



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 8, 2024 – 07:21 PM EDT

PDB ID : 5SF4  
Title : CRYSTAL STRUCTURE OF HUMAN PHOSPHODIESTERASE 10 IN COMPLEX WITH c1(cc(nn1CCN(C)C)c2cccn2)NC(c3nc(ccc3Nc4cncn4)C5CC5)=O, micromolar IC<sub>50</sub>=0.001046  
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Deposited on : 2022-01-21  
Resolution : 2.25 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 : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtrriage (Phenix) : 1.20.1  
EDS : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.003 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

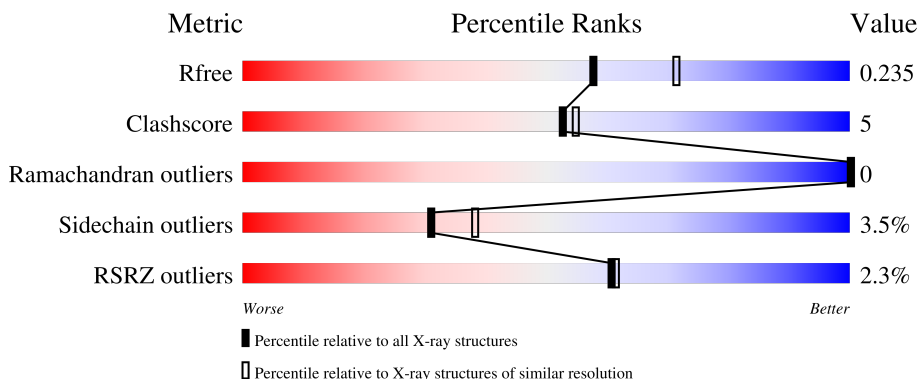
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.25 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))
$R_{free}$	164625	1763 (2.26-2.26)
Clashscore	180529	1919 (2.26-2.26)
Ramachandran outliers	177936	1884 (2.26-2.26)
Sidechain outliers	177891	1885 (2.26-2.26)
RSRZ outliers	164620	1763 (2.26-2.26)

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	343	 81% 10% • 9%
1	B	343	 3% 78% 14% • 8%
1	C	343	 80% 10% • 9%
1	D	343	 2% 80% 10% • 10%

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 10809 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 cAMP and cAMP-inhibited cGMP 3',5'-cyclic phosphodiesterase 10A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	313	Total 2541	C 1624	N 432	O 461	S 24	0	0	0
1	B	315	Total 2559	C 1635	N 437	O 463	S 24	0	1	0
1	C	313	Total 2549	C 1629	N 435	O 461	S 24	0	1	0
1	D	310	Total 2519	C 1612	N 429	O 454	S 24	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	447	GLY	-	expression tag	UNP Q9Y233
A	448	SER	-	expression tag	UNP Q9Y233
B	447	GLY	-	expression tag	UNP Q9Y233
B	448	SER	-	expression tag	UNP Q9Y233
C	447	GLY	-	expression tag	UNP Q9Y233
C	448	SER	-	expression tag	UNP Q9Y233
D	447	GLY	-	expression tag	UNP Q9Y233
D	448	SER	-	expression tag	UNP Q9Y233

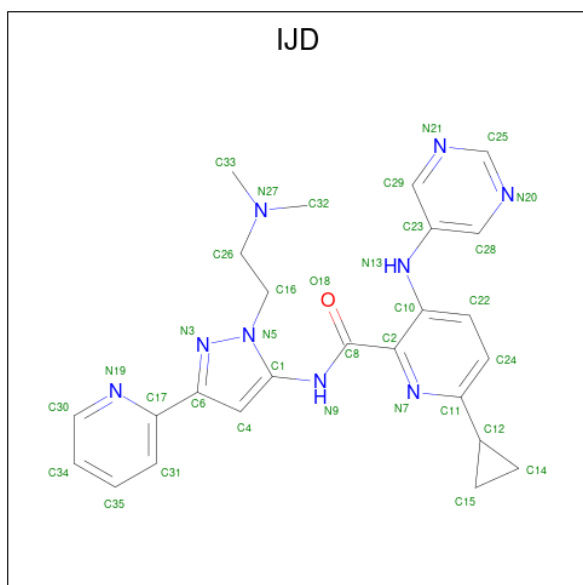
- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total 1	Zn 1	0	0
2	B	1	Total 1	Zn 1	0	0
2	C	1	Total 1	Zn 1	0	0
2	D	1	Total 1	Zn 1	0	0

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Mg 1 1	0	0
3	B	1	Total Mg 1 1	0	0
3	C	1	Total Mg 1 1	0	0
3	D	1	Total Mg 1 1	0	0

- Molecule 4 is 6-cyclopropyl-N-{1-[2-(dimethylamino)ethyl]-3-(pyridin-2-yl)-1H-pyrazol-5-yl}-3-[(pyrimidin-5-yl)amino]pyridine-2-carboxamide (three-letter code: IJD) (formula: C<sub>25</sub>H<sub>27</sub>N<sub>9</sub>O) (labeled as "Ligand of Interest" by depositor).

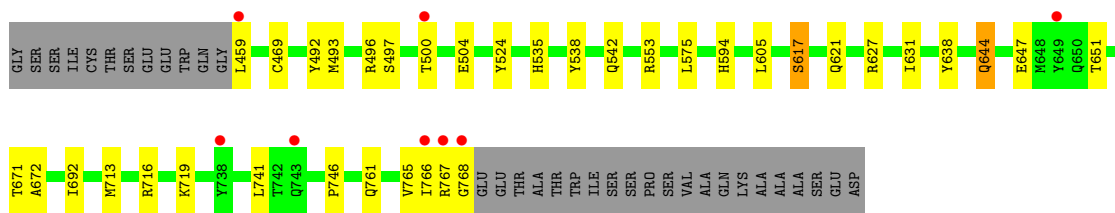


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C N O 35 25 9 1	0	0
4	B	1	Total C N O 35 25 9 1	0	0
4	C	1	Total C N O 35 25 9 1	0	0
4	D	1	Total C N O 35 25 9 1	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	131	Total 131	O 131	0	0
5	B	140	Total 140	O 140	0	0
5	C	140	Total 140	O 140	0	0
5	D	82	Total 82	O 82	0	0





## 4 Data and refinement statistics

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	134.65Å 134.65Å 234.10Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	43.31 – 2.25 43.31 – 2.25	Depositor EDS
% Data completeness (in resolution range)	96.8 (43.31-2.25) 96.8 (43.31-2.25)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.28 (at 2.24Å)	Xtrriage
Refinement program	REFMAC 5.8.0258	Depositor
R, $R_{free}$	0.185 , 0.234 0.190 , 0.235	Depositor DCC
$R_{free}$ test set	3739 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	34.4	Xtrriage
Anisotropy	0.177	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 34.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.46$ , $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	0.070 for h,-h-k,-l	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	10809	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	44.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.52% 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: CME, MG, ZN, IJD

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	0.67	0/2592	0.76	0/3507
1	B	0.66	0/2613	0.77	0/3535
1	C	0.66	0/2603	0.77	0/3521
1	D	0.70	0/2570	0.76	0/3478
All	All	0.67	0/10378	0.77	0/14041

There are no bond length outliers.

