



Full wwPDB X-ray Structure Validation Report ⓘ

May 16, 2020 – 05:31 am BST

PDB ID : 6MGR
Title : Crystal Structure of the Catalytic Domain of the Inosine Monophosphate Dehydrogenase from *Campylobacter jejuni* in the complex with inhibitor Oxanosine monophosphate
Authors : Kim, Y.; Maltseva, N.; Yu, R.; Hedstrom, L.; Joachimiak, A.; Center for Structural Genomics of Infectious Diseases (CSGID)
Deposited on : 2018-09-14
Resolution : 1.97 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 ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) 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	:	2.11
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)	:	2.11

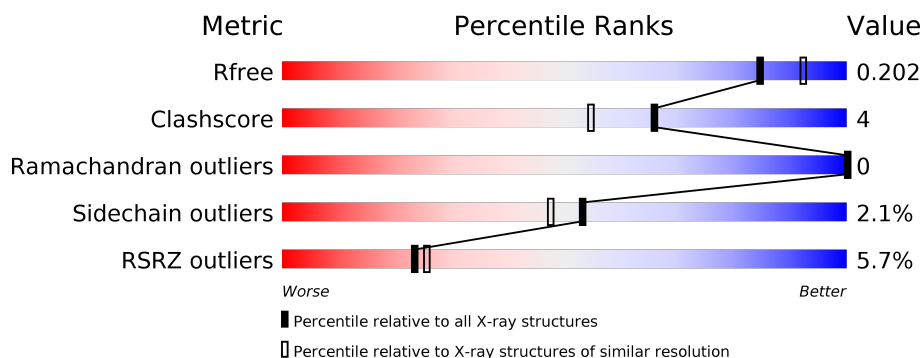
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.97 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	11647 (2.00-1.96)
Clashscore	141614	1014 (1.98-1.98)
Ramachandran outliers	138981	1006 (1.98-1.98)
Sidechain outliers	138945	1006 (1.98-1.98)
RSRZ outliers	127900	11410 (2.00-1.96)

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 on 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 $\leq 5\%$. 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	385	<div> <div>5%</div> <div> <div></div> <div>84%</div> <div>9%</div> <div>6%</div> </div> </div>
1	B	385	<div> <div>4%</div> <div> <div></div> <div>84%</div> <div>9%</div> <div>7%</div> </div> </div>
1	C	385	<div> <div>6%</div> <div> <div></div> <div>86%</div> <div>10%</div> <div></div> </div> </div>
1	D	385	<div> <div>6%</div> <div> <div></div> <div>86%</div> <div>7%</div> <div>6%</div> </div> </div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	MPD	A	508	-	-	-	X
5	MPD	C	509	-	-	-	X

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 11602 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.

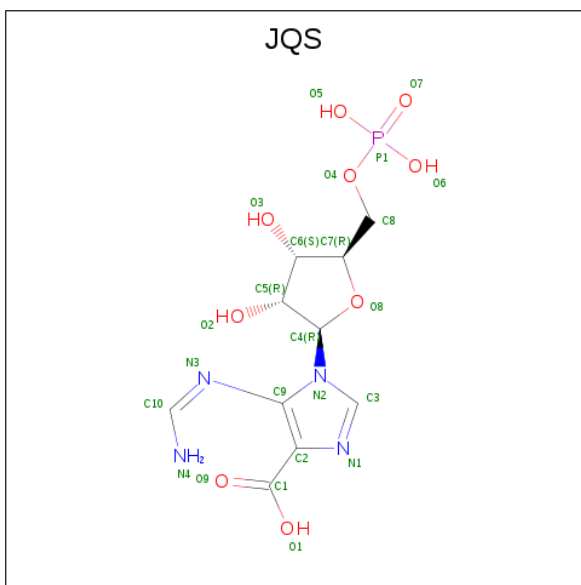
- Molecule 1 is a protein called Inosine monophosphate dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	361	Total	C	N	O	S	0	2	0
			2722	1716	481	511	14			
1	B	359	Total	C	N	O	S	0	4	0
			2721	1713	481	513	14			
1	C	369	Total	C	N	O	S	0	3	0
			2790	1750	496	530	14			
1	D	360	Total	C	N	O	S	0	3	0
			2721	1713	481	513	14			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	expression tag	UNP A0A2R4D3F6
A	-1	ASN	-	expression tag	UNP A0A2R4D3F6
A	0	ALA	-	expression tag	UNP A0A2R4D3F6
A	195	GLY	-	linker	UNP A0A2R4D3F6
B	-2	SER	-	expression tag	UNP A0A2R4D3F6
B	-1	ASN	-	expression tag	UNP A0A2R4D3F6
B	0	ALA	-	expression tag	UNP A0A2R4D3F6
B	195	GLY	-	linker	UNP A0A2R4D3F6
C	-2	SER	-	expression tag	UNP A0A2R4D3F6
C	-1	ASN	-	expression tag	UNP A0A2R4D3F6
C	0	ALA	-	expression tag	UNP A0A2R4D3F6
C	195	GLY	-	linker	UNP A0A2R4D3F6
D	-2	SER	-	expression tag	UNP A0A2R4D3F6
D	-1	ASN	-	expression tag	UNP A0A2R4D3F6
D	0	ALA	-	expression tag	UNP A0A2R4D3F6
D	195	GLY	-	linker	UNP A0A2R4D3F6

- Molecule 2 is 5-[(Z)-(aminomethylidene)amino]-1-(5-O-phosphono-beta-D-ribofuranosyl)-1H-imidazole-4-carboxylic acid (three-letter code: JQS) (formula: C₁₀H₁₅N₄O₉P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			24	10	4	9	1		
2	B	1	Total	C	N	O	P	0	0
			24	10	4	9	1		
2	C	1	Total	C	N	O	P	0	0
			24	10	4	9	1		
2	D	1	Total	C	N	O	P	0	0
			24	10	4	9	1		

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total O S 5 4 1	0	0
3	A	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	C	1	Total O S 5 4 1	0	0
3	C	1	Total O S 5 4 1	0	0
3	C	1	Total O S 5 4 1	0	0
3	C	1	Total O S 5 4 1	0	0
3	C	1	Total O S 5 4 1	0	0
3	D	1	Total O S 5 4 1	0	0
3	D	1	Total O S 5 4 1	0	0
3	D	1	Total O S 5 4 1	0	0
3	D	1	Total O S 5 4 1	0	0

