



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 10, 2026 – 06:57 PM UTC

PDB ID : 1IWB / pdb_00001iwb
Title : Crystal structure of diol dehydratase
Authors : Shibata, N.; Masuda, J.; Morimoto, Y.; Yasuoka, N.; Toraya, T.
Deposited on : 2002-05-01
Resolution : 1.85 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 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

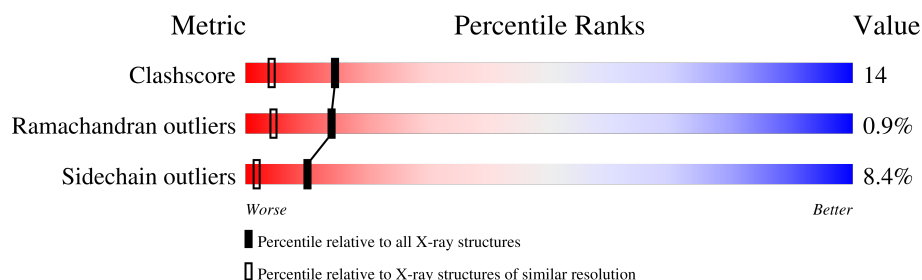
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.85 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	190562	3579 (1.86-1.86)
Ramachandran outliers	187476	3553 (1.86-1.86)
Sidechain outliers	187428	3553 (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	554	77% 19% . .
1	L	554	75% 21% . .
2	B	224	50% 25% . . 21%
2	E	224	36% 34% 8% 21%
3	G	173	51% 23% . . 21%
3	M	173	54% 20% . . 21%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 14446 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 DIOL DEHYDRATASE alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	551	Total	C	N	O	S	0	0	0
			4201	2620	727	825	29			
1	L	551	Total	C	N	O	S	0	0	0
			4200	2620	727	824	29			

- Molecule 2 is a protein called DIOL DEHYDRATASE beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	178	Total	C	N	O	S	0	0	0
			1357	859	244	252	2			
2	E	177	Total	C	N	O	S	0	0	0
			1352	856	243	251	2			

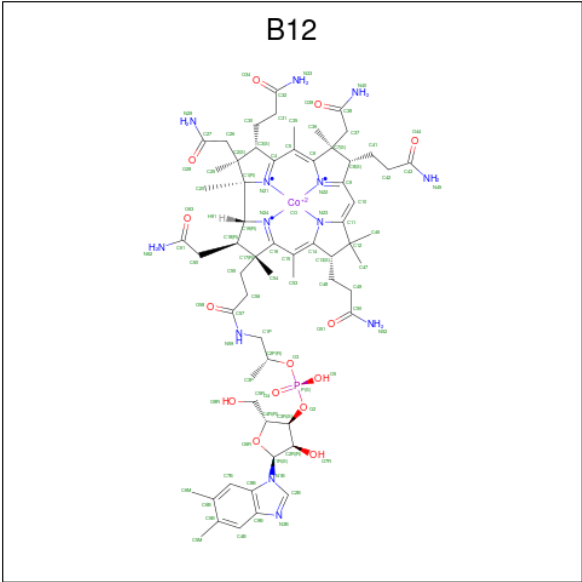
- Molecule 3 is a protein called DIOL DEHYDRATASE gamma chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	G	137	Total	C	N	O	S	0	0	0
			1093	681	195	214	3			
3	M	137	Total	C	N	O	S	0	0	0
			1093	681	195	214	3			

- Molecule 4 is POTASSIUM ION (CCD ID: K) (formula: K).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	3	Total	K	0	0
			3	3		
4	L	3	Total	K	0	0
			3	3		

- Molecule 5 is COBALAMIN (CCD ID: B12) (formula: C₆₂H₈₉CoN₁₃O₁₄P).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
5	B	1	Total	C	Co	N	O	P	0	0
			91	62	1	13	14	1		
5	E	1	Total	C	Co	N	O	P	0	0
			91	62	1	13	14	1		

- Molecule 6 is water.