There are no bond angle outliers.

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	2541	0	2511	22	0
1	B	2559	0	2528	27	0
1	C	2549	0	2524	22	0
1	D	2519	0	2496	24	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
4	A	35	0	0	2	0
4	B	35	0	0	3	0
4	C	35	0	0	3	0
4	D	35	0	0	2	0
5	A	131	0	0	0	0
5	B	140	0	0	4	0
5	C	140	0	0	4	0
5	D	82	0	0	2	0
All	All	10809	0	10059	100	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 5.

All (100) 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:461:GLN:HE21	1:A:461:GLN:HA	1.42	0.84
4:B:803:IJD:C32	4:B:803:IJD:C14	2.57	0.83
1:A:461:GLN:HE22	1:A:500:THR:HG22	1.45	0.81
1:B:470:LYS:HE2	1:D:746:PRO:HG3	1.65	0.77
1:C:469:CYS:SG	5:C:1018:HOH:O	2.43	0.75
1:A:461:GLN:HA	1:A:461:GLN:NE2	2.00	0.75
1:A:602:ILE:HA	1:A:605:LEU:HD22	1.73	0.70
4:C:803:IJD:C29	4:C:803:IJD:C22	2.67	0.70
1:D:469:CYS:SG	5:D:979:HOH:O	2.52	0.68
1:C:568:ARG:NH1	5:C:901:HOH:O	2.28	0.67
4:A:803:IJD:C22	4:A:803:IJD:C29	2.73	0.65
4:B:803:IJD:C29	4:B:803:IJD:C22	2.75	0.63
1:B:727:LEU:HD12	1:B:766:ILE:CD1	2.28	0.62
1:C:700:GLY:HA3	1:C:714:MET:O	2.01	0.60
1:B:724:GLN:NE2	5:B:902:HOH:O	2.23	0.58
1:D:524:TYR:CD2	1:D:692:ILE:HD13	2.38	0.58
1:D:493:MET:O	1:D:497:SER:HB2	2.03	0.57
1:A:675:LEU:O	1:A:678:VAL:HG22	2.03	0.57
4:D:803:IJD:C22	4:D:803:IJD:C29	2.82	0.57
1:C:553:ARG:NH1	5:C:903:HOH:O	2.37	0.57
4:B:803:IJD:C28	5:B:906:HOH:O	2.55	0.55
1:B:492:TYR:OH	5:B:901:HOH:O	2.10	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:727:LEU:HD12	1:B:766:ILE:HD13	1.89	0.54
1:C:524:TYR:CD2	1:C:692:ILE:HD13	2.43	0.54
1:D:766:ILE:HG22	1:D:766:ILE:O	2.08	0.54
1:D:594:HIS:ND1	5:D:902:HOH:O	2.34	0.53
1:B:727:LEU:HD23	1:B:759:LEU:HD11	1.92	0.52
1:C:602:ILE:HA	1:C:605:LEU:HD22	1.92	0.52
1:D:644:GLN:HE21	1:D:644:GLN:HA	1.75	0.52
1:C:497:SER:HA	1:C:542:GLN:HE22	1.76	0.51
1:A:749:GLU:N	1:A:750:PRO:CD	2.74	0.51
1:A:461:GLN:NE2	1:A:500:THR:HG22	2.20	0.51
1:B:752:LEU:HD21	1:B:756[B]:ARG:NH2	2.26	0.50
1:A:493:MET:O	1:A:497:SER:HB2	2.12	0.50
1:D:493:MET:SD	1:D:535:HIS:HA	2.52	0.50
1:D:767:ARG:HG3	1:D:768:GLY:H	1.77	0.50
1:D:497:SER:HA	1:D:542:GLN:NE2	2.28	0.49
1:A:461:GLN:HE21	1:A:461:GLN:CA	2.19	0.49
1:A:492:TYR:CZ	1:A:496:ARG:HD2	2.48	0.49
1:D:638:TYR:CD1	1:D:671:THR:HG21	2.48	0.49
1:B:498:CYS:O	1:B:502:CYS:SG	2.71	0.48
1:A:549:THR:OG1	1:A:552:GLU:HG3	2.12	0.48
1:D:761:GLN:O	1:D:765:VAL:HG23	2.14	0.47
1:A:682:TRP:N	1:A:683:PRO:CD	2.77	0.47
1:B:470:LYS:HE2	1:D:746:PRO:CG	2.40	0.47
1:C:467:ARG:O	1:C:471:GLU:HB2	2.15	0.47
1:B:703:MET:HE1	1:B:708:ILE:HG21	1.96	0.47
1:C:638:TYR:CD1	1:C:671:THR:HG21	2.50	0.47
1:C:740:THR:HA	1:C:743:GLN:HE21	1.80	0.46
1:A:462:PHE:CE1	1:A:491:VAL:HG11	2.51	0.46
1:D:492:TYR:CZ	1:D:496:ARG:HD2	2.50	0.46
1:A:713:MET:HE1	4:A:803:IJD:C26	2.46	0.46
1:B:493:MET:O	1:B:497:SER:HB2	2.16	0.46
1:B:697:TRP:CZ2	1:B:719:LYS:HG2	2.52	0.45
1:C:551:LEU:HD23	1:C:551:LEU:HA	1.86	0.45
1:C:693:TYR:OH	4:C:803:IJD:N19	2.50	0.45
1:D:627:ARG:O	1:D:631:ILE:HG12	2.17	0.45
1:A:722:VAL:HB	1:A:723:PRO:HD3	1.98	0.45
1:C:727:LEU:HD21	1:C:763:GLU:HG3	1.98	0.45
1:C:730:TYR:HA	1:C:734:ALA:HB3	2.00	0.44
1:A:461:GLN:HE22	1:A:500:THR:CG2	2.25	0.44
1:D:647:GLU:O	1:D:651:THR:HG23	2.18	0.44
1:B:730:TYR:HA	1:B:734:ALA:HB3	1.98	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:727:LEU:CD2	1:B:759:LEU:HD11	2.47	0.44
1:C:493:MET:HB3	1:C:538:TYR:CD1	2.53	0.43
1:B:727:LEU:HD22	1:B:731:ASN:HD21	1.84	0.43
1:B:507:LYS:NZ	5:B:914:HOH:O	2.52	0.43
1:B:467:ARG:O	1:B:471:GLU:HB2	2.19	0.42
1:B:770:GLU:HG3	1:B:771:THR:N	2.34	0.42
1:B:492:TYR:CZ	1:B:496:ARG:HD2	2.54	0.42
1:D:497:SER:HA	1:D:542:GLN:HE22	1.84	0.42
1:D:672:ALA:CB	1:D:741:LEU:HD22	2.49	0.42
1:B:746:PRO:N	1:B:747:PRO:CD	2.82	0.42
1:C:497:SER:HA	1:C:542:GLN:NE2	2.33	0.42
1:C:646:GLU:HG2	5:C:995:HOH:O	2.19	0.42
1:C:497:SER:OG	1:C:557:LEU:HD11	2.19	0.42
1:B:638:TYR:CD1	1:B:671:THR:HG21	2.54	0.42
1:B:700:GLY:HA3	1:B:714:MET:O	2.19	0.42
4:C:803:IJD:O18	4:C:803:IJD:N13	2.52	0.42
1:A:486:TRP:N	1:A:487:PRO:CD	2.83	0.42
1:A:627:ARG:O	1:A:631:ILE:HG12	2.20	0.42
1:A:658:ASN:O	1:A:661:HIS:HB2	2.20	0.41
1:B:470:LYS:HG3	1:B:471:GLU:N	2.35	0.41
1:D:497:SER:O	1:D:553:ARG:HD2	2.19	0.41
1:D:535:HIS:O	1:D:538:TYR:HB3	2.21	0.41
1:B:535:HIS:O	1:B:538:TYR:HB3	2.21	0.41
1:D:617:SER:O	1:D:621:GLN:HB2	2.20	0.41
1:D:716:ARG:O	1:D:719:LYS:HG3	2.21	0.41
1:A:541:LEU:HD22	1:A:553:ARG:HG2	2.02	0.41
1:B:727:LEU:HD22	1:B:731:ASN:ND2	2.35	0.41
1:C:493:MET:SD	1:C:535:HIS:HA	2.60	0.41
1:C:735:ILE:HB	1:C:736:PRO:HD3	2.02	0.41
1:C:740:THR:HA	1:C:743:GLN:NE2	2.34	0.41
1:B:761:GLN:O	1:B:765:VAL:HG23	2.20	0.41
1:D:713:MET:HG3	4:D:803:IJD:C4	2.51	0.41
1:A:510:ARG:HG2	1:A:608:HIS:CE1	2.56	0.40
1:A:735:ILE:HB	1:A:736:PRO:HD3	2.03	0.40
1:D:766:ILE:O	1:D:766:ILE:CG2	2.68	0.40
1:C:749:GLU:N	1:C:750:PRO:CD	2.85	0.40
1:B:619:TYR:O	1:B:622:VAL:HG12	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	310/343 (90%)	303 (98%)	7 (2%)	0	100	100
1	B	313/343 (91%)	300 (96%)	13 (4%)	0	100	100
1	C	311/343 (91%)	305 (98%)	6 (2%)	0	100	100
1	D	307/343 (90%)	297 (97%)	10 (3%)	0	100	100
All	All	1241/1372 (90%)	1205 (97%)	36 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	281/305 (92%)	275 (98%)	6 (2%)	48	57
1	B	282/305 (92%)	268 (95%)	14 (5%)	20	22
1	C	282/305 (92%)	270 (96%)	12 (4%)	25	28
1	D	279/305 (92%)	272 (98%)	7 (2%)	42	52
All	All	1124/1220 (92%)	1085 (96%)	39 (4%)	31	38