- Molecule 4 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

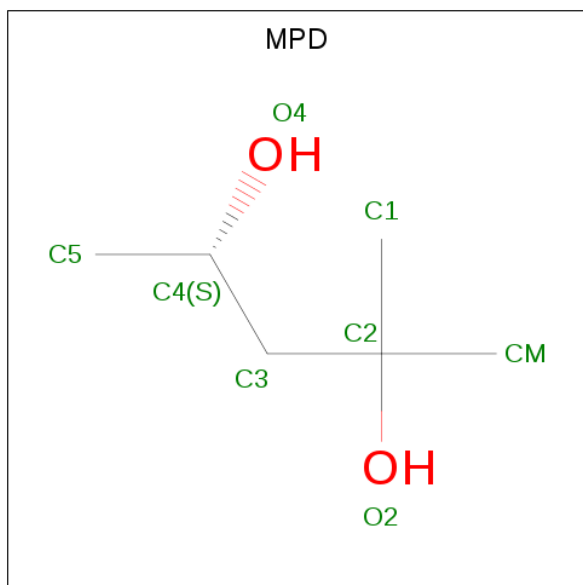
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total Cl 1 1	0	0
4	A	4	Total Cl 4 4	0	0
4	D	4	Total Cl 4 4	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	C	1	Total Cl 1 1	0	0

- Molecule 5 is (4S)-2-METHYL-2,4-PENTANEDIOL (three-letter code: MPD) (formula: $C_6H_{14}O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 8 6 2	0	0
5	B	1	Total C O 8 6 2	0	0
5	C	1	Total C O 8 6 2	0	0

- Molecule 6 is POTASSIUM ION (three-letter code: K) (formula: K).

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

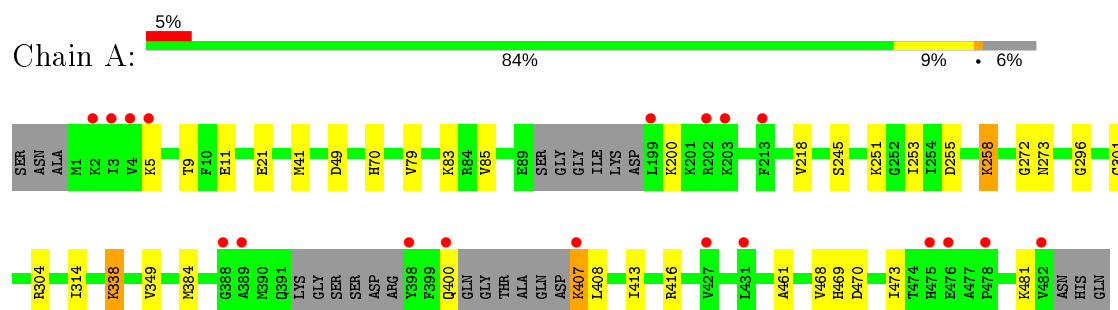
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	102	Total 102	O 102	0	0
7	B	111	Total 111	O 111	0	0
7	C	115	Total 115	O 115	0	0
7	D	100	Total 100	O 100	0	0

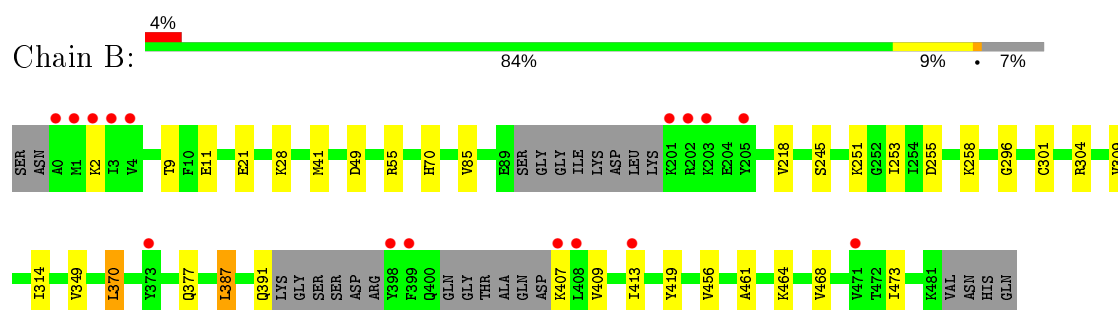
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

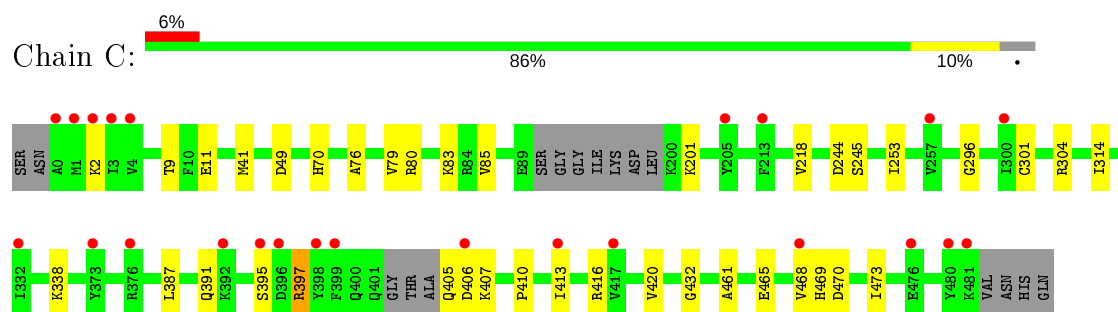
- Molecule 1: Inosine monophosphate dehydrogenase



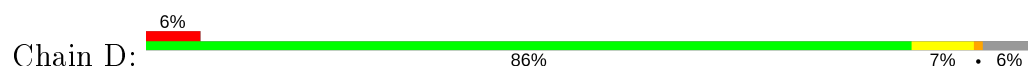
- Molecule 1: Inosine monophosphate dehydrogenase