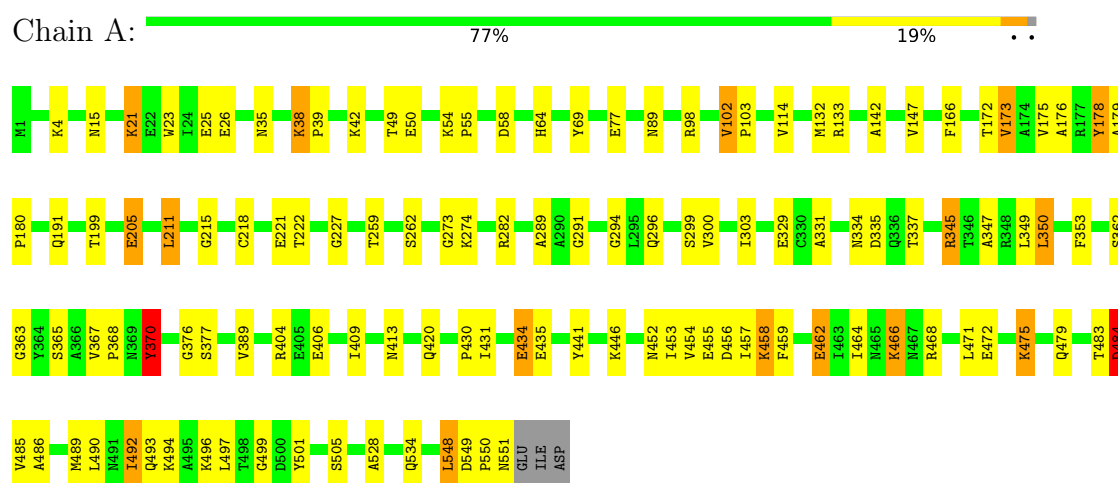
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	335	Total	O	0	0
			335	335		
6	B	89	Total	O	0	0
			89	89		
6	G	70	Total	O	0	0
			70	70		
6	L	330	Total	O	0	0
			330	330		
6	E	54	Total	O	0	0
			54	54		
6	M	84	Total	O	0	0
			84	84		

3 Residue-property plots

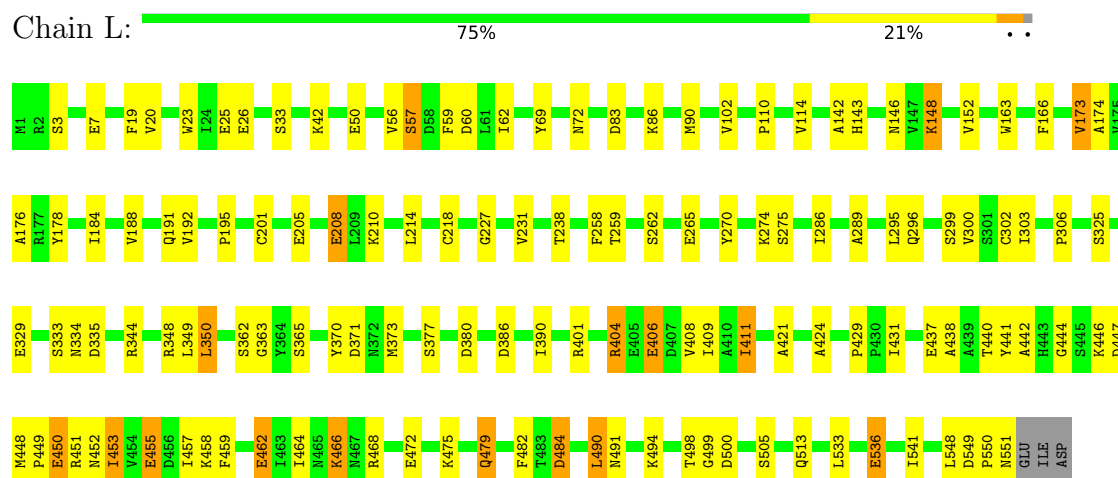
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded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

