



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 05:40 AM UTC

PDB ID : 5I96 / pdb_00005i96
Title : Crystal Structure of Human Mitochondrial Isocitrate Dehydrogenase (IDH2) R140Q Mutant Homodimer in Complex with AG-221 (Enasidenib) Inhibitor.
Authors : Wei, W.; Zhang, B.; Jin, L.; Jiang, F.; DeLaBarre, B.; Travins, J.A.; Padyana, A.K.
Deposited on : 2016-02-19
Resolution : 1.55 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

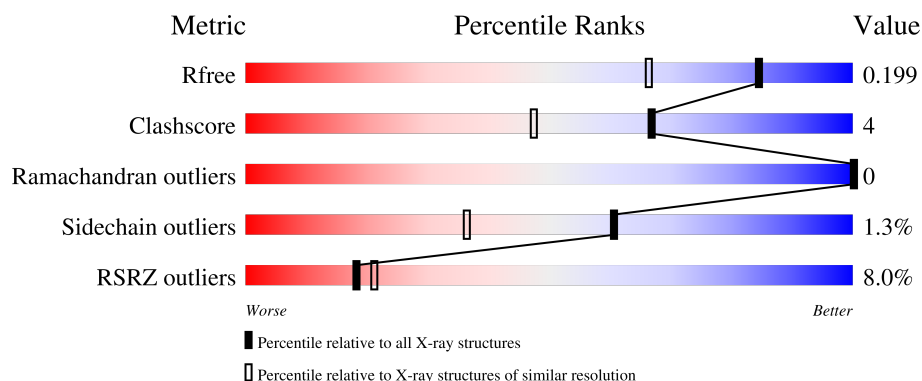
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.55 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	2145 (1.56-1.56)
Clashscore	190562	2189 (1.56-1.56)
Ramachandran outliers	187476	2153 (1.56-1.56)
Sidechain outliers	187428	2150 (1.56-1.56)
RSRZ outliers	180081	2146 (1.56-1.56)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	458	
1	B	458	

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 8184 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], mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	417	Total	C	N	O	S	0	35	0
			3586	2283	632	651	20			
1	B	407	Total	C	N	O	S	0	24	0
			3408	2165	585	637	21			

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	140	GLN	ARG	engineered mutation	UNP P48735
A	453	HIS	-	expression tag	UNP P48735
A	454	HIS	-	expression tag	UNP P48735
A	455	HIS	-	expression tag	UNP P48735
A	456	HIS	-	expression tag	UNP P48735
A	457	HIS	-	expression tag	UNP P48735
A	458	HIS	-	expression tag	UNP P48735
B	140	GLN	ARG	engineered mutation	UNP P48735
B	453	HIS	-	expression tag	UNP P48735
B	454	HIS	-	expression tag	UNP P48735
B	455	HIS	-	expression tag	UNP P48735
B	456	HIS	-	expression tag	UNP P48735
B	457	HIS	-	expression tag	UNP P48735
B	458	HIS	-	expression tag	UNP P48735

- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca).

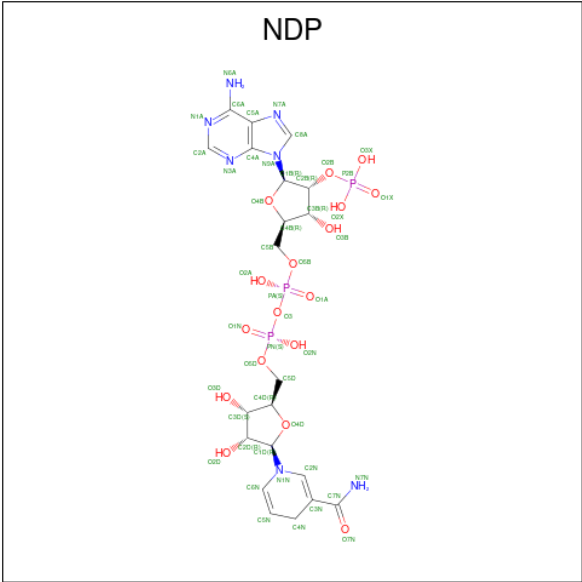
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Ca	0	0
			2	2		

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

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

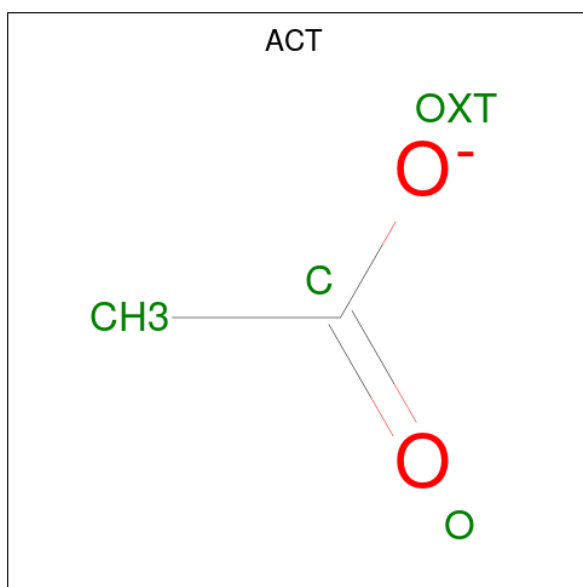


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
4	B	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

- Molecule 5 is SODIUM ION (CCD ID: NA) (formula: Na).

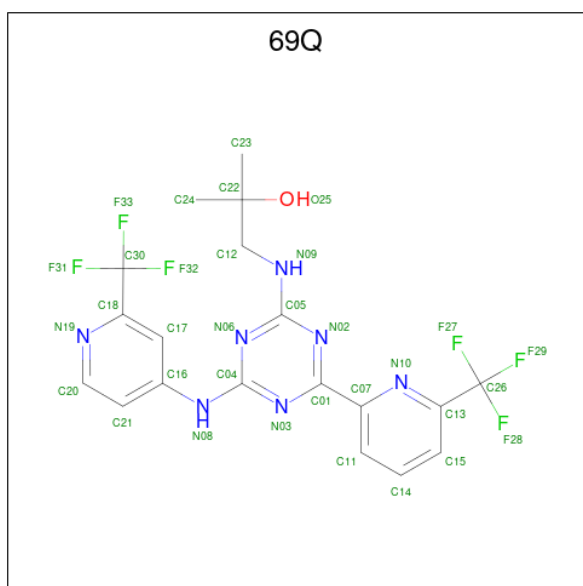
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Na	0	0
			1	1		
5	B	1	Total	Na	0	0
			1	1		