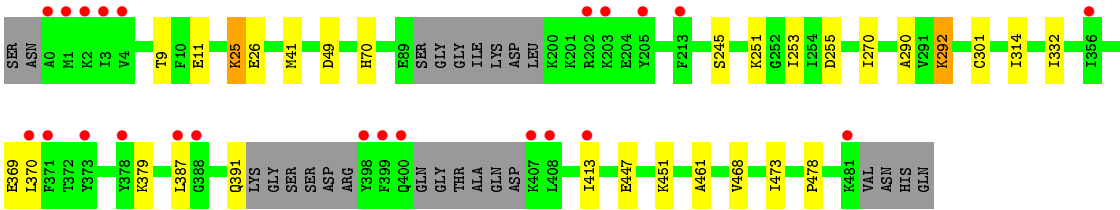


- Molecule 1: Inosine monophosphate dehydrogenase



- Molecule 1: Inosine monophosphate dehydrogenase





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	69.34Å 119.59Å 119.31Å 90.00° 89.99° 90.00°	Depositor
Resolution (Å)	45.28 – 1.97 45.28 – 1.97	Depositor EDS
% Data completeness (in resolution range)	97.4 (45.28-1.97) 97.5 (45.28-1.97)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.58 (at 1.97Å)	Xtriage
Refinement program	PHENIX (1.13_2998)	Depositor
R, R_{free}	0.173 , 0.202 0.173 , 0.202	Depositor DCC
R_{free} test set	6506 reflections (4.84%)	wwPDB-VP
Wilson B-factor (Å ²)	49.5	Xtriage
Anisotropy	0.368	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 45.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.399 for -h,-l,-k 0.389 for -h,l,k 0.437 for h,-k,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	11602	wwPDB-VP
Average B, all atoms (Å ²)	61.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.45% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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: SO4, MPD, JQS, K, CL

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	0.37	0/2758	0.52	0/3713
1	B	0.37	0/2757	0.52	0/3711
1	C	0.37	0/2827	0.52	0/3805
1	D	0.38	0/2757	0.54	0/3711
All	All	0.37	0/11099	0.53	0/14940

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	2722	0	2809	29	0
1	B	2721	0	2798	30	0
1	C	2790	0	2861	28	0
1	D	2721	0	2799	22	0
2	A	24	0	0	5	0
2	B	24	0	0	4	0
2	C	24	0	0	5	0
2	D	24	0	0	3	0
3	A	10	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	30	0	0	0	0
3	C	25	0	0	0	0
3	D	20	0	0	0	0
4	A	4	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	4	0	0	0	0
5	A	8	0	14	2	0
5	B	8	0	14	0	0
5	C	8	0	14	0	0
6	A	1	0	0	0	0
6	B	2	0	0	0	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
7	A	102	0	0	1	0
7	B	111	0	0	1	0
7	C	115	0	0	0	0
7	D	100	0	0	0	0
All	All	11602	0	11309	89	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 4.

