



wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 14, 2020 – 04:12 am BST

PDB ID : 1EFL
Title : HUMAN MALIC ENZYME IN A QUATERNARY COMPLEX WITH NAD,
MG, AND TARTRONATE
Authors : Yang, Z.; Floyd, D.L.; Loeber, G.; Tong, L.
Deposited on : 2000-02-09
Resolution : 2.60 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
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) : 2.11

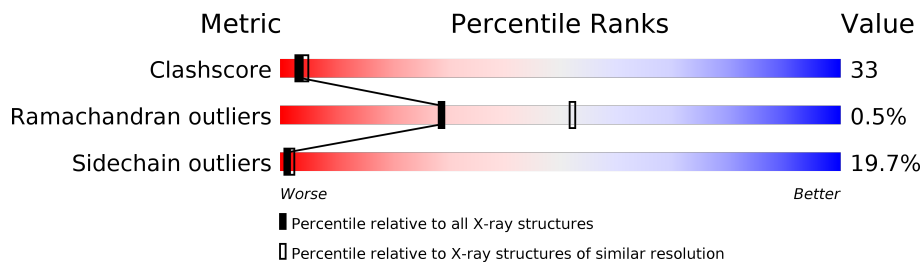
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)

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

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	584	
1	B	584	
1	C	584	
1	D	584	

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 17947 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 MALIC ENZYME.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	553	4367	2796	744	804	9	14	0	0	0
1	B	553	4367	2796	744	804	9	14	0	0	0
1	C	553	4367	2796	744	804	9	14	0	0	0
1	D	553	4367	2796	744	804	9	14	0	0	0

There are 56 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	29	MSE	MET	MODIFIED RESIDUE	UNP P23368
A	38	MSE	MET	MODIFIED RESIDUE	UNP P23368
A	47	MSE	MET	MODIFIED RESIDUE	UNP P23368
A	75	MSE	MET	MODIFIED RESIDUE	UNP P23368
A	86	MSE	MET	MODIFIED RESIDUE	UNP P23368
A	108	MSE	MET	MODIFIED RESIDUE	UNP P23368
A	177	MSE	MET	MODIFIED RESIDUE	UNP P23368
A	219	MSE	MET	MODIFIED RESIDUE	UNP P23368
A	239	MSE	MET	MODIFIED RESIDUE	UNP P23368
A	325	MSE	MET	MODIFIED RESIDUE	UNP P23368
A	327	MSE	MET	MODIFIED RESIDUE	UNP P23368
A	343	MSE	MET	MODIFIED RESIDUE	UNP P23368
A	407	MSE	MET	MODIFIED RESIDUE	UNP P23368
A	539	MSE	MET	MODIFIED RESIDUE	UNP P23368
B	29	MSE	MET	MODIFIED RESIDUE	UNP P23368
B	38	MSE	MET	MODIFIED RESIDUE	UNP P23368
B	47	MSE	MET	MODIFIED RESIDUE	UNP P23368
B	75	MSE	MET	MODIFIED RESIDUE	UNP P23368
B	86	MSE	MET	MODIFIED RESIDUE	UNP P23368
B	108	MSE	MET	MODIFIED RESIDUE	UNP P23368
B	177	MSE	MET	MODIFIED RESIDUE	UNP P23368

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
B	219	MSE	MET	MODIFIED RESIDUE	UNP P23368
B	239	MSE	MET	MODIFIED RESIDUE	UNP P23368
B	325	MSE	MET	MODIFIED RESIDUE	UNP P23368
B	327	MSE	MET	MODIFIED RESIDUE	UNP P23368
B	343	MSE	MET	MODIFIED RESIDUE	UNP P23368
B	407	MSE	MET	MODIFIED RESIDUE	UNP P23368
B	539	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	29	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	38	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	47	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	75	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	86	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	108	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	177	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	219	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	239	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	325	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	327	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	343	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	407	MSE	MET	MODIFIED RESIDUE	UNP P23368
C	539	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	29	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	38	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	47	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	75	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	86	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	108	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	177	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	219	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	239	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	325	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	327	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	343	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	407	MSE	MET	MODIFIED RESIDUE	UNP P23368
D	539	MSE	MET	MODIFIED RESIDUE	UNP P23368

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

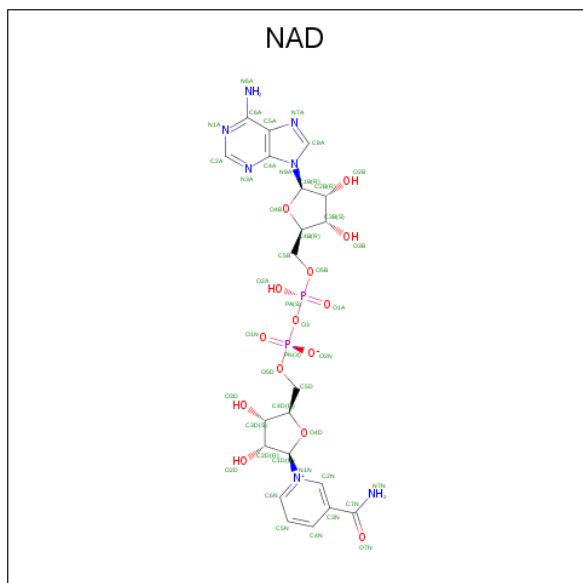
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total Mg 1 1	0	0
2	A	1	Total Mg 1 1	0	0

Continued on next page...

Continued from previous page...

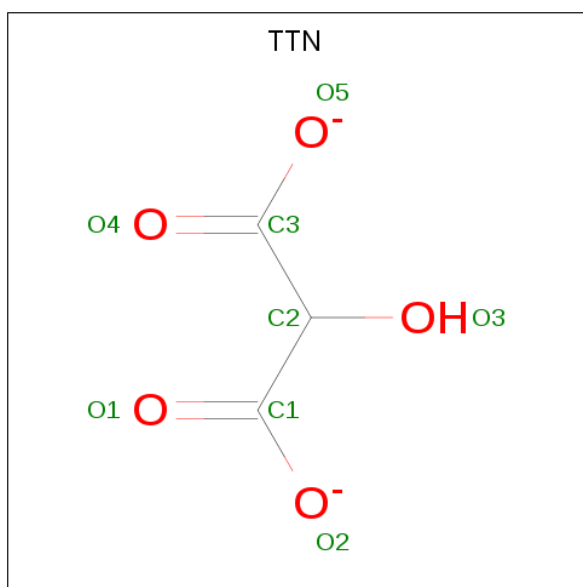
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	D	1	Total Mg 1 1	0	0
2	C	1	Total Mg 1 1	0	0

- Molecule 3 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (three-letter code: NAD) (formula: $C_{21}H_{27}N_7O_{14}P_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C N O P 44 21 7 14 2	0	0
3	A	1	Total C N O P 44 21 7 14 2	9	0
3	B	1	Total C N O P 44 21 7 14 2	0	0
3	B	1	Total C N O P 44 21 7 14 2	9	0
3	C	1	Total C N O P 44 21 7 14 2	0	0
3	C	1	Total C N O P 44 21 7 14 2	9	0
3	D	1	Total C N O P 44 21 7 14 2	0	0
3	D	1	Total C N O P 44 21 7 14 2	9	0

