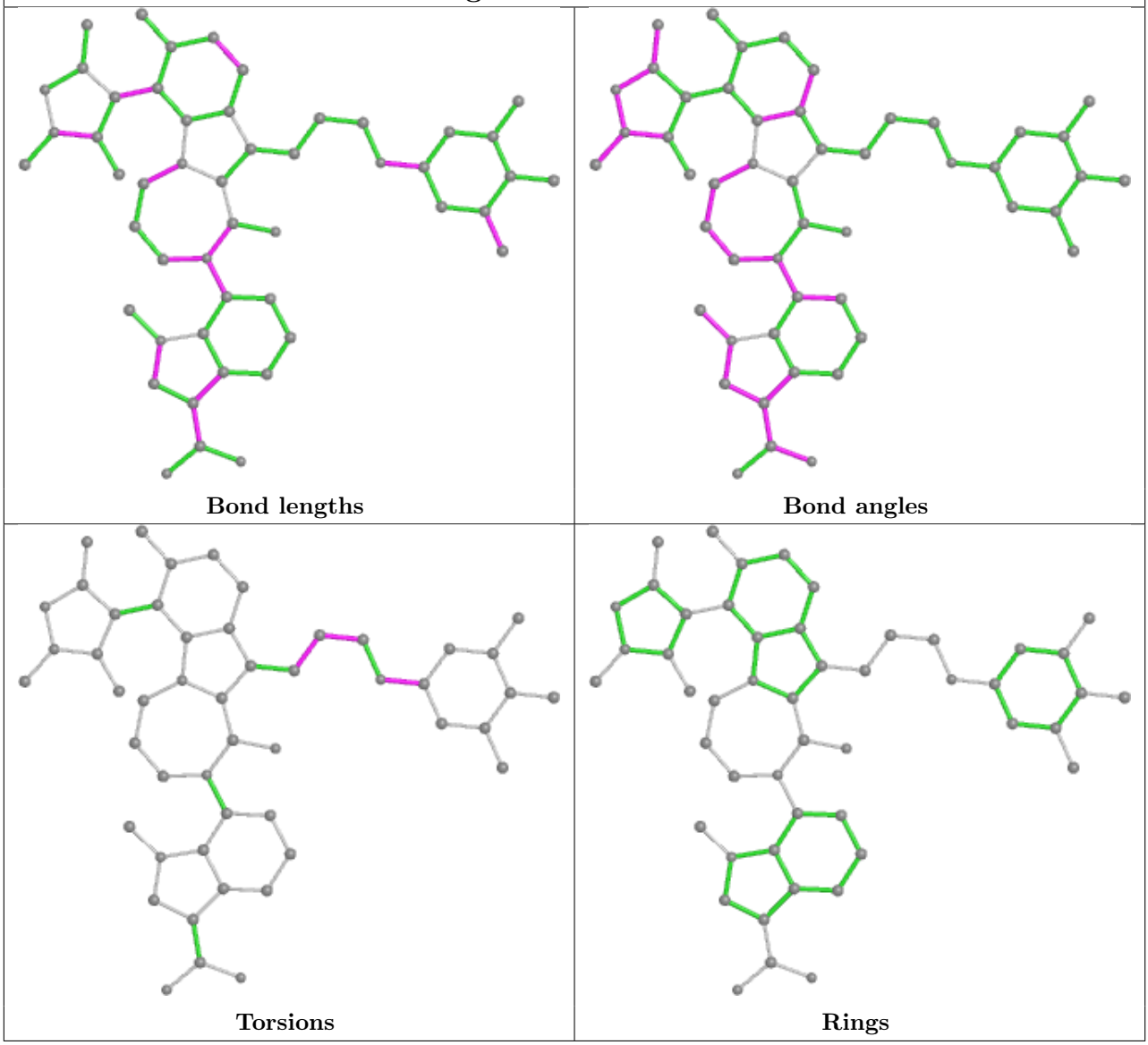


Torsions



Rings

Ligand ECM C 400



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	149/158 (94%)	0.10	1 (0%)	87	87	38, 47, 54, 68	0
1	B	148/158 (93%)	0.27	2 (1%)	75	75	42, 51, 62, 67	0
1	C	145/158 (91%)	0.17	1 (0%)	87	87	43, 58, 77, 88	0
1	D	149/158 (94%)	0.17	2 (1%)	77	77	47, 55, 69, 71	0
All	All	591/632 (93%)	0.18	6 (1%)	82	82	38, 52, 70, 88	0