All (89) 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:301:CYS:SG	2:C:502:JQS:C10	2.08	1.42
1:A:301:CYS:SG	2:A:501:JQS:C10	2.09	1.39
1:B:301:CYS:SG	2:B:502:JQS:C10	2.15	1.35
1:D:301:CYS:SG	2:D:502:JQS:C10	2.14	1.35
1:C:301:CYS:HG	2:C:502:JQS:C10	1.96	0.77
1:A:301:CYS:HB2	2:A:501:JQS:N3	2.04	0.72
1:B:301:CYS:HG	2:B:502:JQS:C10	2.04	0.66
1:C:387:LEU:O	1:C:391:GLN:HG2	1.97	0.64
1:A:251:LYS:HB2	1:B:21:GLU:HG2	1.80	0.63
1:A:413:ILE:HD13	1:B:473:ILE:HG12	1.80	0.62
1:C:301:CYS:HB2	2:C:502:JQS:N3	2.16	0.60
1:C:395:SER:O	1:C:397:ARG:NH1	2.35	0.59
1:A:301:CYS:CB	2:A:501:JQS:C10	2.80	0.59
1:C:301:CYS:CB	2:C:502:JQS:C10	2.79	0.59
1:A:49:ASP:HA	1:A:70:HIS:CD2	2.38	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:251:LYS:NZ	1:A:255:ASP:OD2	2.35	0.59
1:C:413:ILE:HD13	1:D:473:ILE:HG12	1.84	0.59
1:B:251:LYS:NZ	1:B:255:ASP:OD2	2.36	0.58
1:A:338:LYS:NZ	1:B:464:LYS:HE3	2.18	0.57
1:D:387:LEU:O	1:D:391:GLN:HG2	2.07	0.55
1:A:301:CYS:HG	2:A:501:JQS:C10	2.13	0.55
1:B:301:CYS:HB2	2:B:502:JQS:N3	2.21	0.55
1:D:301:CYS:HG	2:D:502:JQS:C10	2.15	0.54
1:D:49:ASP:HA	1:D:70:HIS:CD2	2.42	0.54
1:C:49:ASP:HA	1:C:70:HIS:CD2	2.43	0.53
1:C:85:VAL:HG11	1:C:218:VAL:HB	1.89	0.53
1:C:301:CYS:SG	2:C:502:JQS:N4	2.78	0.53
1:A:9:THR:HA	1:A:314:ILE:HB	1.92	0.52
1:B:413:ILE:HD13	1:C:473:ILE:HG12	1.90	0.52
1:D:245:SER:HB2	1:D:253:ILE:HD11	1.92	0.52
1:A:338:LYS:HZ3	1:B:464:LYS:HE3	1.74	0.51
1:A:461:ALA:HB1	1:D:11[A]:GLU:HB2	1.92	0.51
1:A:473:ILE:HG12	1:D:413:ILE:HD13	1.92	0.51
1:B:387:LEU:O	1:B:391:GLN:HG3	2.11	0.51
1:C:413:ILE:HG12	1:D:468:VAL:HG21	1.93	0.51
1:A:400:GLN:NE2	5:A:508:MPD:H52	2.26	0.50
1:A:258:LYS:HE3	7:A:639:HOH:O	2.11	0.50
1:B:301:CYS:CB	2:B:502:JQS:C10	2.90	0.49
1:C:9:THR:HA	1:C:314:ILE:HB	1.95	0.49
1:B:9:THR:HA	1:B:314:ILE:HB	1.94	0.49
1:B:370:LEU:HD21	1:B:419:TYR:CG	2.47	0.49
1:A:301:CYS:CB	2:A:501:JQS:N3	2.74	0.49
1:C:11[B]:GLU:HB2	1:D:461:ALA:HB1	1.94	0.48
1:D:301:CYS:HB2	2:D:502:JQS:N3	2.28	0.48
1:D:251:LYS:NZ	1:D:255:ASP:OD2	2.47	0.48
1:A:85:VAL:HG11	1:A:218:VAL:HB	1.96	0.47
1:B:2:LYS:HD2	1:B:2:LYS:HA	1.67	0.47
1:B:245:SER:HB2	1:B:253:ILE:HD11	1.96	0.47
1:A:245:SER:HB2	1:A:253:ILE:HD11	1.94	0.47
1:C:469:HIS:ND1	1:C:470:ASP:OD2	2.32	0.47
1:B:49:ASP:HA	1:B:70:HIS:CD2	2.50	0.47
1:A:79:VAL:O	1:A:83:LYS:HG2	2.14	0.46
1:B:9:THR:OG1	1:C:465:GLU:OE2	2.33	0.46
1:B:413:ILE:HG12	1:C:468:VAL:HG21	1.97	0.46
1:C:296:GLY:HA3	1:C:304:ARG:HG3	1.97	0.46
1:A:11[A]:GLU:HB2	1:B:461:ALA:HB1	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:469:HIS:ND1	1:A:470:ASP:OD2	2.37	0.46
1:B:85:VAL:HG11	1:B:218:VAL:HB	1.98	0.45
1:D:292:LYS:HG3	1:D:332:ILE:HB	1.97	0.45
1:A:21:GLU:HG2	1:D:251:LYS:HB2	1.97	0.45
1:A:413:ILE:HG12	1:B:468:VAL:HG21	1.99	0.45
1:C:387:LEU:HD11	1:C:407:LYS:HE3	1.99	0.45
1:C:76:ALA:O	1:C:80:ARG:HG3	2.17	0.45
1:D:387:LEU:HA	1:D:387:LEU:HD23	1.80	0.45
1:A:384:MET:HB2	5:A:508:MPD:HM1	1.99	0.44
1:C:405:GLN:HB3	1:C:406:ASP:H	1.46	0.44
1:B:258[B]:LYS:HE3	7:B:615:HOH:O	2.18	0.43
1:B:55:ARG:HD2	1:B:55:ARG:HA	1.90	0.43
1:D:370:LEU:HD23	1:D:379:LYS:HG3	2.00	0.43
1:A:407:LYS:HG3	1:A:408:LEU:N	2.33	0.43
1:B:11[B]:GLU:HB2	1:C:461:ALA:HB1	1.99	0.43
1:B:370:LEU:HD23	1:B:377:GLN:HB3	2.00	0.43
1:C:11[B]:GLU:CD	1:C:338:LYS:HZ1	2.18	0.43
1:C:79:VAL:HG12	1:C:83:LYS:HE2	2.01	0.43
1:B:387:LEU:HD13	1:B:387:LEU:HA	1.90	0.42
1:A:296:GLY:HA3	1:A:304:ARG:HG3	2.01	0.42
1:C:420:VAL:HG12	1:C:420:VAL:O	2.20	0.42
1:C:410:PRO:HG2	1:D:478:PRO:HD2	2.02	0.42
1:D:270:ILE:HG12	1:D:290:ALA:HB3	2.01	0.42
1:A:5:LYS:HG3	1:B:456:VAL:HG12	2.02	0.42
1:D:447[A]:GLU:O	1:D:451:LYS:HG3	2.20	0.41
1:A:272:GLY:HA3	1:A:273:ASN:HA	1.93	0.41
1:C:245:SER:HB2	1:C:253:ILE:HD11	2.02	0.41
1:A:468:VAL:HG21	1:D:413:ILE:HG12	2.01	0.41
1:D:9:THR:HA	1:D:314:ILE:HB	2.02	0.41
1:B:304:ARG:HG2	1:B:309:VAL:O	2.21	0.41
1:B:296:GLY:HA3	1:B:304:ARG:HG3	2.04	0.40
1:B:409:VAL:HG21	1:C:432:GLY:HA3	2.03	0.40
1:D:25:LYS:HE2	1:D:26:GLU:HG3	2.02	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	355/385 (92%)	348 (98%)	7 (2%)	0	100	100
1	B	355/385 (92%)	348 (98%)	7 (2%)	0	100	100
1	C	366/385 (95%)	355 (97%)	11 (3%)	0	100	100
1	D	355/385 (92%)	347 (98%)	8 (2%)	0	100	100
All	All	1431/1540 (93%)	1398 (98%)	33 (2%)	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	288/304 (95%)	280 (97%)	8 (3%)	43	32
1	B	287/304 (94%)	281 (98%)	6 (2%)	53	47
1	C	295/304 (97%)	288 (98%)	7 (2%)	49	41
1	D	287/304 (94%)	283 (99%)	4 (1%)	67	62
All	All	1157/1216 (95%)	1132 (98%)	25 (2%)	53	46

All (25) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	41	MET
1	A	200	LYS

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Mol	Chain	Res	Type
1	A	258	LYS
1	A	338	LYS
1	A	349	VAL
1	A	407	LYS
1	A	416	ARG
1	A	481	LYS
1	B	28	LYS
1	B	41	MET
1	B	349	VAL
1	B	370	LEU
1	B	387	LEU
1	B	407	LYS
1	C	2	LYS
1	C	41	MET
1	C	201	LYS
1	C	244[A]	ASP
1	C	244[B]	ASP
1	C	397	ARG
1	C	416	ARG
1	D	25	LYS
1	D	41	MET
1	D	292	LYS
1	D	369	GLU