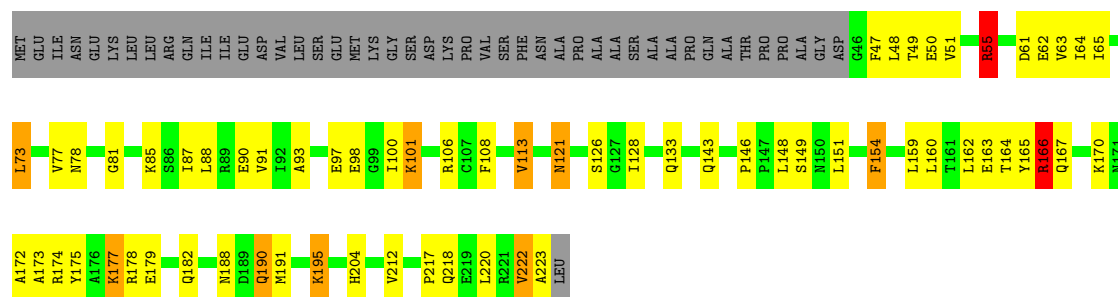


• Molecule 1: DIOL DEHYDRATASE alpha chain



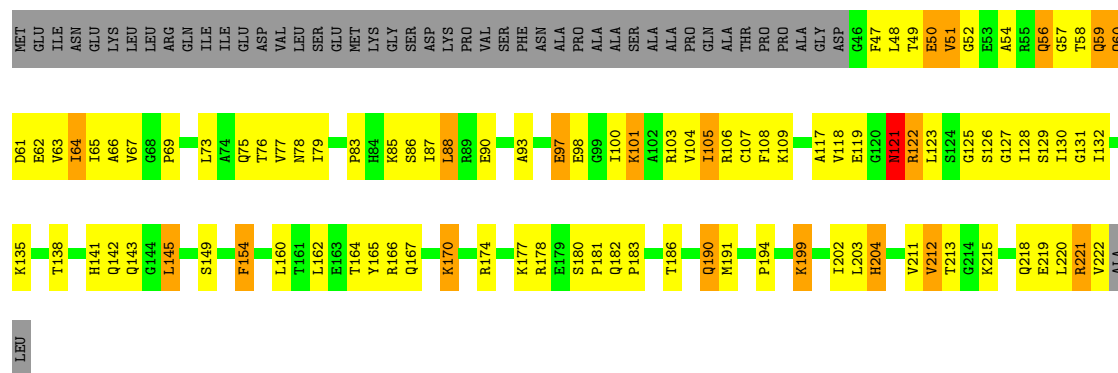
• Molecule 2: DIOL DEHYDRATASE beta chain





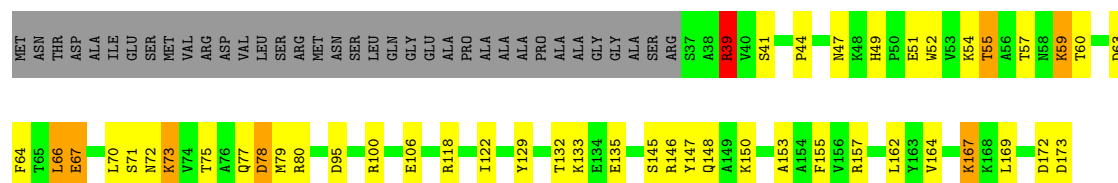
• Molecule 2: DIOL DEHYDRATASE beta chain

Chain E: 36% 34% 8% 21%



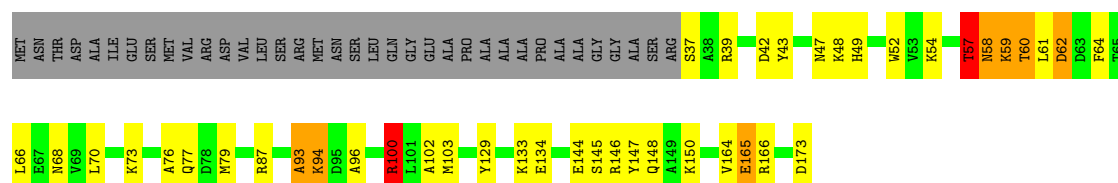
• Molecule 3: DIOL DEHYDRATASE gamma chain

Chain G: 51% 23% • • 21%



• Molecule 3: DIOL DEHYDRATASE gamma chain

Chain M: 54% 20% • • 21%



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	75.79Å 122.40Å 207.59Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.00 – 1.85	Depositor
% Data completeness (in resolution range)	(Not available) (10.00-1.85)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS, SHELXL-97	Depositor
R, R_{free}	0.181 , 0.256	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	14446	wwPDB-VP
Average B, all atoms (Å ²)	27.0	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: K, B12

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	0.40	0/4273	1.33	12/5787 (0.2%)
1	L	0.41	0/4272	1.36	13/5786 (0.2%)
2	B	0.40	0/1379	1.36	11/1867 (0.6%)
2	E	0.37	0/1374	1.35	12/1860 (0.6%)
3	G	0.38	0/1108	1.29	3/1497 (0.2%)
3	M	0.40	0/1108	1.36	8/1497 (0.5%)
All	All	0.40	0/13514	1.34	59/18294 (0.3%)

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	1
1	L	0	1
All	All	0	2

There are no bond length outliers.