- Molecule 6 is ACETATE ION (CCD ID: ACT) (formula: C₂H₃O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			4	2	2		
6	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 7 is 2-methyl-1-[(4-[6-(trifluoromethyl)pyridin-2-yl]-6-{[2-(trifluoromethyl)pyridin-4-yl]amino}-1,3,5-triazin-2-yl)amino]propan-2-ol (CCD ID: 69Q) (formula: C₁₉H₁₇F₆N₇O).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	B	1	Total	C	F	N	O	0	1
			66	38	12	14	2		

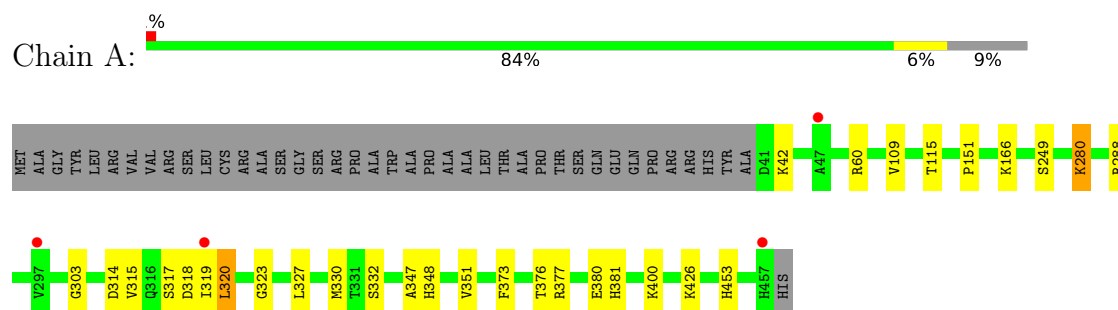
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	646	Total 651	O 651	0	11
8	B	333	Total 335	O 335	0	7

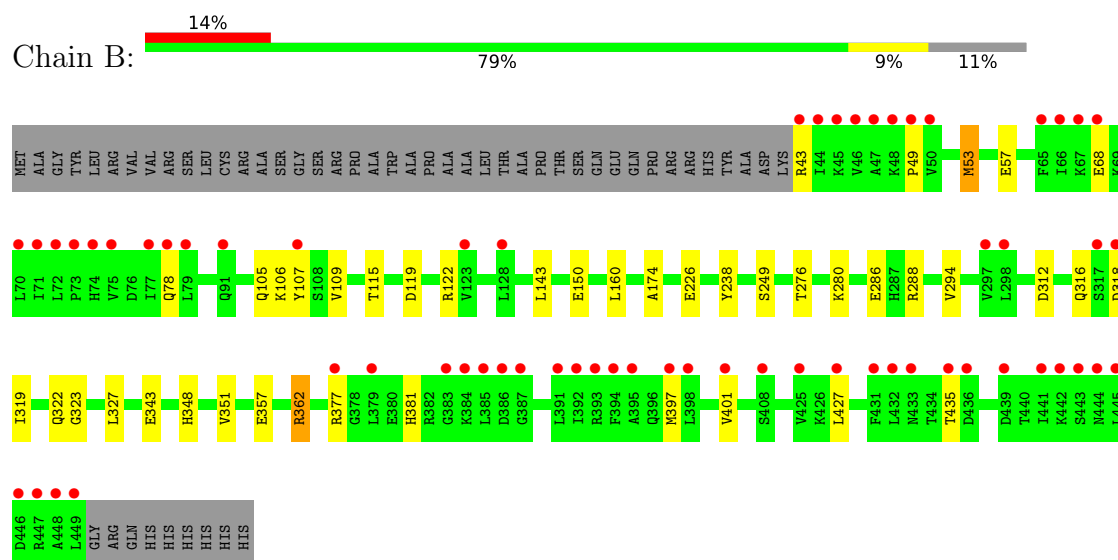
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Isocitrate dehydrogenase [NADP], mitochondrial



- Molecule 1: Isocitrate dehydrogenase [NADP], mitochondrial



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	58.37Å 120.35Å 124.73Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	41.90 – 1.55 41.90 – 1.55	Depositor EDS
% Data completeness (in resolution range)	95.0 (41.90-1.55) 95.0 (41.90-1.55)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.85 (at 1.55Å)	Xtriage
Refinement program	PHENIX 1.11.1_2575	Depositor
R, R_{free}	0.163 , 0.199 0.164 , 0.199	Depositor DCC
R_{free} test set	6152 reflections (4.81%)	wwPDB-VP
Wilson B-factor (Å ²)	14.5	Xtriage
Anisotropy	0.017	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 48.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.013 for -h,l,k	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	8184	wwPDB-VP
Average B, all atoms (Å ²)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.76% 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: NDP, NA, CA, 69Q, ACT, GOL

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	0.32	0/3699	0.53	0/4988
1	B	0.22	0/3494	0.44	0/4721
All	All	0.28	0/7193	0.49	0/9709

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	3586	0	3596	25	0
1	B	3408	0	3377	28	0
2	A	2	0	0	0	0
3	A	24	0	32	0	0
3	B	6	0	8	0	0
4	A	48	0	26	1	0
4	B	48	0	26	2	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
6	A	4	0	3	0	0
6	B	4	0	3	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	B	66	0	0	0	0
8	A	651	0	0	5	1
8	B	335	0	0	4	0
All	All	8184	0	7071	53	1

