



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 17, 2024 – 10:07 PM EDT

PDB ID : 5TQH  
Title : IDH1 R132H mutant in complex with IDH889  
Authors : Xie, X.; Kulathila, R.  
Deposited on : 2016-10-24  
Resolution : 2.20 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 : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.37.1  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.37.1

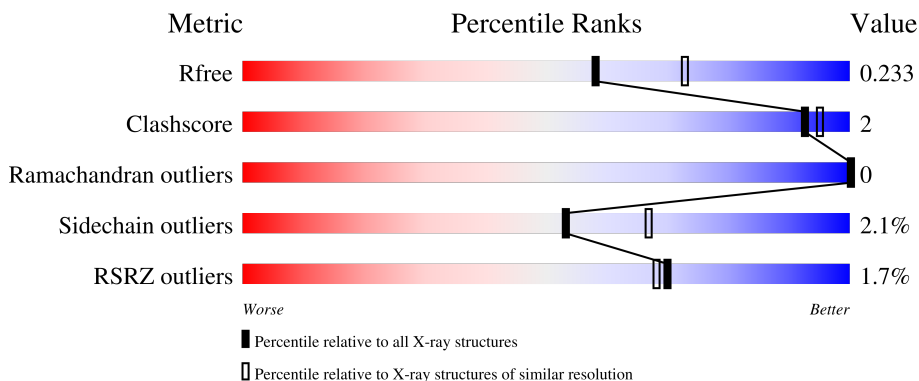
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.20 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	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

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	417	93% (0% red, 0% orange, 0% yellow, 93% green, 6% grey)
1	B	417	92% (0% red, 0% orange, 0% yellow, 92% green, 6% grey)
1	C	417	3% (3% red, 0% orange, 0% yellow, 92% green, 6% grey)
1	D	417	3% (3% red, 0% orange, 0% yellow, 90% green, 6% grey)

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 13864 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 Isocitrate dehydrogenase [NADP] cytoplasmic.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	401	3196	2034	543	601	18	0	3	0
1	B	407	3235	2056	550	611	18	0	1	0
1	C	408	3236	2059	549	610	18	0	0	0
1	D	402	3191	2031	542	600	18	0	1	0

There are 16 discrepancies between the modelled and reference sequences:

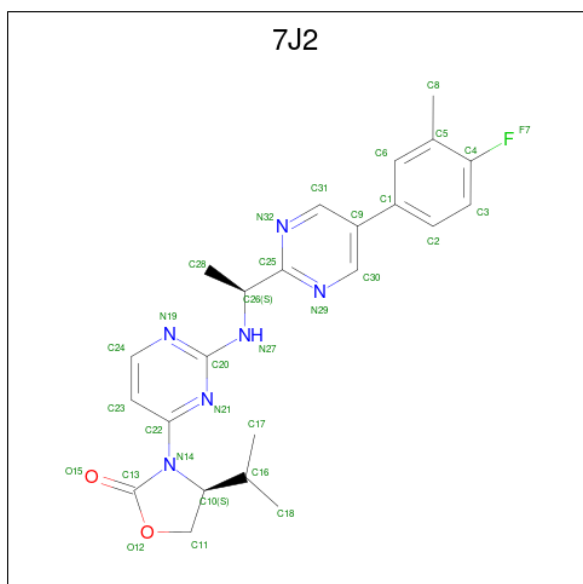
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP O75874
A	-1	PRO	-	expression tag	UNP O75874
A	0	GLY	-	expression tag	UNP O75874
A	132	HIS	ARG	engineered mutation	UNP O75874
B	-2	GLY	-	expression tag	UNP O75874
B	-1	PRO	-	expression tag	UNP O75874
B	0	GLY	-	expression tag	UNP O75874
B	132	HIS	ARG	engineered mutation	UNP O75874
C	-2	GLY	-	expression tag	UNP O75874
C	-1	PRO	-	expression tag	UNP O75874
C	0	GLY	-	expression tag	UNP O75874
C	132	HIS	ARG	engineered mutation	UNP O75874
D	-2	GLY	-	expression tag	UNP O75874
D	-1	PRO	-	expression tag	UNP O75874
D	0	GLY	-	expression tag	UNP O75874
D	132	HIS	ARG	engineered mutation	UNP O75874

- Molecule 2 is CITRATE ANION (three-letter code: FLC) (formula: C<sub>6</sub>H<sub>5</sub>O<sub>7</sub>).



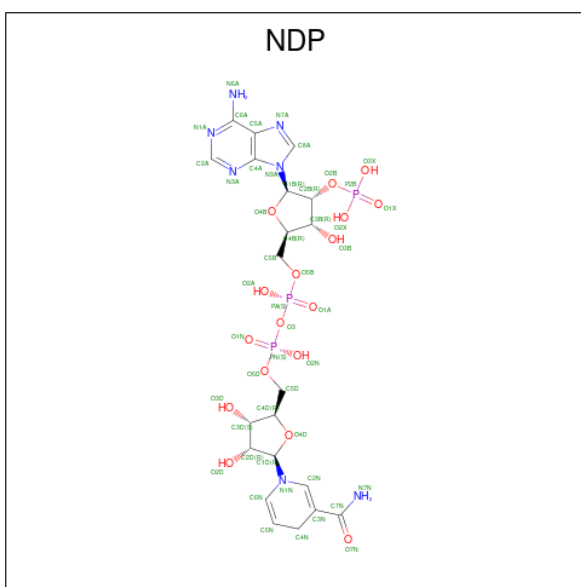
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			13	6	7		
2	B	1	Total	C	O	0	0
			13	6	7		
2	C	1	Total	C	O	0	0
			13	6	7		
2	D	1	Total	C	O	0	0
			13	6	7		

- Molecule 3 is (4S)-3-[2-((1S)-1-[5-(4-fluoro-3-methylphenyl)pyrimidin-2-yl]ethyl)amino]pyrimidin-4-yl]-4-(propan-2-yl)-1,3-oxazolidin-2-one (three-letter code: 7J2) (formula:  $C_{23}H_{25}FN_6O_2$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
3	A	1	Total	C	F	N	O	0	0
			32	23	1	6	2		
3	B	1	Total	C	F	N	O	0	0
			32	23	1	6	2		
3	C	1	Total	C	F	N	O	0	0
			32	23	1	6	2		
3	D	1	Total	C	F	N	O	0	0
			32	23	1	6	2		

- Molecule 4 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula:  $C_{21}H_{30}N_7O_{17}P_3$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
4	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
4	B	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
4	C	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
4	D	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	188	Total	O	0	0
			188	188		

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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
5	B	262	Total 262	O 262	0	0
5	C	107	Total 107	O 107	0	0
5	D	77	Total 77	O 77	0	0

### 3 Residue-property plots

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.

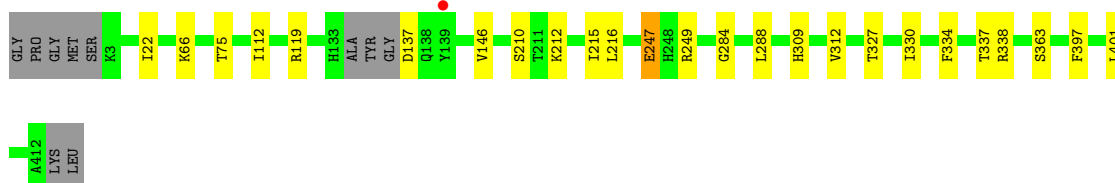
- Molecule 1: Isocitrate dehydrogenase [NADP] cytoplasmic

Chain A:  93%

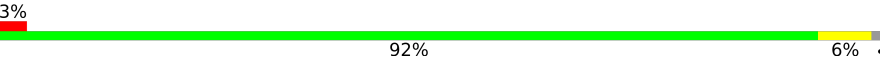


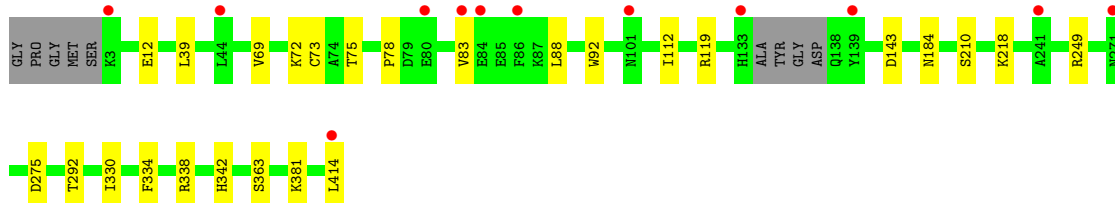
- Molecule 1: Isocitrate dehydrogenase [NADP] cytoplasmic

Chain B:  92% 6%

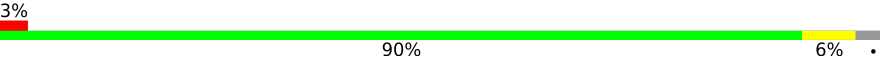


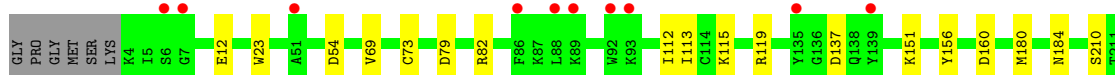
- Molecule 1: Isocitrate dehydrogenase [NADP] cytoplasmic

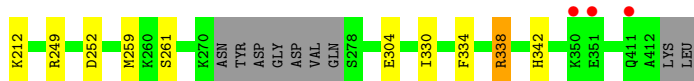
Chain C:  3% 92% 6%



- Molecule 1: Isocitrate dehydrogenase [NADP] cytoplasmic

Chain D:  3% 90% 6%







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	81.73Å 155.75Å 163.05Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	112.62 – 2.20 112.62 – 2.20	Depositor EDS
% Data completeness (in resolution range)	99.9 (112.62-2.20) 99.9 (112.62-2.20)	Depositor EDS
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.99 (at 2.20Å)	Xtrriage
Refinement program	BUSTER-TNT 2.11.6, BUSTER	Depositor
R, $R_{free}$	0.188 , 0.225 0.197 , 0.233	Depositor DCC
$R_{free}$ test set	5295 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	44.2	Xtrriage
Anisotropy	0.062	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 46.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	0.019 for -h,l,k	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	13864	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	52.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.15% 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: 7J2, NDP, FLC

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	0.50	0/3270	0.64	0/4405
1	B	0.49	0/3305	0.63	0/4455
1	C	0.46	0/3303	0.64	0/4452
1	D	0.48	0/3261	0.64	0/4396
All	All	0.48	0/13139	0.64	0/17708

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	3196	0	3179	7	0
1	B	3235	0	3204	15	0
1	C	3236	0	3211	11	0
1	D	3191	0	3165	12	0
2	A	13	0	5	0	0
2	B	13	0	5	1	0
2	C	13	0	5	0	0
2	D	13	0	5	0	0
3	A	32	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	32	0	0	0	0
3	C	32	0	0	0	0
3	D	32	0	0	0	0
4	A	48	0	26	1	0
4	B	48	0	26	2	0
4	C	48	0	26	1	0
4	D	48	0	26	0	0
5	A	188	0	0	0	0
5	B	262	0	0	0	0
5	C	107	0	0	0	0
5	D	77	0	0	0	0
All	All	13864	0	12883	40	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 2.