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	461	GLN
1	A	471	GLU

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Mol	Chain	Res	Type
1	A	497	SER
1	A	504	GLU
1	A	575	LEU
1	A	605	LEU
1	B	459	LEU
1	B	471	GLU
1	B	504	GLU
1	B	547	LEU
1	B	573	SER
1	B	575	LEU
1	B	576	GLN
1	B	587	SER
1	B	597	SER
1	B	605	LEU
1	B	606	GLU
1	B	613	THR
1	B	650	GLN
1	B	727	LEU
1	C	463	THR
1	C	471	GLU
1	C	504	GLU
1	C	517	LYS
1	C	575	LEU
1	C	576	GLN
1	C	605	LEU
1	C	617	SER
1	C	638	TYR
1	C	727	LEU
1	C	749	GLU
1	C	760	SER
1	D	459	LEU
1	D	500	THR
1	D	504	GLU
1	D	575	LEU
1	D	605	LEU
1	D	617	SER
1	D	644	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	461	GLN

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Mol	Chain	Res	Type
1	A	484	ASN
1	A	604	GLN
1	A	743	GLN
1	B	484	ASN
1	B	542	GLN
1	B	604	GLN
1	B	731	ASN
1	C	542	GLN
1	C	604	GLN
1	C	743	GLN
1	D	476	HIS
1	D	484	ASN
1	D	542	GLN
1	D	604	GLN
1	D	644	GLN
1	D	731	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

4 non-standard protein/DNA/RNA residues 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	$\# Z  > 2$
1	CME	D	509	1	8,9,10	0.46	0	6,9,11	0.71	0
1	CME	A	509	1	8,9,10	0.59	0	6,9,11	0.85	0
1	CME	B	509	1	8,9,10	0.32	0	6,9,11	0.85	0
1	CME	C	509	1	8,9,10	0.58	0	6,9,11	0.92	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the

Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	CME	D	509	1	-	1/5/8/10	-
1	CME	A	509	1	-	1/5/8/10	-
1	CME	B	509	1	-	1/5/8/10	-
1	CME	C	509	1	-	2/5/8/10	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	B	509	CME	SD-CE-CZ-OH
1	C	509	CME	CE-SD-SG-CB
1	D	509	CME	SD-CE-CZ-OH
1	A	509	CME	CZ-CE-SD-SG
1	C	509	CME	CZ-CE-SD-SG

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 8 are monoatomic - leaving 4 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	IJD	C	803	-	36,39,39	0.88	0	45,54,54	2.09	13 (28%)
4	IJD	A	803	-	36,39,39	0.90	1 (2%)	45,54,54	2.05	14 (31%)
4	IJD	D	803	-	36,39,39	0.97	0	45,54,54	1.98	11 (24%)
4	IJD	B	803	-	36,39,39	0.99	1 (2%)	45,54,54	2.16	13 (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
4	IJD	C	803	-	-	1/23/27/27	0/5/5/5
4	IJD	A	803	-	-	3/23/27/27	0/5/5/5
4	IJD	D	803	-	-	2/23/27/27	0/5/5/5
4	IJD	B	803	-	-	2/23/27/27	0/5/5/5

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	803	IJD	C4-C6	2.14	1.43	1.40
4	A	803	IJD	C6-N3	-2.04	1.31	1.34