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 (53) 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:380:GLU:OE1	8:A:601:HOH:O	2.15	0.65
1:B:286:GLU:OE1	1:B:288:ARG:NH2	2.31	0.64
1:A:377[A]:ARG:HH21	1:A:377[A]:ARG:HG3	1.63	0.64
1:B:276:THR:HG22	1:B:280:LYS:HD2	1.82	0.61
1:A:332[A]:SER:HB2	1:A:347[A]:ALA:HB2	1.82	0.61
1:A:166[A]:LYS:HE2	1:A:303:GLY:HA3	1.86	0.57
1:B:109[B]:VAL:HG22	1:B:381:HIS:HD2	1.68	0.57
1:B:57:GLU:OE2	1:B:122[B]:ARG:NH2	2.36	0.56
1:A:373:PHE:O	1:A:377[A]:ARG:HG2	2.07	0.54
1:B:109[A]:VAL:HG22	1:B:381:HIS:HD2	1.72	0.54
8:A:770:HOH:O	1:B:160:LEU:HD12	2.07	0.53
1:B:357:GLU:OE2	1:B:362:ARG:NH1	2.41	0.53
1:B:49:PRO:HB3	1:B:78:GLN:HB2	1.91	0.51
1:A:327:LEU:HB3	1:A:348[B]:HIS:HB3	1.92	0.51
1:B:318[B]:ASP:O	1:B:322:GLN:HG2	2.10	0.51
1:A:327:LEU:HB3	1:A:348[A]:HIS:HB3	1.92	0.51
1:A:60[A]:ARG:HH21	1:A:60[A]:ARG:HB3	1.76	0.51
1:B:150[B]:GLU:OE2	1:B:238:TYR:OH	2.27	0.50
1:A:115:THR:O	4:A:506:NDP:H2N	2.12	0.50
1:B:115:THR:O	4:B:503:NDP:H2N	2.12	0.50
1:A:318[B]:ASP:HB2	8:A:968[B]:HOH:O	2.10	0.49
1:B:106:LYS:HD3	1:B:107:TYR:CZ	2.48	0.49
1:A:151:PRO:HB3	1:A:330[B]:MET:HE1	1.95	0.48
1:B:174:ALA:HB2	8:B:657:HOH:O	2.13	0.48
1:A:280[A]:LYS:HB2	1:A:280[A]:LYS:HE2	1.60	0.48
1:A:42:LYS:HD3	1:A:453:HIS:CE1	2.49	0.48
1:B:226[B]:GLU:OE1	8:B:601:HOH:O	2.20	0.48
1:B:249:SER:HA	1:B:288:ARG:O	2.14	0.47
1:B:280:LYS:NZ	8:B:609:HOH:O	2.47	0.47
1:A:109[A]:VAL:HG22	1:A:381:HIS:HD2	1.79	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:377[B]:ARG:HD2	8:B:805:HOH:O	2.13	0.47
1:A:314:ASP:O	1:A:317[B]:SER:HB2	2.16	0.46
1:B:43:ARG:HA	1:B:43:ARG:HD3	1.66	0.45
1:B:327:LEU:HB3	1:B:348:HIS:HB3	1.96	0.45
1:B:119:ASP:H	1:B:122[B]:ARG:HB2	1.82	0.45
1:A:249:SER:HA	1:A:288:ARG:O	2.17	0.44
4:B:503:NDP:O2A	4:B:503:NDP:H51N	2.18	0.43
1:A:315[B]:VAL:C	1:A:317[B]:SER:H	2.25	0.43
1:B:53[A]:MET:HE1	1:B:343:GLU:HG3	1.99	0.43
1:A:109[B]:VAL:CG1	1:A:381:HIS:HD2	2.32	0.43
1:A:400:LYS:HD3	8:A:1043:HOH:O	2.19	0.42
1:A:320[B]:LEU:HD23	1:A:320[B]:LEU:HA	1.86	0.42
1:B:119:ASP:OD1	1:B:122[A]:ARG:HG2	2.20	0.41
1:B:397:MET:O	1:B:401:VAL:HG23	2.20	0.41
1:B:312:ASP:O	1:B:316[A]:GLN:HG2	2.20	0.41
1:A:319[B]:ILE:O	1:A:323:GLY:N	2.45	0.41
1:A:377[A]:ARG:HD3	8:A:601:HOH:O	2.21	0.41
1:A:373:PHE:HA	1:A:376:THR:OG1	2.21	0.40
1:A:426:LYS:HD3	1:A:426:LYS:HA	1.81	0.40
1:B:316[B]:GLN:HA	1:B:319[B]:ILE:HG22	2.03	0.40
1:B:105:GLN:HG2	1:B:143:LEU:CD2	2.51	0.40
1:A:319[B]:ILE:HD13	1:B:294[B]:VAL:HB	2.03	0.40
1:B:319[B]:ILE:O	1:B:323:GLY:N	2.50	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:A:841:HOH:O	8:A:1075:HOH:O[1_655]	2.18	0.02

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	450/458 (98%)	434 (96%)	16 (4%)	0	100	100
1	B	429/458 (94%)	414 (96%)	15 (4%)	0	100	100
All	All	879/916 (96%)	848 (96%)	31 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	392/389 (101%)	387 (99%)	5 (1%)	61	36
1	B	373/389 (96%)	366 (98%)	7 (2%)	50	22
All	All	765/778 (98%)	753 (98%)	12 (2%)	61	28

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	280[A]	LYS
1	A	280[B]	LYS
1	A	320[A]	LEU
1	A	320[B]	LEU
1	A	351	VAL
1	B	53[A]	MET
1	B	53[B]	MET
1	B	68	GLU
1	B	351	VAL
1	B	362	ARG
1	B	427	LEU
1	B	435	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	140	GLN

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Mol	Chain	Res	Type
1	A	424	ASN
1	A	452	GLN
1	A	453	HIS
1	A	457	HIS

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 15 ligands modelled in this entry, 4 are monoatomic - leaving 11 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	GOL	B	501	-	5,5,5	0.38	0	5,5,5	0.68	0
4	NDP	B	503	-	51,52,52	2.53	7 (13%)	71,80,80	1.43	12 (16%)
3	GOL	A	504	-	5,5,5	0.36	0	5,5,5	0.65	0
7	69Q	B	502[A]	-	35,35,35	1.54	7 (20%)	49,53,53	2.58	17 (34%)
3	GOL	A	502	-	5,5,5	0.33	0	5,5,5	0.38	0
3	GOL	A	503	-	5,5,5	0.53	0	5,5,5	0.45	0
3	GOL	A	505	-	5,5,5	0.38	0	5,5,5	0.43	0
6	ACT	B	505	-	3,3,3	0.81	0	3,3,3	1.36	0
7	69Q	B	502[B]	-	35,35,35	1.57	4 (11%)	49,53,53	2.48	13 (26%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	NDP	A	506	-	51,52,52	2.04	6 (11%)	71,80,80	1.39	12 (16%)
6	ACT	A	508	-	3,3,3	0.79	0	3,3,3	1.34	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
3	GOL	B	501	-	-	2/4/4/4	-
4	NDP	B	503	-	-	7/34/77/77	0/5/5/5
3	GOL	A	504	-	-	0/4/4/4	-
7	69Q	B	502[A]	-	-	2/26/26/26	0/3/3/3
3	GOL	A	502	-	-	0/4/4/4	-
3	GOL	A	503	-	-	0/4/4/4	-
3	GOL	A	505	-	-	2/4/4/4	-
7	69Q	B	502[B]	-	-	6/26/26/26	0/3/3/3
4	NDP	A	506	-	-	6/34/77/77	0/5/5/5

