



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 3, 2023 – 01:33 AM EDT

PDB ID : 1IA4
Title : Candida albicans dihydrofolate reductase complex in which the dihydronicotinamide moiety of dihydro-nicotinamide-adenine-dinucleotide phosphate (NADPH) is displaced by 5- $\{[4-(4\text{-MORPHOLINYL})\text{PHENYL}]\text{SULFANYL}\}$ -2,4-QUINAZOLINEDIAMIN (GW2021)
Authors : Whitlow, M.; Howard, A.J.; Kuyper, L.F.
Deposited on : 2001-03-22
Resolution : 1.85 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtrriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.34

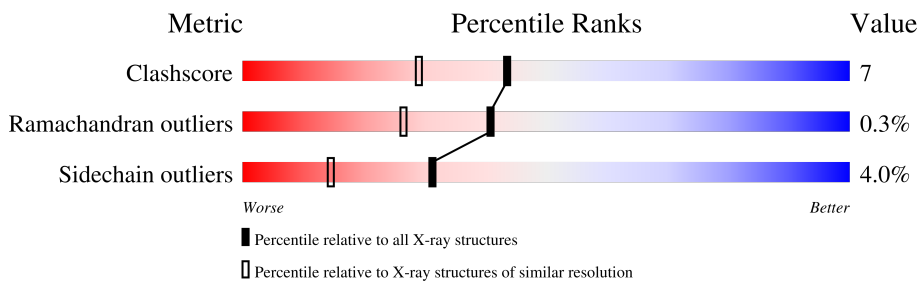
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.85 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))
Clashscore	141614	2625 (1.86-1.86)
Ramachandran outliers	138981	2592 (1.86-1.86)
Sidechain outliers	138945	2592 (1.86-1.86)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	192	 74% 20% . .
1	B	192	 78% 18% . .

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 3659 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 DIHYDROFOLATE REDUCTASE.

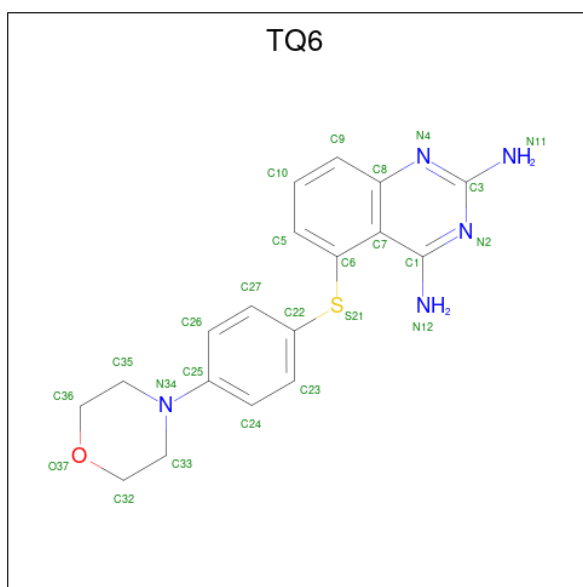
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	192	Total	C	N	O	S	0	10	0
			1586	1017	271	294	4			
1	B	192	Total	C	N	O	S	0	12	0
			1594	1025	264	301	4			

- Molecule 2 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
			Total	C	N	O	P		
2	A	1	Total	C	N	O	P	0	0
			35	13	5	14	3		
2	B	1	Total	C	N	O	P	0	0
			39	15	5	16	3		

- Molecule 3 is 5-(4-MORPHOLIN-4-YL-PHENYLSULFANYL)-2,4-QUINAZOLINEDIAMINE (three-letter code: TQ6) (formula: $C_{18}H_{19}N_5OS$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
3	A	1	25	18	5	1	1	0	0
3	B	1	25	18	5	1	1	0	0

- Molecule 4 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: C₆H₁₃NO₄S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
4	A	1	12	6	1	4	1	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
4	B	1	12	6	1	4	1	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	144	Total	O	0	8
			152	152		
5	B	175	Total	O	0	4
			179	179		

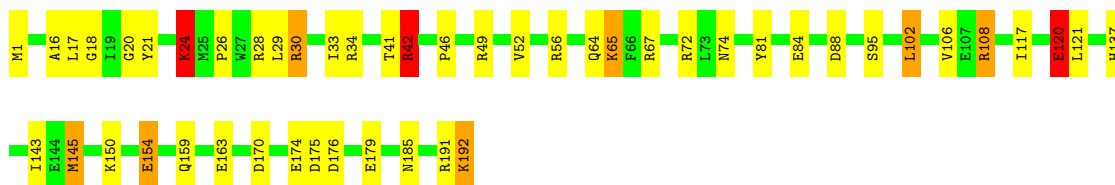
3 Residue-property plots

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. 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. 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.


Note EDS was not executed.