All (51) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	803	IJD	C29-N21-C25	6.78	123.80	115.80
4	C	803	IJD	N9-C1-N5	6.20	126.04	118.84
4	D	803	IJD	C2-C8-N9	5.99	120.04	113.99
4	A	803	IJD	N9-C1-N5	5.98	125.78	118.84
4	D	803	IJD	C29-N21-C25	5.54	122.34	115.80
4	C	803	IJD	C29-N21-C25	5.09	121.81	115.80
4	B	803	IJD	C2-C8-N9	4.80	118.83	113.99
4	A	803	IJD	C29-N21-C25	4.51	121.13	115.80
4	B	803	IJD	C26-C16-N5	4.43	118.83	111.11
4	A	803	IJD	C30-N19-C17	4.38	123.37	117.24
4	B	803	IJD	N9-C1-N5	4.14	123.65	118.84
4	C	803	IJD	C4-C1-N9	-4.00	125.59	131.11
4	D	803	IJD	N9-C1-N5	3.90	123.38	118.84
4	D	803	IJD	C30-N19-C17	3.87	122.66	117.24
4	A	803	IJD	C4-C1-N9	-3.78	125.90	131.11

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	803	IJD	C26-C16-N5	3.70	117.57	111.11
4	D	803	IJD	C28-N20-C25	3.60	120.05	115.80
4	A	803	IJD	C28-N20-C25	3.49	119.92	115.80
4	B	803	IJD	C30-N19-C17	3.47	122.10	117.24
4	C	803	IJD	C8-C2-N7	3.36	119.31	116.02
4	A	803	IJD	C2-C8-N9	3.33	117.35	113.99
4	A	803	IJD	C26-C16-N5	3.27	116.82	111.11
4	C	803	IJD	C28-N20-C25	3.21	119.58	115.80
4	A	803	IJD	C24-C11-N7	-3.20	119.07	122.39
4	D	803	IJD	N21-C25-N20	-3.20	121.13	126.73
4	B	803	IJD	C23-C29-N21	-3.19	117.03	123.15
4	B	803	IJD	N21-C25-N20	-3.09	121.33	126.73
4	A	803	IJD	C8-C2-N7	2.92	118.88	116.02
4	C	803	IJD	C6-C17-N19	2.84	121.65	116.77
4	B	803	IJD	C6-C17-N19	2.81	121.60	116.77
4	B	803	IJD	C8-C2-N7	2.80	118.76	116.02
4	D	803	IJD	C6-C17-N19	2.73	121.46	116.77
4	C	803	IJD	C24-C11-N7	-2.68	119.62	122.39
4	A	803	IJD	C34-C30-N19	-2.67	119.20	123.42
4	B	803	IJD	C24-C11-N7	-2.66	119.63	122.39
4	C	803	IJD	C23-C29-N21	-2.63	118.11	123.15
4	B	803	IJD	C28-N20-C25	2.57	118.83	115.80
4	C	803	IJD	C17-C6-N3	2.54	125.07	120.88
4	D	803	IJD	C23-C29-N21	-2.49	118.37	123.15
4	C	803	IJD	C2-C8-N9	2.46	116.48	113.99
4	C	803	IJD	N21-C25-N20	-2.46	122.42	126.73
4	A	803	IJD	N21-C25-N20	-2.31	122.69	126.73
4	A	803	IJD	C23-C29-N21	-2.28	118.77	123.15
4	C	803	IJD	C30-N19-C17	2.23	120.35	117.24
4	A	803	IJD	C6-C17-N19	2.22	120.58	116.77
4	D	803	IJD	O18-C8-N9	-2.20	118.17	123.75
4	B	803	IJD	O18-C8-N9	-2.15	118.29	123.75
4	A	803	IJD	C23-C28-N20	-2.15	119.03	123.15
4	D	803	IJD	C24-C11-N7	-2.14	120.18	122.39
4	D	803	IJD	C8-C2-N7	2.03	118.01	116.02
4	B	803	IJD	C31-C17-N19	-2.01	119.25	122.24

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	803	IJD	N7-C11-C12-C15

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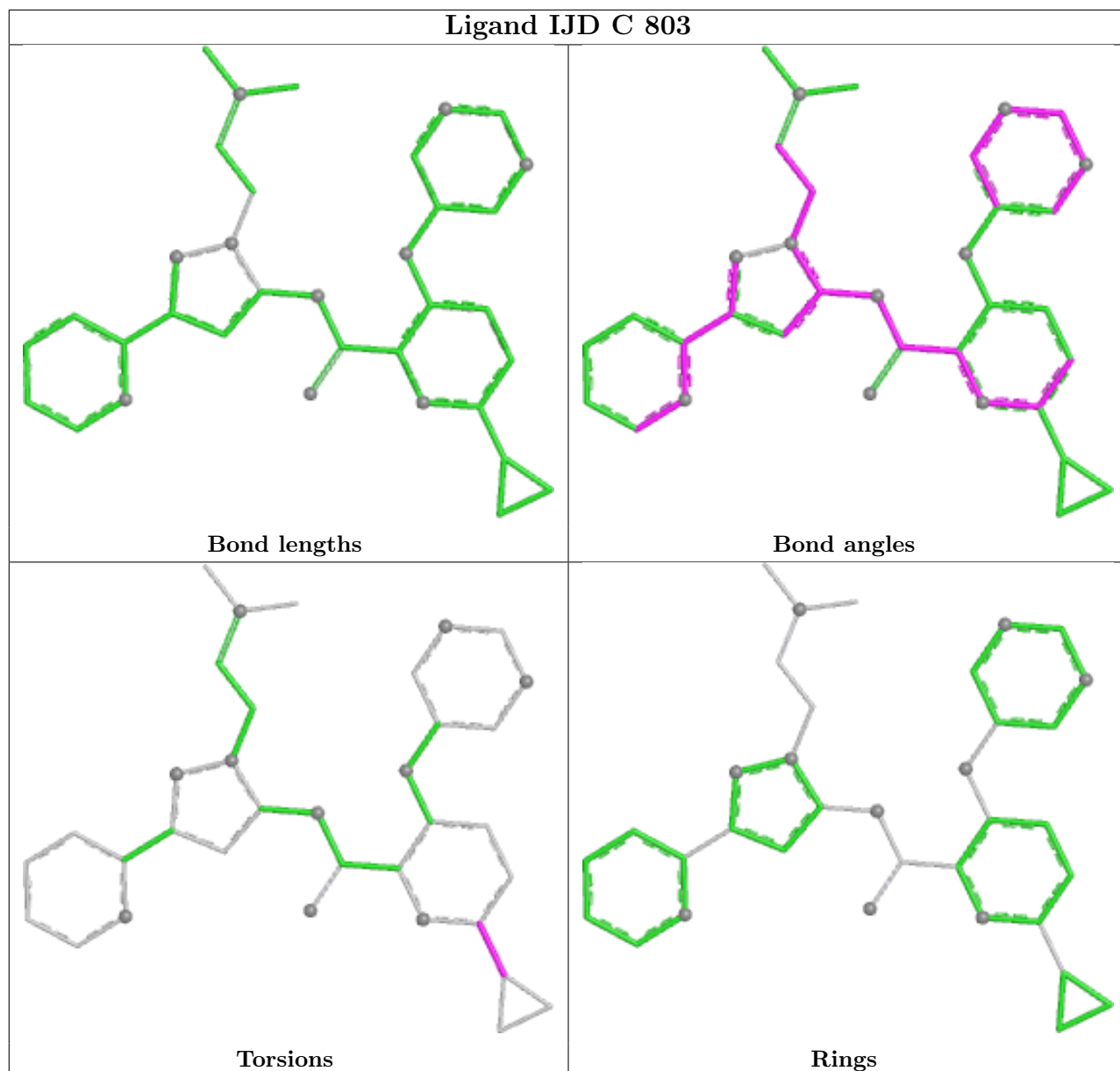
Mol	Chain	Res	Type	Atoms
4	C	803	IJD	N7-C11-C12-C15
4	D	803	IJD	N7-C11-C12-C15
4	D	803	IJD	N5-C16-C26-N27
4	B	803	IJD	C24-C11-C12-C14
4	A	803	IJD	N7-C11-C12-C15
4	A	803	IJD	N7-C11-C12-C14
4	A	803	IJD	C24-C11-C12-C14

