



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 10:55 PM UTC

PDB ID : 1EKX / pdb_00001ekx
Title : THE ISOLATED, UNREGULATED CATALYTIC TRIMER OF ASPARTATE TRANSCARBAMOYLASE COMPLEXED WITH BISUBSTRATE ANALOG PALA (N-(PHOSPHONACETYL)-L-ASPARTATE)
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Deposited on : 2000-03-09
Resolution : 1.95 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)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

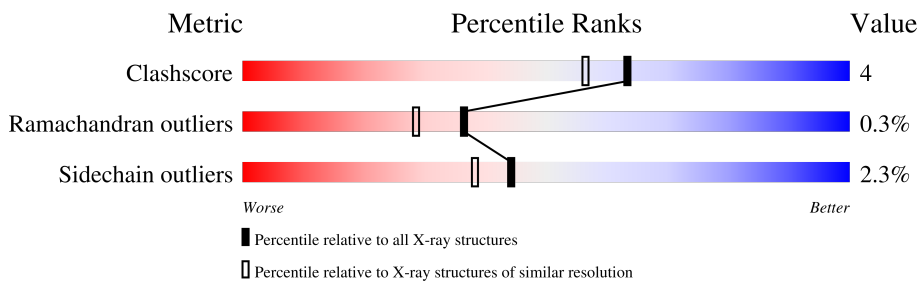
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.95 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	190562	3612 (1.96-1.96)
Ramachandran outliers	187476	3587 (1.96-1.96)
Sidechain outliers	187428	3587 (1.96-1.96)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments 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	311	 87% 10% .
1	B	311	 83% 14% ..
1	C	311	 87% 10% ..

2 Entry composition [i](#)

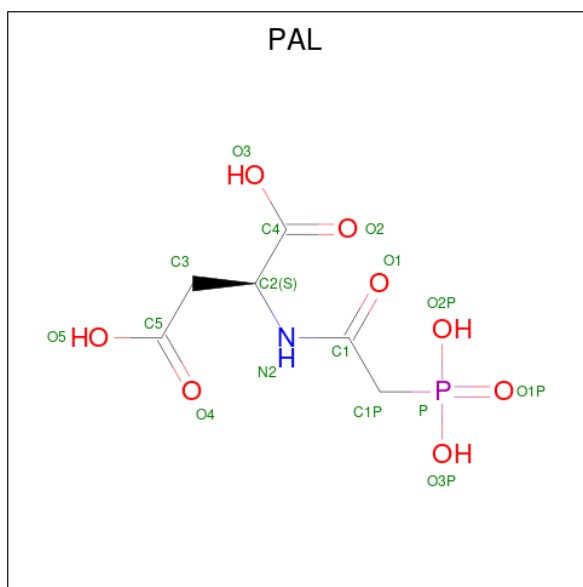
There are 4 unique types of molecules in this entry. The entry contains 8084 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 ASPARTATE TRANSCARBAMOYLASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	310	Total	C	N	O	S	0	0	0
			2414	1527	423	455	9			
1	B	308	Total	C	N	O	S	0	0	0
			2398	1516	420	453	9			
1	C	308	Total	C	N	O	S	0	0	0
			2399	1516	421	453	9			

- Molecule 2 is N-(PHOSPHONACETYL)-L-ASPARTIC ACID (CCD ID: PAL) (formula: $C_6H_{10}NO_8P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			16	6	1	8	1		
2	B	1	Total	C	N	O	P	0	0
			16	6	1	8	1		
2	C	1	Total	C	N	O	P	0	0
			16	6	1	8	1		

- Molecule 3 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	1	Total 1	Ca 1	0	0
3	C	1	Total 1	Ca 1	0	0

- Molecule 4 is water.