- Molecule 1: DIHYDROFOLATE REDUCTASE

Chain A:  74% 20%



- Molecule 1: DIHYDROFOLATE REDUCTASE

Chain B:  78% 18%



4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	77.05Å 67.09Å 38.54Å 90.00° 93.43° 90.00°	Depositor
Resolution (Å)	10.00 – 1.85	Depositor
% Data completeness (in resolution range)	97.6 (10.00-1.85)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	0.07	Depositor
Refinement program	PROFFT	Depositor
R, R_{free}	0.159 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	3659	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

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, TQ6, MES

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	1.22	2/1673 (0.1%)	1.96	36/2267 (1.6%)
1	B	1.17	0/1692	1.69	25/2292 (1.1%)
All	All	1.20	2/3365 (0.1%)	1.83	61/4559 (1.3%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	4
1	B	0	1
All	All	0	5

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	174	GLU	CD-OE1	-5.63	1.19	1.25
1	A	81	TYR	CG-CD2	5.12	1.45	1.39

All (61) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	30[A]	ARG	NE-CZ-NH1	20.24	130.42	120.30
1	A	30[B]	ARG	NE-CZ-NH1	20.24	130.42	120.30
1	A	108	ARG	NE-CZ-NH1	-16.69	111.96	120.30
1	A	49	ARG	NE-CZ-NH2	-15.92	112.34	120.30
1	B	108	ARG	NE-CZ-NH1	14.40	127.50	120.30
1	A	67	ARG	NE-CZ-NH1	13.59	127.10	120.30
1	B	79	ARG	NE-CZ-NH2	-13.21	113.69	120.30

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	30[A]	ARG	NE-CZ-NH2	-13.12	113.74	120.30
1	A	30[B]	ARG	NE-CZ-NH2	-13.12	113.74	120.30
1	A	56	ARG	CD-NE-CZ	11.84	140.18	123.60
1	A	191	ARG	NE-CZ-NH1	10.13	125.36	120.30
1	A	67	ARG	CD-NE-CZ	8.76	135.87	123.60
1	B	72	ARG	NE-CZ-NH1	8.64	124.62	120.30
1	B	145	MET	CA-CB-CG	8.52	127.78	113.30
1	B	56	ARG	NE-CZ-NH1	-8.25	116.17	120.30
1	A	49	ARG	NE-CZ-NH1	8.10	124.35	120.30
1	A	67	ARG	NE-CZ-NH2	-7.86	116.37	120.30
1	B	79	ARG	NE-CZ-NH1	7.80	124.20	120.30
1	B	56	ARG	NE-CZ-NH2	7.73	124.17	120.30
1	A	42[A]	ARG	NE-CZ-NH1	7.53	124.06	120.30
1	A	42[B]	ARG	NE-CZ-NH1	7.53	124.06	120.30
1	A	154	GLU	CA-CB-CG	7.46	129.82	113.40
1	B	119	ASN	CB-CA-C	7.27	124.95	110.40
1	A	34	ARG	NE-CZ-NH1	7.21	123.91	120.30
1	A	28	ARG	CD-NE-CZ	7.20	133.68	123.60
1	B	97	GLU	OE1-CD-OE2	-7.12	114.75	123.30
1	A	120	GLU	CA-CB-CG	6.76	128.28	113.40
1	A	81	TYR	CB-CG-CD1	6.74	125.04	121.00
1	A	34	ARG	CD-NE-CZ	6.65	132.91	123.60
1	B	34	ARG	NE-CZ-NH2	-6.64	116.98	120.30
1	A	175	ASP	CB-CG-OD1	6.59	124.23	118.30
1	A	108	ARG	NH1-CZ-NH2	6.54	126.60	119.40
1	B	67	ARG	NE-CZ-NH2	6.49	123.54	120.30
1	B	145	MET	CB-CG-SD	-6.37	93.28	112.40
1	A	81	TYR	CB-CG-CD2	-6.36	117.19	121.00
1	B	56	ARG	CD-NE-CZ	6.31	132.43	123.60
1	B	184	TYR	CB-CG-CD1	6.31	124.79	121.00
1	B	34	ARG	NE-CZ-NH1	6.27	123.44	120.30
1	A	72	ARG	NE-CZ-NH1	6.23	123.42	120.30
1	A	192	LYS	CA-CB-CG	6.09	126.81	113.40
1	A	95	SER	N-CA-CB	6.08	119.61	110.50
1	B	71	ASP	CB-CG-OD1	6.05	123.75	118.30
1	B	184	TYR	CB-CG-CD2	-5.85	117.49	121.00
1	B	153	LEU	CB-CA-C	5.77	121.16	110.20
1	A	88	ASP	CB-CG-OD1	-5.75	113.13	118.30
1	A	28	ARG	NE-CZ-NH1	5.38	122.99	120.30
1	B	42	ARG	NE-CZ-NH2	5.38	122.99	120.30
1	B	149	LEU	O-C-N	5.29	131.16	122.70
1	A	102	LEU	CA-CB-CG	5.26	127.40	115.30