- Molecule 4 is TARTRONATE (three-letter code: TTN) (formula: $C_3H_2O_5$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 8 3 5	0	0
4	B	1	Total C O 8 3 5	0	0
4	C	1	Total C O 8 3 5	0	0
4	D	1	Total C O 8 3 5	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	24	Total O 24 24	0	0
5	B	17	Total O 17 17	0	0
5	C	23	Total O 23 23	0	0
5	D	27	Total O 27 27	0	0

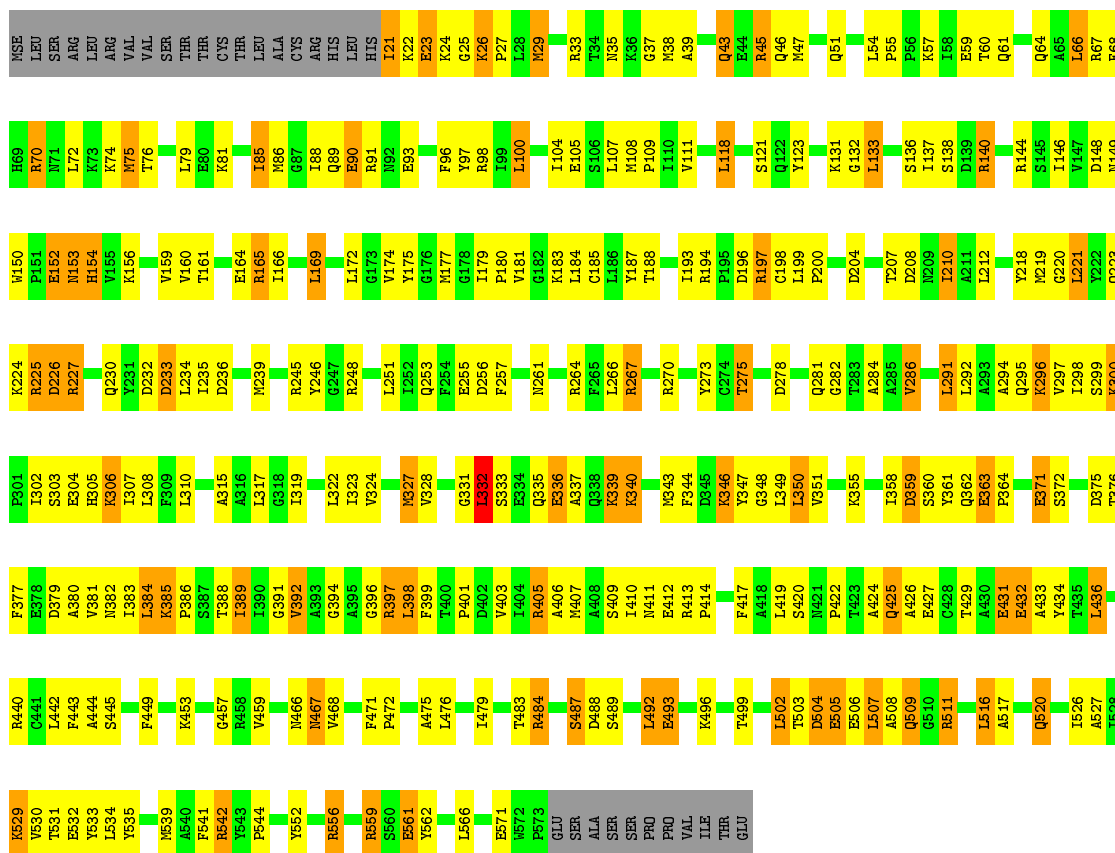
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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.

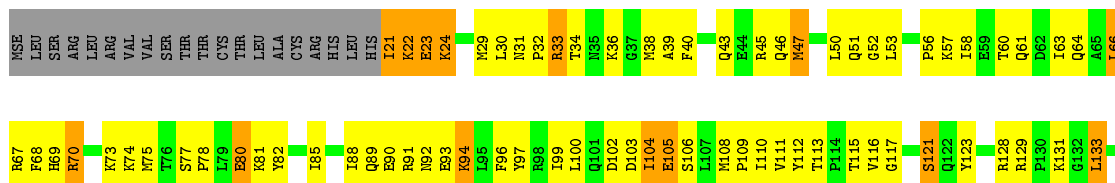
- Molecule 1: MALIC ENZYME

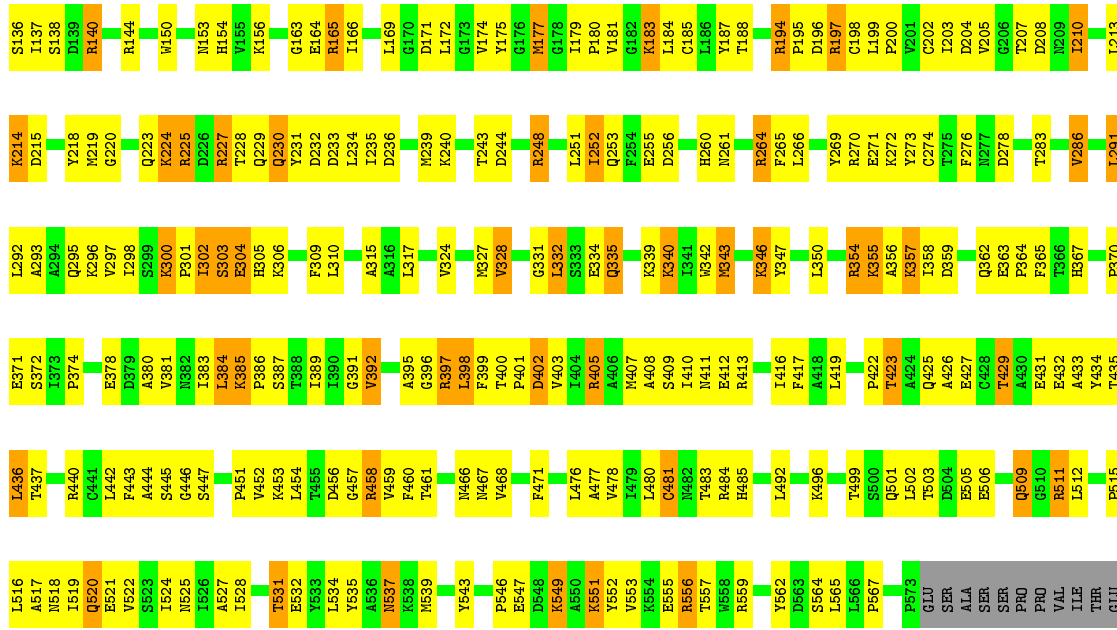
Chain A: 