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	503	NDP	P2B-O2B	13.97	1.84	1.59
4	A	506	NDP	PA-O3	9.05	1.69	1.59
4	A	506	NDP	P2B-O2B	8.37	1.74	1.59
4	B	503	NDP	PA-O3	6.47	1.66	1.59
7	B	502[B]	69Q	C05-N09	5.85	1.43	1.34
7	B	502[A]	69Q	C05-N09	5.46	1.43	1.34
7	B	502[B]	69Q	C07-N10	-4.40	1.28	1.34
4	B	503	NDP	PN-O5D	4.08	1.75	1.59
7	B	502[A]	69Q	C07-N10	-3.12	1.30	1.34
7	B	502[A]	69Q	C04-N08	3.08	1.42	1.36
4	B	503	NDP	PN-O3	2.70	1.62	1.59
4	B	503	NDP	O2B-C2B	-2.60	1.35	1.44
4	A	506	NDP	O2B-C2B	-2.50	1.35	1.44
7	B	502[B]	69Q	C13-N10	-2.34	1.31	1.34
4	A	506	NDP	C6A-N6A	2.29	1.40	1.34
4	B	503	NDP	C8A-N9A	2.28	1.41	1.37
4	B	503	NDP	O5D-C5D	-2.27	1.36	1.44
7	B	502[B]	69Q	C04-N08	2.22	1.41	1.36
7	B	502[A]	69Q	C17-C16	2.21	1.43	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	B	502[A]	69Q	C16-N08	2.18	1.45	1.40
4	A	506	NDP	C5A-C4A	2.16	1.42	1.39
4	A	506	NDP	C6N-N1N	2.13	1.42	1.37
7	B	502[A]	69Q	O25-C22	-2.03	1.39	1.44
7	B	502[A]	69Q	C21-C20	2.01	1.42	1.38

All (54) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	B	502[A]	69Q	C04-N03-C01	11.64	121.92	114.50
7	B	502[B]	69Q	C04-N03-C01	8.22	119.74	114.50
7	B	502[B]	69Q	F32-C30-C18	-7.45	99.31	112.43
7	B	502[A]	69Q	C05-N02-C01	6.85	118.87	114.50
7	B	502[B]	69Q	C05-N02-C01	4.66	117.47	114.50
7	B	502[A]	69Q	N06-C04-N03	-4.60	118.72	126.26
7	B	502[B]	69Q	C07-C01-N02	4.50	123.65	117.47
4	A	506	NDP	O3-PA-O1A	-4.26	97.90	110.70
7	B	502[B]	69Q	N06-C04-N03	-4.03	119.65	126.26
7	B	502[A]	69Q	C12-N09-C05	-3.77	117.59	123.98
7	B	502[B]	69Q	N06-C05-N02	-3.71	120.18	126.26
4	A	506	NDP	O2N-PN-O3	3.68	117.22	107.27
4	B	503	NDP	O3-PA-O1A	-3.63	99.79	110.70
4	B	503	NDP	O2B-P2B-O1X	-3.49	96.88	109.33
7	B	502[B]	69Q	C05-N06-C04	3.46	120.06	113.85
7	B	502[B]	69Q	C12-N09-C05	-3.41	118.20	123.98
7	B	502[A]	69Q	N03-C01-N02	-3.33	119.66	125.13
4	B	503	NDP	O2N-PN-O3	3.25	116.06	107.27
4	A	506	NDP	O3-PN-O1N	-3.02	101.61	110.70
7	B	502[B]	69Q	C07-C01-N03	-2.92	113.45	117.47
7	B	502[B]	69Q	N08-C04-N06	2.88	126.80	116.90
4	B	503	NDP	C3B-C2B-C1B	-2.85	97.36	102.81
4	A	506	NDP	O2B-P2B-O1X	-2.84	99.20	109.33
7	B	502[B]	69Q	C21-C20-N19	-2.84	120.49	123.97
7	B	502[B]	69Q	C20-N19-C18	2.77	121.08	117.48
7	B	502[A]	69Q	C20-N19-C18	2.75	121.05	117.48
4	B	503	NDP	O5D-PN-O1N	-2.73	98.11	108.94
7	B	502[A]	69Q	C05-N06-C04	2.70	118.69	113.85
4	B	503	NDP	C2A-N1A-C6A	-2.70	114.29	118.73
4	A	506	NDP	P2B-O2B-C2B	-2.57	116.56	123.43
4	A	506	NDP	C3B-C2B-C1B	-2.56	97.91	102.81
4	B	503	NDP	O3X-P2B-O2X	2.55	117.35	107.80
7	B	502[A]	69Q	F31-C30-C18	-2.53	107.98	112.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	B	502[A]	69Q	N06-C05-N02	-2.52	122.13	126.26
4	B	503	NDP	PA-O5B-C5B	-2.52	106.93	121.35
7	B	502[A]	69Q	C26-C13-N10	2.42	117.48	114.60
4	A	506	NDP	O2A-PA-O3	2.31	113.52	107.27
7	B	502[A]	69Q	C07-C01-N03	2.31	120.65	117.47
7	B	502[A]	69Q	C07-N10-C13	2.26	120.85	118.68
4	A	506	NDP	O3X-P2B-O2X	2.26	116.26	107.80
7	B	502[A]	69Q	C11-C14-C15	-2.21	117.40	120.24
7	B	502[A]	69Q	F32-C30-C18	-2.19	108.57	112.43
4	A	506	NDP	O7N-C7N-N7N	-2.17	118.03	122.89
4	A	506	NDP	C1D-N1N-C2N	-2.15	117.60	121.14
7	B	502[A]	69Q	C21-C20-N19	-2.15	121.34	123.97
4	B	503	NDP	N3A-C4A-N9A	2.14	130.81	127.17
4	B	503	NDP	C5A-C4A-N3A	-2.13	123.78	126.72
4	B	503	NDP	P2B-O2B-C2B	-2.11	117.80	123.43
7	B	502[A]	69Q	C21-C16-C17	-2.05	117.18	119.66
7	B	502[B]	69Q	C11-C14-C15	-2.04	117.62	120.24
4	A	506	NDP	O7N-C7N-C3N	2.02	124.69	120.90
7	B	502[A]	69Q	N08-C04-N06	2.01	123.82	116.90
4	B	503	NDP	O7N-C7N-N7N	-2.01	118.40	122.89
4	A	506	NDP	N3A-C4A-N9A	2.00	130.58	127.17

There are no chirality outliers.

All (25) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	505	GOL	C1-C2-C3-O3
3	B	501	GOL	O1-C1-C2-O2
3	B	501	GOL	O1-C1-C2-C3
4	B	503	NDP	C5B-O5B-PA-O1A
4	B	503	NDP	C5B-O5B-PA-O3
7	B	502[B]	69Q	N02-C05-N09-C12
7	B	502[B]	69Q	N06-C05-N09-C12
3	A	505	GOL	O2-C2-C3-O3
4	B	503	NDP	O4B-C4B-C5B-O5B
7	B	502[B]	69Q	N06-C04-N08-C16
7	B	502[B]	69Q	N09-C12-C22-C23
4	A	506	NDP	C3B-C4B-C5B-O5B
4	B	503	NDP	C3B-C4B-C5B-O5B
7	B	502[B]	69Q	N03-C04-N08-C16
4	A	506	NDP	C5B-O5B-PA-O1A
4	A	506	NDP	C5D-O5D-PN-O3