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	179	GLU	OE1-CD-OE2	5.21	129.56	123.30
1	A	150	LYS	CA-CB-CG	5.21	124.86	113.40
1	A	17	LEU	CB-CA-C	5.19	120.05	110.20
1	B	175	ASP	CB-CG-OD2	-5.16	113.65	118.30
1	B	151[A]	PHE	CA-CB-CG	5.14	126.23	113.90
1	B	151[B]	PHE	CA-CB-CG	5.14	126.23	113.90
1	B	146	ASP	CB-CG-OD1	5.12	122.91	118.30
1	A	52	VAL	CA-CB-CG2	5.08	118.53	110.90
1	B	28	ARG	NE-CZ-NH1	5.06	122.83	120.30
1	A	24	LYS	CA-CB-CG	5.04	124.49	113.40
1	A	84	GLU	N-CA-CB	-5.00	101.59	110.60
1	A	108	ARG	CB-CG-CD	-5.00	98.59	111.60

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	30[A]	ARG	Sidechain
1	A	30[B]	ARG	Sidechain
1	A	42[A]	ARG	Sidechain
1	A	42[B]	ARG	Sidechain
1	B	34	ARG	Sidechain

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	1586	0	1611	19	0
1	B	1594	0	1611	26	0
2	A	35	0	14	1	0
2	B	39	0	18	0	0
3	A	25	0	19	0	0
3	B	25	0	19	0	0
4	A	12	0	13	0	0
4	B	12	0	13	1	0
5	A	152	0	0	3	0
5	B	179	0	0	4	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	3659	0	3318	45	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 7.

All (45) 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:B:5[B]:ASN:ND2	5:B:283:HOH:O	1.84	1.07
1:B:5[B]:ASN:OD1	5:B:297:HOH:O	1.99	0.79
1:B:124:ASN:HD22	1:B:126:LEU:H	1.34	0.74
1:B:28:ARG:HH11	1:B:30:ARG:HG2	1.53	0.73
1:B:5[B]:ASN:ND2	1:B:108:ARG:HH11	1.87	0.72
1:B:5[B]:ASN:HD21	1:B:108:ARG:HH11	1.40	0.68
1:B:53:ILE:HB	1:B:111[A]:ILE:HD13	1.83	0.61
1:B:21:TYR:HB2	1:B:145:MET:HA	1.84	0.60
1:B:83:ASN:ND2	1:B:94:SER:H	2.00	0.59
1:B:137:HIS:HD2	1:B:139:SER:H	1.49	0.59
1:A:176:ASP:H	1:A:185:ASN:HD21	1.52	0.57
1:A:117:ILE:HG23	1:A:121[A]:LEU:HD12	1.87	0.55
1:B:69:LEU:HD22	4:B:202:MES:H82	1.88	0.54
1:A:41[B]:THR:HG21	5:A:446:HOH:O	2.09	0.53
1:B:137:HIS:CD2	1:B:139:SER:H	2.27	0.53
1:B:83:ASN:HD21	1:B:94:SER:H	1.55	0.53
1:B:151[A]:PHE:HB2	1:B:153:LEU:HD13	1.91	0.52
1:A:120:GLU:HG2	2:A:193:NDP:H61A	1.76	0.51
1:B:176:ASP:H	1:B:185:ASN:ND2	2.08	0.50
1:A:176:ASP:H	1:A:185:ASN:ND2	2.10	0.49
1:A:18:GLY:HA3	1:A:145:MET:CE	2.45	0.47
1:A:65:LYS:H	1:A:65:LYS:CD	2.27	0.47
1:A:64:GLN:HG2	1:A:65:LYS:HE3	1.97	0.46
1:A:159:GLN:HE21	1:A:163:GLU:HG3	1.81	0.46
1:B:78:SER:HB3	1:B:81:TYR:CG	2.51	0.45
1:A:108:ARG:HD2	5:A:485:HOH:O	2.16	0.45
1:B:5[B]:ASN:ND2	1:B:108:ARG:NH1	2.62	0.45
1:B:176:ASP:H	1:B:185:ASN:HD21	1.64	0.44
1:A:21:TYR:O	1:A:24:LYS:HD2	2.18	0.44
1:B:20:GLY:HA2	1:B:26:PRO:HD3	1.99	0.44
1:B:45:LYS:HA	1:B:46:PRO:HD3	1.86	0.43
1:A:16:ALA:HB3	5:A:260[B]:HOH:O	2.19	0.43
1:B:30:ARG:NH1	5:B:339:HOH:O	2.52	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:20:GLY:O	1:A:145:MET:HG3	2.19	0.42
1:A:20:GLY:HA2	1:A:26:PRO:HD3	2.01	0.42
1:B:124:ASN:ND2	1:B:126:LEU:H	2.09	0.42
1:A:137:HIS:CD2	1:A:143:ILE:HD11	2.55	0.42
1:B:144:GLU:HB2	5:B:384:HOH:O	2.19	0.42
1:A:42[A]:ARG:NH1	1:A:170:ASP:H	2.18	0.41
1:B:139:SER:HA	1:B:140:PRO:HD2	1.86	0.41
1:A:29:LEU:O	1:A:33[A]:ILE:HG12	2.20	0.41
1:B:149:LEU:HD22	1:B:151[A]:PHE:CZ	2.56	0.41
1:A:29:LEU:O	1:A:33[B]:ILE:HG13	2.21	0.41
1:A:1:MET:HE1	1:A:106:VAL:O	2.21	0.41
1:B:149:LEU:HD22	1:B:151[A]:PHE:CE1	2.56	0.41