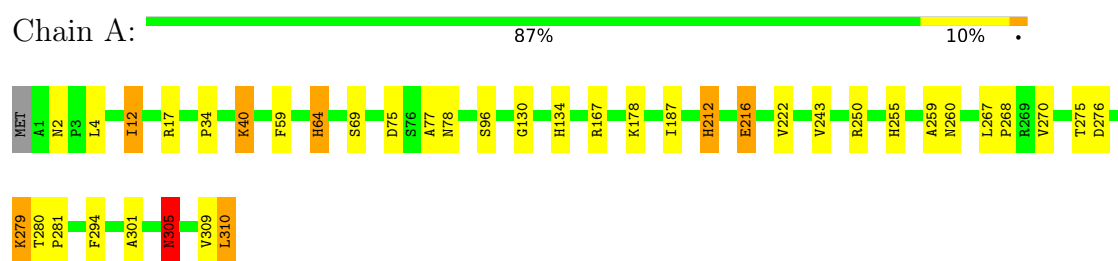
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	304	Total 304	O 304	0	0
4	B	228	Total 228	O 228	0	0
4	C	291	Total 291	O 291	0	0

3 Residue-property plots

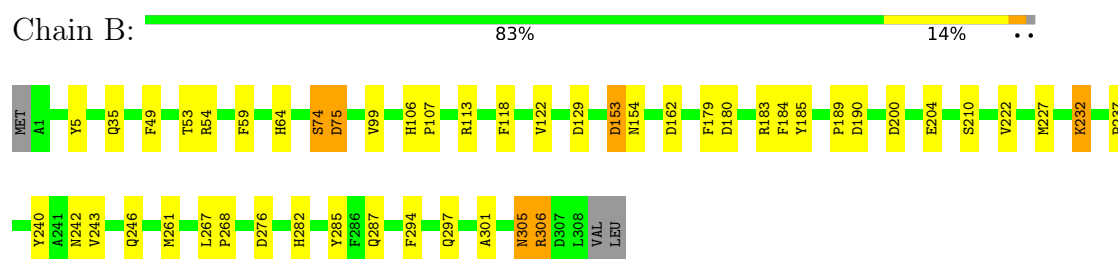
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded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

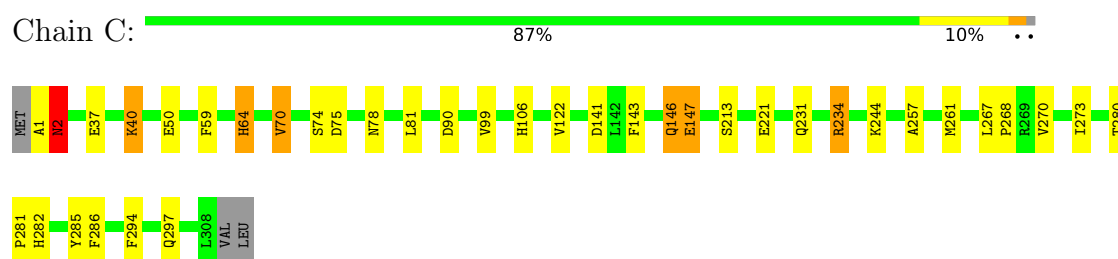
• Molecule 1: ASPARTATE TRANSCARBAMOYLASE



• Molecule 1: ASPARTATE TRANSCARBAMOYLASE



• Molecule 1: ASPARTATE TRANSCARBAMOYLASE



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	58.12Å 82.13Å 252.51Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 1.95	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-1.95)	Depositor
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	TNT, REFMAC	Depositor
R, R_{free}	0.171 , 0.214	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	8084	wwPDB-VP
Average B, all atoms (Å ²)	16.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CA, PAL

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	0.89	0/2460	1.59	27/3339 (0.8%)
1	B	0.86	0/2444	1.57	25/3316 (0.8%)
1	C	0.92	0/2445	1.63	23/3318 (0.7%)
All	All	0.89	0/7349	1.60	75/9973 (0.8%)

There are no bond length outliers.