All (40) 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:112:ILE:HD13	1:C:330:ILE:HG22	1.82	0.61
1:B:288:LEU:HG	1:B:309:HIS:HB3	1.82	0.61
2:B:502:FLC:HA1	4:B:503:NDP:H42N	1.82	0.61
1:C:330:ILE:HD12	1:C:363:SER:HB3	1.86	0.58
1:B:212:LYS:HG2	1:B:215:ILE:HD12	1.91	0.52
1:B:112:ILE:HD13	1:B:330:ILE:HG22	1.91	0.51
1:B:216:LEU:HD22	1:D:180:MET:CE	2.41	0.51
1:D:79:ASP:H	1:D:82:ARG:HB2	1.76	0.50
1:D:69:VAL:HG22	1:D:342:HIS:HD2	1.77	0.49
1:C:75:THR:O	4:C:503:NDP:H2N	2.13	0.49
1:B:247:GLU:HG2	1:B:249:ARG:HH12	1.77	0.49
1:C:72:LYS:HG2	1:C:73:CYS:O	2.13	0.48
1:A:112:ILE:HD13	1:A:330:ILE:HG22	1.96	0.48
1:B:216:LEU:HD22	1:D:180:MET:HE3	1.96	0.48
1:C:210:SER:HA	1:C:249:ARG:O	2.14	0.47
1:A:62[A]:GLU:OE2	1:B:66:LYS:HE2	2.14	0.47
1:C:78:PRO:HG2	1:C:92:TRP:O	2.12	0.47
1:D:334:PHE:O	1:D:338:ARG:HB2	2.14	0.47
1:A:330:ILE:HD12	1:A:363:SER:HB3	1.98	0.46
1:C:292:THR:HG21	1:C:334:PHE:HB3	1.99	0.45
1:B:146:VAL:HG13	1:D:156:TYR:CE2	2.52	0.45
1:A:210:SER:HA	1:A:249:ARG:O	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:75:THR:O	4:B:503:NDP:H2N	2.17	0.45
1:D:210:SER:HA	1:D:249:ARG:O	2.17	0.44
1:C:69:VAL:HG22	1:C:342:HIS:HD2	1.82	0.44
1:C:12:GLU:HB2	1:C:39:LEU:HD22	2.00	0.43
1:B:284:GLY:HA3	1:D:259:MET:HB2	1.99	0.43
1:C:83:VAL:HA	1:C:88:LEU:HD12	2.01	0.43
1:D:23:TRP:CD2	1:D:73:CYS:HB2	2.55	0.42
1:B:330:ILE:HD12	1:B:363:SER:HB3	2.00	0.42
1:A:75:THR:O	4:A:503:NDP:H2N	2.20	0.42
1:A:223:PHE:CE2	1:A:270:LYS:HG3	2.55	0.42
1:B:334:PHE:HA	1:B:337:THR:OG1	2.20	0.41
1:A:219:TYR:HB2	1:C:143:ASP:HB2	2.01	0.41
1:B:397:PHE:CE2	1:B:401:LEU:HD11	2.56	0.41
1:B:210:SER:HA	1:B:249:ARG:O	2.21	0.41
1:B:22:ILE:HD11	1:B:327:THR:HB	2.03	0.40
1:D:112:ILE:HD13	1:D:330:ILE:HG22	2.02	0.40
1:D:180:MET:HB2	1:D:180:MET:HE2	1.67	0.40
1:D:113:ILE:HG23	1:D:119:ARG:HD3	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	398/417 (95%)	386 (97%)	12 (3%)	0	100	100
1	B	404/417 (97%)	394 (98%)	10 (2%)	0	100	100
1	C	404/417 (97%)	385 (95%)	19 (5%)	0	100	100
1	D	399/417 (96%)	388 (97%)	11 (3%)	0	100	100
All	All	1605/1668 (96%)	1553 (97%)	52 (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	342/351 (97%)	337 (98%)	5 (2%)	65	78
1	B	346/351 (99%)	341 (99%)	5 (1%)	67	80
1	C	346/351 (99%)	339 (98%)	7 (2%)	55	69
1	D	340/351 (97%)	328 (96%)	12 (4%)	36	46
All	All	1374/1404 (98%)	1345 (98%)	29 (2%)	53	67

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	119	ARG
1	A	252	ASP
1	A	303	VAL
1	A	312	VAL
1	A	338	ARG
1	B	119	ARG
1	B	137	ASP
1	B	247	GLU
1	B	312	VAL
1	B	338	ARG
1	C	119	ARG
1	C	184	ASN
1	C	218	LYS
1	C	275	ASP
1	C	338	ARG
1	C	381	LYS
1	C	414	LEU
1	D	12	GLU
1	D	54	ASP
1	D	115	LYS
1	D	137	ASP
1	D	151	LYS
1	D	160	ASP
1	D	184	ASN

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Mol	Chain	Res	Type
1	D	212	LYS
1	D	252	ASP
1	D	261	SER
1	D	304	GLU
1	D	338	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	184	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](#)

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](#)

12 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	7J2	A	502	-	35,35,35	1.40	3 (8%)	42,50,50	2.85	19 (45%)
3	7J2	C	501	-	35,35,35	1.41	4 (11%)	42,50,50	2.67	18 (42%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	NDP	C	503	-	45,52,52	1.29	4 (8%)	53,80,80	1.32	4 (7%)
2	FLC	B	502	-	12,12,12	0.98	0	17,17,17	1.52	2 (11%)
4	NDP	A	503	-	45,52,52	1.28	5 (11%)	53,80,80	1.28	4 (7%)
2	FLC	D	502	-	12,12,12	0.92	0	17,17,17	1.31	1 (5%)
2	FLC	A	501	-	12,12,12	0.97	0	17,17,17	1.47	3 (17%)
3	7J2	B	501	-	35,35,35	1.31	3 (8%)	42,50,50	2.41	18 (42%)
4	NDP	D	503	-	45,52,52	1.32	5 (11%)	53,80,80	1.20	2 (3%)
3	7J2	D	501	-	35,35,35	1.45	4 (11%)	42,50,50	2.61	18 (42%)
2	FLC	C	502	-	12,12,12	0.95	0	17,17,17	1.44	2 (11%)
4	NDP	B	503	-	45,52,52	1.24	5 (11%)	53,80,80	1.35	3 (5%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	7J2	A	502	-	-	4/20/33/33	0/4/4/4
3	7J2	C	501	-	-	1/20/33/33	0/4/4/4
4	NDP	C	503	-	-	7/30/77/77	0/5/5/5
2	FLC	B	502	-	-	0/16/16/16	-
4	NDP	A	503	-	-	5/30/77/77	0/5/5/5
2	FLC	D	502	-	-	6/16/16/16	-
2	FLC	A	501	-	-	2/16/16/16	-
3	7J2	B	501	-	-	1/20/33/33	0/4/4/4
4	NDP	D	503	-	-	8/30/77/77	0/5/5/5
3	7J2	D	501	-	-	3/20/33/33	0/4/4/4
2	FLC	C	502	-	-	0/16/16/16	-
4	NDP	B	503	-	-	3/30/77/77	0/5/5/5

All (33) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	503	NDP	C4N-C3N	-4.53	1.41	1.49
4	C	503	NDP	C4N-C3N	-4.45	1.41	1.49
4	A	503	NDP	C6N-C5N	4.36	1.41	1.33
4	A	503	NDP	C4N-C3N	-4.17	1.41	1.49
4	C	503	NDP	C6N-C5N	4.02	1.40	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	503	NDP	C6N-C5N	4.01	1.40	1.33
4	B	503	NDP	C6N-C5N	3.99	1.40	1.33
3	D	501	7J2	C5-C4	3.98	1.42	1.37
4	B	503	NDP	C4N-C3N	-3.90	1.42	1.49
3	A	502	7J2	C5-C4	3.52	1.42	1.37
3	A	502	7J2	C16-C10	3.44	1.58	1.53
3	B	501	7J2	C5-C4	3.32	1.41	1.37
3	C	501	7J2	C22-N14	3.28	1.45	1.41
4	A	503	NDP	C4N-C5N	-3.21	1.40	1.48
4	D	503	NDP	C4N-C5N	-3.20	1.40	1.48
3	D	501	7J2	C16-C10	3.10	1.58	1.53
3	B	501	7J2	C16-C10	3.04	1.57	1.53
4	C	503	NDP	C4N-C5N	-3.02	1.41	1.48
3	B	501	7J2	C22-N14	2.98	1.44	1.41
3	C	501	7J2	C5-C4	2.96	1.41	1.37
3	C	501	7J2	C16-C10	2.88	1.57	1.53
3	D	501	7J2	C22-N14	2.87	1.44	1.41
4	B	503	NDP	C4N-C5N	-2.77	1.41	1.48
3	D	501	7J2	C25-C26	2.62	1.55	1.50
4	C	503	NDP	O4B-C1B	2.56	1.44	1.41
3	A	502	7J2	C22-N14	2.45	1.44	1.41
4	D	503	NDP	O4B-C1B	2.35	1.44	1.41
4	B	503	NDP	O4B-C1B	2.35	1.44	1.41
4	A	503	NDP	P2B-O2B	2.20	1.63	1.59
4	D	503	NDP	C2N-C3N	2.10	1.40	1.34
3	C	501	7J2	C25-C26	2.10	1.54	1.50
4	A	503	NDP	O4B-C1B	2.09	1.44	1.41
4	B	503	NDP	P2B-O2B	2.04	1.63	1.59