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	200/192 (104%)	195 (98%)	4 (2%)	1 (0%)	29	15
1	B	202/192 (105%)	196 (97%)	6 (3%)	0	100	100
All	All	402/384 (105%)	391 (97%)	10 (2%)	1 (0%)	41	33

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	46	PRO

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	184/177 (104%)	176 (96%)	8 (4%)	29	12
1	B	186/177 (105%)	178 (96%)	8 (4%)	29	12
All	All	370/354 (104%)	354 (96%)	16 (4%)	31	12

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	24	LYS
1	A	65	LYS
1	A	74	ASN
1	A	102	LEU
1	A	120	GLU
1	A	145	MET
1	A	154	GLU
1	A	192	LYS
1	B	28	ARG
1	B	65[A]	LYS
1	B	65[B]	LYS
1	B	74	ASN
1	B	124	ASN
1	B	145	MET
1	B	173[A]	LEU
1	B	173[B]	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	47	ASN
1	A	159	GLN
1	A	185	ASN
1	B	83	ASN
1	B	89	ASN
1	B	101	ASN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	123	ASN
1	B	124	ASN
1	B	137	HIS
1	B	185	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](#)

6 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	TQ6	B	196	-	28,28,28	1.54	4 (14%)	38,39,39	2.26	16 (42%)
3	TQ6	A	194	-	28,28,28	1.83	4 (14%)	38,39,39	2.32	18 (47%)
4	MES	B	202	-	12,12,12	7.50	6 (50%)	14,16,16	2.09	3 (21%)
2	NDP	B	195	-	36,42,52	1.67	8 (22%)	43,65,80	1.57	9 (20%)
2	NDP	A	193	-	30,37,52	1.80	7 (23%)	35,57,80	1.80	11 (31%)
4	MES	A	201	-	12,12,12	7.63	6 (50%)	14,16,16	2.56	6 (42%)

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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	TQ6	B	196	-	-	2/8/16/16	0/4/4/4
3	TQ6	A	194	-	-	4/8/16/16	0/4/4/4
4	MES	B	202	-	-	3/6/14/14	0/1/1/1
2	NDP	B	195	-	-	1/23/56/77	0/4/4/5
2	NDP	A	193	-	-	4/23/43/77	0/3/3/5
4	MES	A	201	-	-	3/6/14/14	0/1/1/1

All (35) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	201	MES	C8-S	-25.45	1.41	1.77
4	B	202	MES	C8-S	-25.10	1.41	1.77
2	A	193	NDP	P2B-O2B	6.76	1.72	1.59
3	A	194	TQ6	C8-N4	5.97	1.47	1.37
3	A	194	TQ6	C35-N34	5.13	1.54	1.46
3	B	196	TQ6	C8-N4	4.97	1.45	1.37
4	A	201	MES	C5-N4	3.65	1.57	1.46
2	B	195	NDP	C3B-C2B	3.63	1.61	1.52
2	B	195	NDP	C3B-C4B	3.59	1.62	1.53
2	B	195	NDP	P2B-O2B	3.45	1.65	1.59
3	B	196	TQ6	C33-N34	3.42	1.52	1.46
4	A	201	MES	C7-N4	3.38	1.55	1.47
4	B	202	MES	C5-N4	3.25	1.55	1.46
4	A	201	MES	O1-C6	3.11	1.55	1.42
2	B	195	NDP	P2B-O2X	-3.07	1.43	1.54
2	B	195	NDP	O4B-C1B	-2.95	1.37	1.41
2	A	193	NDP	P2B-O2X	-2.92	1.43	1.54
3	A	194	TQ6	C24-C25	2.89	1.45	1.39
4	A	201	MES	O1-C2	2.71	1.53	1.42
4	B	202	MES	C3-N4	2.70	1.54	1.46
4	B	202	MES	C7-N4	2.69	1.53	1.47
4	B	202	MES	O1-C6	2.68	1.53	1.42
3	A	194	TQ6	C33-N34	-2.61	1.42	1.46
2	B	195	NDP	C8A-N7A	-2.60	1.30	1.34
2	B	195	NDP	PA-O1A	-2.55	1.41	1.50
4	B	202	MES	O1-C2	2.51	1.52	1.42
2	B	195	NDP	PA-O2A	-2.34	1.44	1.55
2	A	193	NDP	C2A-N1A	2.32	1.38	1.33
4	A	201	MES	C3-N4	2.30	1.53	1.46