All (75) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	234	ARG	NH1-CZ-NH2	-12.34	103.26	119.30
1	C	146	GLN	OE1-CD-NE2	12.19	134.78	122.60
1	B	122	VAL	CA-C-O	11.36	125.85	119.15
1	C	234	ARG	NE-CZ-NH1	10.71	132.22	121.50
1	C	297	GLN	OE1-CD-NE2	-10.19	112.41	122.60
1	A	260	ASN	CA-CB-CG	9.44	122.04	112.60
1	A	255	HIS	CA-CB-CG	9.43	123.23	113.80
1	C	234	ARG	CD-NE-CZ	9.21	137.29	124.40
1	C	147	GLU	CB-CG-CD	9.17	128.18	112.60
1	B	232	LYS	CA-CB-CG	8.82	131.74	114.10
1	A	305	ASN	CA-CB-CG	7.75	120.35	112.60
1	C	294	PHE	CA-CB-CG	-7.31	106.49	113.80
1	B	287	GLN	OE1-CD-NE2	-7.28	115.32	122.60
1	A	96	SER	CA-CB-OG	-7.25	96.59	111.10
1	A	260	ASN	CB-CG-ND2	7.20	127.20	116.40
1	B	242	ASN	CA-CB-CG	-7.03	105.57	112.60
1	B	113	ARG	CD-NE-CZ	7.01	134.21	124.40
1	A	260	ASN	OD1-CG-ND2	-6.90	115.70	122.60
1	B	232	LYS	N-CA-CB	6.71	120.12	110.06
1	C	99	VAL	N-CA-C	6.68	118.44	108.96
1	C	122	VAL	CA-C-O	6.46	122.96	119.15

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	305	ASN	OD1-CG-ND2	-6.44	116.16	122.60
1	A	64	HIS	CA-CB-CG	-6.31	107.49	113.80
1	A	250	ARG	CD-NE-CZ	6.25	133.15	124.40
1	B	113	ARG	NE-CZ-NH2	6.19	124.77	119.20
1	B	118	PHE	CA-CB-CG	-6.04	107.76	113.80
1	B	54	ARG	N-CA-C	5.99	117.48	111.07
1	A	243	VAL	N-CA-C	5.99	116.73	110.62
1	B	49	PHE	CA-CB-CG	5.97	119.77	113.80
1	C	273	ILE	N-CA-CB	5.97	119.74	112.10
1	C	234	ARG	NE-CZ-NH2	5.91	124.52	119.20
1	A	294	PHE	CA-CB-CG	-5.90	107.90	113.80
1	B	74	SER	CA-C-O	5.83	126.17	119.35
1	B	222	VAL	N-CA-C	5.83	117.13	109.21
1	C	141	ASP	CA-CB-CG	5.82	118.42	112.60
1	A	78	ASN	OD1-CG-ND2	-5.81	116.79	122.60
1	C	70	VAL	CB-CA-C	-5.64	101.81	110.50
1	B	294	PHE	CA-CB-CG	-5.63	108.17	113.80
1	B	180	ASP	N-CA-C	5.62	118.64	109.59
1	C	2	ASN	OD1-CG-ND2	5.60	128.20	122.60
1	C	64	HIS	CA-CB-CG	-5.58	108.22	113.80
1	A	255	HIS	CB-CA-C	-5.56	101.91	110.81
1	A	12	ILE	CA-C-O	5.56	126.47	120.47
1	B	232	LYS	CB-CA-C	-5.55	101.25	110.68
1	C	90	ASP	CA-CB-CG	5.54	118.14	112.60
1	C	231	GLN	OE1-CD-NE2	-5.48	117.12	122.60
1	A	216	GLU	CB-CG-CD	5.47	121.89	112.60
1	B	154	ASN	CA-CB-CG	-5.45	107.15	112.60
1	C	106	HIS	CA-C-N	5.40	125.01	119.56
1	C	106	HIS	C-N-CA	5.40	125.01	119.56
1	B	129	ASP	CA-CB-CG	5.38	117.97	112.60
1	A	222	VAL	N-CA-C	5.35	117.57	109.12
1	B	153	ASP	OD1-CG-OD2	-5.31	110.15	122.90
1	A	212	HIS	CA-CB-CG	-5.30	108.50	113.80
1	C	221	GLU	N-CA-CB	-5.29	102.64	110.53
1	A	259	ALA	CA-C-N	5.29	131.89	121.58
1	A	259	ALA	C-N-CA	5.29	131.89	121.58
1	B	53	THR	N-CA-C	-5.29	105.03	112.12
1	C	286	PHE	CA-CB-CG	-5.29	108.51	113.80
1	A	77	ALA	N-CA-C	5.27	117.71	111.33
1	B	99	VAL	N-CA-C	5.27	116.44	108.96
1	A	40	LYS	O-C-N	-5.26	116.33	122.81
1	A	134	HIS	CA-CB-CG	5.21	119.01	113.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	34	PRO	O-C-N	-5.21	116.61	122.91
1	B	185	TYR	CA-C-O	-5.20	114.73	120.24
1	C	286	PHE	N-CA-CB	5.19	117.94	110.20
1	A	78	ASN	CB-CG-ND2	5.19	124.18	116.40
1	B	297	GLN	CB-CA-C	-5.17	102.21	110.79
1	A	259	ALA	CA-C-O	-5.15	115.09	120.55
1	C	74	SER	CA-C-O	5.15	125.44	119.32
1	B	35	GLN	OE1-CD-NE2	-5.12	117.48	122.60
1	A	77	ALA	CA-C-O	-5.11	115.11	120.63
1	B	276	ASP	CA-CB-CG	5.09	117.69	112.60
1	B	162	ASP	CA-CB-CG	5.07	117.67	112.60
1	A	69	SER	CA-C-O	-5.04	115.51	121.66