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

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry

Of 39 ligands modelled in this entry, 15 are monoatomic - leaving 24 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
3	SO4	D	504	-	4,4,4	0.13	0	6,6,6	0.09	0
3	SO4	B	505	-	4,4,4	0.13	0	6,6,6	0.10	0
3	SO4	B	509	-	4,4,4	0.14	0	6,6,6	0.07	0
2	JQS	B	502	-	18,25,25	1.03	2 (11%)	20,37,37	1.21	2 (10%)
3	SO4	C	506	-	4,4,4	0.14	0	6,6,6	0.06	0
3	SO4	B	503	-	4,4,4	0.12	0	6,6,6	0.16	0
3	SO4	C	505	-	4,4,4	0.13	0	6,6,6	0.07	0
3	SO4	B	507	-	4,4,4	0.14	0	6,6,6	0.09	0
3	SO4	D	510	-	4,4,4	0.13	0	6,6,6	0.10	0
2	JQS	D	502	-	18,25,25	0.89	1 (5%)	20,37,37	1.10	2 (10%)
3	SO4	C	507	-	4,4,4	0.14	0	6,6,6	0.07	0
2	JQS	A	501	-	18,25,25	0.95	1 (5%)	20,37,37	1.25	2 (10%)
5	MPD	A	508	-	7,7,7	0.38	0	9,10,10	0.53	0
3	SO4	C	508	-	4,4,4	0.15	0	6,6,6	0.07	0
2	JQS	C	502	-	18,25,25	0.94	1 (5%)	20,37,37	1.19	2 (10%)
3	SO4	B	506	-	4,4,4	0.13	0	6,6,6	0.06	0
5	MPD	B	511	-	7,7,7	0.34	0	9,10,10	0.41	0
3	SO4	A	502	-	4,4,4	0.13	0	6,6,6	0.10	0
3	SO4	B	504	-	4,4,4	0.14	0	6,6,6	0.07	0
5	MPD	C	509	-	7,7,7	0.35	0	9,10,10	0.36	0
3	SO4	D	505	-	4,4,4	0.15	0	6,6,6	0.05	0
3	SO4	A	503	-	4,4,4	0.11	0	6,6,6	0.13	0
3	SO4	C	503	-	4,4,4	0.14	0	6,6,6	0.11	0
3	SO4	D	503	-	4,4,4	0.15	0	6,6,6	0.14	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
2	JQS	A	501	-	-	0/6/33/33	0/2/2/2
5	MPD	A	508	-	-	0/5/5/5	-
5	MPD	C	509	-	-	0/5/5/5	-
2	JQS	C	502	-	-	0/6/33/33	0/2/2/2
5	MPD	B	511	-	-	0/5/5/5	-
2	JQS	B	502	-	-	0/6/33/33	0/2/2/2
2	JQS	D	502	-	-	0/6/33/33	0/2/2/2

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	502	JQS	C2-C9	-2.71	1.38	1.43
2	B	502	JQS	C2-C9	-2.55	1.38	1.43
2	A	501	JQS	C2-C9	-2.44	1.39	1.43
2	D	502	JQS	C2-C9	-2.43	1.39	1.43
2	B	502	JQS	O8-C4	2.06	1.44	1.41

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	JQS	N4-C10-N3	3.35	127.13	122.25
2	B	502	JQS	N4-C10-N3	3.09	126.76	122.25
2	C	502	JQS	N4-C10-N3	2.81	126.35	122.25
2	A	501	JQS	C3-N1-C2	2.71	108.16	102.99
2	D	502	JQS	N4-C10-N3	2.65	126.11	122.25
2	D	502	JQS	C3-N1-C2	2.62	107.99	102.99
2	B	502	JQS	C3-N1-C2	2.55	107.86	102.99
2	C	502	JQS	C3-N1-C2	2.53	107.81	102.99

There are no chirality outliers.

There are no torsion outliers.

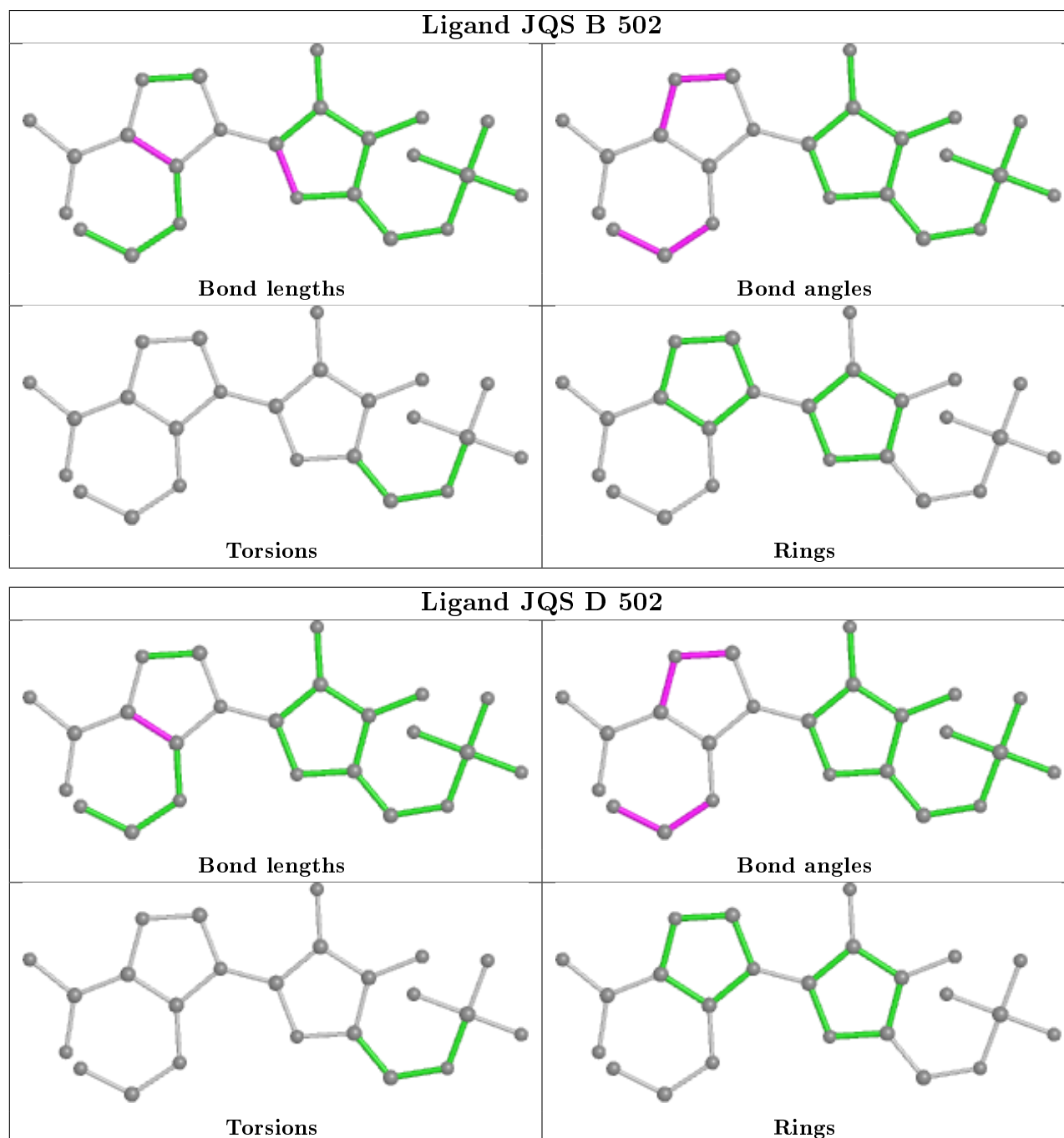
There are no ring outliers.