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	193	NDP	C3B-C2B	2.24	1.57	1.52
3	B	196	TQ6	C1-N2	-2.16	1.29	1.33
2	A	193	NDP	C8A-N7A	-2.15	1.30	1.34
3	B	196	TQ6	C3-N2	-2.13	1.31	1.35
2	A	193	NDP	PN-O2N	-2.07	1.45	1.55
2	A	193	NDP	P2B-O3X	-2.06	1.46	1.54

All (63) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	201	MES	O1S-S-C8	6.80	115.10	106.92
4	B	202	MES	O1S-S-C8	6.13	114.30	106.92
3	B	196	TQ6	N11-C3-N2	5.74	126.18	117.25
3	A	194	TQ6	C32-C33-N34	5.73	120.60	110.02
3	A	194	TQ6	C33-N34-C25	5.26	132.31	118.09
3	B	196	TQ6	N4-C3-N2	-5.25	120.22	127.22
2	B	195	NDP	C5A-C6A-N6A	4.17	126.69	120.35
3	A	194	TQ6	N4-C3-N2	-4.07	121.79	127.22
3	B	196	TQ6	O37-C32-C33	-3.91	103.18	111.80
2	A	193	NDP	O2B-P2B-O1X	-3.85	94.53	109.39
2	A	193	NDP	O2X-P2B-O1X	3.78	125.50	110.68
3	B	196	TQ6	C35-N34-C33	3.78	119.87	111.52
3	A	194	TQ6	O37-C36-C35	-3.72	103.60	111.80
3	A	194	TQ6	C24-C23-C22	3.40	124.59	120.50
3	A	194	TQ6	N12-C1-N2	-3.33	108.01	117.07
3	B	196	TQ6	C32-C33-N34	-3.32	103.89	110.02
3	A	194	TQ6	C7-C1-N12	3.26	128.56	122.67
4	A	201	MES	C2-C3-N4	3.24	115.02	110.10
2	A	193	NDP	C1B-N9A-C4A	3.03	131.97	126.64
2	B	195	NDP	C2B-C3B-C4B	-2.99	95.50	101.99
3	B	196	TQ6	C26-C25-N34	-2.98	117.27	121.38
2	B	195	NDP	C3B-C2B-C1B	-2.84	97.55	102.89
4	A	201	MES	O3S-S-C8	2.80	110.30	105.77
3	B	196	TQ6	C24-C25-N34	2.80	125.24	121.38
2	A	193	NDP	N6A-C6A-N1A	2.75	124.28	118.57
2	A	193	NDP	O3B-C3B-C2B	2.72	118.89	111.17
2	A	193	NDP	O2B-C2B-C1B	-2.69	100.43	110.10
4	A	201	MES	O2S-S-C8	2.67	110.14	106.92
4	B	202	MES	O2S-S-O1S	-2.66	104.75	113.95
3	A	194	TQ6	C27-C22-C23	-2.63	114.42	118.82
3	B	196	TQ6	N11-C3-N4	-2.62	113.53	117.79
2	B	195	NDP	O4D-C1D-C2D	-2.60	100.97	105.99

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	201	MES	O2S-S-O1S	-2.56	105.08	113.95
2	A	193	NDP	C4A-C5A-N7A	2.56	112.06	109.40
2	A	193	NDP	O3B-C3B-C4B	-2.54	103.69	111.05
2	B	195	NDP	C1D-C2D-C3D	-2.52	97.80	101.63
3	B	196	TQ6	C9-C8-C7	2.51	124.30	119.50
3	A	194	TQ6	C6-C7-C8	-2.50	114.55	117.38
3	A	194	TQ6	C27-C26-C25	2.49	123.60	120.32
3	A	194	TQ6	C5-C6-C7	2.48	123.52	120.50
3	B	196	TQ6	C36-C35-N34	2.45	114.55	110.02
3	B	196	TQ6	C3-N2-C1	2.45	123.72	116.72
3	B	196	TQ6	C26-C27-C22	2.42	123.42	120.50
2	B	195	NDP	O4B-C4B-C3B	-2.41	100.34	105.11
2	B	195	NDP	O4B-C1B-C2B	2.40	110.75	106.59
2	B	195	NDP	O2X-P2B-O1X	2.39	120.05	110.68
2	A	193	NDP	C5A-C6A-N1A	-2.37	114.98	120.35
2	A	193	NDP	O3X-P2B-O2X	2.37	116.68	107.64
3	A	194	TQ6	C26-C25-N34	2.26	124.50	121.38
3	A	194	TQ6	C26-C25-C24	-2.24	114.60	119.16
2	A	193	NDP	C2B-C3B-C4B	-2.23	97.15	101.99
3	B	196	TQ6	C23-C24-C25	2.19	123.20	120.32
3	A	194	TQ6	C35-N34-C25	-2.14	112.32	118.09
4	A	201	MES	O3S-S-O2S	-2.13	106.07	111.27
3	B	196	TQ6	C7-C1-N12	2.12	126.50	122.67
3	A	194	TQ6	C22-S21-C6	-2.10	99.21	103.17
3	B	196	TQ6	N12-C1-N2	-2.08	111.41	117.07
3	A	194	TQ6	C36-C35-N34	-2.07	106.20	110.02
3	A	194	TQ6	C7-C8-N4	-2.06	118.15	122.49
3	B	196	TQ6	C10-C9-C8	-2.01	117.19	120.08
4	B	202	MES	C2-C3-N4	2.01	113.15	110.10
3	A	194	TQ6	C23-C22-S21	2.00	126.46	120.34
2	B	195	NDP	O3D-C3D-C2D	-2.00	107.22	112.04