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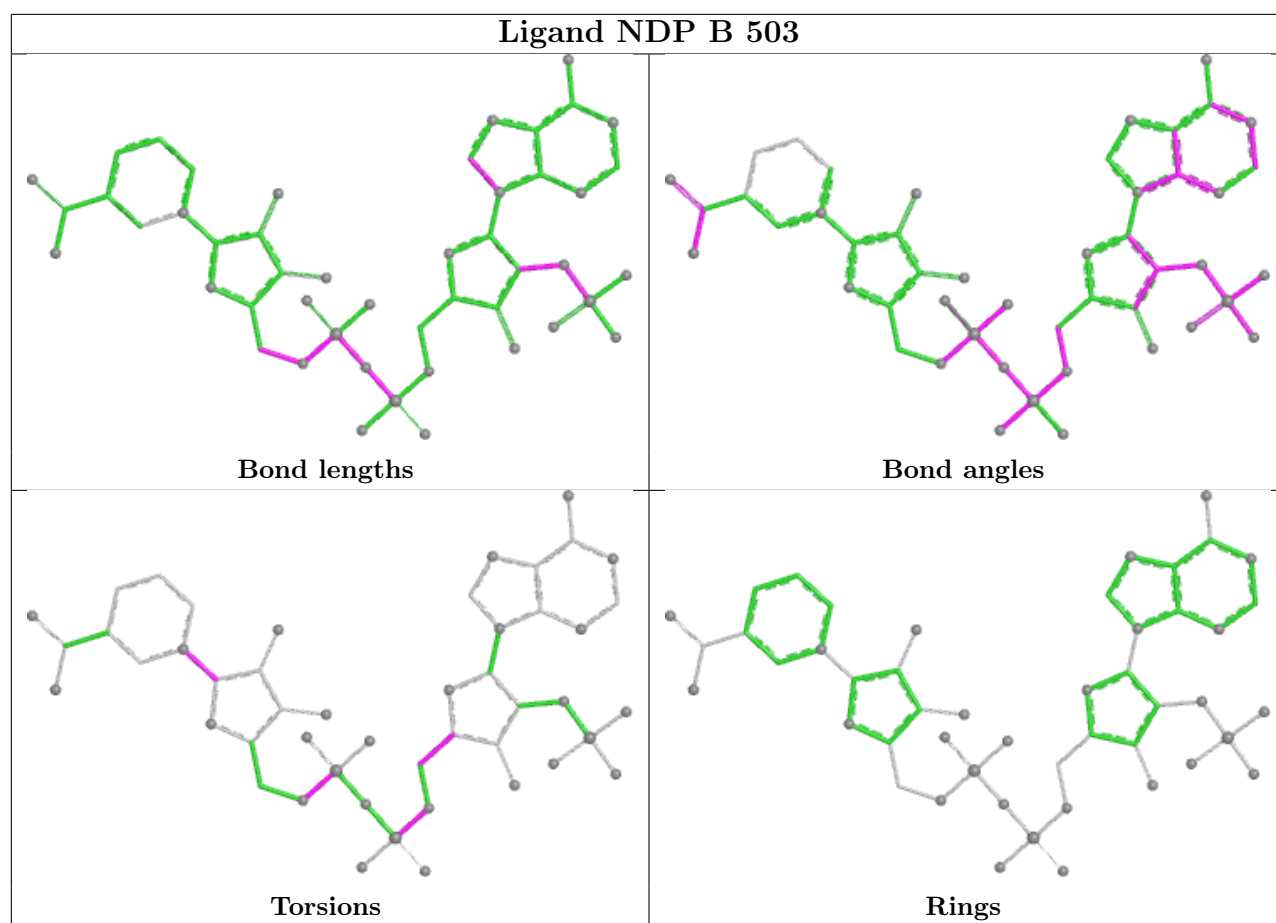
Mol	Chain	Res	Type	Atoms
4	B	503	NDP	C5D-O5D-PN-O3
4	A	506	NDP	C2D-C1D-N1N-C2N
4	B	503	NDP	C2D-C1D-N1N-C2N
4	A	506	NDP	O4B-C4B-C5B-O5B
4	B	503	NDP	O4D-C1D-N1N-C2N
4	A	506	NDP	O4D-C1D-N1N-C2N
7	B	502[B]	69Q	C22-C12-N09-C05
7	B	502[A]	69Q	N06-C04-N08-C16
7	B	502[A]	69Q	N09-C12-C22-O25

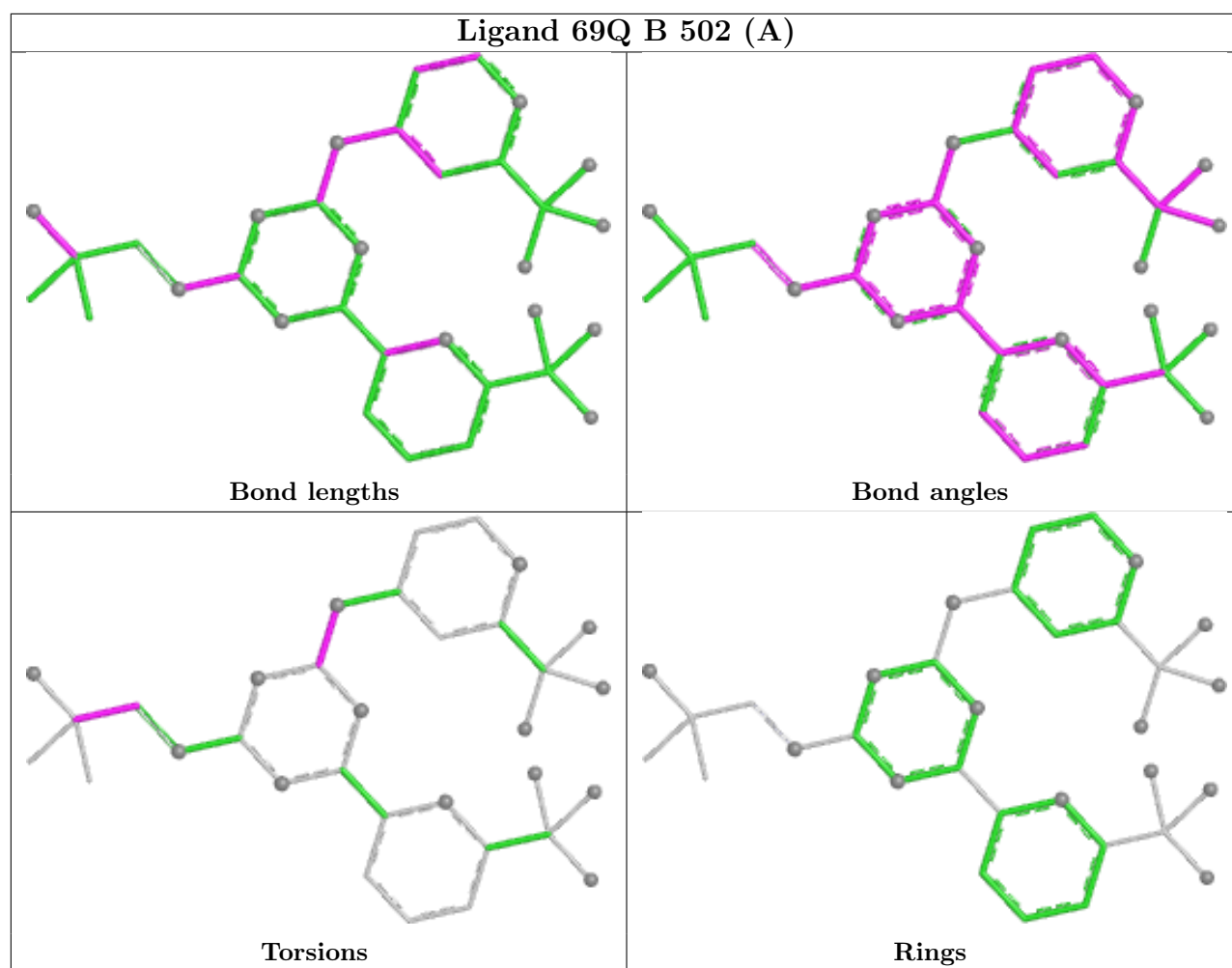
There are no ring outliers.