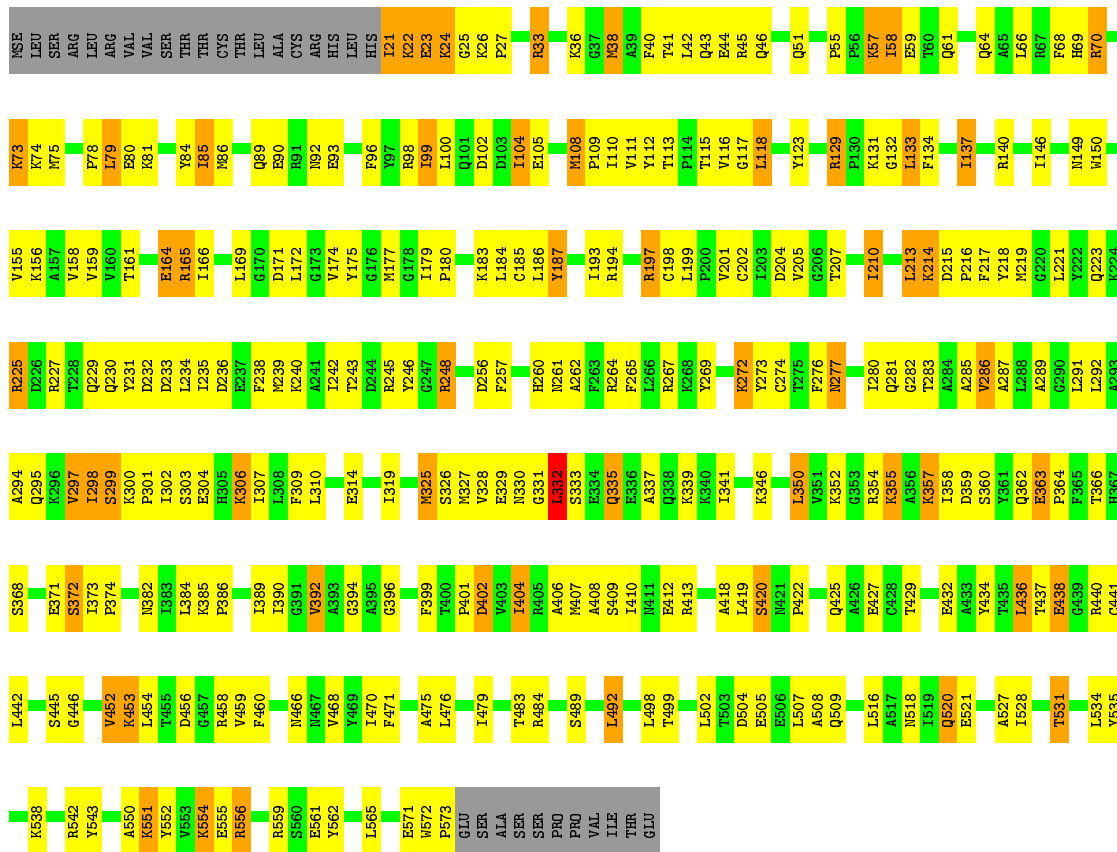
- Molecule 1: MALIC ENZYME

Chain B: 





• Molecule 1: MALIC ENZYME



• Molecule 1: MALIC ENZYME

Chain D:  43% 42% 9% 5%

R5E	A65	L221	A294	F377	G457	T531
LEU	L66	T222	Q295	E376	R458	E532
SER	H67	Q223	R296	D379	V459	Y533
ARG	F68	K224	A380	A380	F460	L534
LEU	H69	R225	I298	Y381	G466	Y535
ARG	R70	D226	S299	Y382	V467	A536
VAL	H71	R227	I300	I383	V468	H537
VAL	L72	T228	F301	L384	V469	A540
SER	K73	Q229	I302	K385	L470	F541
THR	R74	Q230	S303	F386	F471	R542
THR	H75	N153	E304	S387	P472	Y543
CYS	T76	K156	H305	T388	A475	P544
THR	S77	R185	I306	I389	L476	E545
THR	F78	I166	I307	S390	L477	D548
LEU	L79	E237	L308	G391	V478	K549
ALA	R81	F238	F309	R393	L479	A550
CYS	R81	N239	L310	G394	L480	K551
ARG	Y82	K240	E314	R397	C481	K554
HIS	Y82	A241	A315	L398	M482	E555
LEU	I83	I242	A316	F399	T483	R556
HIS	H84	T243	I319	T400	R484	
LEU	I85	D244	I324	P401	H485	
HIS	I85	R245	V324	D402	L486	
I21	E93	Y246	R327	V403	S489	
K22	R94	I249	V328	L404	R405	
E23	L95	T250	I251	R405	L492	
K24	F96	L251	G331	N407	A406	
G25	R97	I252	I332	A408	K496	
K26	I30	Q253	S333	S409	A497	
P27	R31	D256	E334	L410	L498	
L28	R33	I261	I335	M411	T499	
M29	R33	R194	E336	E412	S500	
L30	R35	I193	A337	R413	L501	
R32	R35	F195	A337	P414	L502	
R33	R35	D196	R342	V415	T503	
T34	R35	R197	R343	F416	D504	
K36	R35	C198	R346	F417	E505	
G37	R35	L199	Y347	S420	L507	
R38	R35	P200	R268	T423	A508	
A39	R35	V201	Y269	E427	Q509	
Q43	R35	G202	R270	R355	G510	
E44	R35	I203	E271	E427	H511	
R45	R35	D204	K272	E432	P515	
Q46	R35	T207	Y273	E432	L516	
M47	R35	D208	C274	L436	A517	
Q51	R35	R128	T275	T437	H518	
G52	R35	I210	F276	R440	H519	
L53	R35	A211	A285	C441	L520	
L54	R35	L212	V286	L442	E521	
P55	R35	L213	A287	F443	L526	
P56	R35	D215	L288	S447	A527	
K57	R35	P216	A289	S372	H528	
L58	R35	F217	G290	I373	V530	
E59	R35	Y218	L291	D456		
T60	R35	M219	L292			
Q61	R35	G220	A293			
D62	R35					
T63	R35					
Q64	R35					
GLU						
SER						
ALA						
SER						
SER						
PRO						
PRO						
VAL						
ILE						
THR						
GLU						

4 Data and refinement statistics

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

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	228.80Å 117.00Å 114.30Å 90.00° 109.20° 90.00°	Depositor
Resolution (Å)	20.00 – 2.60	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-2.60)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.851	Depositor
R, R_{free}	0.206 , 0.285	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	17947	wwPDB-VP
Average B, all atoms (Å ²)	21.0	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: MG, TTN, NAD

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	0.46	0/4447	0.65	0/5998
1	B	0.46	0/4447	0.66	0/5998
1	C	0.45	0/4447	0.65	1/5998 (0.0%)
1	D	0.46	0/4447	0.65	0/5998
All	All	0.46	0/17788	0.65	1/23992 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	310	LEU	N-CA-C	-5.09	97.27	111.00

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	4367	0	4407	333	0
1	B	4367	0	4407	331	0
1	C	4367	0	4407	252	0
1	D	4367	0	4407	314	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	88	0	52	6	0
3	B	88	0	52	2	0
3	C	88	0	52	5	0
3	D	88	0	52	4	0
4	A	8	0	1	0	0
4	B	8	0	1	1	0
4	C	8	0	1	2	0
4	D	8	0	2	1	0
5	A	24	0	0	5	0
5	B	17	0	0	9	0
5	C	23	0	0	5	0
5	D	27	0	0	3	0
All	All	17947	0	17841	1185	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 33.