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	193	NDP	C5D-O5D-PN-O3
2	A	193	NDP	O4D-C4D-C5D-O5D
4	A	201	MES	C7-C8-S-O1S
4	A	201	MES	C7-C8-S-O3S
4	B	202	MES	C7-C8-S-O2S
3	A	194	TQ6	C24-C25-N34-C33

Continued on next page...

Continued from previous page...

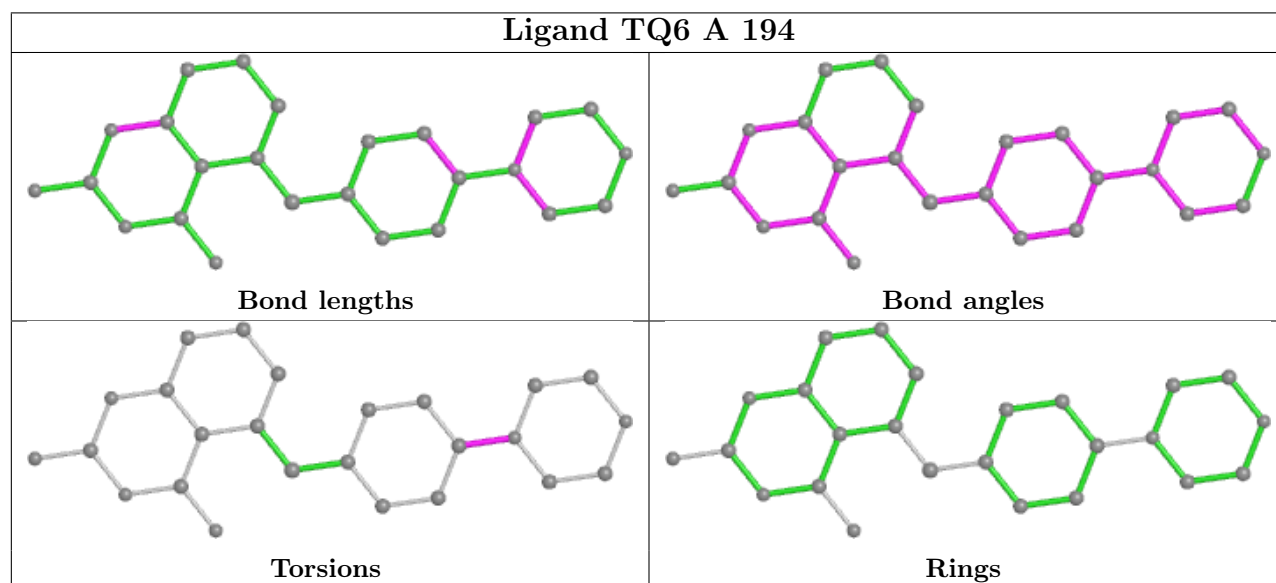
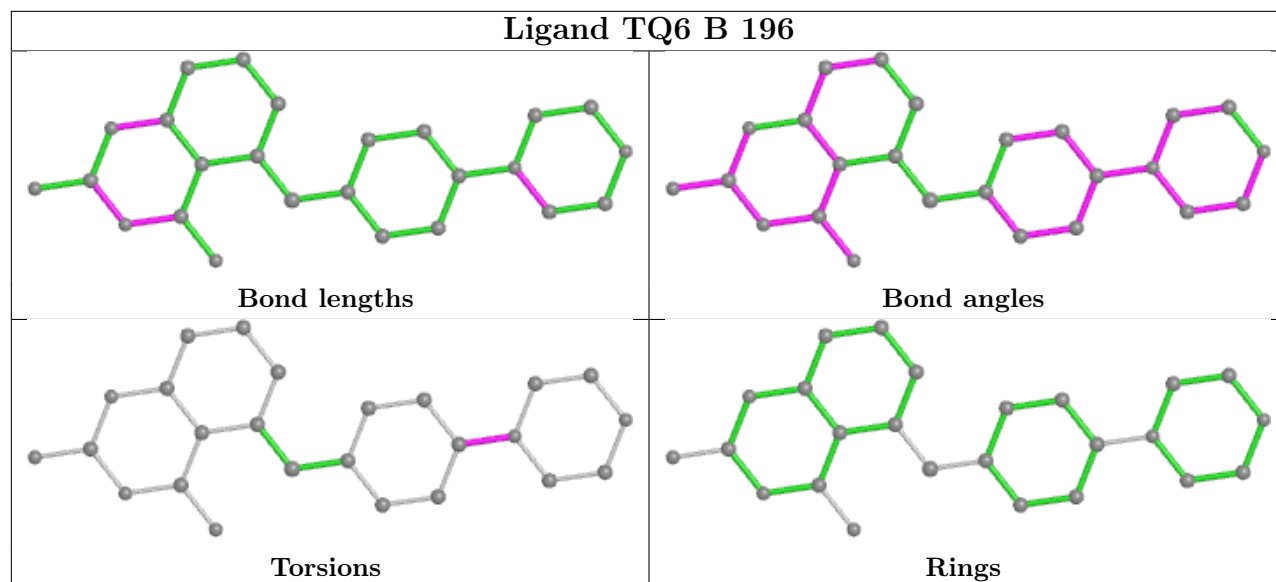
Mol	Chain	Res	Type	Atoms
3	A	194	TQ6	C24-C25-N34-C35
3	A	194	TQ6	C26-C25-N34-C33
3	A	194	TQ6	C26-C25-N34-C35
3	B	196	TQ6	C24-C25-N34-C33
3	B	196	TQ6	C26-C25-N34-C33
4	B	202	MES	C7-C8-S-O3S
2	A	193	NDP	C3D-C4D-C5D-O5D
2	B	195	NDP	C2B-O2B-P2B-O3X
2	A	193	NDP	C5D-O5D-PN-O2N
4	A	201	MES	C7-C8-S-O2S
4	B	202	MES	C7-C8-S-O1S