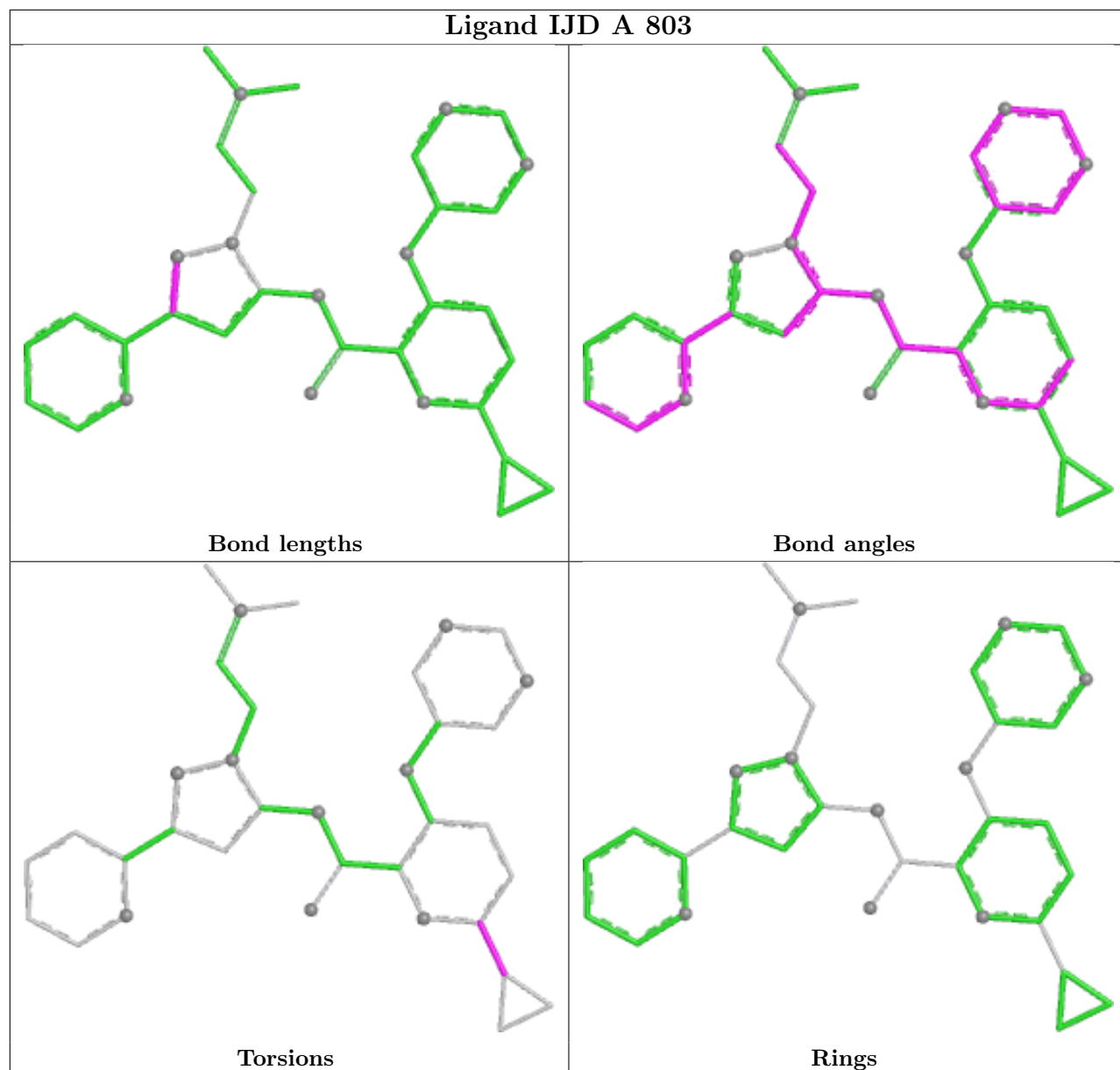
There are no ring outliers.