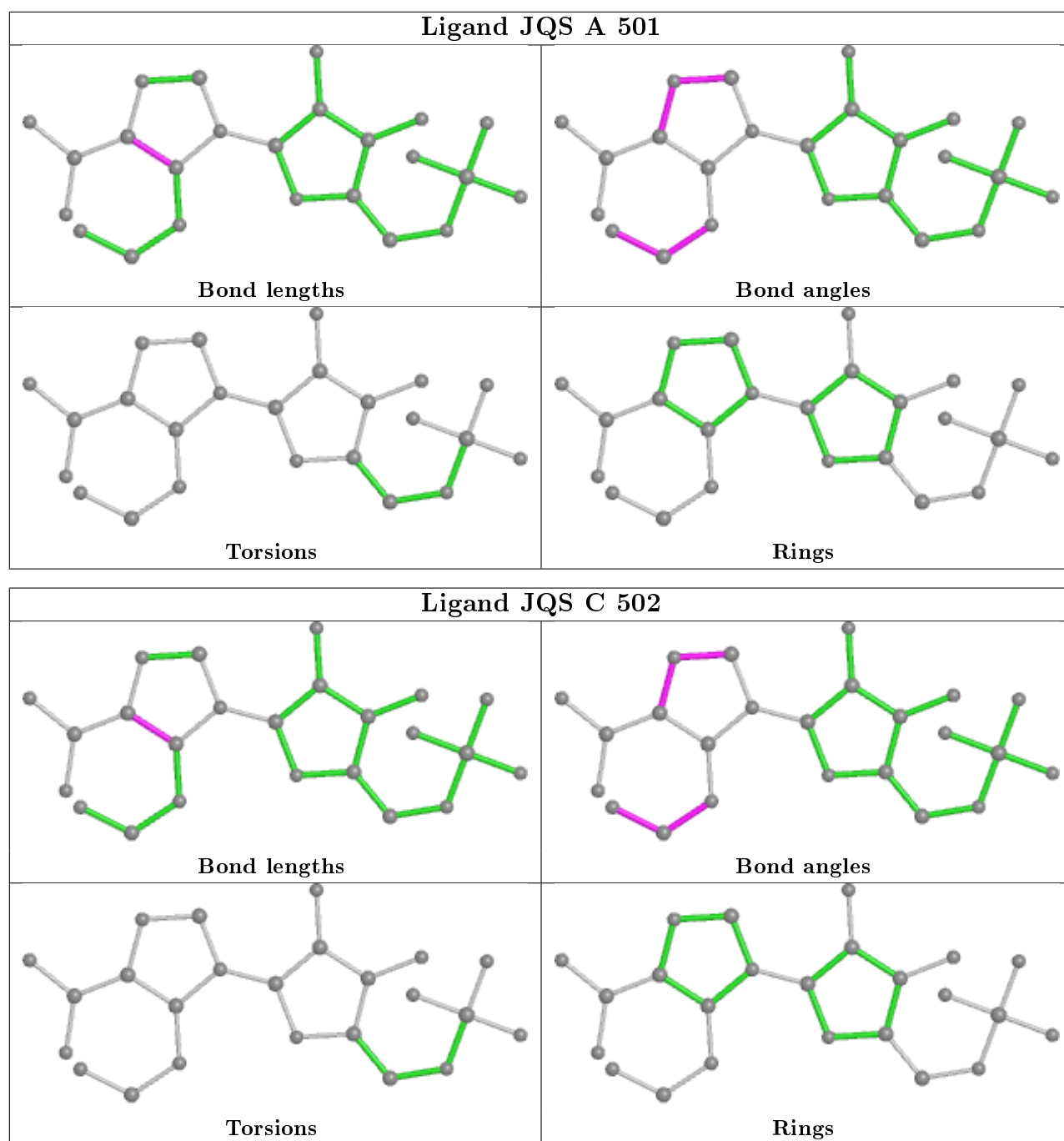
5 monomers are involved in 19 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	502	JQS	4	0
2	D	502	JQS	3	0
2	A	501	JQS	5	0
5	A	508	MPD	2	0
2	C	502	JQS	5	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, 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	361/385 (93%)	0.55	19 (5%)	26 28	39, 52, 100, 144	0
1	B	359/385 (93%)	0.50	16 (4%)	33 35	40, 53, 97, 140	0
1	C	369/385 (95%)	0.58	24 (6%)	18 20	40, 53, 112, 150	0
1	D	360/385 (93%)	0.56	23 (6%)	19 21	40, 53, 103, 131	0
All	All	1449/1540 (94%)	0.55	82 (5%)	23 25	39, 53, 104, 150	0

All (82) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	4	VAL	6.5
1	B	471	VAL	5.9
1	D	0	ALA	5.3
1	D	3	ILE	5.2
1	A	398	TYR	5.1
1	B	4	VAL	4.8
1	D	4	VAL	4.8
1	B	408	LEU	4.6
1	C	481	LYS	4.2
1	B	407	LYS	4.0
1	A	199	LEU	4.0
1	D	398	TYR	3.9
1	B	413	ILE	3.9
1	D	1	MET	3.9
1	A	407	LYS	3.9
1	C	213	PHE	3.8
1	A	202	ARG	3.8
1	D	202	ARG	3.7
1	A	213	PHE	3.7
1	C	398	TYR	3.7
1	B	1	MET	3.7