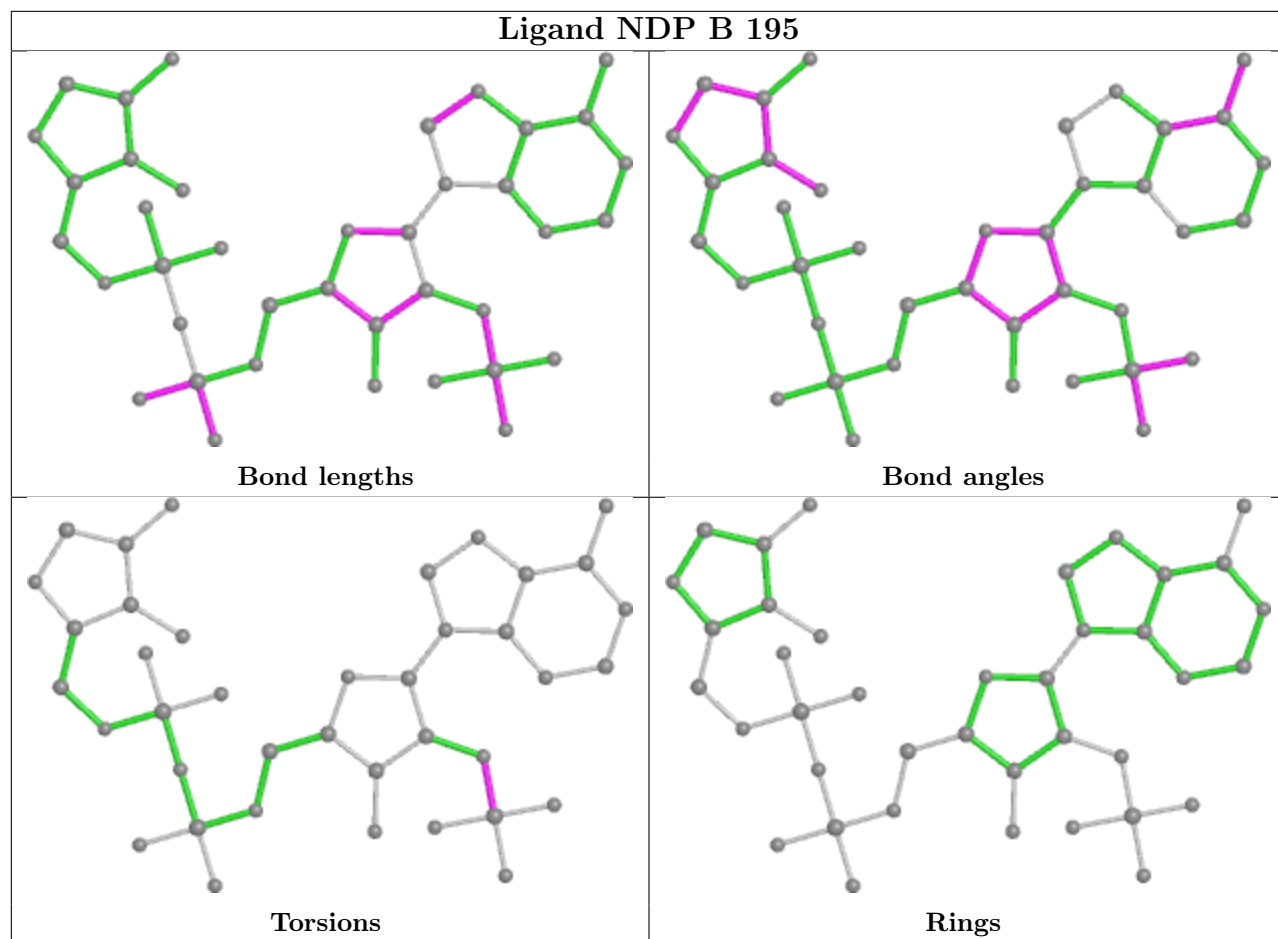
There are no ring outliers.