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	2414	0	2422	19	0
1	B	2398	0	2395	23	0
1	C	2399	0	2402	20	0
2	A	16	0	6	0	0
2	B	16	0	6	0	0
2	C	16	0	6	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
4	A	304	0	0	4	1
4	B	228	0	0	3	0
4	C	291	0	0	6	0
All	All	8084	0	7237	58	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 (58) 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:276:ASP:HA	1:A:279:LYS:HE2	1.66	0.77
1:B:75:ASP:HB3	1:C:78:ASN:ND2	2.05	0.72
1:A:310:LEU:HD13	4:A:1300:HOH:O	1.92	0.68
1:C:143:PHE:O	1:C:147:GLU:HG2	1.95	0.66
1:C:147:GLU:HG3	4:C:1170:HOH:O	1.94	0.65
1:B:237:PRO:HA	1:B:240:TYR:CD1	2.33	0.63
1:B:74:SER:O	1:C:78:ASN:ND2	2.31	0.63
1:A:12:ILE:O	1:A:178:LYS:NZ	2.36	0.59
1:A:64:HIS:HE1	4:B:1043:HOH:O	1.85	0.59
1:C:40:LYS:O	1:C:40:LYS:HD3	2.03	0.59
1:B:183:ARG:NH1	1:B:184:PHE:O	2.37	0.57
1:B:232:LYS:CE	1:B:243:VAL:HG13	2.34	0.57
1:A:40:LYS:HD3	4:A:1123:HOH:O	2.04	0.57
1:A:64:HIS:HD2	4:A:1072:HOH:O	1.87	0.56
1:B:200:ASP:O	1:B:204:GLU:HG3	2.05	0.56
1:B:64:HIS:HD2	4:B:1046:HOH:O	1.89	0.55
1:B:267:LEU:HB3	1:B:268:PRO:HA	1.86	0.55
1:C:267:LEU:HB3	1:C:268:PRO:HA	1.88	0.55
1:B:153:ASP:OD1	1:B:179:PHE:HB3	2.07	0.55
1:B:232:LYS:NZ	1:B:243:VAL:HG13	2.22	0.55
1:C:50:GLU:OE1	1:C:234:ARG:NH2	2.37	0.54
1:A:309:VAL:O	1:A:310:LEU:HB2	2.07	0.54
1:B:75:ASP:HB3	1:C:78:ASN:HD21	1.74	0.52
1:B:5:TYR:CE2	1:B:306:ARG:HG3	2.44	0.51
1:C:64:HIS:HD2	4:C:1067:HOH:O	1.93	0.51
1:A:2:ASN:ND2	1:A:4:LEU:H	2.09	0.50
1:C:261:MET:HE3	1:C:282:HIS:ND1	2.26	0.50
1:C:280:THR:HB	1:C:281:PRO:HD2	1.92	0.50
1:B:237:PRO:HA	1:B:240:TYR:CG	2.46	0.49
1:A:187:ILE:HG12	1:A:212:HIS:HB2	1.95	0.49
1:B:75:ASP:CB	1:C:78:ASN:HD21	2.26	0.48
1:A:130:GLY:O	1:A:167:ARG:HD3	2.12	0.48
1:A:279:LYS:HZ3	1:A:279:LYS:H	1.59	0.48
1:C:64:HIS:HE1	4:C:1064:HOH:O	1.96	0.48
1:B:64:HIS:HE1	4:C:1106:HOH:O	1.95	0.48
1:C:78:ASN:ND2	4:C:1004:HOH:O	2.47	0.48
1:B:183:ARG:HH22	1:B:210:SER:HB3	1.79	0.47
1:B:301:ALA:O	1:B:305:ASN:HB2	2.15	0.47
1:B:227:MET:HE3	4:B:1057:HOH:O	2.15	0.46
1:B:106:HIS:CG	1:B:107:PRO:HD2	2.51	0.46
1:C:257:ALA:HB1	1:C:261:MET:HE2	1.98	0.46
1:C:37:GLU:O	1:C:40:LYS:HD2	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:189:PRO:HB3	1:B:246:GLN:OE1	2.16	0.45
1:A:267:LEU:HB3	1:A:268:PRO:HA	1.98	0.45
1:A:280:THR:HB	1:A:281:PRO:HD2	1.98	0.43
1:C:1:ALA:O	1:C:2:ASN:C	2.60	0.43
1:B:237:PRO:HA	1:B:240:TYR:CE1	2.52	0.43
1:B:232:LYS:HZ2	1:B:243:VAL:HG13	1.82	0.42
1:A:216:GLU:H	1:A:216:GLU:CD	2.28	0.42
1:A:17:ARG:NH1	4:A:1290:HOH:O	2.53	0.42
1:A:310:LEU:HA	1:A:310:LEU:HD12	1.76	0.42
1:A:301:ALA:O	1:A:305:ASN:HB3	2.19	0.42
1:B:261:MET:HE3	1:B:282:HIS:ND1	2.34	0.42
1:C:81:LEU:HD23	1:C:81:LEU:C	2.45	0.41
1:A:275:THR:O	1:A:279:LYS:NZ	2.40	0.41
1:C:244:LYS:HE2	4:C:1038:HOH:O	2.20	0.41
1:C:50:GLU:OE2	1:C:234:ARG:NH2	2.53	0.41
1:A:309:VAL:O	1:A:309:VAL:HG23	2.21	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)
4:A:1026:HOH:O	4:A:1269:HOH:O[4_555]	2.04	0.16