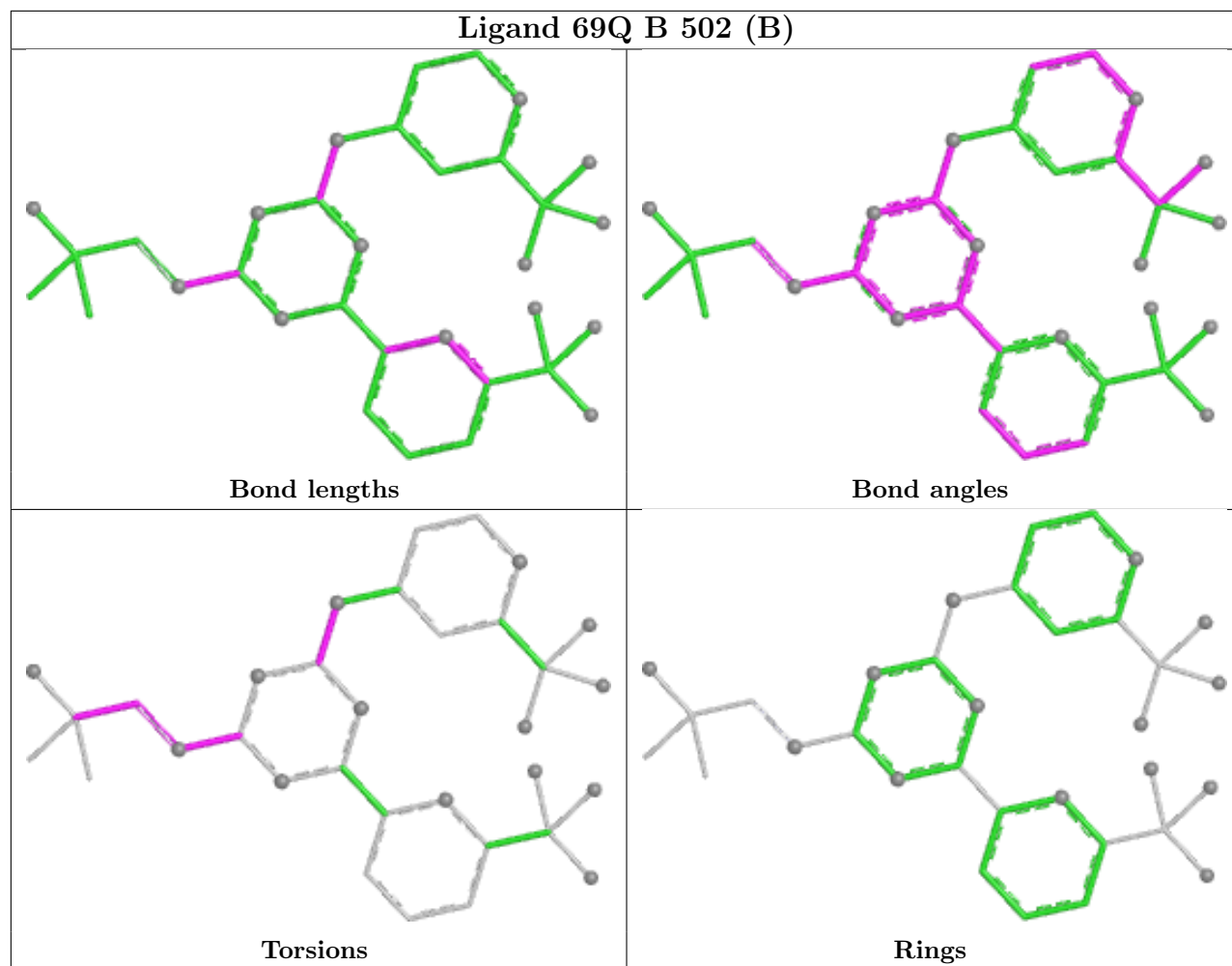
2 monomers are involved in 3 short contacts:

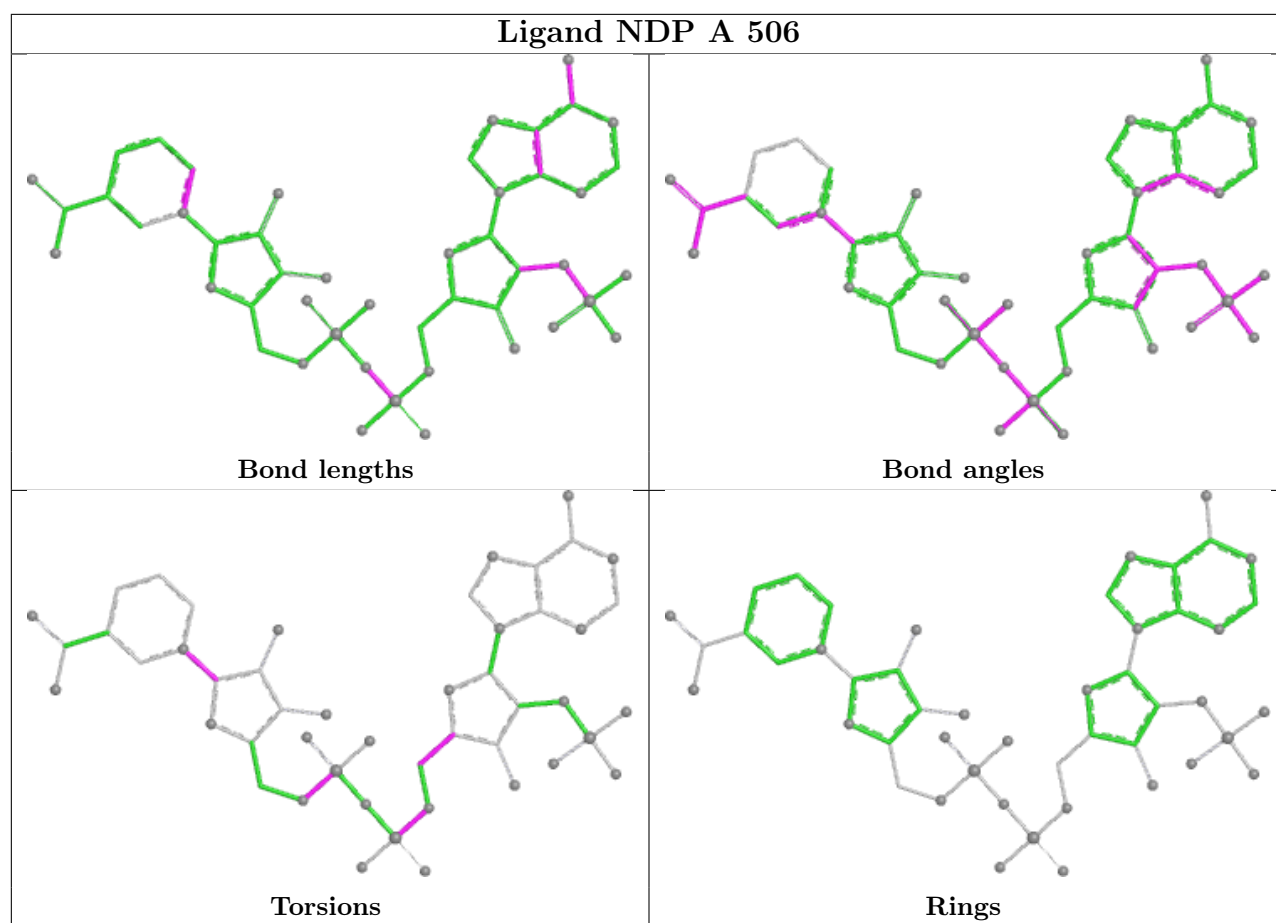
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	503	NDP	2	0
4	A	506	NDP	1	0

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	417/458 (91%)	-0.31	4 (0%) 79 85	4, 13, 31, 52	35 (8%)
1	B	407/458 (88%)	0.74	62 (15%) 5 6	6, 30, 74, 102	24 (5%)
All	All	824/916 (89%)	0.21	66 (8%) 18 21	4, 18, 61, 102	59 (7%)

All (66) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	46	VAL	5.2
1	B	72	LEU	5.0
1	B	75	VAL	4.9
1	B	44	ILE	4.7
1	B	449	LEU	4.1
1	B	47	ALA	4.1
1	B	386[A]	ASP	4.0
1	B	445	LEU	3.8
1	B	77	ILE	3.7
1	B	297	VAL	3.6
1	B	394	PHE	3.5
1	B	385	LEU	3.5
1	B	107	TYR	3.3
1	B	391	LEU	3.2
1	B	427	LEU	3.2
1	B	71	ILE	3.2
1	B	448	ALA	3.2
1	B	397	MET	3.1
1	A	457	HIS	3.0
1	B	298	LEU	3.0
1	B	442	LYS	3.0
1	B	433	ASN	2.9
1	B	73	PRO	2.9
1	B	401	VAL	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	443	SER	2.8
1	B	45	LYS	2.8
1	B	70	LEU	2.7
1	B	383	GLY	2.7
1	B	50	VAL	2.7
1	B	48	LYS	2.6
1	B	395	ALA	2.6
1	B	431	PHE	2.6
1	B	78	GLN	2.6
1	B	425	VAL	2.6
1	B	387	GLY	2.6
1	B	444	ASN	2.6
1	B	447	ARG	2.6
1	B	432	LEU	2.5
1	B	65	PHE	2.5
1	B	435	THR	2.5
1	B	377[A]	ARG	2.5
1	B	74	HIS	2.5
1	B	128	LEU	2.5
1	A	297	VAL	2.5
1	B	398	LEU	2.4
1	B	66	ILE	2.4
1	B	439	ASP	2.3
1	B	446	ASP	2.3
1	B	49	PRO	2.3
1	B	123	VAL	2.3
1	A	319[A]	ILE	2.3
1	B	91	GLN	2.3
1	B	436	ASP	2.3
1	B	79	LEU	2.3
1	B	392	ILE	2.3
1	B	318[A]	ASP	2.2
1	A	47	ALA	2.2
1	B	43	ARG	2.2
1	B	393	ARG	2.1
1	B	379	LEU	2.1
1	B	67	LYS	2.1
1	B	408[A]	SER	2.1
1	B	68	GLU	2.0
1	B	441	ILE	2.0
1	B	384	LYS	2.0
1	B	317[A]	SER	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

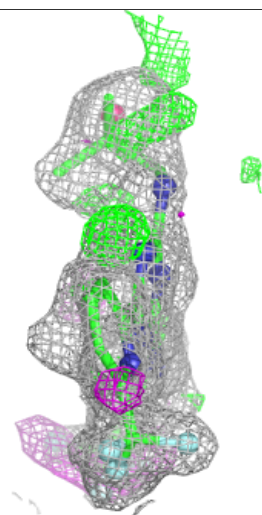
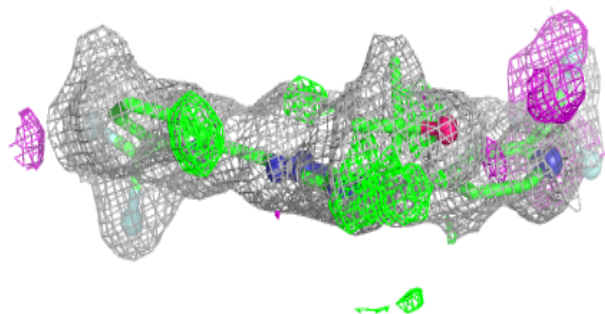
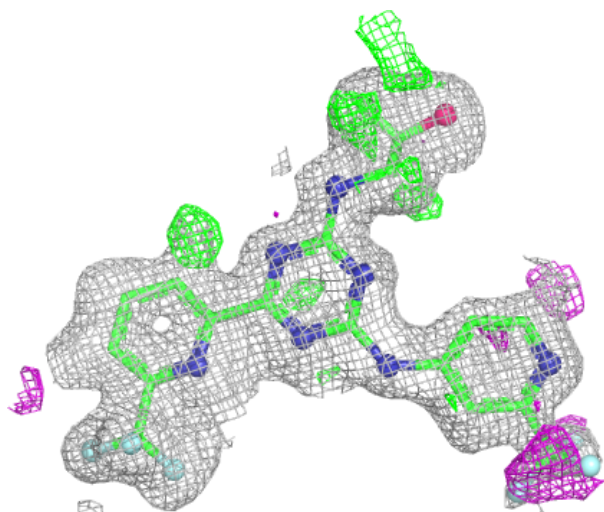
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
6	ACT	B	505	4/4	0.67	0.20	48,51,53,57	0
6	ACT	A	508	4/4	0.82	0.16	47,48,51,51	0
3	GOL	A	504	6/6	0.87	0.13	25,32,36,39	0
3	GOL	A	505	6/6	0.90	0.11	21,39,43,46	0
7	69Q	B	502[A]	33/33	0.90	0.11	8,19,30,35	33
7	69Q	B	502[B]	33/33	0.90	0.11	9,25,30,33	33
3	GOL	B	501	6/6	0.94	0.08	24,31,36,36	0
4	NDP	B	503	48/48	0.94	0.08	18,24,30,40	0
3	GOL	A	502	6/6	0.95	0.07	18,20,26,29	0
3	GOL	A	503	6/6	0.95	0.08	14,15,30,40	0
2	CA	A	509	1/1	0.97	0.04	16,16,16,16	1
5	NA	B	504	1/1	0.97	0.10	27,27,27,27	0
5	NA	A	507	1/1	0.98	0.07	15,15,15,15	0
4	NDP	A	506	48/48	0.99	0.04	7,10,15,21	0
2	CA	A	501	1/1	0.99	0.03	14,14,14,14	1