The worst 5 of 59 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	121	ASN	CA-CB-CG	9.70	122.30	112.60
3	M	100	ARG	CD-NE-CZ	9.49	137.69	124.40
2	B	154	PHE	CA-CB-CG	-8.25	105.55	113.80
2	B	55	ARG	CD-NE-CZ	8.13	135.78	124.40
1	L	449	PRO	CA-C-N	-8.09	108.89	122.64

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	205	GLU	Sidechain
1	L	208	GLU	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	4201	0	4138	76	0
1	L	4200	0	4139	103	0
2	B	1357	0	1408	47	0
2	E	1352	0	1403	88	0
3	G	1093	0	1101	37	0
3	M	1093	0	1101	35	0
4	A	3	0	0	0	0
4	L	3	0	0	0	0
5	B	91	0	88	9	0
5	E	91	0	88	5	0
6	A	335	0	0	8	0
6	B	89	0	0	2	0
6	E	54	0	0	3	0
6	G	70	0	0	1	0
6	L	330	0	0	6	0
6	M	84	0	0	2	0
All	All	14446	0	13466	374	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 14.

The worst 5 of 374 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)
3:M:76:ALA:HA	3:M:79:MET:HE2	1.40	1.02
3:M:37:SER:HB3	3:M:39:ARG:HH21	1.32	0.94
2:E:190:GLN:H	2:E:190:GLN:HE21	1.14	0.94
2:B:47:PHE:HA	2:B:223:ALA:HB3	1.52	0.91
1:L:513:GLN:HE22	3:M:47:ASN:HD21	1.13	0.90

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	549/554 (99%)	526 (96%)	17 (3%)	6 (1%)	11	3
1	L	549/554 (99%)	532 (97%)	14 (3%)	3 (0%)	24	13
2	B	176/224 (79%)	169 (96%)	7 (4%)	0	100	100
2	E	175/224 (78%)	161 (92%)	8 (5%)	6 (3%)	3	0
3	G	135/173 (78%)	131 (97%)	4 (3%)	0	100	100
3	M	135/173 (78%)	132 (98%)	2 (2%)	1 (1%)	18	8
All	All	1719/1902 (90%)	1651 (96%)	52 (3%)	16 (1%)	14	4

5 of 16 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	E	50	GLU
2	E	59	GLN
3	M	57	THR
2	E	51	VAL
2	E	52	GLY

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	450/453 (99%)	424 (94%)	26 (6%)	18	6

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	L	450/453 (99%)	427 (95%)	23 (5%)	21	7
2	B	146/183 (80%)	127 (87%)	19 (13%)	4	0
2	E	146/183 (80%)	122 (84%)	24 (16%)	2	0
3	G	116/141 (82%)	101 (87%)	15 (13%)	4	0
3	M	116/141 (82%)	104 (90%)	12 (10%)	7	1
All	All	1424/1554 (92%)	1305 (92%)	119 (8%)	10	2

5 of 119 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	G	145	SER
3	M	60	THR
1	L	450	GLU
3	M	59	LYS
3	M	165	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 31 such sidechains are listed below:

Mol	Chain	Res	Type
3	G	72	ASN
2	E	190	GLN
1	L	95	ASN
2	E	218	GLN
2	E	75	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 8 ligands modelled in this entry, 6 are monoatomic - leaving 2 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
5	B12	B	1601	-	94,101,101	1.01	4 (4%)	149,166,166	1.12	8 (5%)
5	B12	E	1602	-	94,101,101	1.04	5 (5%)	149,166,166	1.24	14 (9%)

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
5	B12	B	1601	-	-	10/56/223/223	0/3/11/11
5	B12	E	1602	-	-	7/56/223/223	0/3/11/11

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	E	1602	B12	C14-N23	3.87	1.40	1.35
5	B	1601	B12	C14-N23	3.70	1.40	1.35
5	E	1602	B12	O58-C57	2.74	1.28	1.23
5	E	1602	B12	C9-N22	2.39	1.36	1.30
5	B	1601	B12	C9-N22	2.34	1.36	1.30

The worst 5 of 22 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	1602	B12	C54-C17-C18	-4.38	106.69	112.99
5	E	1602	B12	C55-C17-C16	3.82	124.06	116.59
5	B	1601	B12	C20-C1-C19	3.73	112.94	109.35
5	E	1602	B12	O58-C57-C56	-3.43	115.80	122.02
5	E	1602	B12	C26-C2-C1	3.21	114.96	110.00

There are no chirality outliers.