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	308/311 (99%)	301 (98%)	6 (2%)	1 (0%)	36	28
1	B	306/311 (98%)	299 (98%)	7 (2%)	0	100	100
1	C	306/311 (98%)	296 (97%)	8 (3%)	2 (1%)	18	10
All	All	920/933 (99%)	896 (97%)	21 (2%)	3 (0%)	36	28

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	2	ASN
1	A	270	VAL
1	C	270	VAL

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	261/262 (100%)	256 (98%)	5 (2%)	50	45
1	B	259/262 (99%)	253 (98%)	6 (2%)	44	38
1	C	259/262 (99%)	252 (97%)	7 (3%)	39	32
All	All	779/786 (99%)	761 (98%)	18 (2%)	44	38

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	59	PHE
1	A	75	ASP
1	A	279	LYS
1	A	305	ASN
1	A	310	LEU
1	B	59	PHE
1	B	75	ASP
1	B	190	ASP
1	B	285	TYR
1	B	305	ASN
1	B	306	ARG
1	C	40	LYS
1	C	59	PHE
1	C	70	VAL
1	C	75	ASP
1	C	146	GLN
1	C	213	SER
1	C	285	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	2	ASN
1	A	64	HIS
1	A	231	GLN
1	A	246	GLN
1	A	291	ASN
1	B	33	ASN
1	B	64	HIS
1	B	78	ASN
1	B	108	GLN
1	B	291	ASN
1	C	41	HIS
1	C	64	HIS
1	C	78	ASN
1	C	146	GLN
1	C	291	ASN
1	C	305	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 5 ligands modelled in this entry, 2 are monoatomic - leaving 3 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	$\# Z > 2$
2	PAL	A	1001	-	15,15,15	1.83	7 (46%)	20,21,21	1.63	6 (30%)
2	PAL	B	1002	-	15,15,15	1.62	3 (20%)	20,21,21	1.43	3 (15%)
2	PAL	C	1003	-	15,15,15	1.66	4 (26%)	20,21,21	1.77	6 (30%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	PAL	A	1001	-	-	1/17/17/17	-
2	PAL	B	1002	-	-	1/17/17/17	-
2	PAL	C	1003	-	-	0/17/17/17	-