The worst 5 of 1185 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:227:ARG:HH11	1:A:227:ARG:HG2	1.03	1.11
1:D:520:GLN:HE22	1:D:521:GLU:HG2	1.13	1.07
1:A:511:ARG:HB3	1:A:511:ARG:HH11	1.20	1.02
1:C:355:LYS:HA	1:C:355:LYS:HE2	1.42	1.01
1:B:227:ARG:HH11	1:B:227:ARG:HG2	1.24	1.00

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	551/584 (94%)	516 (94%)	33 (6%)	2 (0%)	34	57
1	B	551/584 (94%)	513 (93%)	35 (6%)	3 (0%)	29	52
1	C	551/584 (94%)	525 (95%)	23 (4%)	3 (0%)	29	52
1	D	551/584 (94%)	515 (94%)	32 (6%)	4 (1%)	22	43
All	All	2204/2336 (94%)	2069 (94%)	123 (6%)	12 (0%)	29	52

5 of 12 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	332	LEU
1	C	332	LEU
1	C	392	VAL
1	A	332	LEU
1	D	270	ARG

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	469/483 (97%)	371 (79%)	98 (21%)	1	2
1	B	469/483 (97%)	373 (80%)	96 (20%)	1	2
1	C	469/483 (97%)	379 (81%)	90 (19%)	1	2
1	D	469/483 (97%)	384 (82%)	85 (18%)	1	2
All	All	1876/1932 (97%)	1507 (80%)	369 (20%)	1	2

5 of 369 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	385	LYS
1	C	74	LYS
1	D	358	ILE
1	B	409	SER
1	B	547	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 52 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	525	ASN
1	C	230	GLN
1	D	482	ASN
1	B	537	ASN
1	C	64	GLN

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 16 ligands modelled in this entry, 4 are monoatomic - leaving 12 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	NAD	B	1601	-	42,48,48	2.11	12 (28%)	50,73,73	1.35	5 (10%)
4	TTN	D	3603	2	1,7,7	0.38	0	0,9,9	0.00	-
3	NAD	C	2601	-	42,48,48	2.08	12 (28%)	50,73,73	1.34	3 (6%)
4	TTN	B	1603	2	1,7,7	0.35	0	0,9,9	0.00	-
3	NAD	C	2602	-	42,48,48	2.29	14 (33%)	50,73,73	1.39	6 (12%)
3	NAD	D	3602	-	42,48,48	2.23	11 (26%)	50,73,73	1.44	6 (12%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	TTN	A	603	2	1,7,7	0.32	0	0,9,9	0.00	-
3	NAD	A	602	-	42,48,48	2.19	11 (26%)	50,73,73	1.46	6 (12%)
3	NAD	B	1602	-	42,48,48	2.15	12 (28%)	50,73,73	1.35	6 (12%)
3	NAD	A	601	-	42,48,48	2.01	11 (26%)	50,73,73	1.37	5 (10%)
3	NAD	D	3601	-	42,48,48	2.10	12 (28%)	50,73,73	1.32	4 (8%)
4	TTN	C	2603	2	1,7,7	0.12	0	0,9,9	0.00	-

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	NAD	B	1601	-	-	3/26/62/62	0/5/5/5
4	TTN	D	3603	2	-	0/0/8/8	-
3	NAD	C	2601	-	-	2/26/62/62	0/5/5/5
4	TTN	B	1603	2	-	0/0/8/8	-
3	NAD	C	2602	-	-	9/26/62/62	0/5/5/5
3	NAD	D	3602	-	-	12/26/62/62	0/5/5/5
4	TTN	A	603	2	-	0/0/8/8	-
3	NAD	A	602	-	-	11/26/62/62	0/5/5/5
3	NAD	B	1602	-	-	11/26/62/62	0/5/5/5
3	NAD	A	601	-	-	2/26/62/62	0/5/5/5
3	NAD	D	3601	-	-	2/26/62/62	0/5/5/5
4	TTN	C	2603	2	-	0/0/8/8	-

The worst 5 of 95 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	3602	NAD	C2N-N1N	7.58	1.44	1.35
3	C	2602	NAD	C2N-N1N	7.51	1.44	1.35
3	B	1602	NAD	C2N-N1N	7.40	1.44	1.35
3	A	602	NAD	C2N-N1N	7.35	1.43	1.35
3	C	2602	NAD	O4D-C1D	6.80	1.50	1.41

The worst 5 of 41 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	2601	NAD	N3A-C2A-N1A	-5.35	120.32	128.68

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	602	NAD	N3A-C2A-N1A	-5.19	120.57	128.68
3	A	601	NAD	N3A-C2A-N1A	-5.15	120.64	128.68
3	B	1601	NAD	N3A-C2A-N1A	-5.07	120.75	128.68
3	D	3601	NAD	N3A-C2A-N1A	-5.06	120.78	128.68

There are no chirality outliers.

5 of 52 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	3602	NAD	C5B-O5B-PA-O1A
3	D	3602	NAD	PA-O3-PN-O5D
3	D	3602	NAD	C5D-O5D-PN-O1N
3	D	3602	NAD	C5D-O5D-PN-O2N
3	D	3602	NAD	C3D-C4D-C5D-O5D

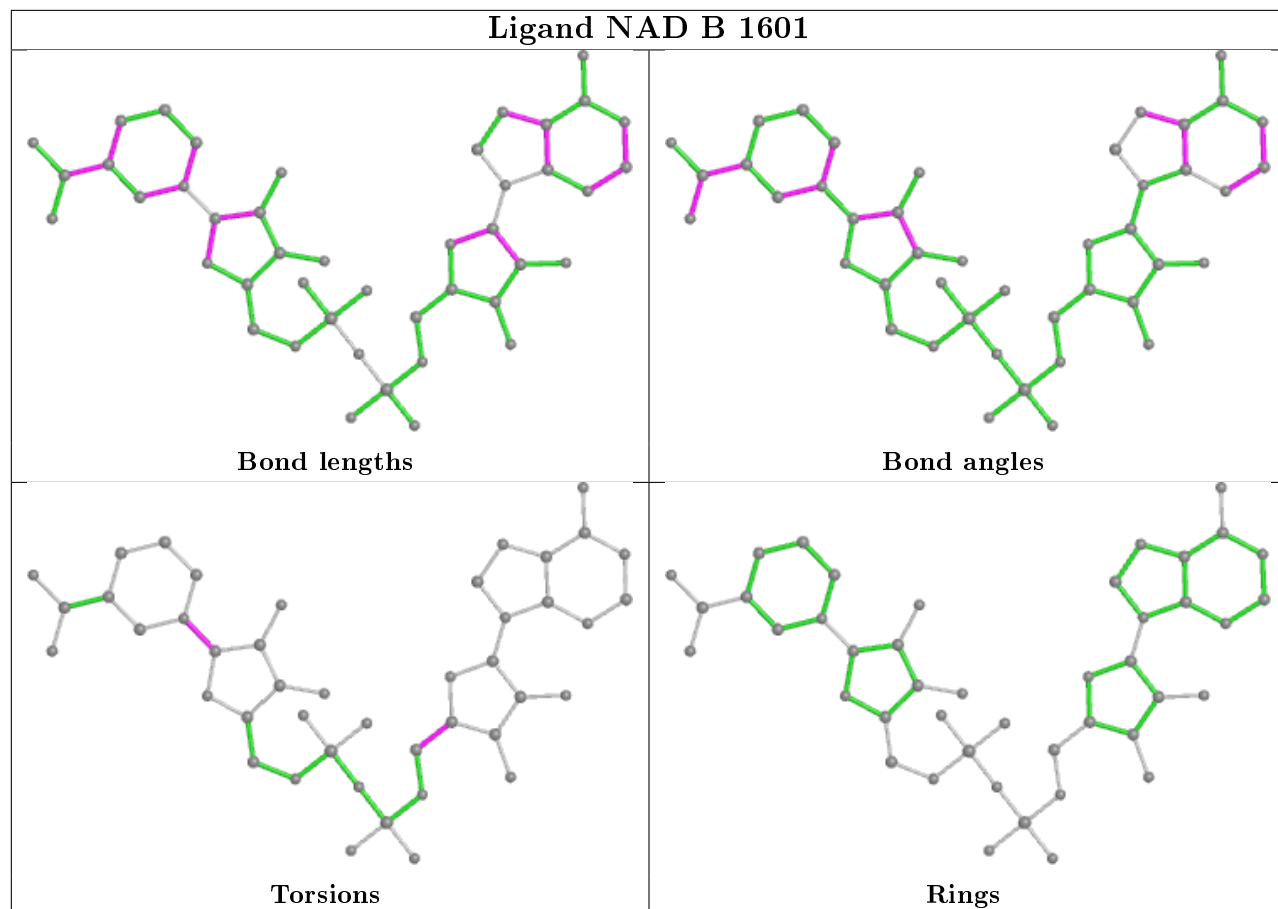
There are no ring outliers.