All (94) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	502	7J2	N19-C20-N21	-8.58	118.42	126.55
3	A	502	7J2	C24-N19-C20	7.35	121.97	115.45
3	D	501	7J2	N19-C20-N21	-7.20	119.73	126.55
3	C	501	7J2	N19-C20-N21	-7.16	119.76	126.55
3	C	501	7J2	C6-C5-C4	6.89	120.45	116.06
3	B	501	7J2	N19-C20-N21	-6.88	120.03	126.55
3	D	501	7J2	C24-N19-C20	6.32	121.06	115.45
3	A	502	7J2	C6-C5-C4	5.63	119.64	116.06
4	C	503	NDP	N3A-C2A-N1A	-5.61	119.91	128.68
4	B	503	NDP	N3A-C2A-N1A	-5.32	120.36	128.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	503	NDP	N3A-C2A-N1A	-5.26	120.46	128.68
4	D	503	NDP	N3A-C2A-N1A	-5.25	120.47	128.68
3	C	501	7J2	C24-N19-C20	5.10	119.97	115.45
3	B	501	7J2	C6-C5-C4	5.00	119.25	116.06
3	B	501	7J2	C24-N19-C20	4.96	119.84	115.45
3	D	501	7J2	N32-C25-N29	-4.82	119.60	125.95
3	A	502	7J2	N32-C25-N29	-4.72	119.72	125.95
3	D	501	7J2	C6-C5-C4	4.56	118.97	116.06
3	B	501	7J2	C23-C22-N21	-4.35	116.43	123.53
3	C	501	7J2	C23-C22-N14	4.30	125.67	122.42
3	C	501	7J2	N32-C25-N29	-4.25	120.35	125.95
2	C	502	FLC	OB2-CBC-CB	4.18	120.31	113.05
3	D	501	7J2	C11-C10-N14	-4.09	96.54	100.11
3	D	501	7J2	C23-C22-N21	-4.08	116.88	123.53
3	B	501	7J2	N32-C25-N29	-4.06	120.59	125.95
3	C	501	7J2	C23-C22-N21	-4.06	116.90	123.53
3	B	501	7J2	C23-C22-N14	4.05	125.47	122.42
2	B	502	FLC	OB2-CBC-CB	4.05	120.08	113.05
4	B	503	NDP	C1D-N1N-C2N	-3.94	114.55	121.11
4	A	503	NDP	C1D-N1N-C2N	-3.94	114.55	121.11
3	A	502	7J2	C23-C22-N21	-3.61	117.64	123.53
2	A	501	FLC	OB2-CBC-CB	3.57	119.26	113.05
3	A	502	7J2	C11-C10-N14	-3.52	97.03	100.11
4	C	503	NDP	C1D-N1N-C2N	-3.52	115.25	121.11
3	D	501	7J2	C23-C24-N19	-3.51	119.60	123.96
3	A	502	7J2	C23-C24-N19	-3.47	119.65	123.96
3	A	502	7J2	C31-N32-C25	3.41	121.83	116.00
2	D	502	FLC	OB2-CBC-CB	3.32	118.81	113.05
3	C	501	7J2	C11-C10-N14	-3.31	97.22	100.11
3	A	502	7J2	C17-C16-C10	3.29	119.75	111.52
3	A	502	7J2	N27-C20-N19	3.22	122.14	116.65
3	C	501	7J2	C17-C16-C10	3.20	119.50	111.52
3	D	501	7J2	C31-N32-C25	3.18	121.44	116.00
3	C	501	7J2	C30-N29-C25	3.16	121.39	116.00
3	D	501	7J2	C30-N29-C25	3.13	121.34	116.00
3	C	501	7J2	N27-C20-N19	3.01	121.78	116.65
3	D	501	7J2	C23-C22-N14	2.99	124.68	122.42
3	D	501	7J2	N27-C20-N19	2.96	121.69	116.65
2	B	502	FLC	OB1-CBC-CB	-2.95	118.08	122.25
3	B	501	7J2	C31-N32-C25	2.92	120.98	116.00
3	B	501	7J2	C9-C31-N32	-2.91	119.53	124.32
3	A	502	7J2	O12-C11-C10	-2.90	102.33	105.66

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	502	7J2	C9-C31-N32	-2.89	119.56	124.32
3	D	501	7J2	C3-C4-C5	-2.86	120.22	124.08
3	C	501	7J2	C9-C30-N29	-2.86	119.61	124.32
3	C	501	7J2	C31-N32-C25	2.86	120.88	116.00
3	C	501	7J2	C20-N21-C22	2.82	123.93	114.64
3	A	502	7J2	C20-N21-C22	2.79	123.85	114.64
2	C	502	FLC	OB1-CBC-CB	-2.77	118.34	122.25
3	C	501	7J2	C23-C24-N19	-2.76	120.53	123.96
3	B	501	7J2	C20-N21-C22	2.76	123.74	114.64
3	B	501	7J2	C23-C24-N19	-2.75	120.54	123.96
3	A	502	7J2	C28-C26-C25	2.73	114.11	110.95
3	A	502	7J2	C23-C22-N14	2.72	124.47	122.42
3	C	501	7J2	C3-C4-C5	-2.71	120.43	124.08
3	D	501	7J2	C9-C30-N29	-2.68	119.91	124.32
2	A	501	FLC	OB1-CBC-CB	-2.68	118.47	122.25
3	D	501	7J2	C20-N21-C22	2.65	123.39	114.64
3	D	501	7J2	C11-O12-C13	-2.64	106.98	109.94
3	B	501	7J2	C30-N29-C25	2.63	120.50	116.00
3	C	501	7J2	C9-C31-N32	-2.63	119.99	124.32
4	B	503	NDP	O2B-P2B-O1X	-2.55	99.55	109.39
3	B	501	7J2	C9-C30-N29	-2.50	120.20	124.32
3	A	502	7J2	C30-N29-C25	2.48	120.24	116.00
3	D	501	7J2	C17-C16-C10	2.47	117.70	111.52
3	A	502	7J2	F7-C4-C5	2.46	121.51	117.84
3	D	501	7J2	F7-C4-C5	2.40	121.42	117.84
3	D	501	7J2	C9-C31-N32	-2.39	120.38	124.32
3	A	502	7J2	C11-C10-C16	2.32	118.56	115.04
3	B	501	7J2	N27-C20-N19	2.32	120.60	116.65
3	A	502	7J2	C3-C4-C5	-2.25	121.05	124.08
3	B	501	7J2	C11-C10-N14	-2.23	98.16	100.11
3	B	501	7J2	C17-C16-C10	2.19	117.00	111.52
3	C	501	7J2	C1-C6-C5	-2.18	119.76	122.33
3	B	501	7J2	C31-C9-C30	2.16	118.03	114.66
4	D	503	NDP	C1D-N1N-C2N	-2.15	117.53	121.11
4	A	503	NDP	C3B-C2B-C1B	-2.13	98.88	102.89
4	A	503	NDP	O3X-P2B-O2X	2.11	115.71	107.64
3	C	501	7J2	F7-C4-C5	2.10	120.99	117.84
3	B	501	7J2	C3-C4-C5	-2.10	121.25	124.08
3	B	501	7J2	C1-C6-C5	-2.08	119.87	122.33
2	A	501	FLC	OG2-CGC-CG	2.07	121.00	114.35
4	C	503	NDP	PN-O3-PA	-2.02	125.88	132.83
4	C	503	NDP	O3B-C3B-C2B	2.01	116.87	111.17

There are no chirality outliers.

All (40) torsion outliers are listed below:

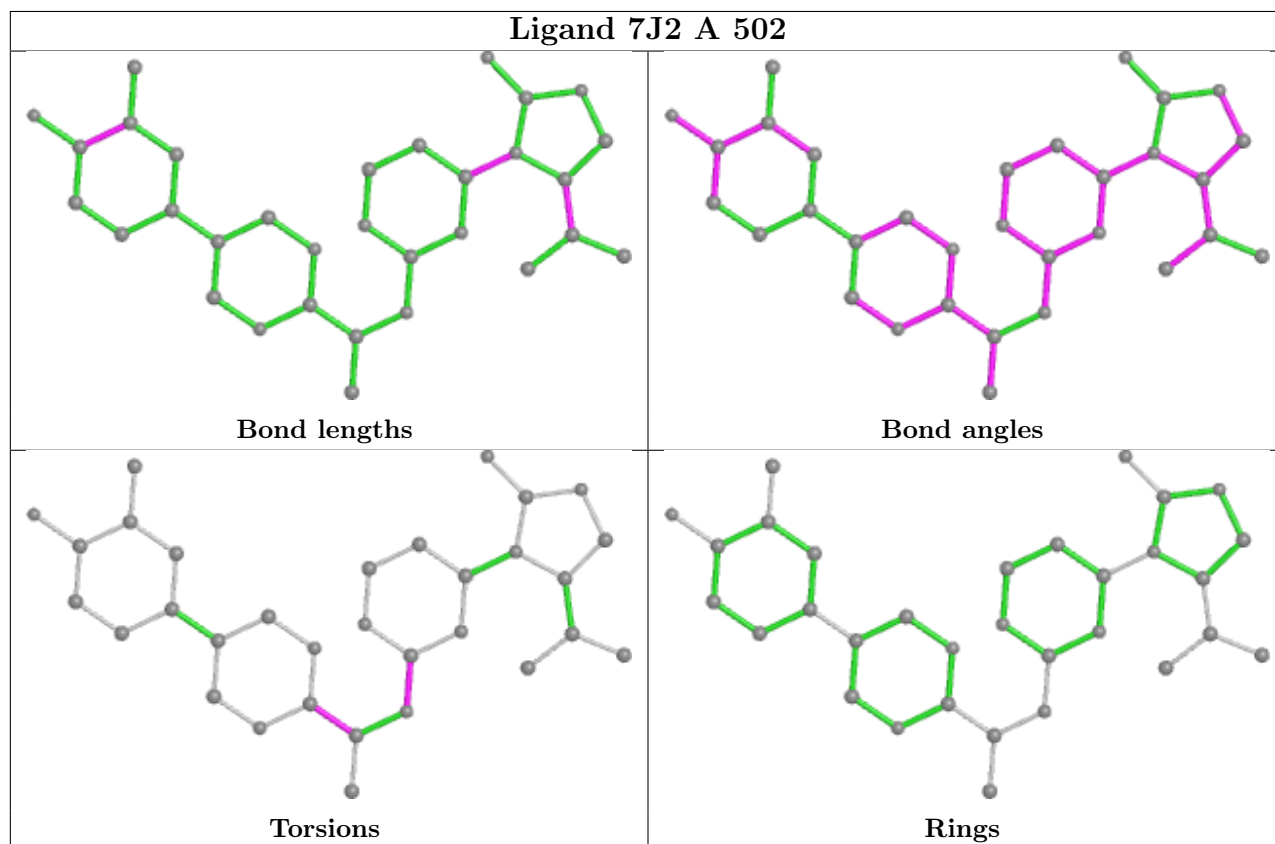
Mol	Chain	Res	Type	Atoms
3	A	502	7J2	N32-C25-C26-N27
3	B	501	7J2	N32-C25-C26-N27
3	C	501	7J2	N32-C25-C26-N27
3	D	501	7J2	N19-C20-N27-C26
3	D	501	7J2	N32-C25-C26-N27
4	A	503	NDP	C2B-O2B-P2B-O2X
4	C	503	NDP	C5D-O5D-PN-O2N
4	D	503	NDP	C2B-O2B-P2B-O2X
4	D	503	NDP	C5D-O5D-PN-O1N
4	D	503	NDP	C5D-O5D-PN-O2N
3	D	501	7J2	N21-C20-N27-C26
4	C	503	NDP	O4B-C4B-C5B-O5B
4	C	503	NDP	C3B-C4B-C5B-O5B
2	D	502	FLC	CA-CB-CBC-OB1
2	D	502	FLC	CA-CB-CBC-OB2
2	D	502	FLC	CG-CB-CBC-OB1
2	D	502	FLC	CG-CB-CBC-OB2
3	A	502	7J2	N19-C20-N27-C26
4	D	503	NDP	PN-O3-PA-O5B
4	B	503	NDP	C2B-O2B-P2B-O2X
4	C	503	NDP	C5D-O5D-PN-O3
4	D	503	NDP	C5D-O5D-PN-O3
4	A	503	NDP	O4D-C1D-N1N-C2N
4	A	503	NDP	C2D-C1D-N1N-C2N
4	C	503	NDP	C5D-O5D-PN-O1N
4	C	503	NDP	O4D-C1D-N1N-C2N
4	B	503	NDP	O4D-C1D-N1N-C2N
4	D	503	NDP	O4D-C1D-N1N-C2N
4	B	503	NDP	C2D-C1D-N1N-C2N
4	D	503	NDP	C2D-C1D-N1N-C2N
2	D	502	FLC	OHB-CB-CBC-OB1
2	D	502	FLC	OHB-CB-CBC-OB2
2	A	501	FLC	CB-CG-CGC-OG2
4	C	503	NDP	C2D-C1D-N1N-C2N
2	A	501	FLC	CB-CG-CGC-OG1
3	A	502	7J2	N29-C25-C26-N27
3	A	502	7J2	N21-C20-N27-C26
4	D	503	NDP	O4B-C4B-C5B-O5B
4	A	503	NDP	C5D-O5D-PN-O3
4	A	503	NDP	O4B-C4B-C5B-O5B

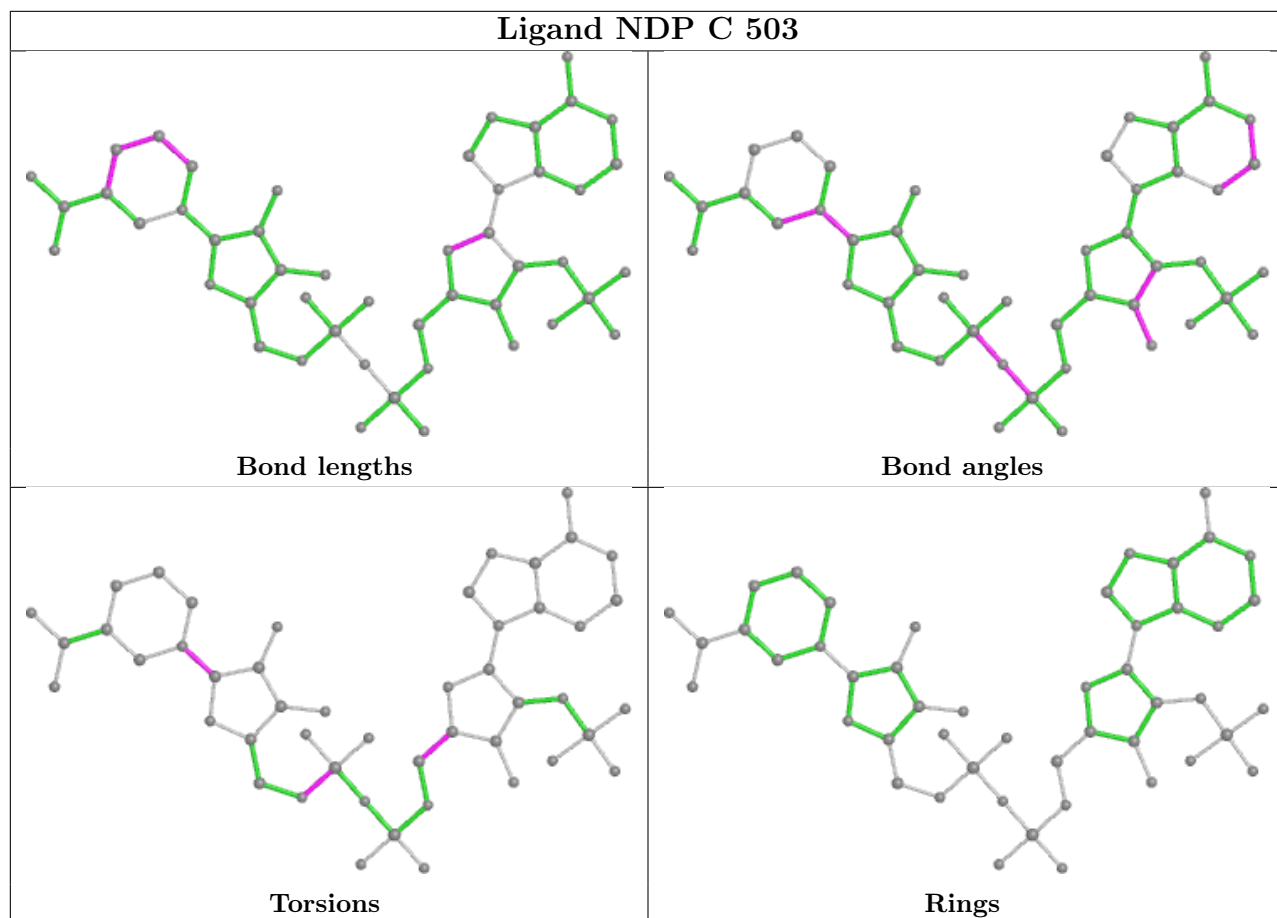
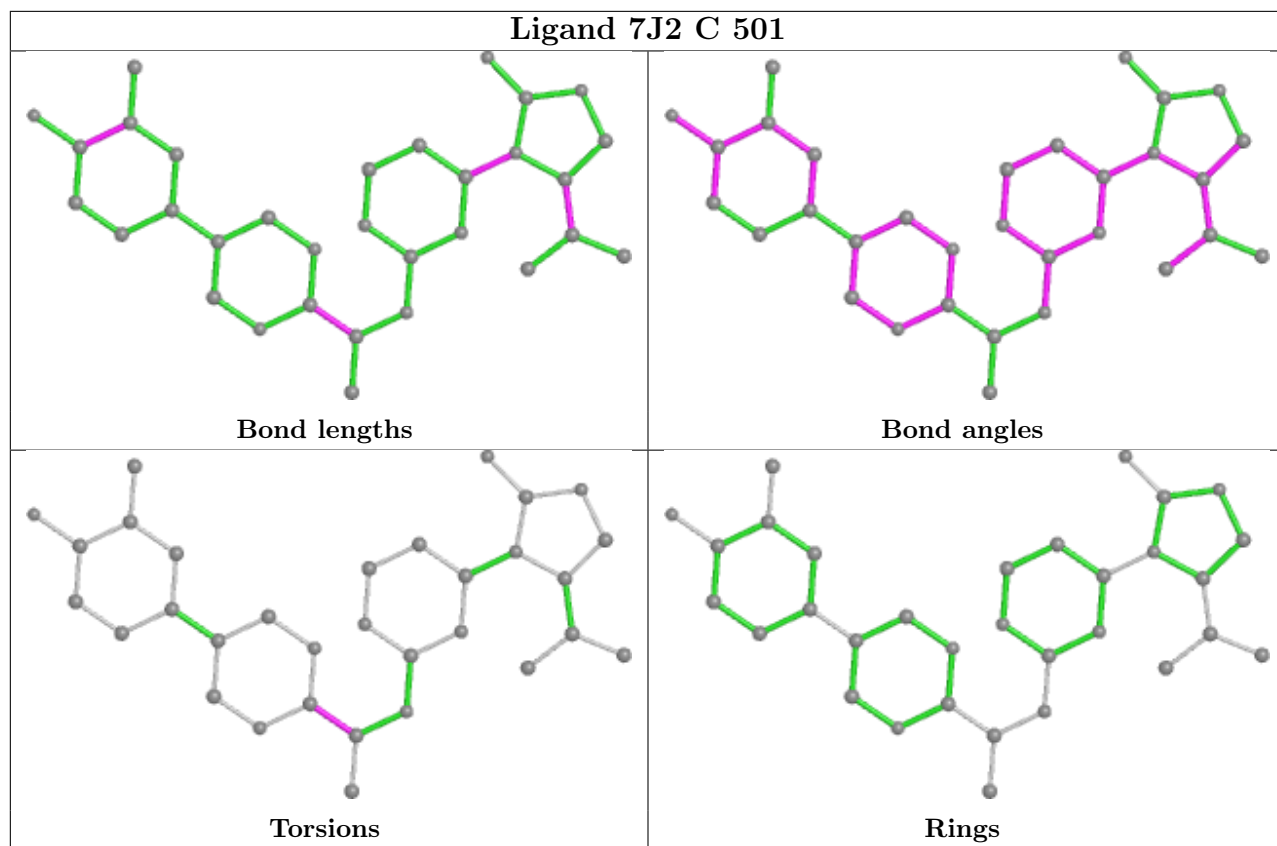
There are no ring outliers.