All (14) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1001	PAL	P-C1P	2.97	1.84	1.79
2	C	1003	PAL	C3-C2	2.79	1.59	1.53
2	B	1002	PAL	C3-C2	2.75	1.59	1.53
2	C	1003	PAL	P-O2P	-2.68	1.49	1.55
2	A	1001	PAL	O4-C5	2.36	1.29	1.22
2	B	1002	PAL	O4-C5	2.24	1.29	1.22
2	A	1001	PAL	C2-N2	-2.22	1.41	1.45
2	A	1001	PAL	C1-N2	-2.21	1.29	1.34
2	B	1002	PAL	O3-C4	-2.20	1.23	1.30
2	A	1001	PAL	C3-C2	2.16	1.58	1.53
2	C	1003	PAL	O3-C4	-2.13	1.23	1.30
2	C	1003	PAL	O4-C5	2.08	1.28	1.22
2	A	1001	PAL	P-O1P	-2.05	1.46	1.50
2	A	1001	PAL	P-O2P	-2.02	1.50	1.55

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1003	PAL	C1P-C1-N2	3.45	118.47	115.19
2	B	1002	PAL	O3-C4-O2	-3.43	116.30	124.08
2	C	1003	PAL	O5-C5-C3	3.37	124.49	114.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1001	PAL	C1P-C1-N2	3.27	118.30	115.19
2	C	1003	PAL	O3-C4-O2	-2.91	117.48	124.08
2	A	1001	PAL	C4-C2-N2	2.90	117.30	110.57
2	B	1002	PAL	C4-C2-N2	2.74	116.92	110.57
2	A	1001	PAL	C2-N2-C1	2.71	128.47	121.68
2	A	1001	PAL	O3-C4-O2	-2.61	118.15	124.08
2	C	1003	PAL	C4-C2-N2	2.50	116.37	110.57
2	A	1001	PAL	O3-C4-C2	2.26	121.17	113.51
2	B	1002	PAL	O3-C4-C2	2.23	121.06	113.51
2	C	1003	PAL	C3-C2-C4	-2.11	106.58	110.79
2	A	1001	PAL	O1-C1-N2	-2.07	119.45	122.95
2	C	1003	PAL	O4-C5-C3	-2.02	116.62	122.84

There are no chirality outliers.