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.

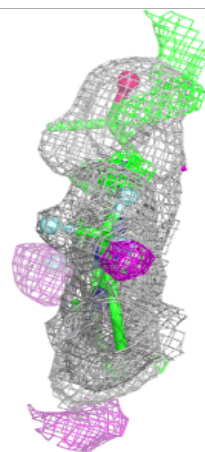
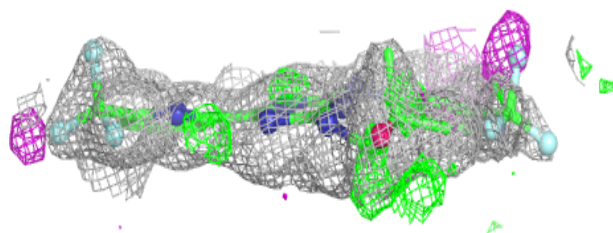
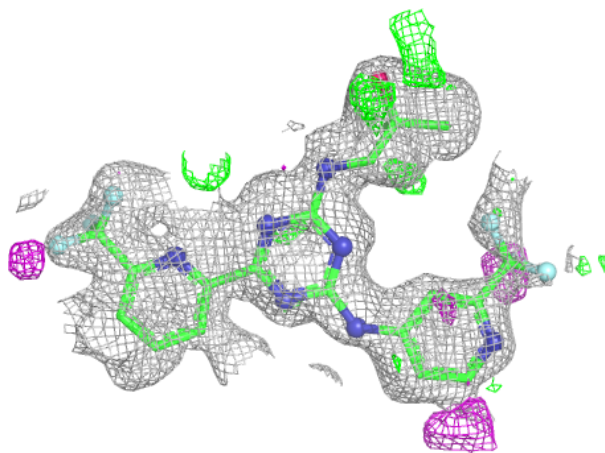
Electron density around 69Q B 502 (A):

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



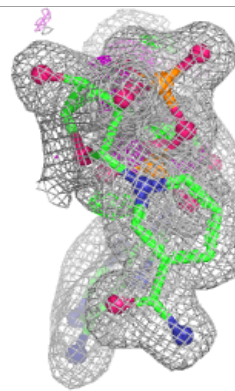
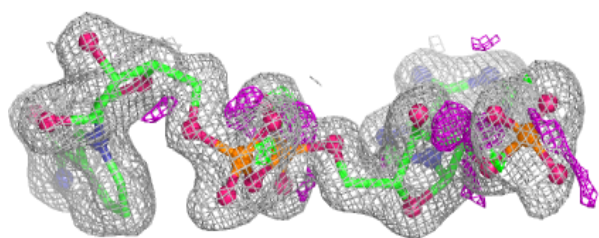
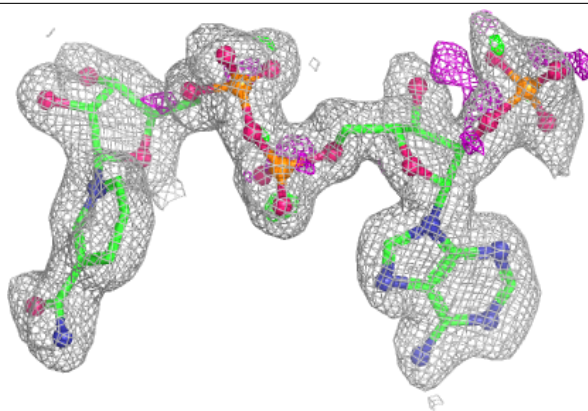
Electron density around 69Q B 502 (B):

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and green (positive)

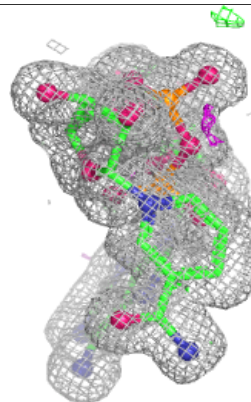
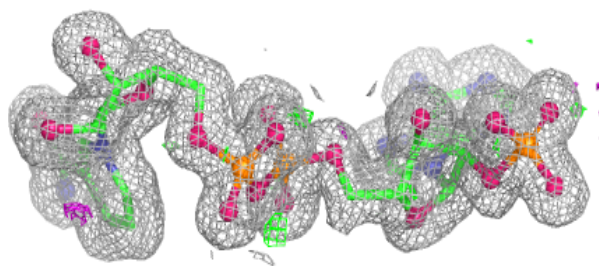
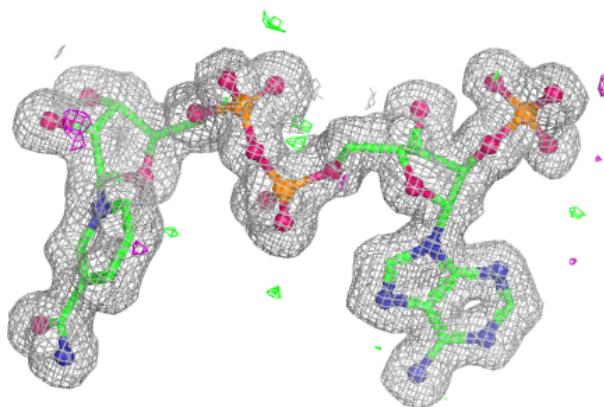


Electron density around NDP B 503:

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

**Electron density around NDP A 506:**

$2mF_o-DF_c$ (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.