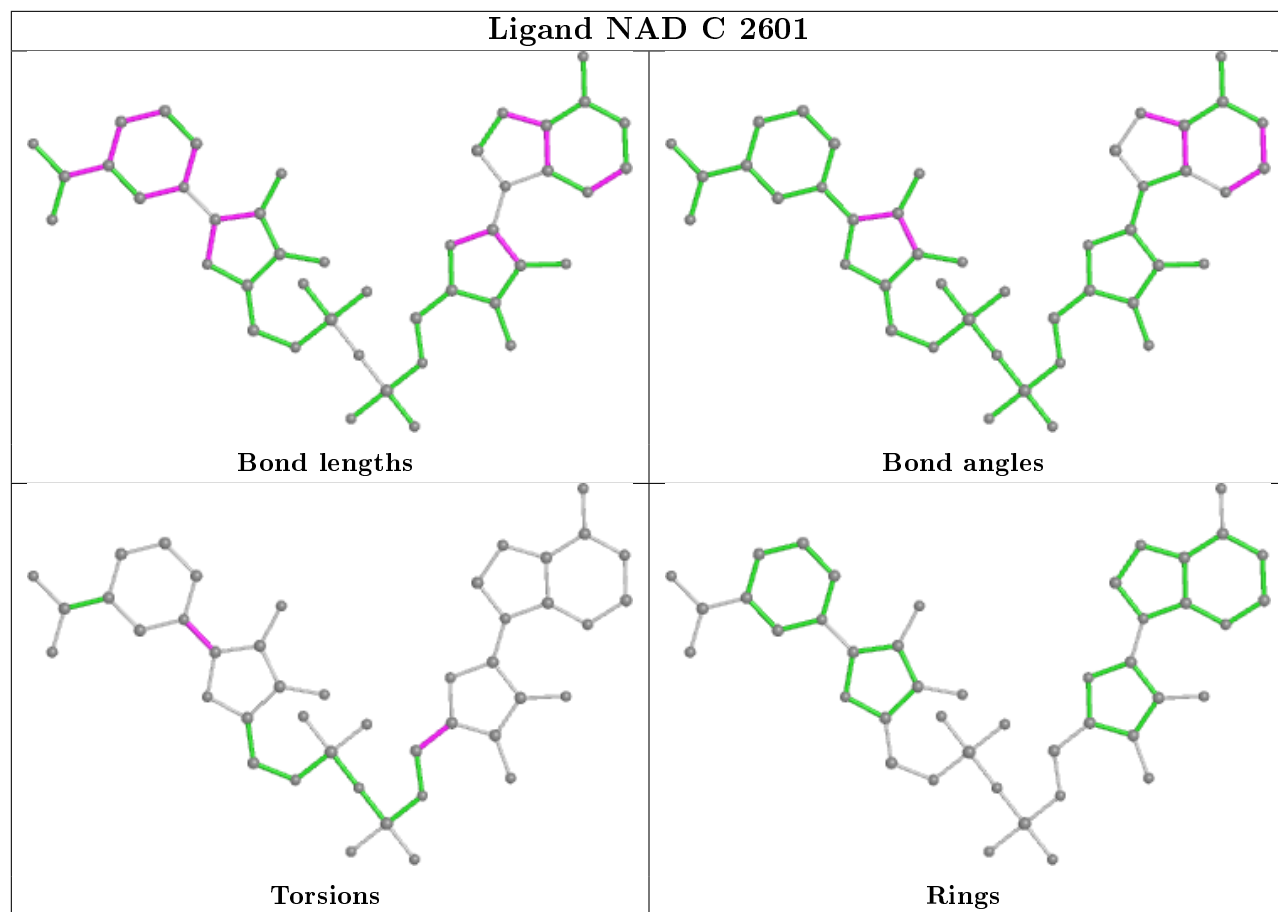
11 monomers are involved in 21 short contacts:

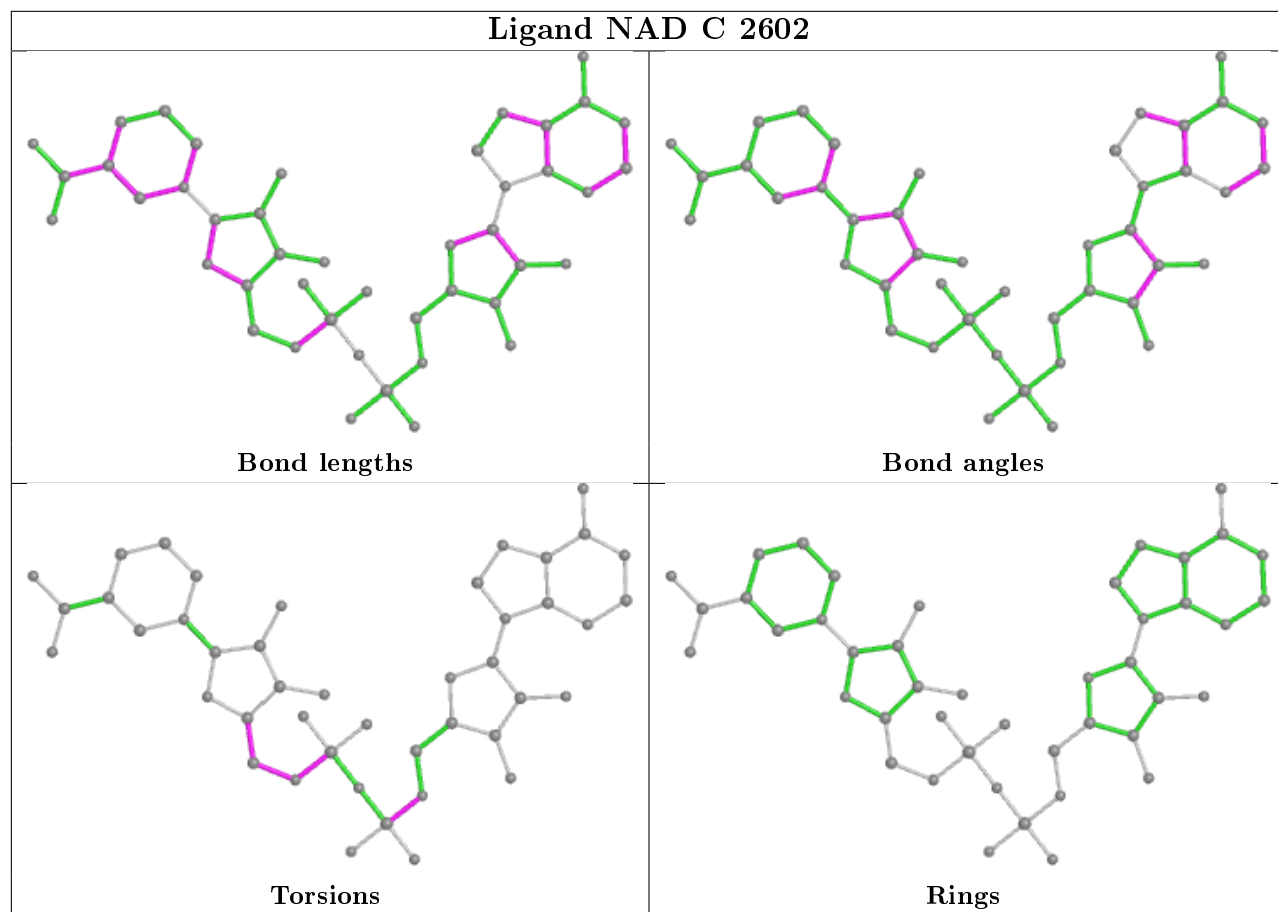
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1601	NAD	1	0
4	D	3603	TTN	1	0
3	C	2601	NAD	4	0
4	B	1603	TTN	1	0
3	C	2602	NAD	1	0
3	D	3602	NAD	3	0
3	A	602	NAD	2	0
3	B	1602	NAD	1	0
3	A	601	NAD	4	0
3	D	3601	NAD	1	0
4	C	2603	TTN	2	0

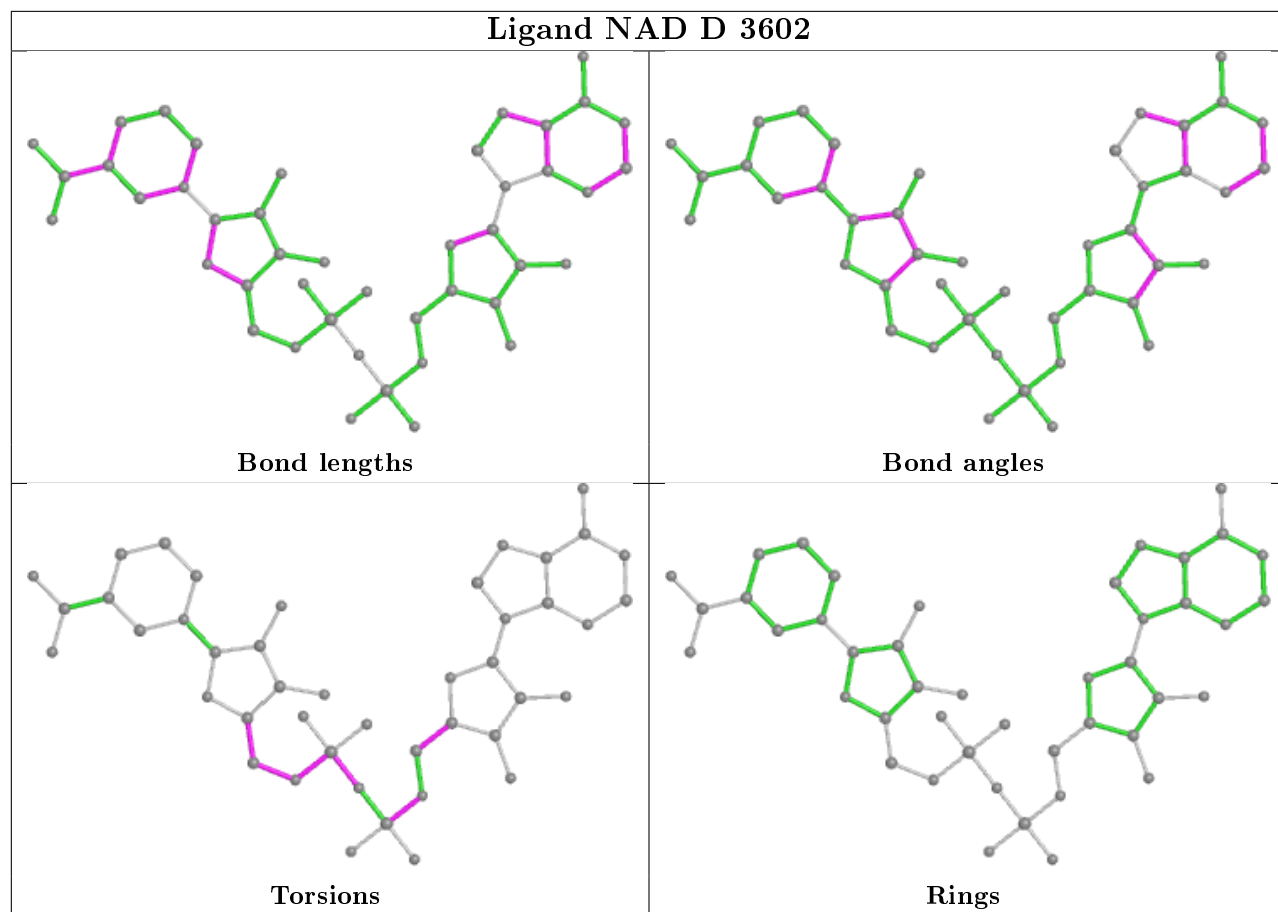
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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