5 of 17 torsion outliers are listed below:

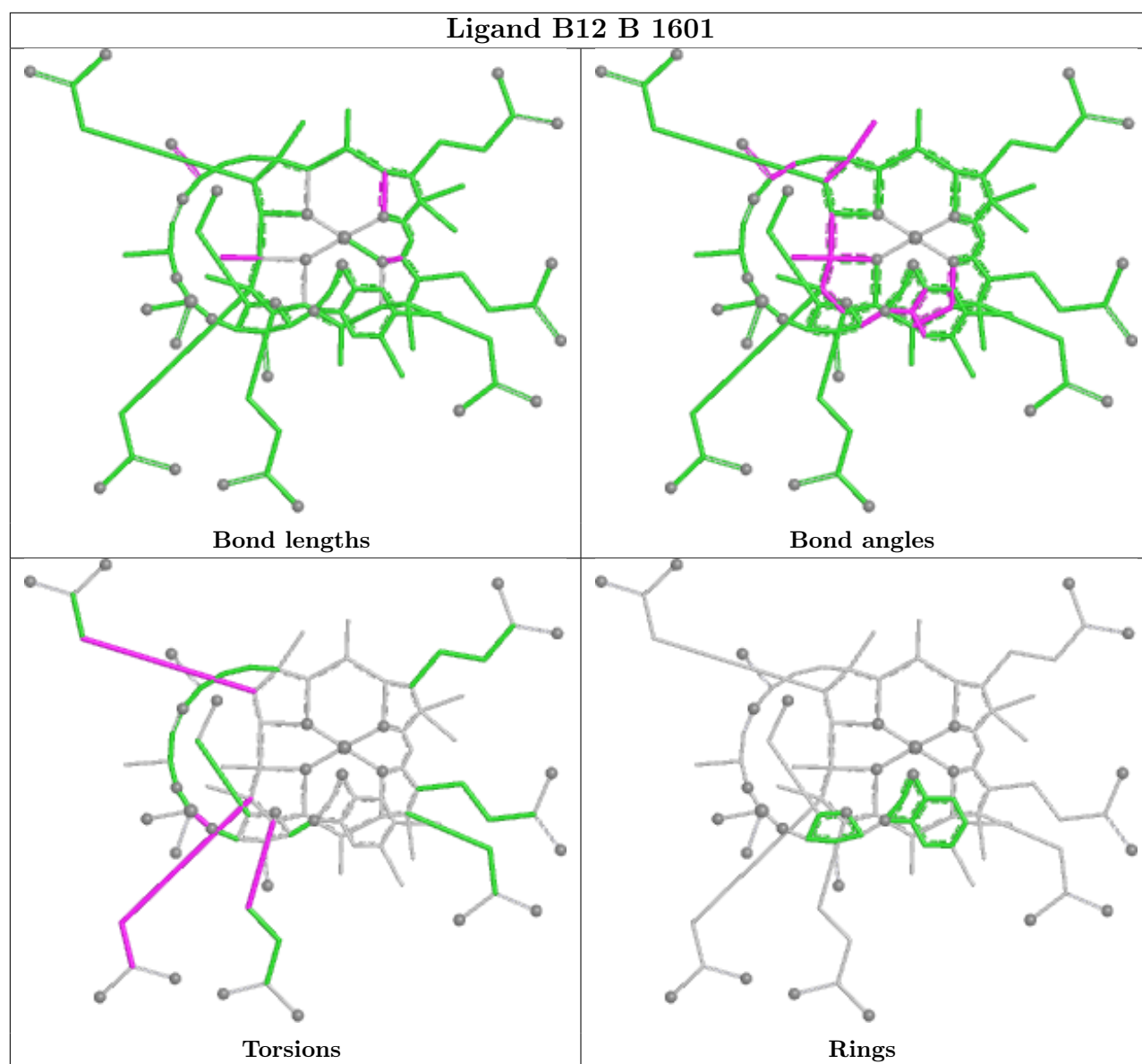
Mol	Chain	Res	Type	Atoms
5	B	1601	B12	C1-C2-C26-C27
5	B	1601	B12	C25-C2-C26-C27
5	B	1601	B12	C3-C2-C26-C27
5	B	1601	B12	C2-C26-C27-N29
5	B	1601	B12	C4-C3-C30-C31