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Mol	Chain	Res	Type	RSRZ
1	D	408	LEU	3.6
1	B	3	ILE	3.6
1	D	399	PHE	3.5
1	B	2	LYS	3.4
1	C	413	ILE	3.4
1	B	398	TYR	3.3
1	D	413	ILE	3.3
1	C	395	SER	3.2
1	C	480	TYR	3.2
1	C	406	ASP	3.2
1	C	373	TYR	3.1
1	C	1	MET	3.1
1	A	3	ILE	3.0
1	C	300	ILE	3.0
1	A	389	ALA	2.9
1	C	205	TYR	2.9
1	A	388	GLY	2.9
1	B	0	ALA	2.9
1	B	202	ARG	2.9
1	B	203	LYS	2.8
1	A	482	VAL	2.8
1	C	399	PHE	2.8
1	D	373	TYR	2.8
1	A	427	VAL	2.8
1	A	478	PRO	2.7
1	B	399	PHE	2.7
1	D	400	GLN	2.6
1	C	376	ARG	2.6
1	C	4	VAL	2.6
1	C	3	ILE	2.6
1	D	387	LEU	2.6
1	C	257	VAL	2.6
1	C	2	LYS	2.5
1	B	373	TYR	2.5
1	C	392	LYS	2.4
1	A	476	GLU	2.4
1	D	378	TYR	2.4
1	C	396	ASP	2.3
1	D	407	LYS	2.3
1	D	388	GLY	2.3
1	A	400	GLN	2.3
1	D	370	LEU	2.3

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Mol	Chain	Res	Type	RSRZ
1	C	417	VAL	2.3
1	A	5	LYS	2.2
1	C	332	ILE	2.2
1	D	371	PHE	2.2
1	C	468	VAL	2.2
1	D	213	PHE	2.1
1	A	475	HIS	2.1
1	A	2	LYS	2.1
1	A	203	LYS	2.1
1	D	356	ILE	2.1
1	A	431	LEU	2.1
1	D	205	TYR	2.1
1	C	476	GLU	2.1
1	B	205	TYR	2.1
1	C	0	ALA	2.0
1	D	481	LYS	2.0
1	B	201	LYS	2.0
1	D	2	LYS	2.0
1	D	203	LYS	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 carbohydrates 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
6	K	B	508	1/1	0.50	0.23	170,170,170,170	0
4	CL	D	506	1/1	0.63	0.10	94,94,94,94	0
3	SO4	C	506	5/5	0.70	0.13	142,143,143,144	0
5	MPD	A	508	8/8	0.73	0.51	103,105,106,107	0

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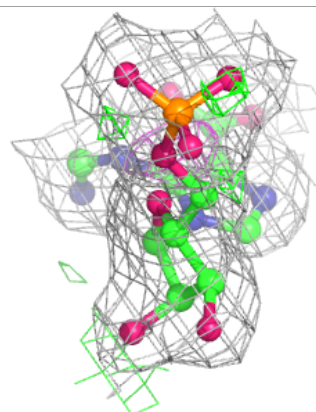
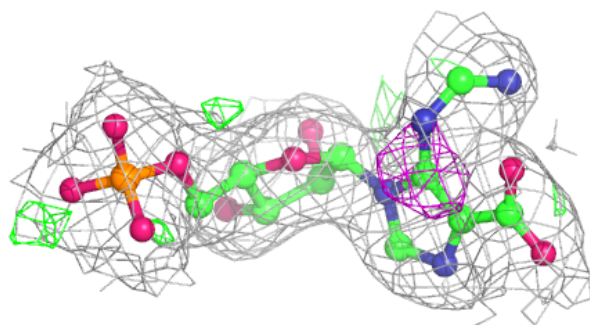
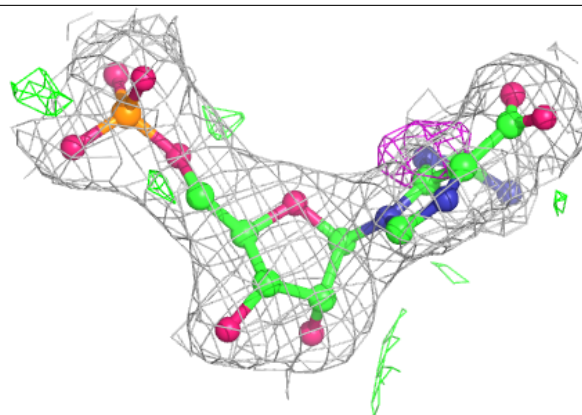
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	SO4	C	507	5/5	0.74	0.30	147,148,148,149	0
5	MPD	C	509	8/8	0.76	0.46	109,110,112,112	0
3	SO4	B	505	5/5	0.78	0.14	137,138,139,139	0
4	CL	A	506	1/1	0.79	0.12	97,97,97,97	0
3	SO4	D	505	5/5	0.81	0.17	131,131,132,132	0
3	SO4	A	502	5/5	0.81	0.13	155,156,156,156	0
3	SO4	D	510	5/5	0.83	0.17	157,158,158,158	0
3	SO4	B	507	5/5	0.85	0.13	131,131,132,133	0
4	CL	A	504	1/1	0.86	0.14	101,101,101,101	0
4	CL	A	505	1/1	0.87	0.12	94,94,94,94	0
4	CL	B	510	1/1	0.87	0.13	92,92,92,92	0
3	SO4	B	509	5/5	0.88	0.12	140,141,141,141	0
4	CL	D	508	1/1	0.89	0.17	105,105,105,105	0
3	SO4	C	508	5/5	0.90	0.14	142,142,143,143	0
4	CL	D	507	1/1	0.90	0.19	94,94,94,94	0
4	CL	C	504	1/1	0.90	0.15	93,93,93,93	0
4	CL	A	507	1/1	0.90	0.10	83,83,83,83	0
3	SO4	C	505	5/5	0.91	0.14	149,149,149,150	0
5	MPD	B	511	8/8	0.91	0.19	107,107,108,109	0
3	SO4	D	503	5/5	0.91	0.15	107,108,111,111	0
3	SO4	B	506	5/5	0.92	0.07	148,148,149,149	0
3	SO4	A	503	5/5	0.92	0.14	113,114,115,115	0
3	SO4	B	503	5/5	0.93	0.19	96,97,99,101	0
4	CL	D	509	1/1	0.93	0.07	95,95,95,95	0
3	SO4	C	503	5/5	0.93	0.17	106,106,107,108	0
2	JQS	B	502	24/24	0.95	0.12	43,50,60,65	0
2	JQS	A	501	24/24	0.96	0.11	43,50,69,76	0
2	JQS	C	502	24/24	0.96	0.13	43,48,61,67	0
2	JQS	D	502	24/24	0.96	0.12	46,49,59,64	0
3	SO4	B	504	5/5	0.96	0.11	91,91,92,94	0
3	SO4	D	504	5/5	0.97	0.13	89,90,91,93	0
6	K	C	501	1/1	0.98	0.06	53,53,53,53	0
6	K	B	501	1/1	0.99	0.05	51,51,51,51	0
6	K	A	509	1/1	0.99	0.04	53,53,53,53	0
6	K	D	501	1/1	0.99	0.08	52,52,52,52	0