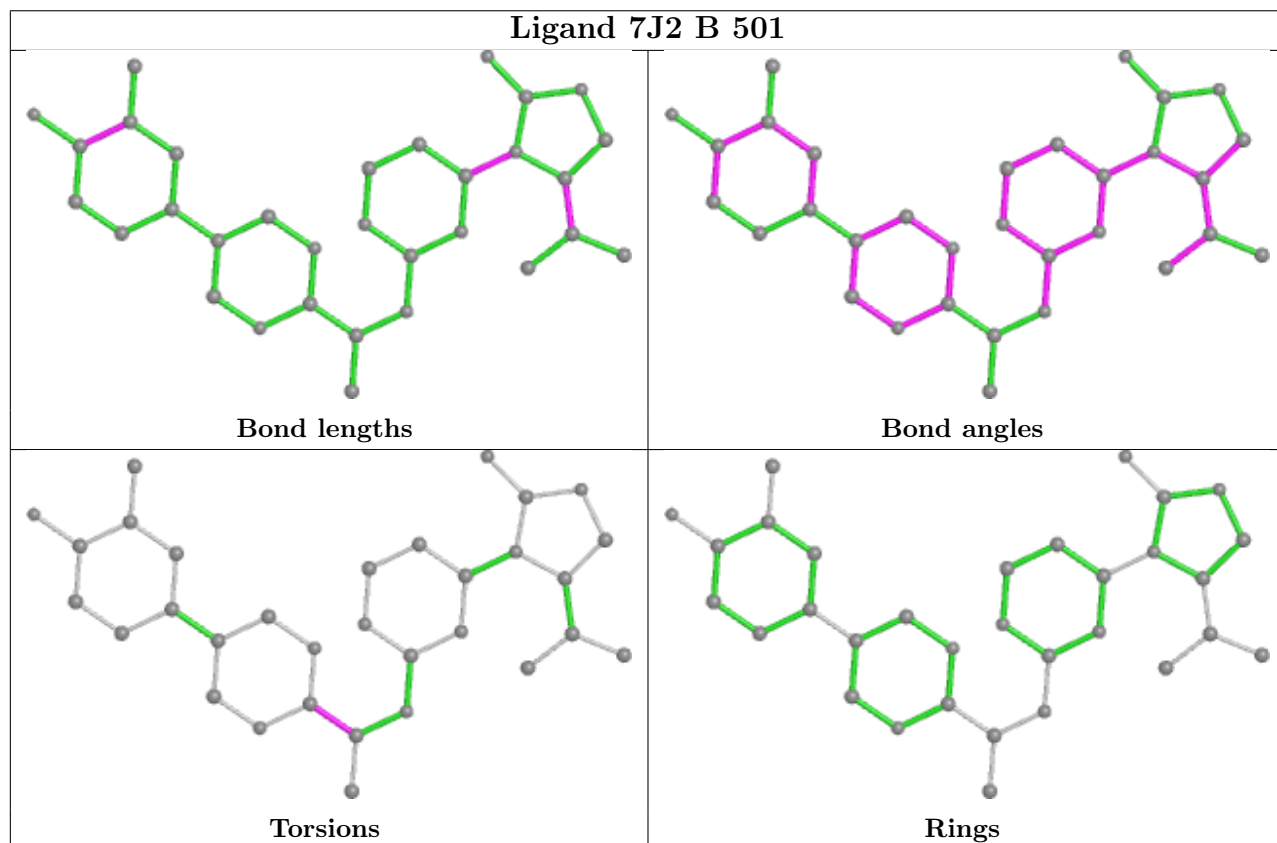
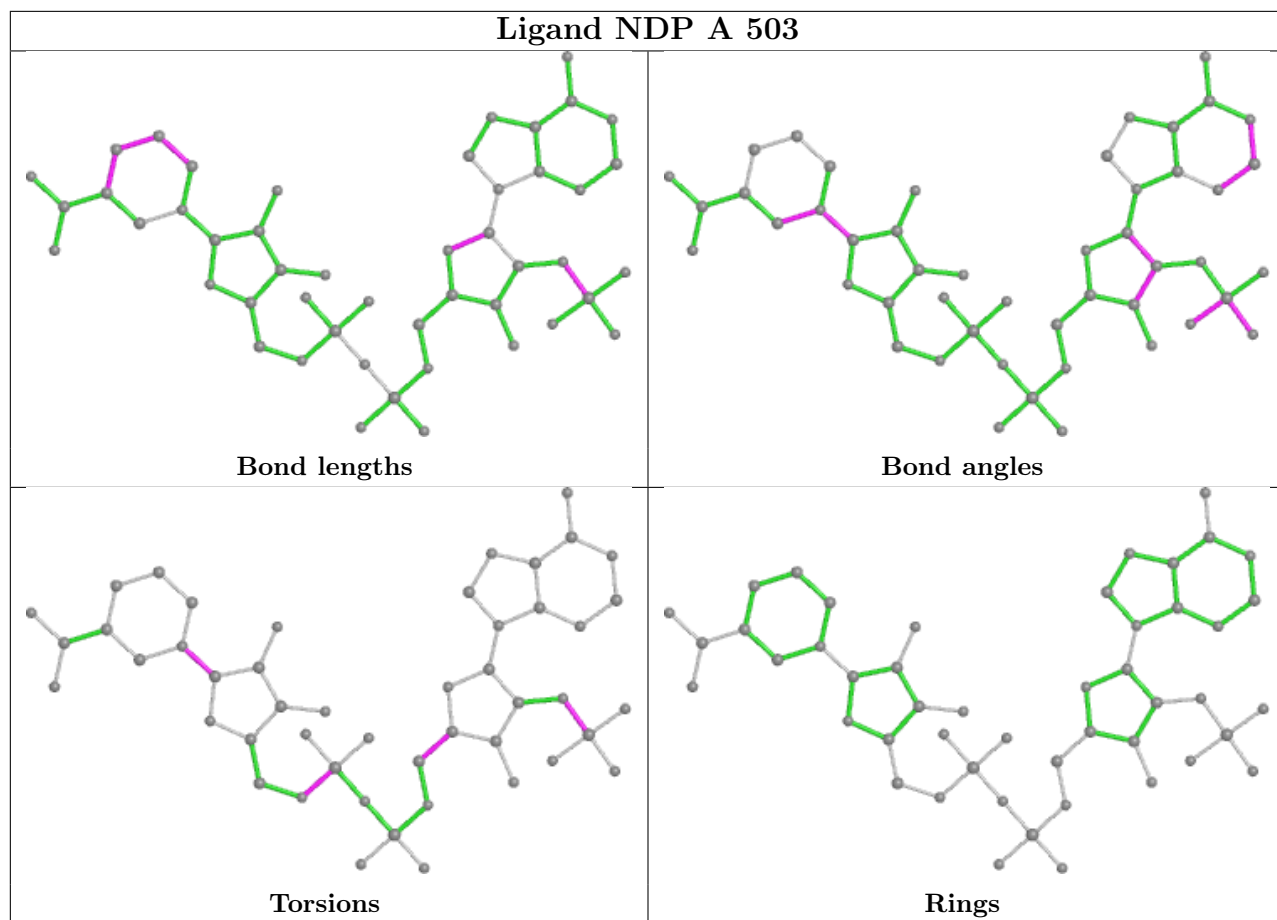
4 monomers are involved in 4 short contacts:

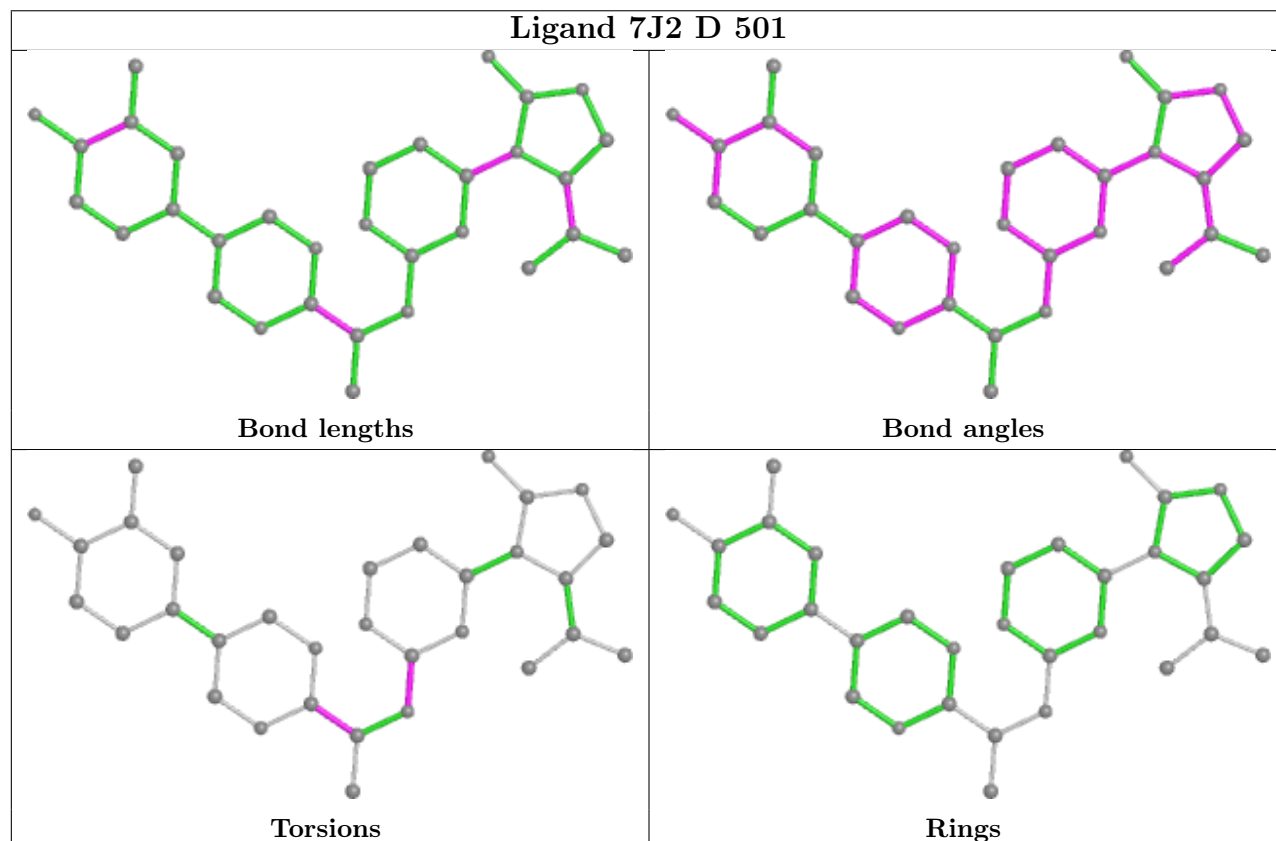
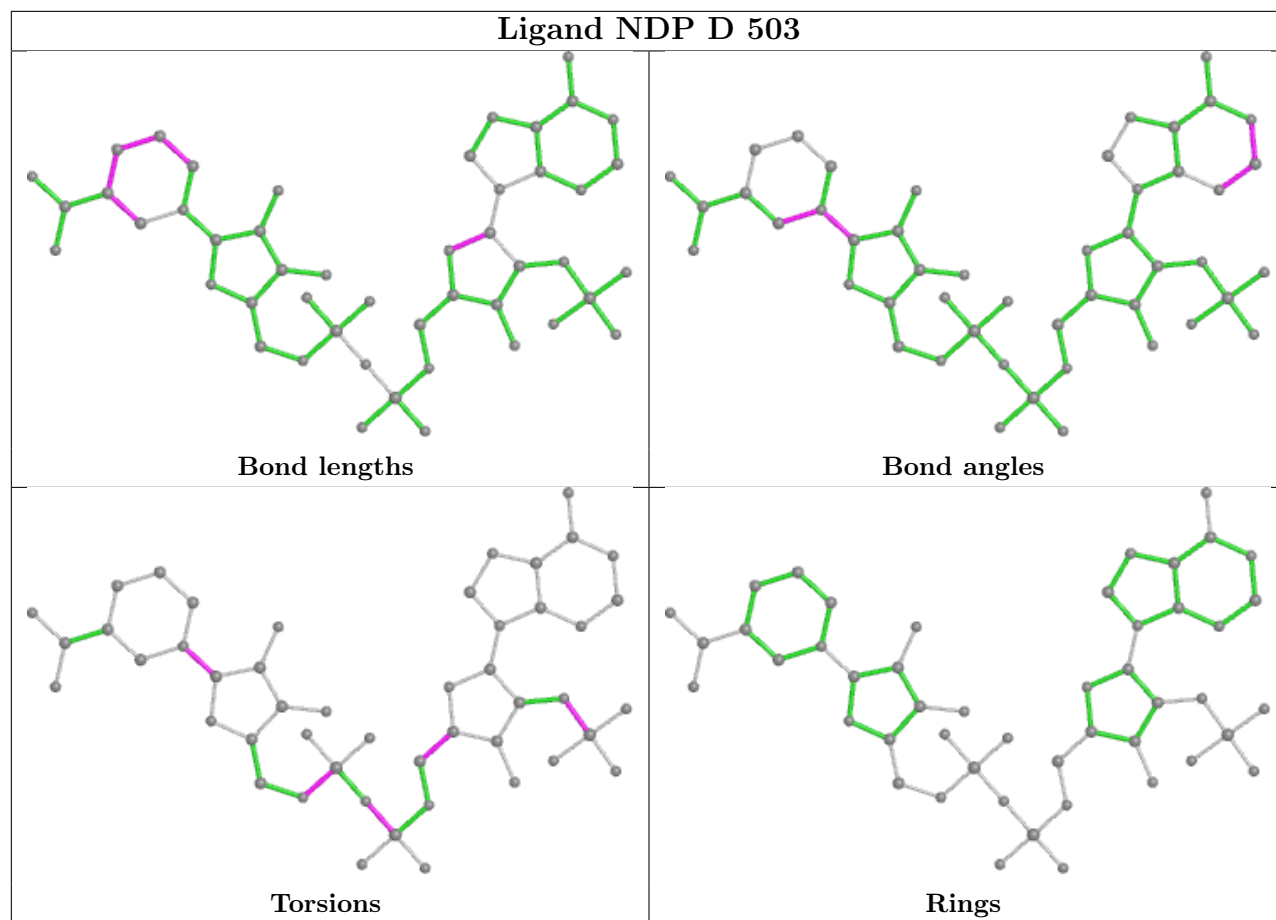
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	503	NDP	1	0
2	B	502	FLC	1	0
4	A	503	NDP	1	0
4	B	503	NDP	2	0

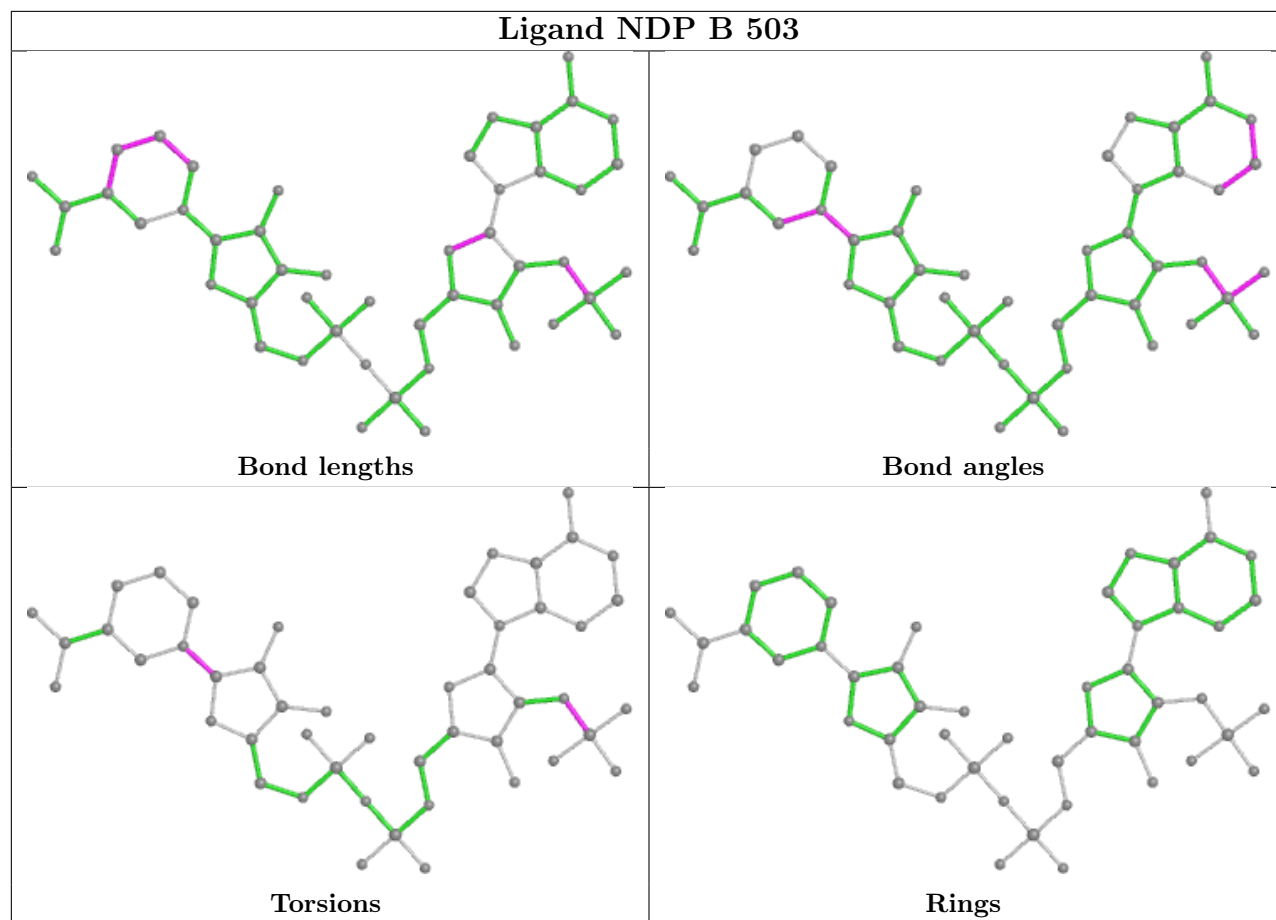
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less 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	401/417 (96%)	-0.28	2 (0%) 91 90	29, 42, 69, 97	0
1	B	407/417 (97%)	-0.39	1 (0%) 95 94	30, 40, 62, 85	0
1	C	408/417 (97%)	-0.06	12 (2%) 51 49	32, 55, 95, 120	0
1	D	402/417 (96%)	0.01	13 (3%) 47 45	32, 59, 94, 114	0
All	All	1618/1668 (97%)	-0.18	28 (1%) 70 68	29, 48, 86, 120	0

All (28) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	86	PHE	5.4
1	A	139	TYR	5.4
1	C	133	HIS	4.4
1	D	89	LYS	4.4
1	C	80	GLU	4.0
1	D	411	GLN	3.9
1	D	135	TYR	3.4
1	C	101	ASN	3.3
1	D	92	TRP	3.3
1	C	241	ALA	3.2
1	D	51	ALA	3.2
1	C	414	LEU	3.2
1	D	350	LYS	3.0
1	D	86	PHE	3.0
1	C	271	ASN	3.0
1	A	383	LEU	2.8
1	D	7	GLY	2.8
1	D	139	TYR	2.6
1	C	83	VAL	2.5
1	D	351	GLU	2.5
1	C	139	TYR	2.4