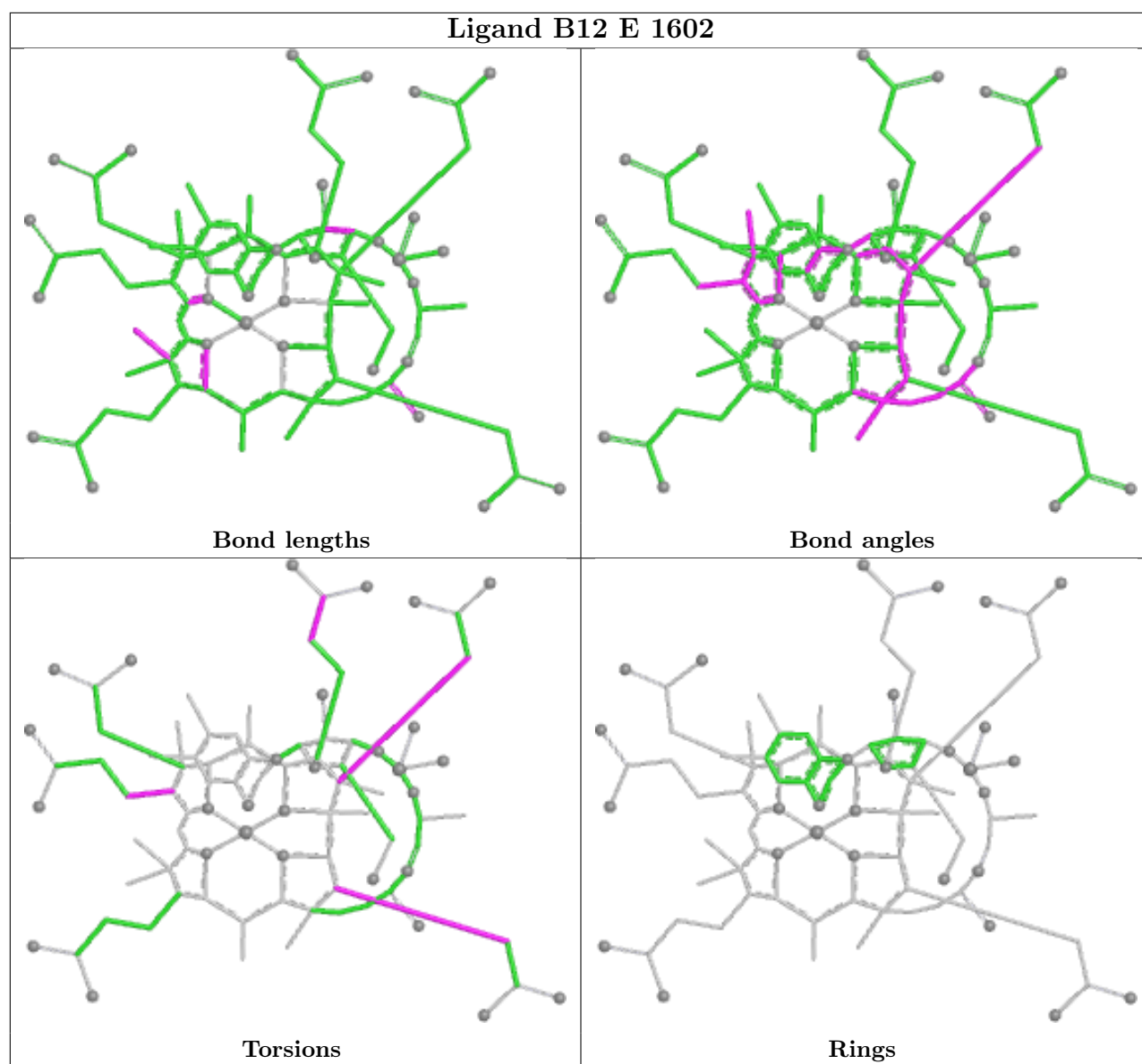
There are no ring outliers.

2 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	1601	B12	9	0
5	E	1602	B12	5	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.