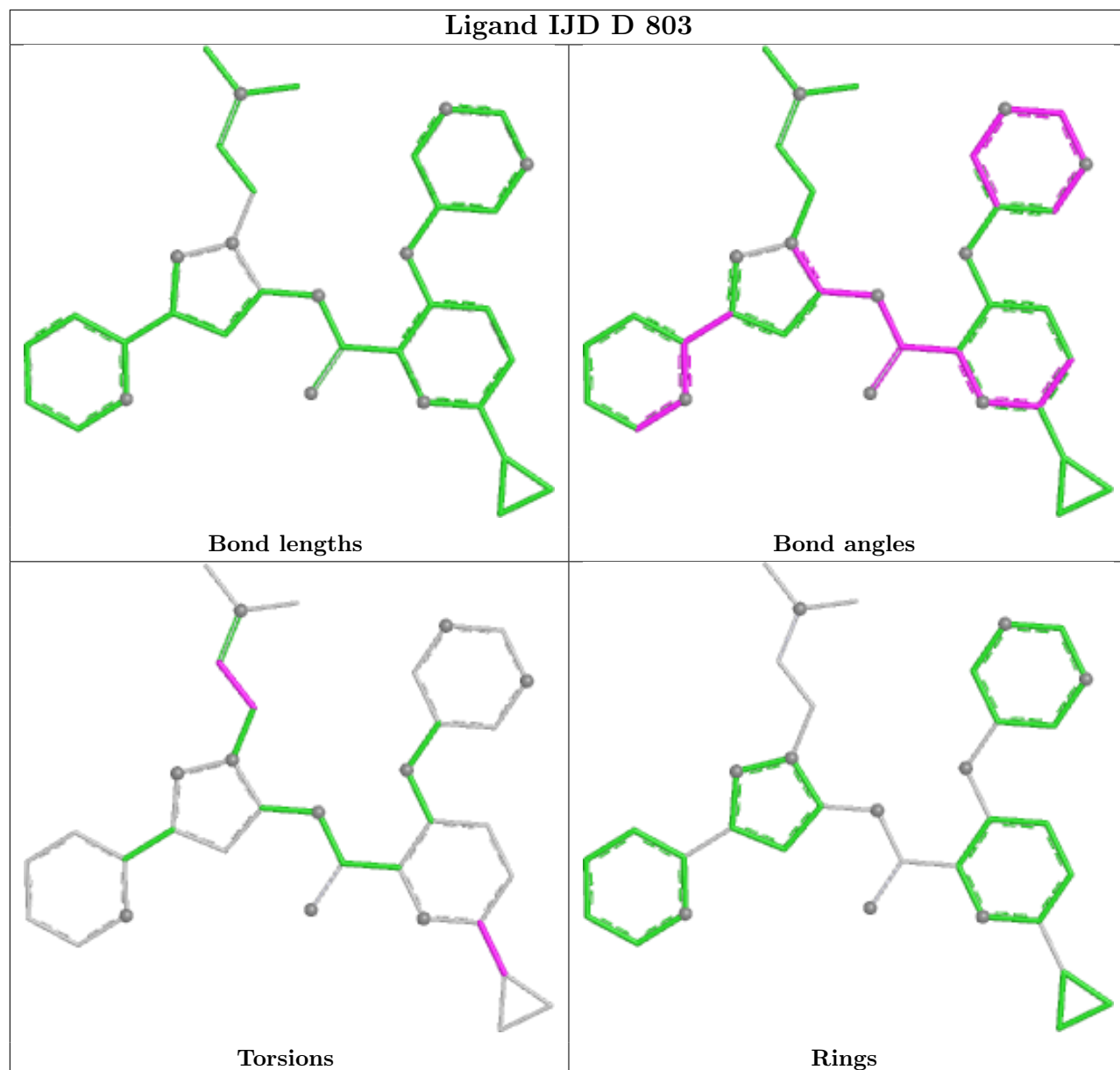
4 monomers are involved in 10 short contacts:

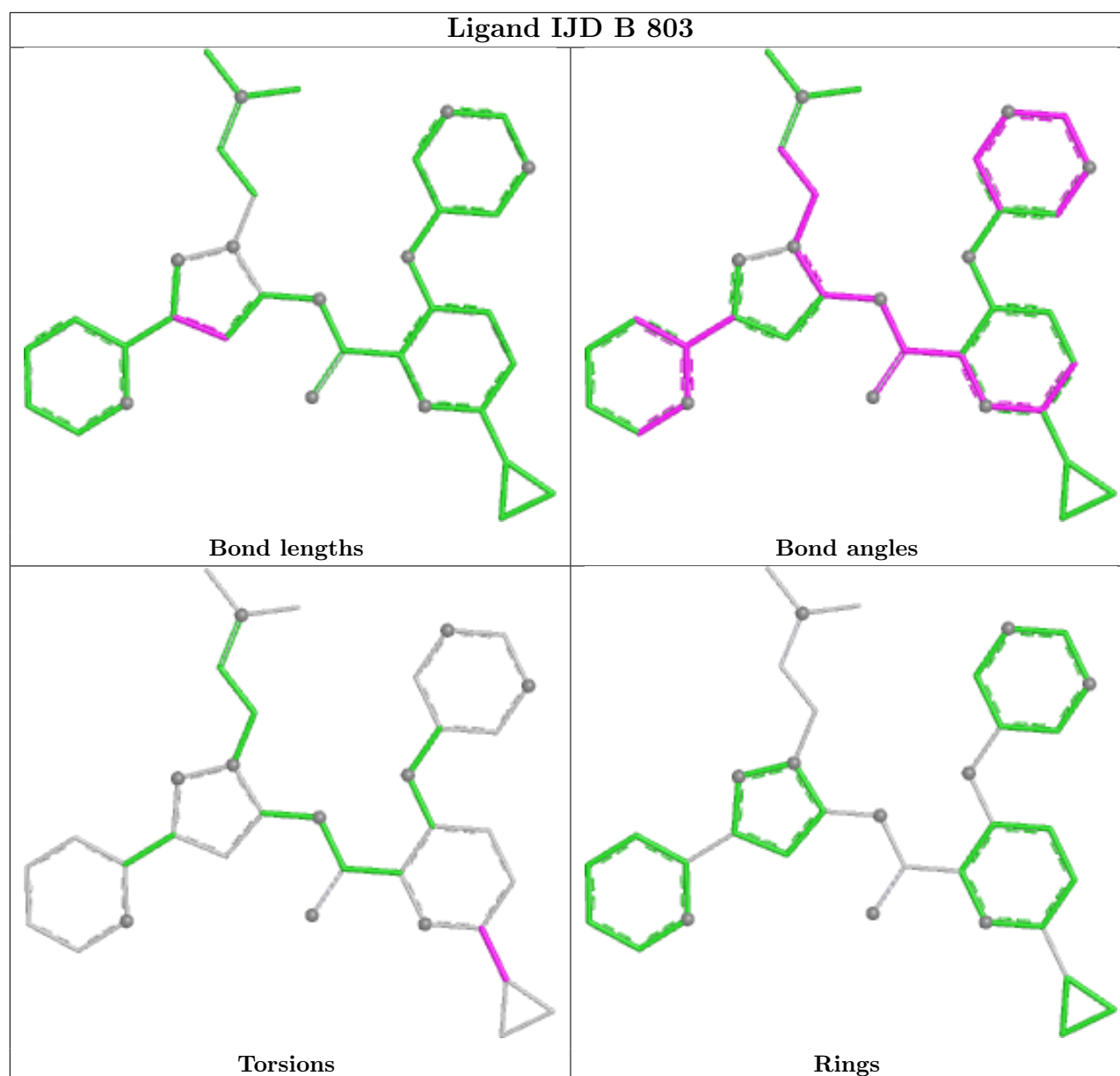
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	803	IJD	3	0
4	A	803	IJD	2	0
4	D	803	IJD	2	0
4	B	803	IJD	3	0

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 [\(i\)](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<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	312/343 (90%)	-0.20	5 (1%) 70 71	25, 37, 67, 100	0
1	B	314/343 (91%)	-0.07	12 (3%) 44 45	23, 37, 69, 123	1 (0%)
1	C	312/343 (90%)	-0.24	4 (1%) 74 76	24, 38, 61, 90	1 (0%)
1	D	309/343 (90%)	0.21	8 (2%) 57 58	36, 51, 74, 103	0
All	All	1247/1372 (90%)	-0.07	29 (2%) 61 61	23, 41, 69, 123	2 (0%)