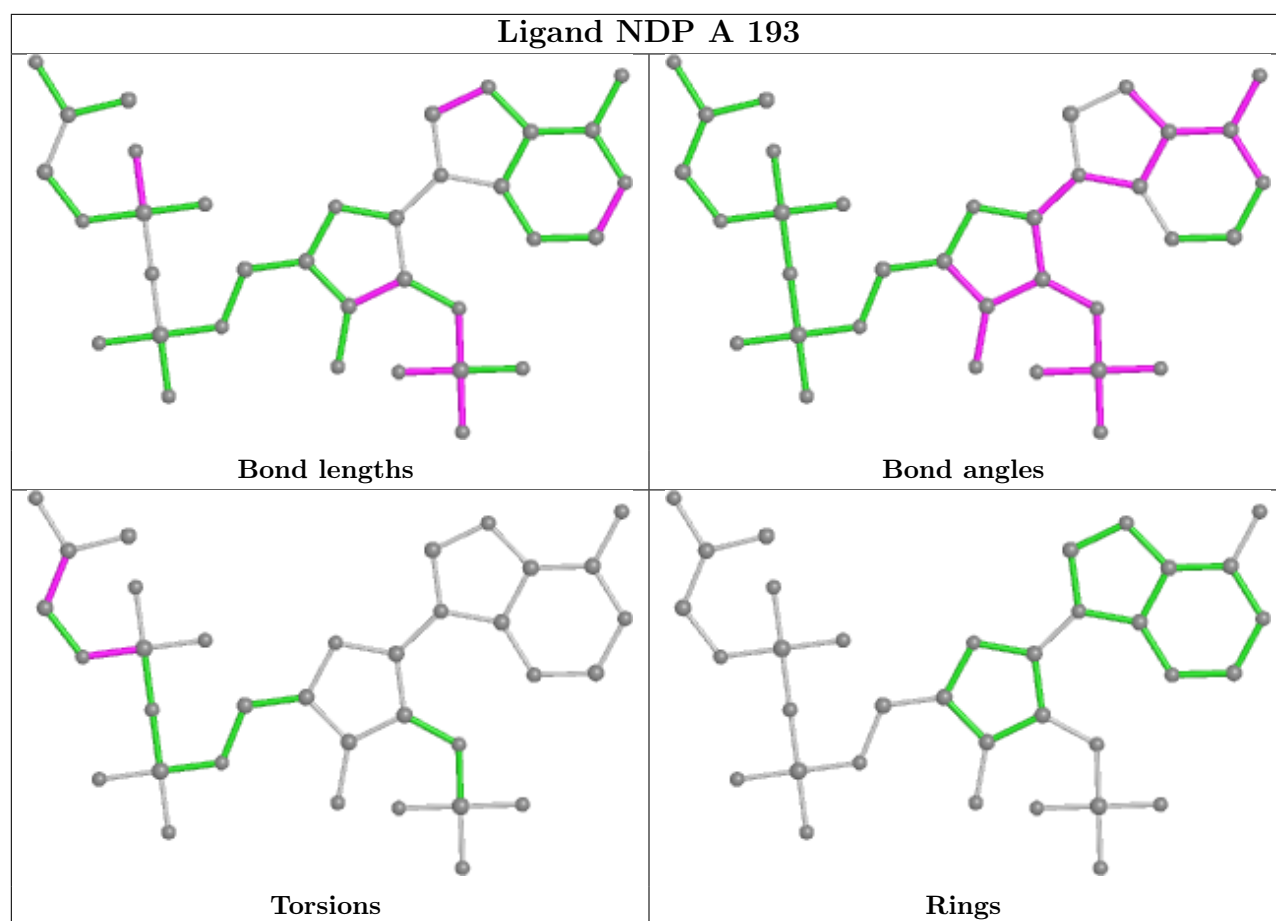
2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	202	MES	1	0
2	A	193	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

6.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.