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	212	THR	3.4
1	B	185	TYR	3.2
1	D	257	GLY	2.9
1	B	200	GLY	2.3
1	A	198	PRO	2.2
1	C	179	LEU	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,

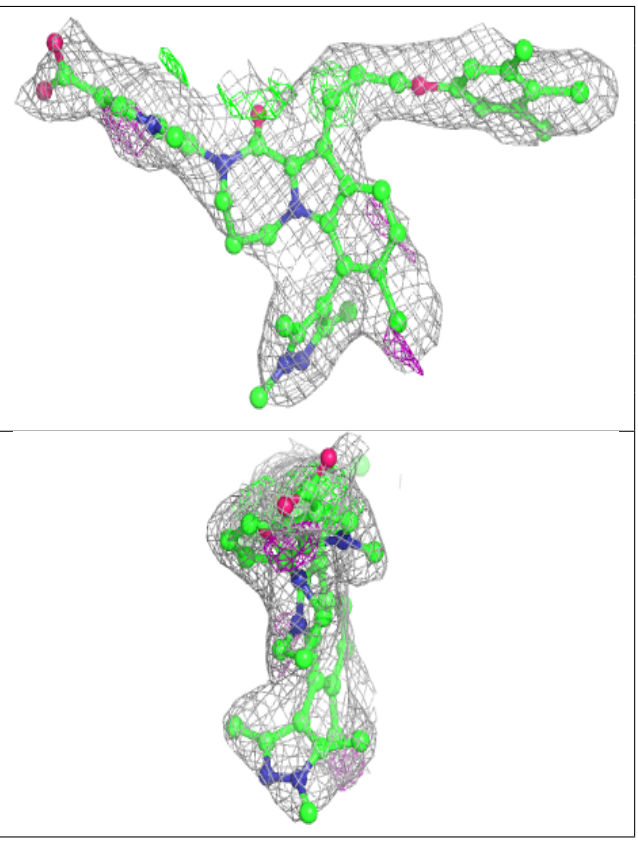
median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	ECM	D	400	50/50	0.83	0.28	51,57,59,60	0
2	ECM	B	400	50/50	0.91	0.19	41,43,45,47	0
2	ECM	A	400	50/50	0.91	0.21	40,43,48,49	0
2	ECM	C	400	50/50	0.92	0.23	45,49,57,57	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.

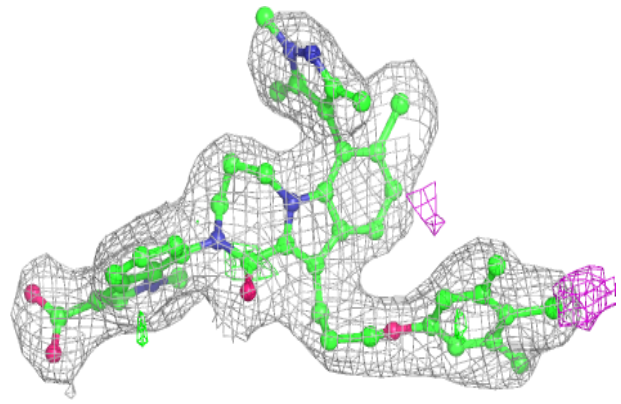
Electron density around ECM D 400:

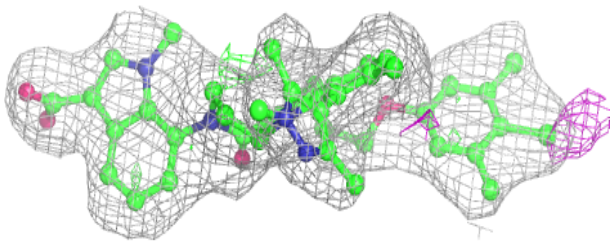
2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