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	459	LEU	4.9
1	B	771	THR	3.9
1	B	768	GLY	3.8
1	B	484	ASN	3.5
1	A	459	LEU	3.4
1	C	460	MET	3.2
1	D	768	GLY	3.2
1	B	770	GLU	3.1
1	B	460	MET	3.1
1	B	458	GLY	3.0
1	B	613	THR	2.8
1	C	458	GLY	2.8
1	B	724	GLN	2.8
1	B	462	PHE	2.8
1	B	769	GLU	2.7
1	B	457	GLN	2.6
1	A	462	PHE	2.5
1	D	649	TYR	2.4
1	D	743	GLN	2.4
1	C	459	LEU	2.4
1	C	462	PHE	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	458	GLY	2.3
1	A	770	GLU	2.2
1	D	767	ARG	2.2
1	D	500	THR	2.1
1	A	643	LYS	2.1
1	D	738	TYR	2.1
1	D	766	ILE	2.1
1	B	459	LEU	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [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, 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
1	CME	D	509	10/11	0.86	0.14	53,68,92,92	0
1	CME	B	509	10/11	0.87	0.19	37,47,74,76	0
1	CME	A	509	10/11	0.91	0.13	44,55,77,79	0
1	CME	C	509	10/11	0.92	0.12	40,48,84,89	0

## 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, 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.

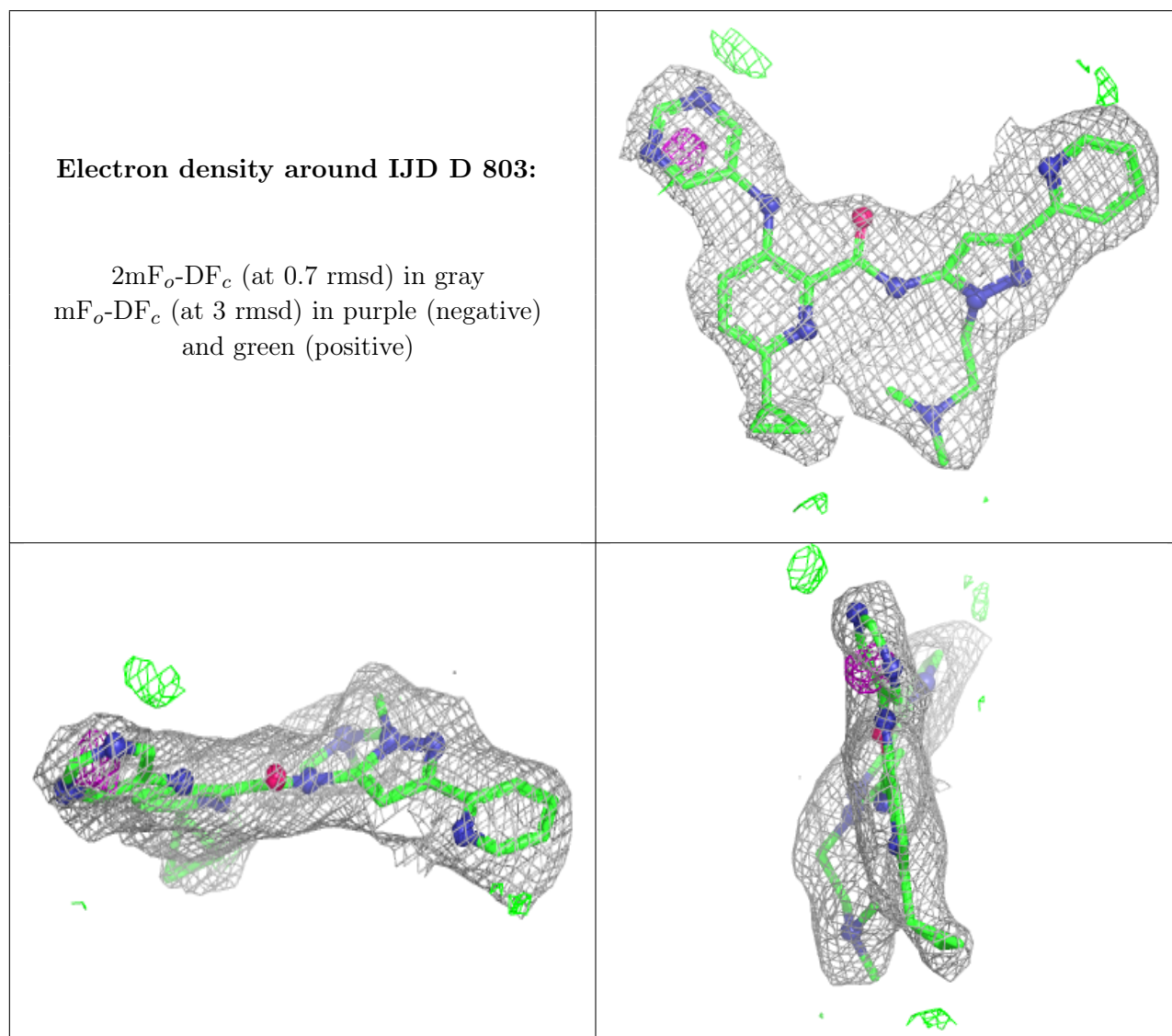
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	IJD	D	803	35/35	0.86	0.13	54,58,67,72	0
4	IJD	B	803	35/35	0.88	0.12	41,49,61,67	0
4	IJD	C	803	35/35	0.90	0.11	38,50,61,69	0
4	IJD	A	803	35/35	0.94	0.09	37,40,51,53	0
3	MG	C	802	1/1	0.99	0.03	25,25,25,25	0
3	MG	D	802	1/1	0.99	0.02	38,38,38,38	0

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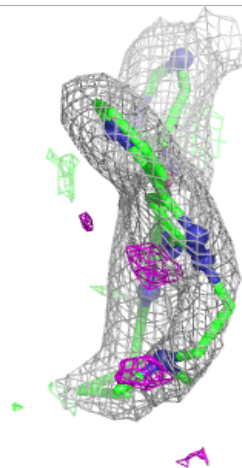
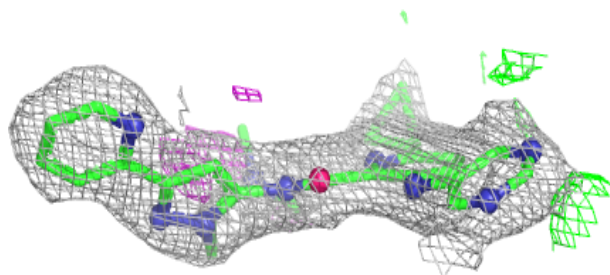
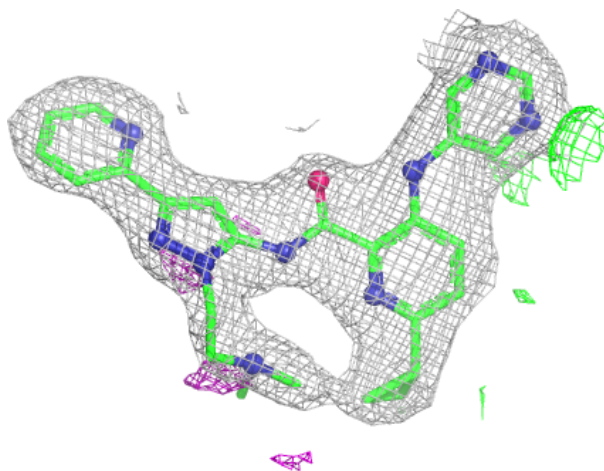
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	MG	B	802	1/1	0.99	0.03	20,20,20,20	0
2	ZN	C	801	1/1	1.00	0.01	31,31,31,31	0
2	ZN	D	801	1/1	1.00	0.01	45,45,45,45	0
3	MG	A	802	1/1	1.00	0.03	22,22,22,22	0
2	ZN	A	801	1/1	1.00	0.01	33,33,33,33	0
2	ZN	B	801	1/1	1.00	0.01	32,32,32,32	0

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.