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Mol	Chain	Res	Type	RSRZ
1	D	93	LYS	2.4
1	C	44	LEU	2.3
1	D	88	LEU	2.3
1	B	139	TYR	2.2
1	C	84	GLU	2.2
1	D	6	SER	2.2
1	C	3	LYS	2.1

## 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](#)

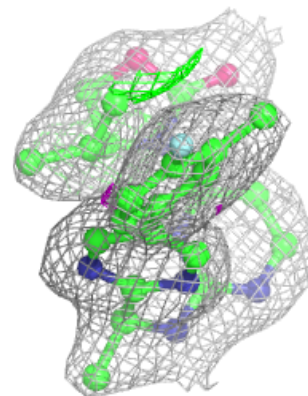
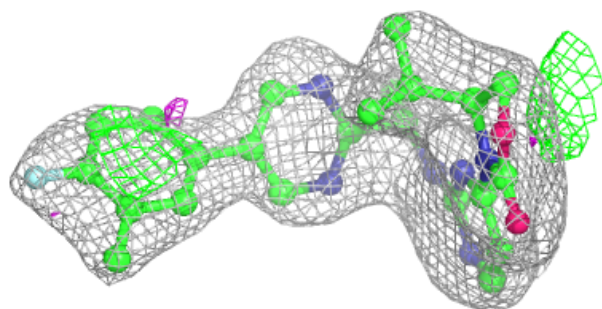
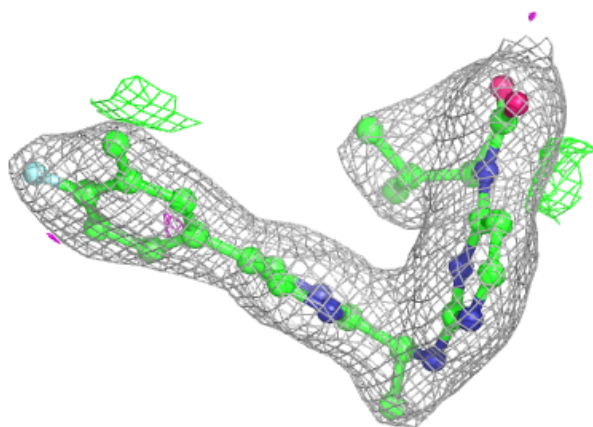
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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
2	FLC	A	501	13/13	0.82	0.18	113,114,115,116	0
2	FLC	C	502	13/13	0.83	0.27	126,129,131,131	0
2	FLC	D	502	13/13	0.83	0.23	98,101,102,103	0
2	FLC	B	502	13/13	0.84	0.19	80,85,88,89	0
3	7J2	C	501	32/32	0.94	0.15	40,46,52,53	0
4	NDP	C	503	48/48	0.94	0.13	54,61,71,74	0
3	7J2	D	501	32/32	0.95	0.15	37,47,55,61	0
3	7J2	A	502	32/32	0.96	0.14	31,40,50,55	0
4	NDP	D	503	48/48	0.96	0.11	47,62,67,69	0
3	7J2	B	501	32/32	0.97	0.11	31,38,42,44	0
4	NDP	A	503	48/48	0.97	0.10	33,41,53,58	0
4	NDP	B	503	48/48	0.98	0.10	32,35,41,49	0

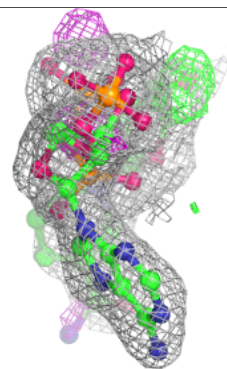
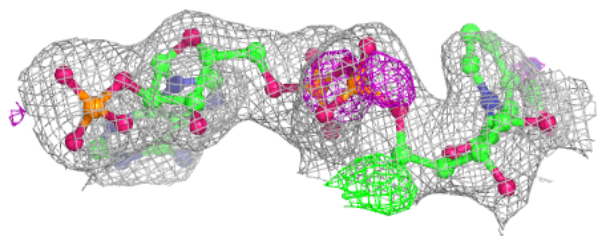
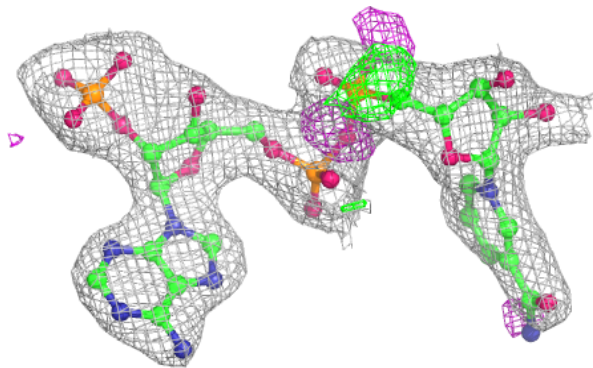
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around 7J2 C 501:**

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

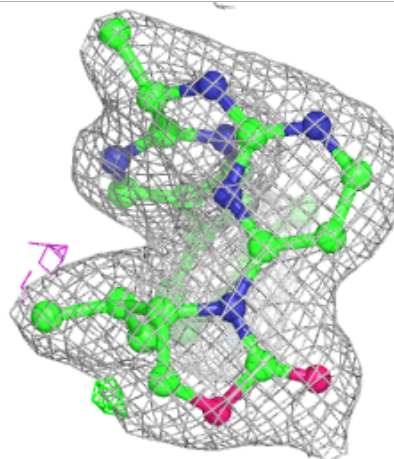
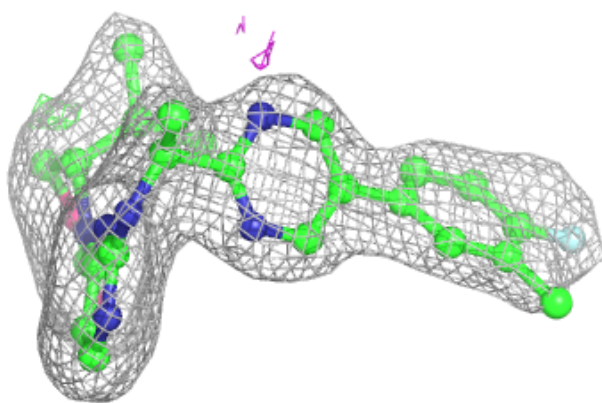
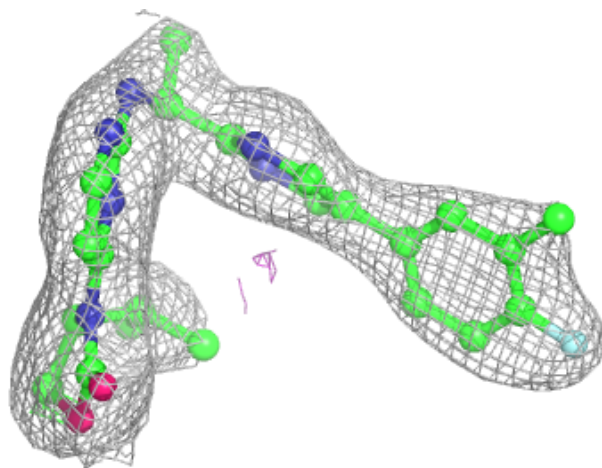
**Electron density around NDP C 503:**

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



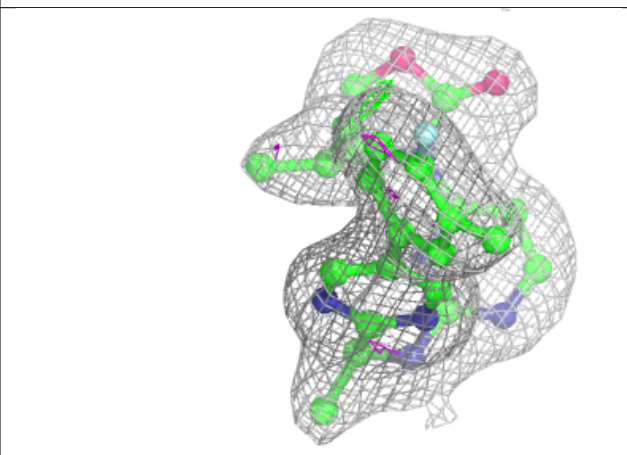
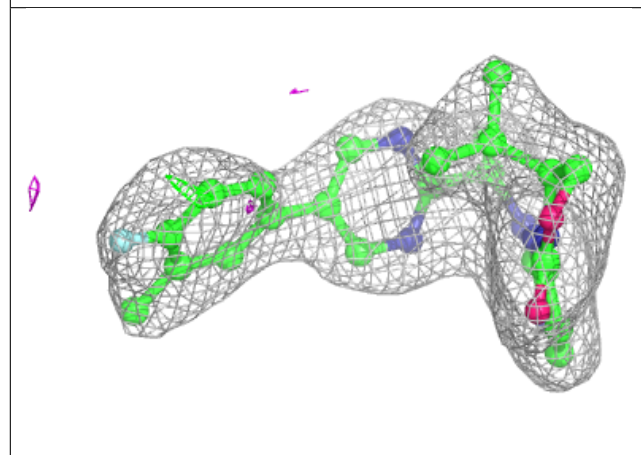
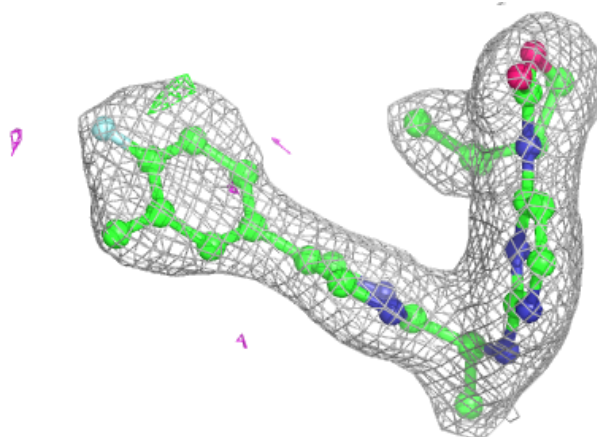
**Electron density around 7J2 D 501:**

