



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 5, 2026 – 08:11 PM EDT

PDB ID : 1JMZ / pdb_00001jnz
Title : crystal structure of a quinoxaline amine dehydrogenase from pseudomonas putida with inhibitor
Authors : Satoh, A.; Miyahara, I.; Hirotsu, K.
Deposited on : 2001-07-20
Resolution : 2.00 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)	:	2.50

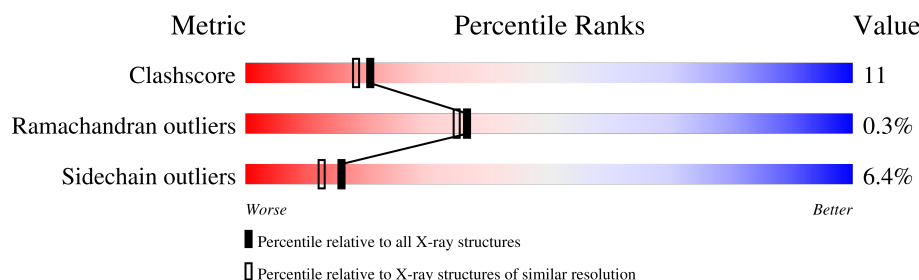
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)

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	494	
2	B	349	
3	G	79	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	HEC	A	1001	X	-	-	-
5	HEC	A	1002	X	-	-	-

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 7460 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 Amine Dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	493	Total	C	N	O	S	10	0	0
			3790	2372	688	713	17			

- Molecule 2 is a protein called Amine Dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	339	Total	C	N	O	S	11	0	0
			2689	1724	453	499	13			

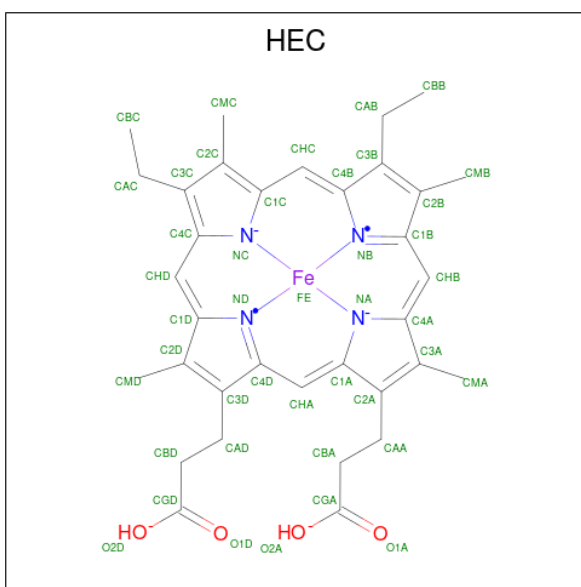
- Molecule 3 is a protein called Amine Dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	G	77	Total	C	N	O	S	0	0	0
			587	365	94	121	7			

- Molecule 4 is NICKEL (II) ION (CCD ID: NI) (formula: Ni).

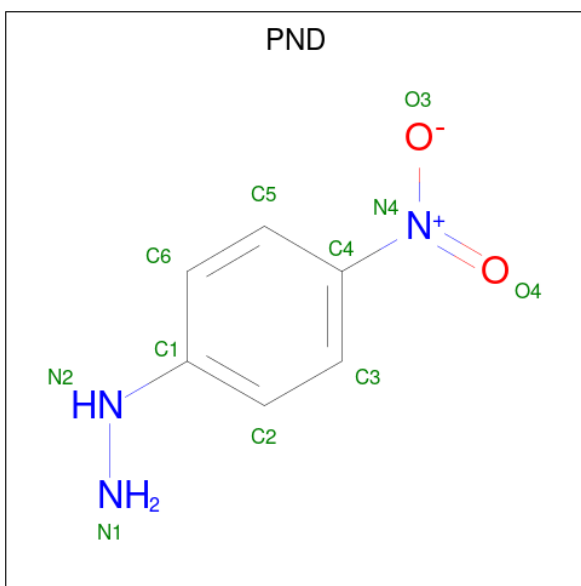
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Ni	0	0
			1	1		

- Molecule 5 is HEME C (CCD ID: HEC) (formula: C₃₄H₃₆FeN₄O₄).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
5	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

- Molecule 6 is P-NITROPHENYLHYDRAZINE (CCD ID: PND) (formula: $\text{C}_6\text{H}_7\text{N}_3\text{O}_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	G	1	Total	C	N	O	0	0
			11	6	3	2		

- Molecule 7 is water.

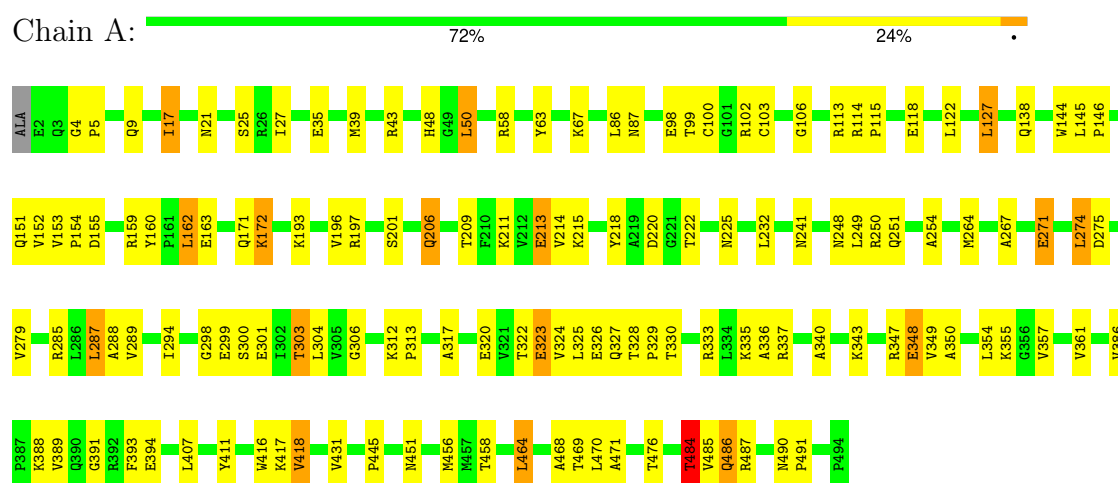
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	146	Total 146	O 146	0	0
7	B	112	Total 112	O 112	0	0
7	G	38	Total 38	O 38	0	0