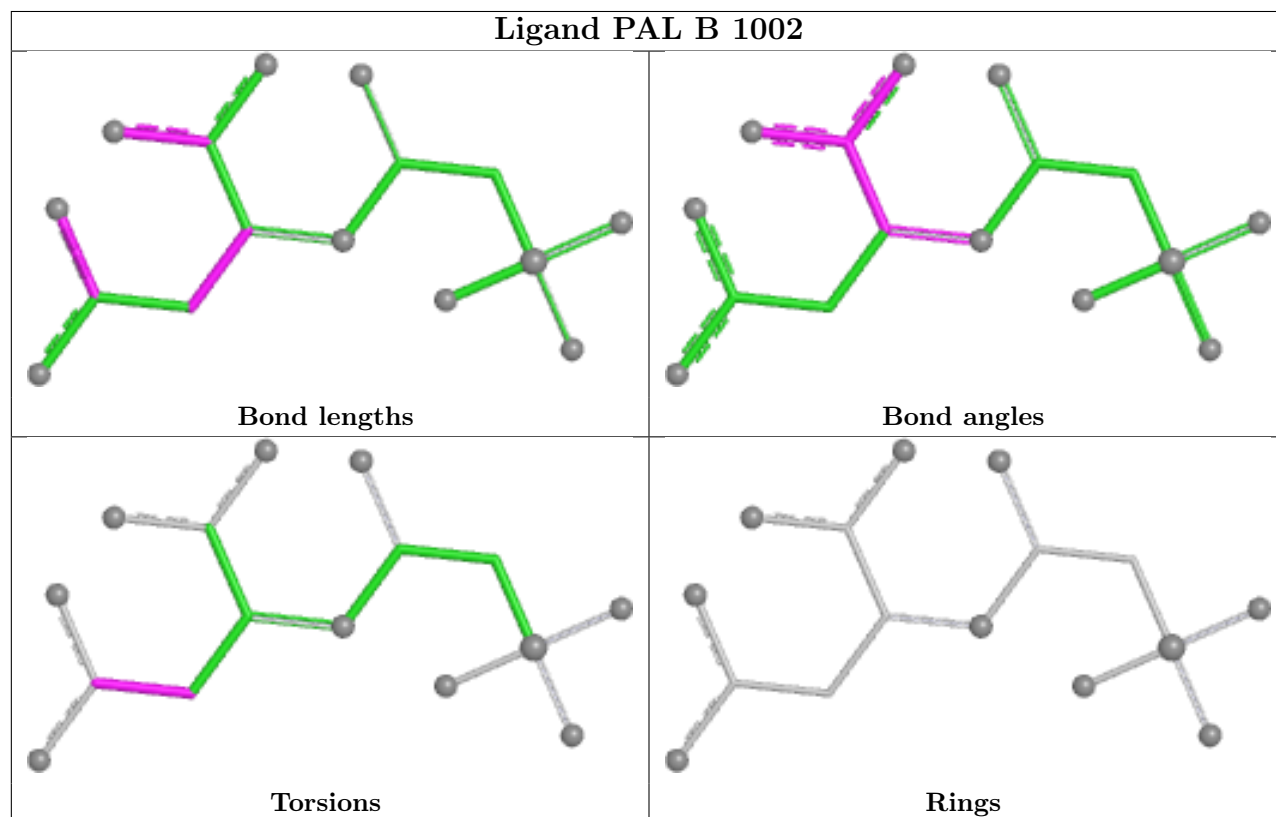
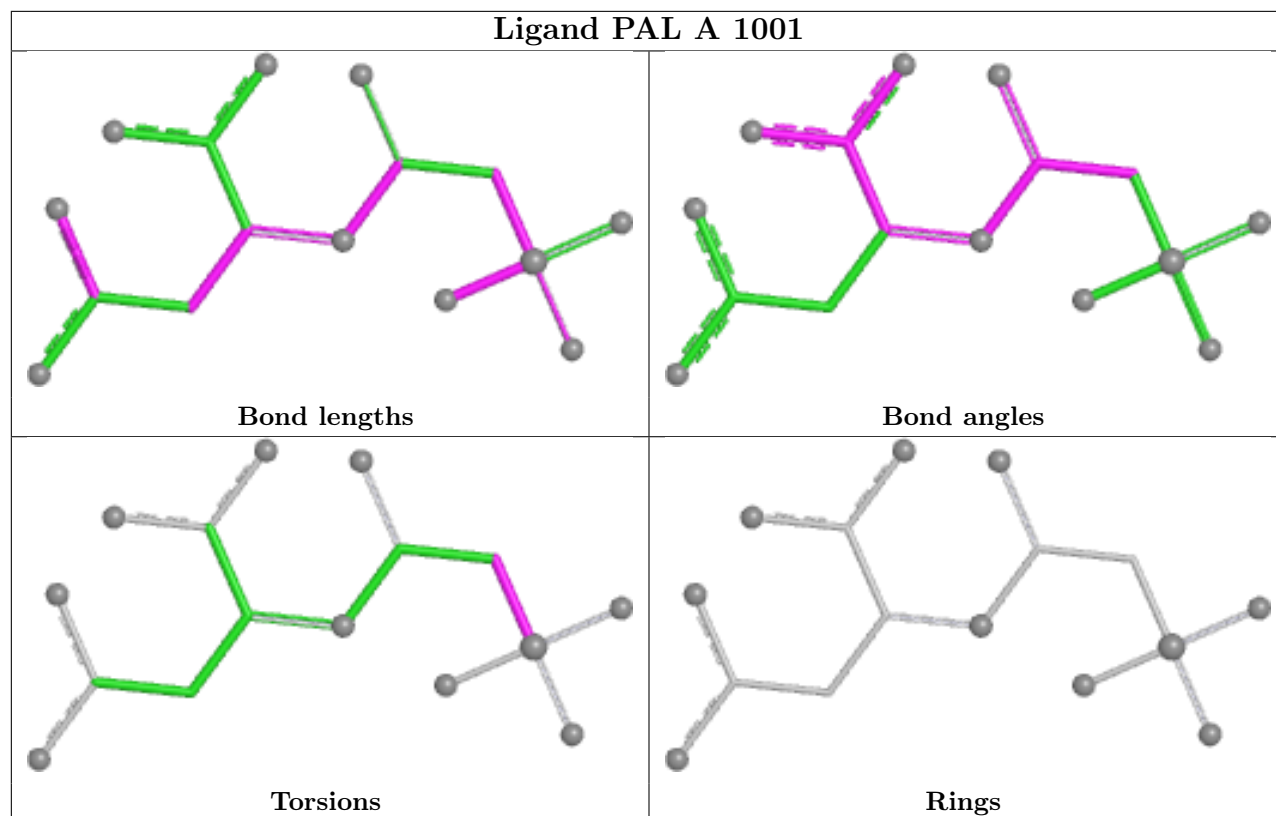
All (2) torsion outliers are listed below:

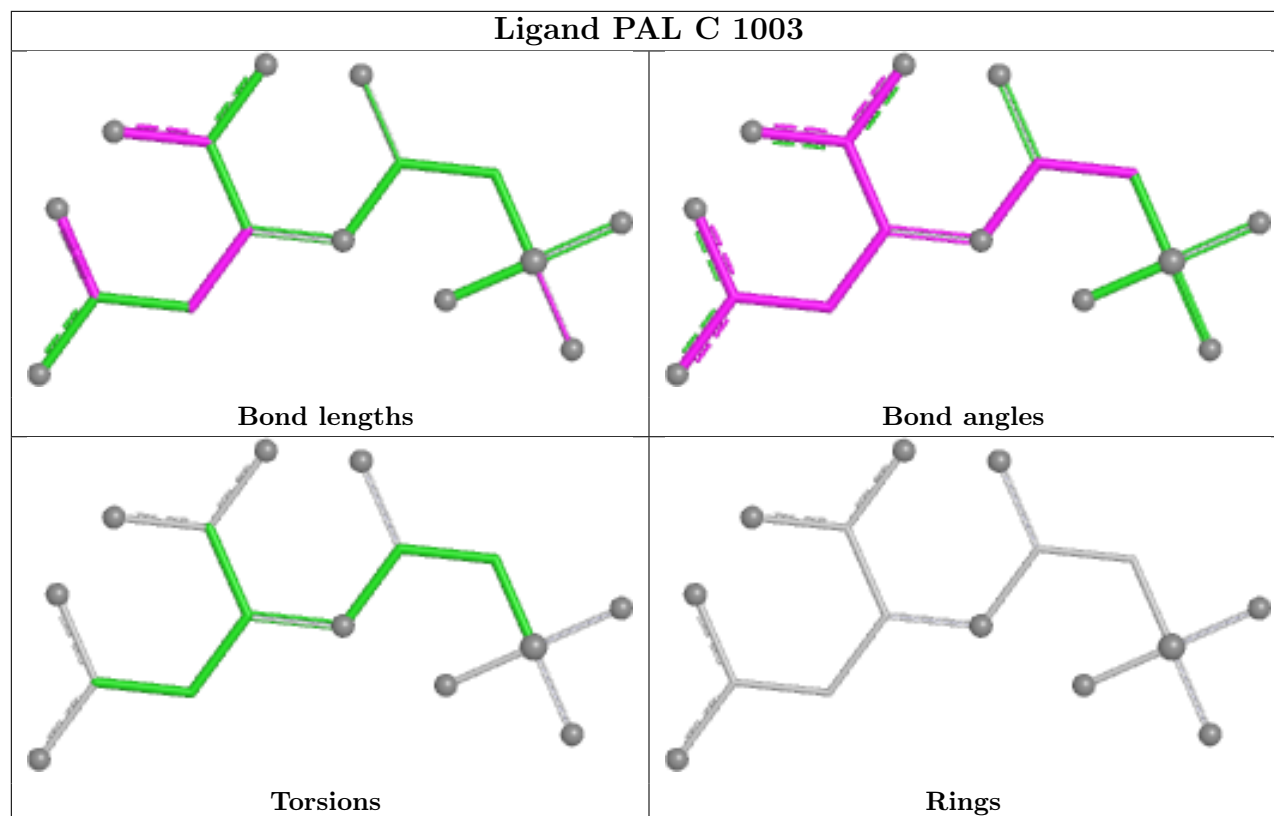
Mol	Chain	Res	Type	Atoms
2	A	1001	PAL	C1-C1P-P-O3P
2	B	1002	PAL	C2-C3-C5-O4

There are no ring outliers.

No monomer is involved in short contacts.

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.