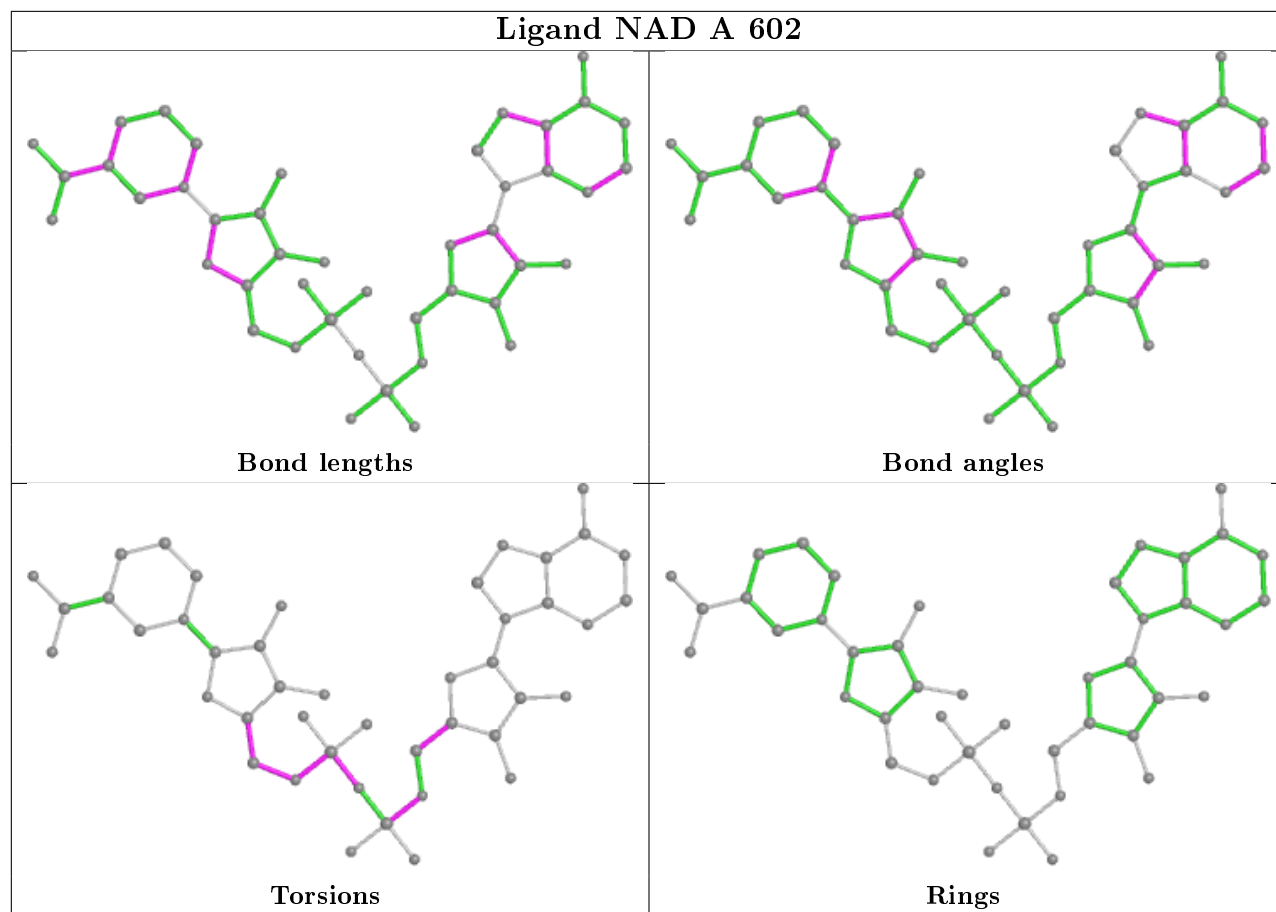
equivalents in the CSD to analyse the geometry.