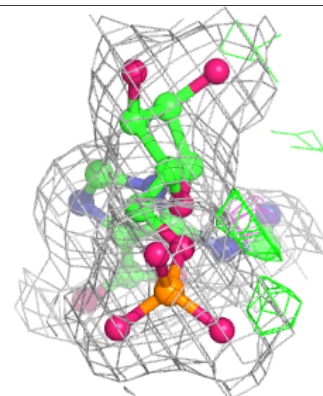
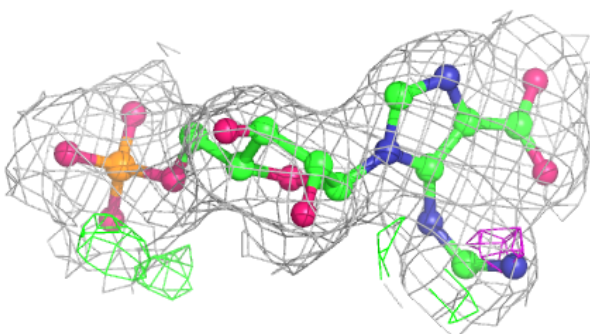
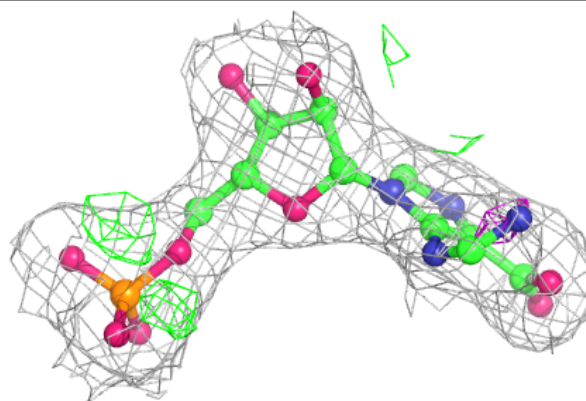
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around JQS B 502:

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

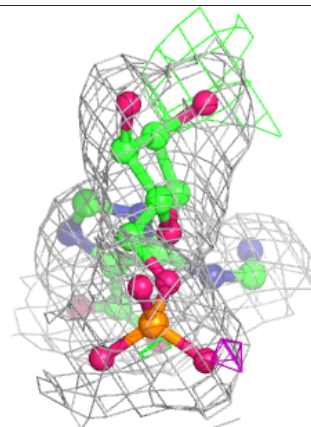
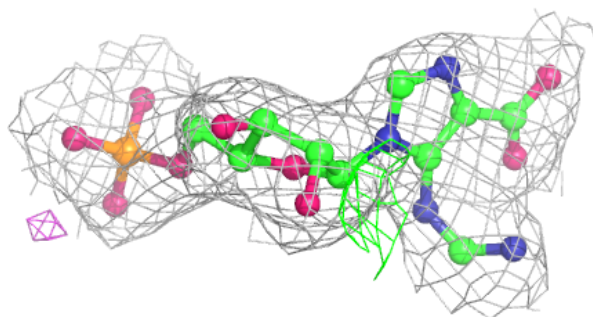
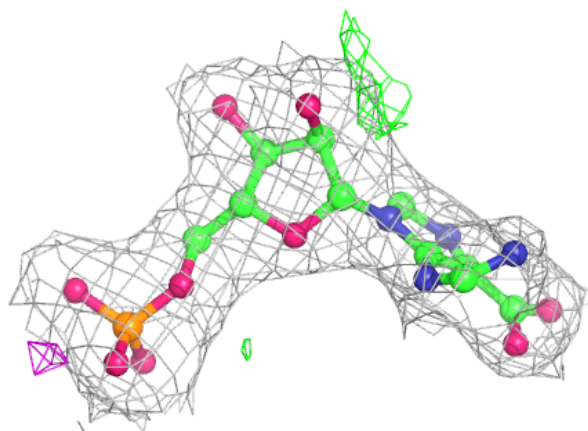
**Electron density around JQS A 501:**

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



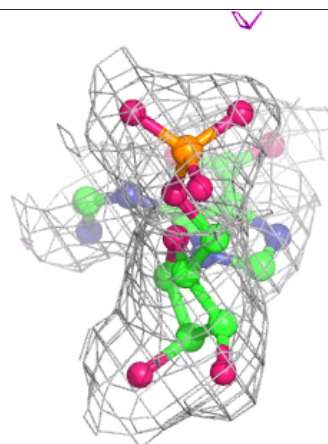
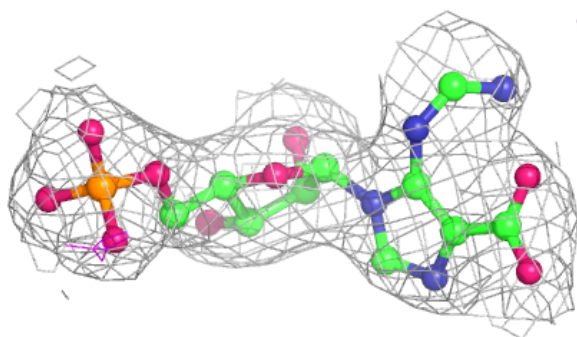
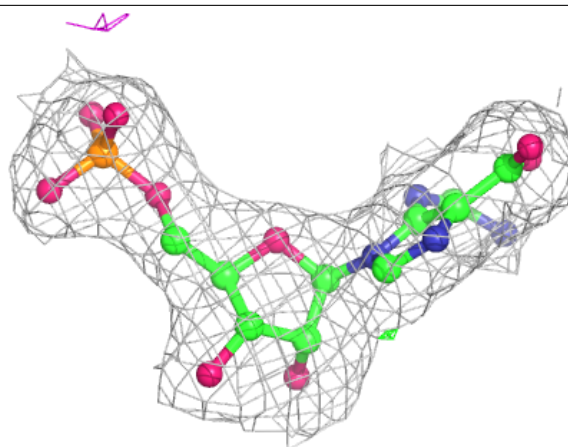
Electron density around JQS C 502:

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



Electron density around JQS D 502:

$2mF_o-DF_c$ (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.