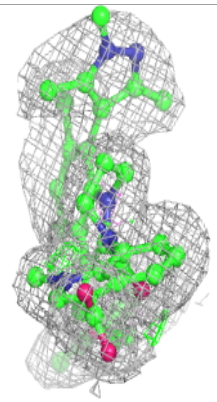


Electron density around ECM B 400:

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

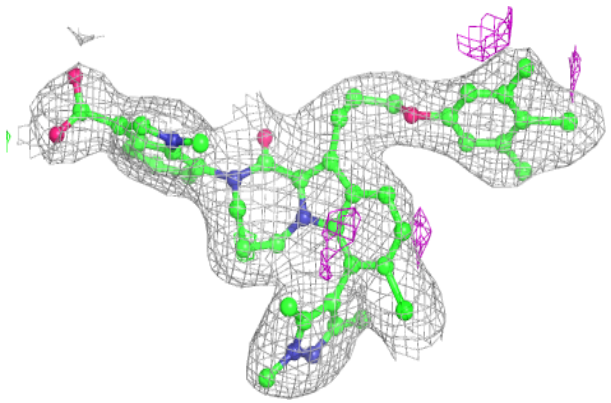


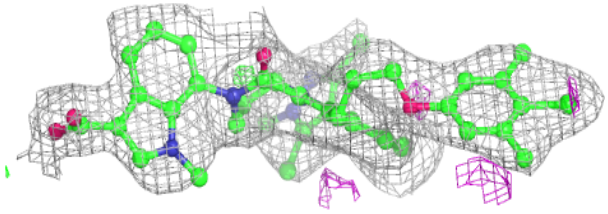


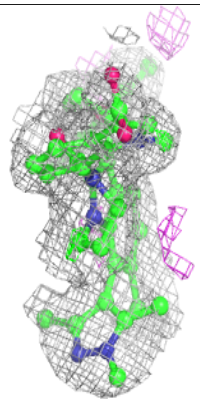


Electron density around ECM A 400:

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

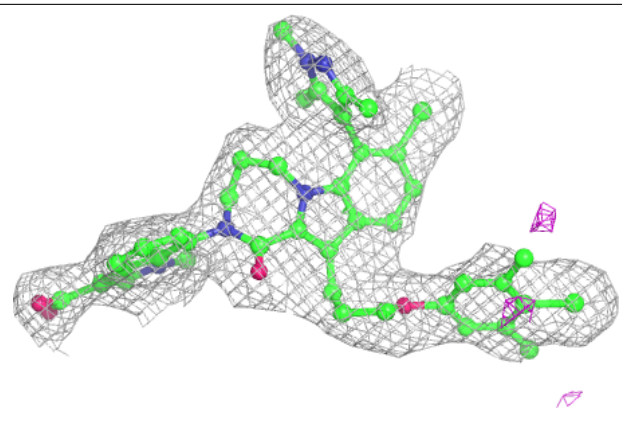


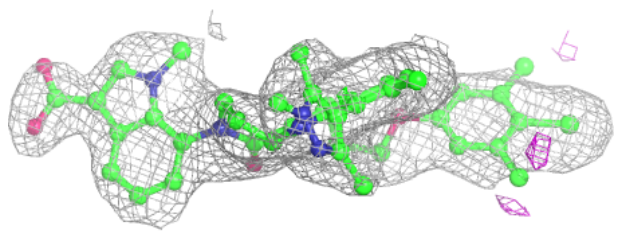


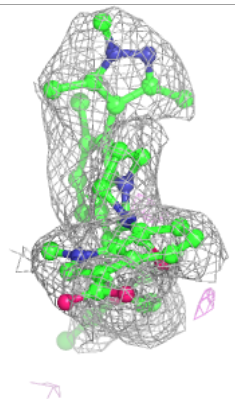


Electron density around ECM C 400:

$2mF_o$-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.