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

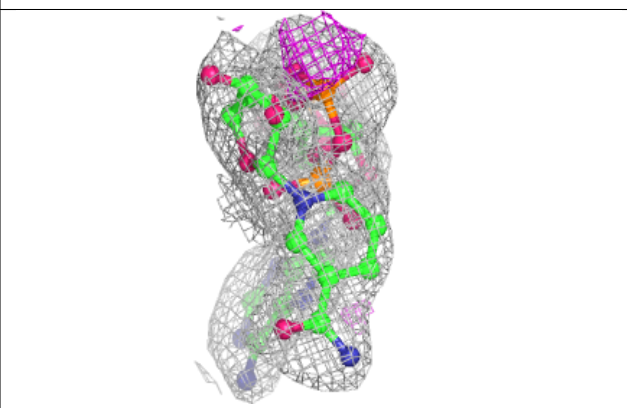
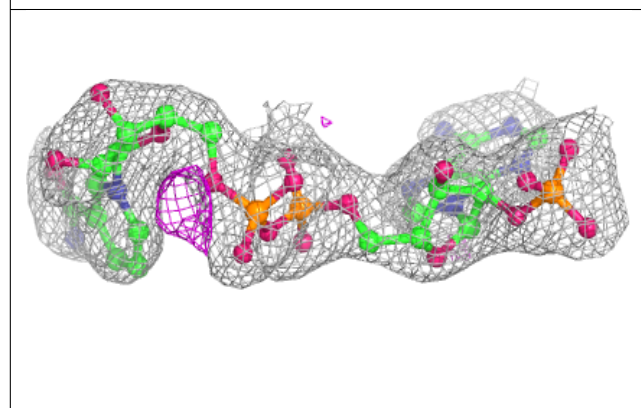
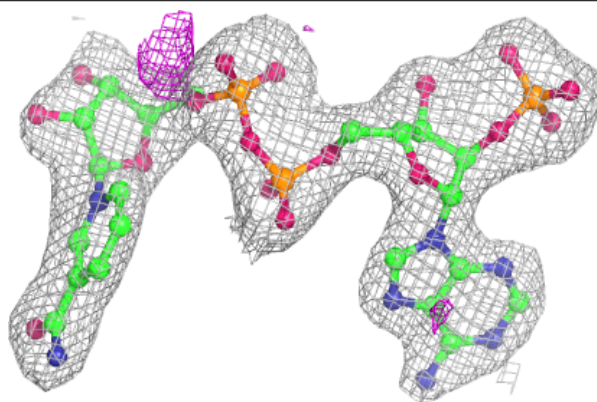


**Electron density around 7J2 A 502:**

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

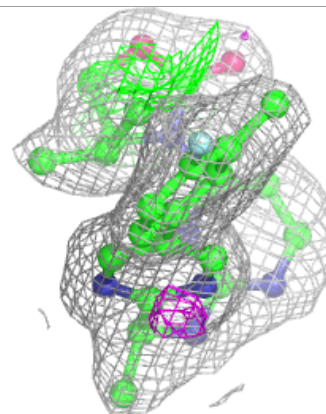
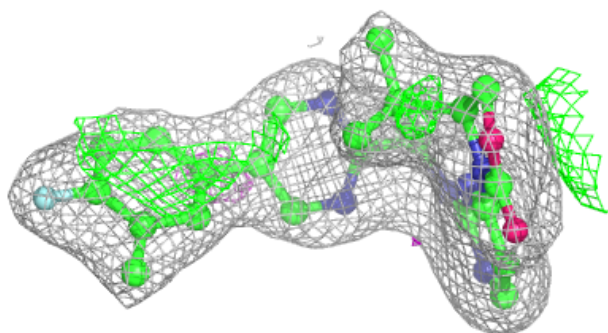
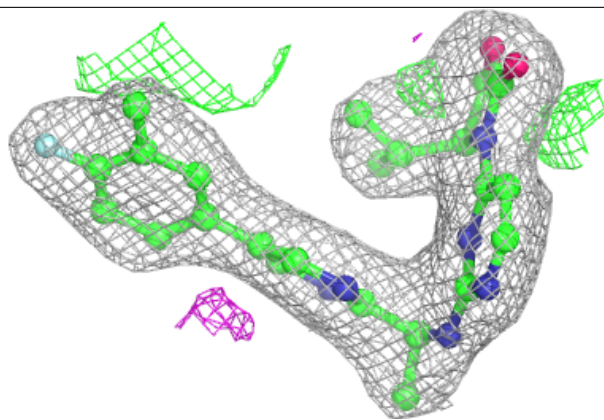
**Electron density around NDP D 503:**

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

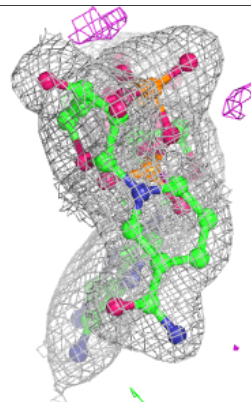
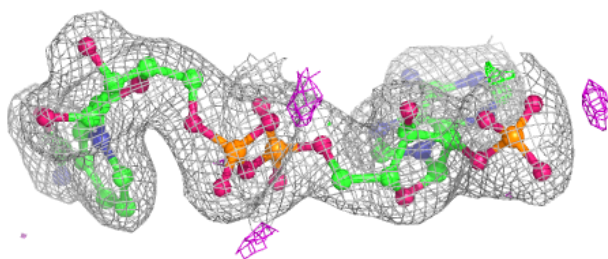
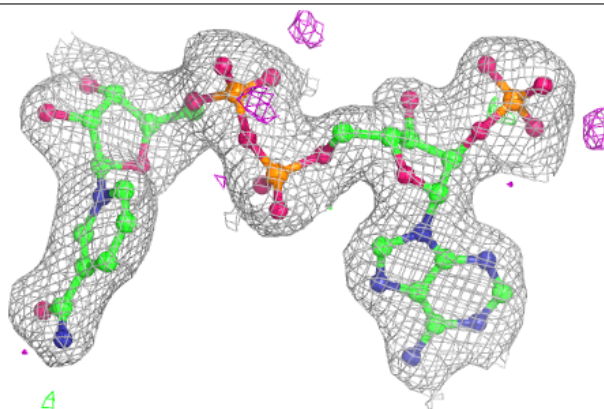


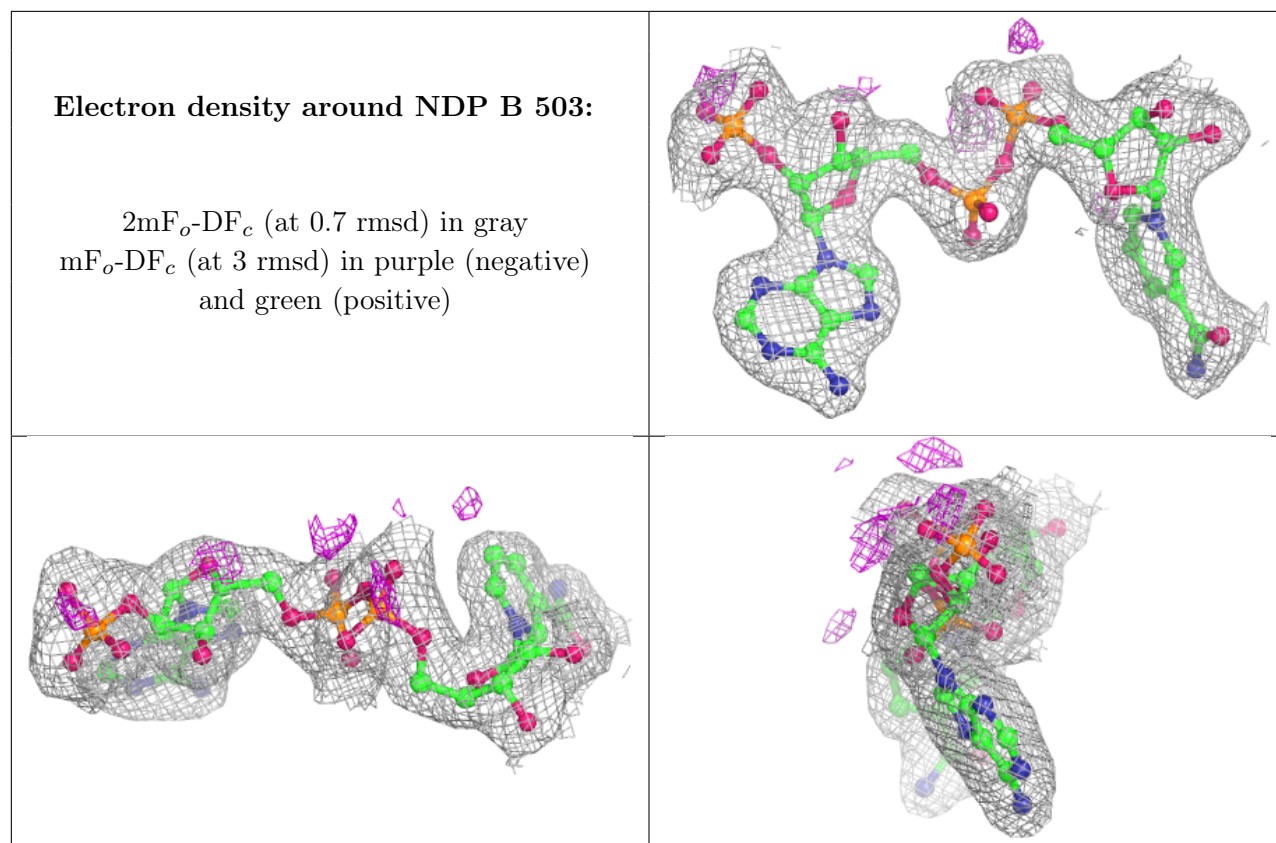
**Electron density around 7J2 B 501:**

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

**Electron density around NDP A 503:**

$2mF_o-DF_c$  (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.