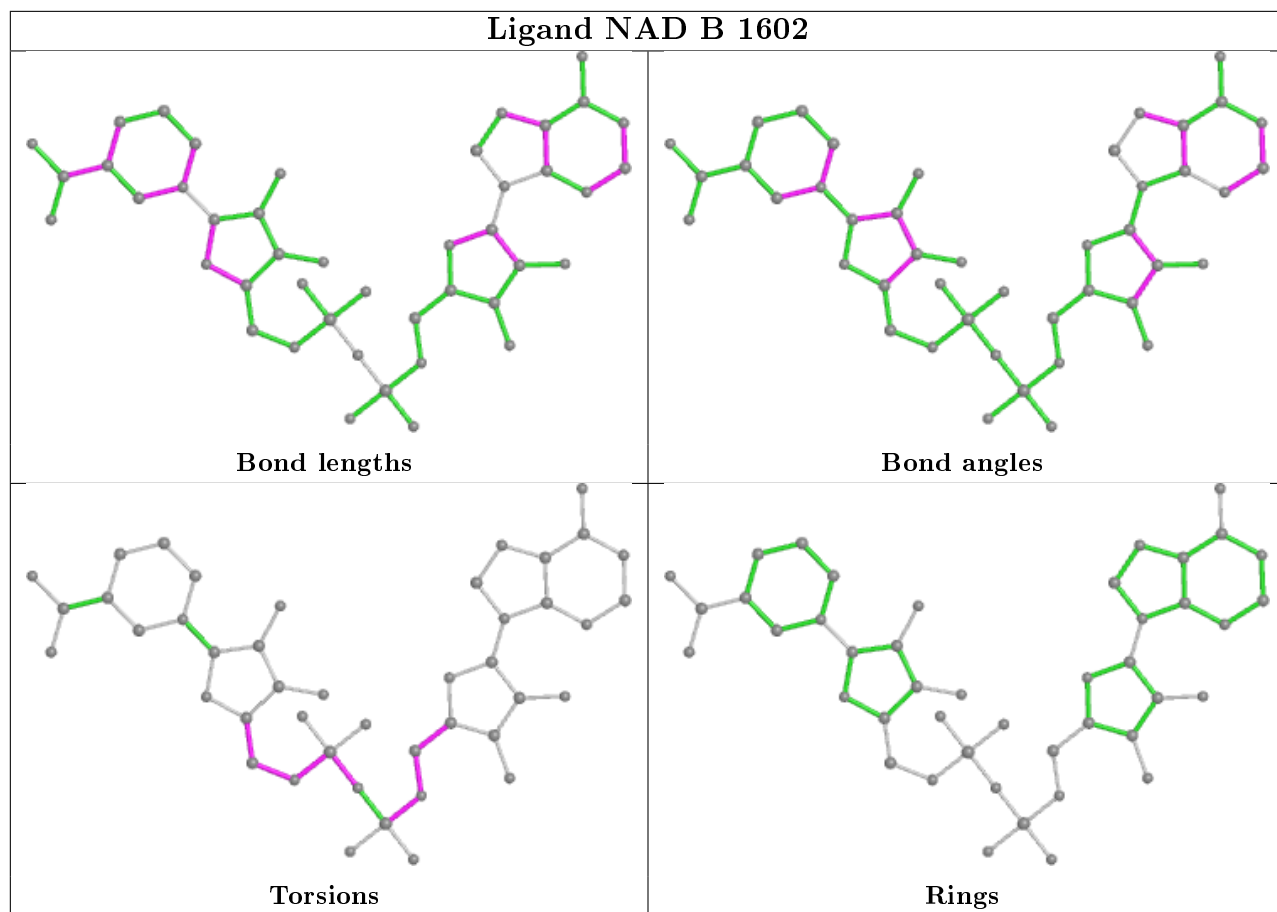


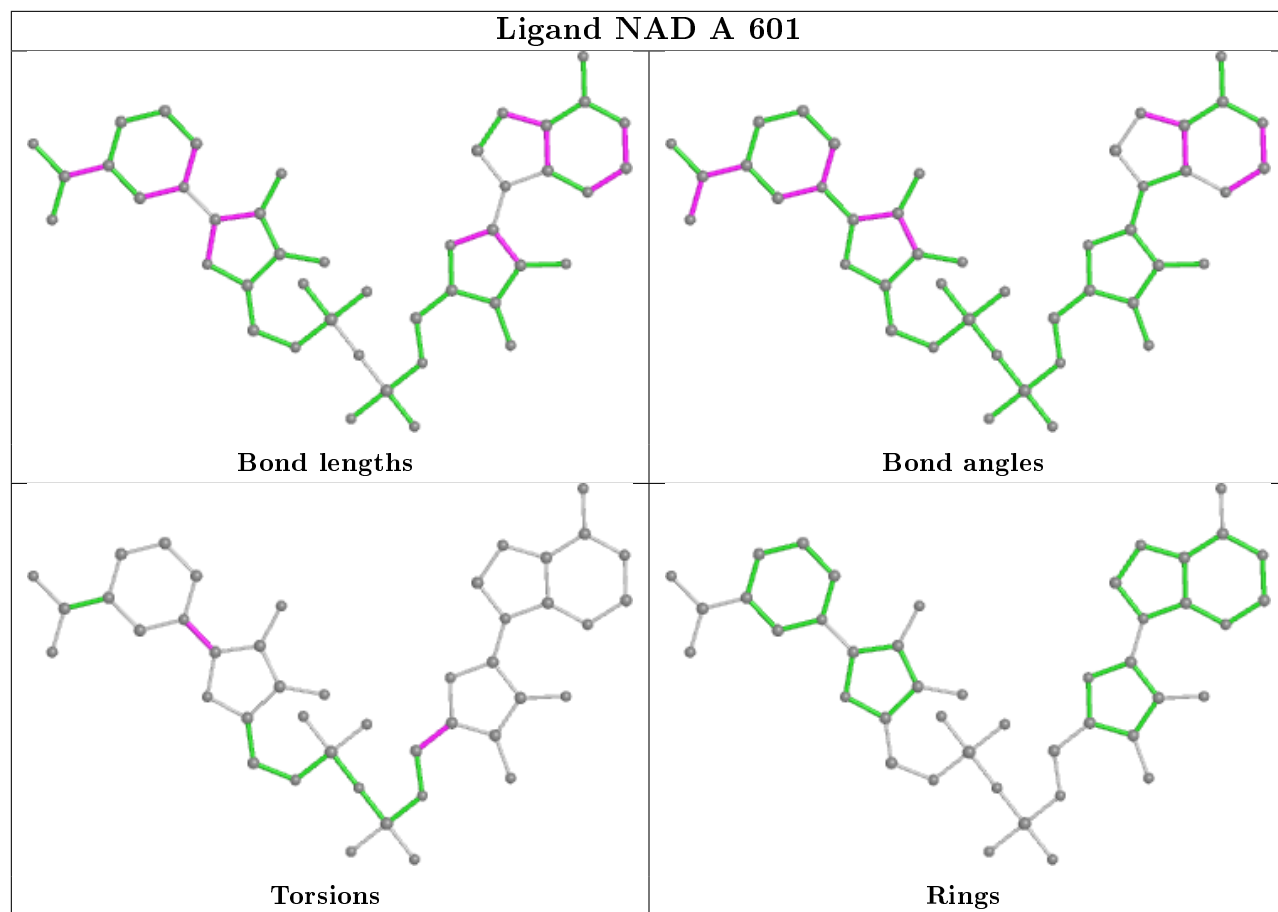


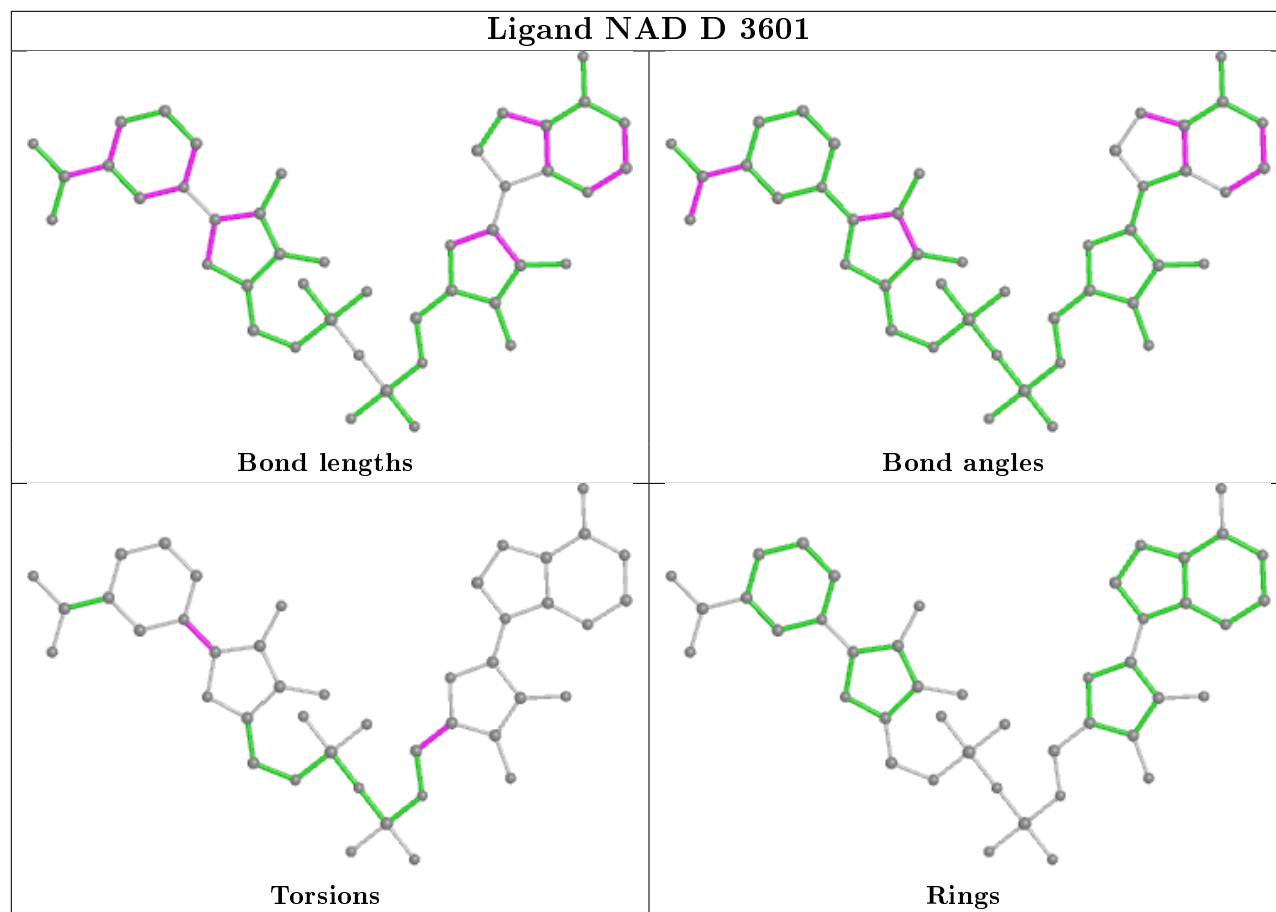












5.7 Other polymers [i](#)

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

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.