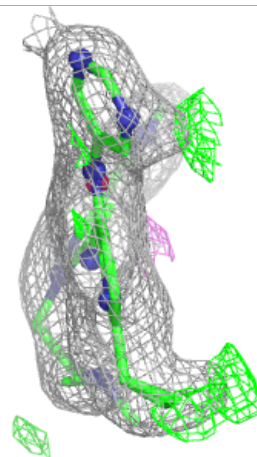
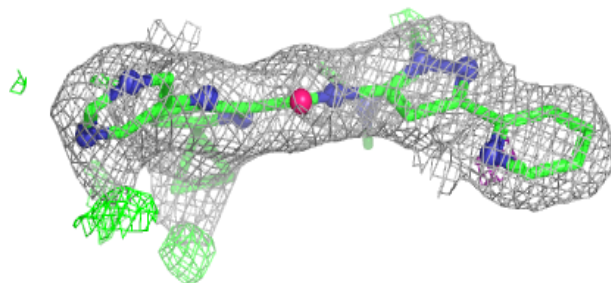
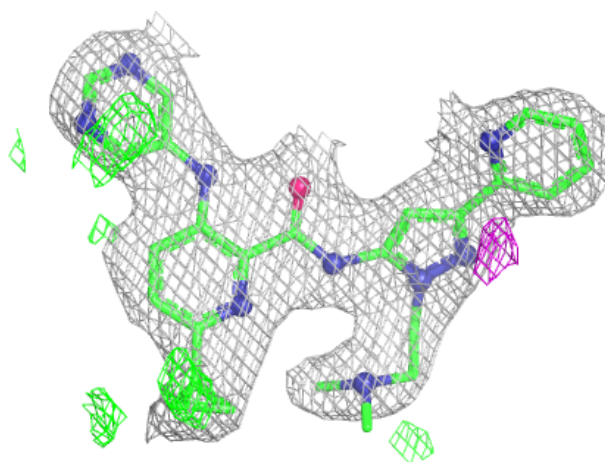
**Electron density around IJD B 803:**

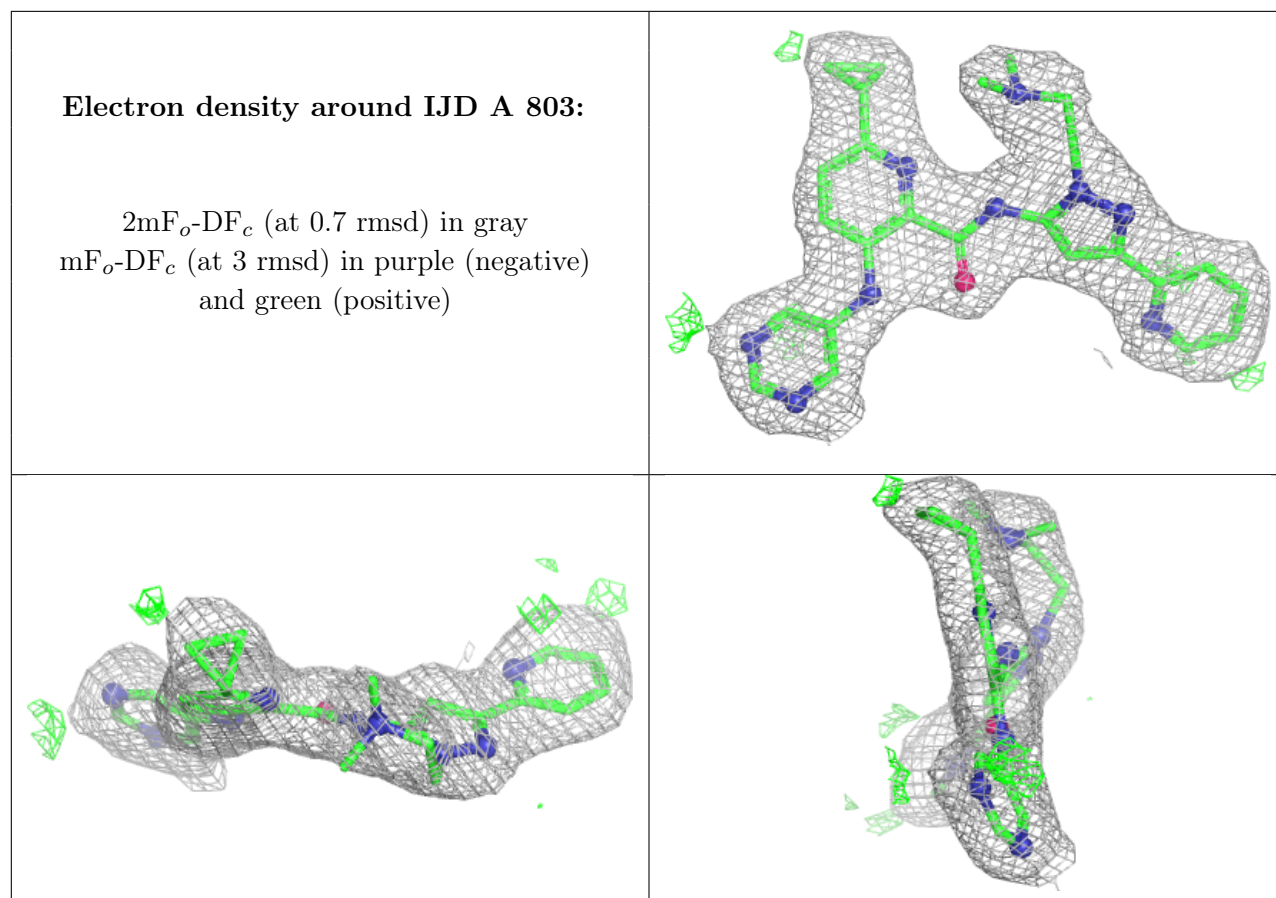
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around IJD C 803:**

$2mF_o-DF_c$  (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.