3 Residue-property plots

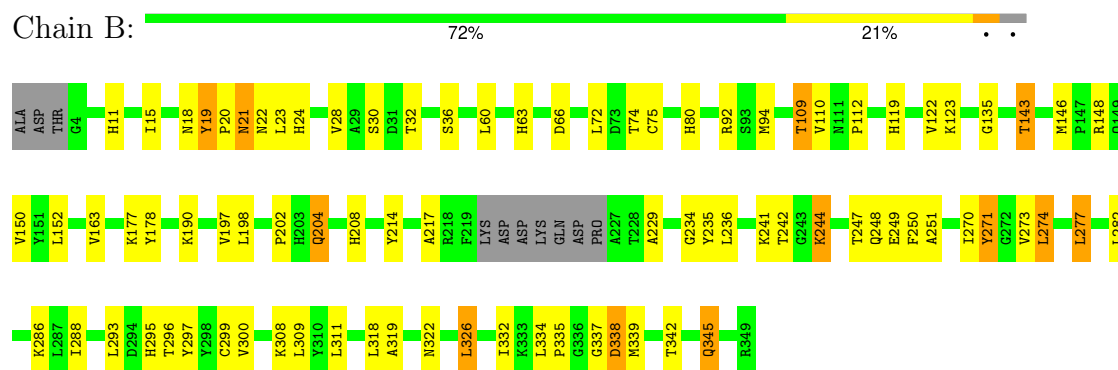
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded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

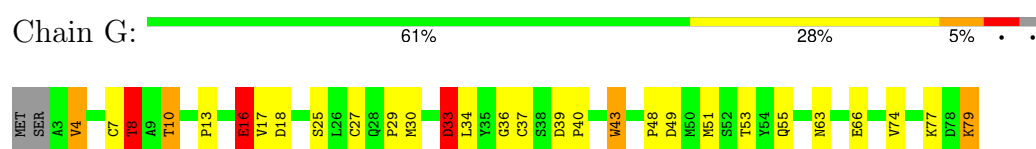
• Molecule 1: Amine Dehydrogenase



• Molecule 2: Amine Dehydrogenase



• Molecule 3: Amine Dehydrogenase



4 Data and refinement statistics

Xtriage (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	167.21Å 92.37Å 79.30Å 90.00° 112.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.00	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-2.00)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.851	Depositor
R, R_{free}	0.215 , 0.251	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	7460	wwPDB-VP
Average B, all atoms (Å ²)	20.0	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: TRQ, PND, HEC, NI

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	0.51	0/3872	0.98	20/5240 (0.4%)
2	B	0.51	0/2761	0.96	7/3752 (0.2%)
3	G	0.73	1/588 (0.2%)	1.29	11/802 (1.4%)
All	All	0.53	1/7221 (0.0%)	1.00	38/9794 (0.4%)

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
3	G	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	G	33	ASP	CA-CB	8.84	1.65	1.53

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	G	49	ASP	N-CA-C	9.88	124.83	110.10
3	G	16	GLU	CB-CA-C	9.51	126.24	110.17
1	A	17	ILE	N-CA-C	8.36	115.81	108.63
2	B	299	CYS	N-CA-C	7.70	121.45	108.90
2	B	19	TYR	N-CA-C	7.64	126.69	109.81
3	G	53	THR	N-CA-C	7.25	120.25	111.40
3	G	36	GLY	N-CA-C	-6.68	106.08	114.16
1	A	464	LEU	N-CA-C	6.65	120.36	109.85
2	B	322	ASN	N-CA-C	-6.42	99.28	109.04

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	287	LEU	N-CA-C	6.29	118.02	111.03
3	G	74	VAL	N-CA-C	6.25	122.58	113.39
2	B	338	ASP	N-CA-C	6.24	119.03	110.24
2	B	23	LEU	N-CA-C	-6.22	98.14	108.34
1	A	391	GLY	N-CA-C	-6.10	100.34	110.95
3	G	27	CYS	CA-CB-SG	-6.08	100.42	114.40
1	A	340	ALA	N-CA-C	-6.02	105.79	113.01
3	G	49	ASP	N-CA-CB	5.98	118.84	109.69
3	G	55	GLN	N-CA-C	5.79	118.37	111.71
1	A	100	CYS	N-CA-C	5.74	121.18	113.72
3	G	16	GLU	N-CA-CB	-5.63	102.10	110.61
2	B	204	GLN	N-CA-C	-5.56	101.87	109.71
2	B	135	GLY	N-CA-C	5.51	121.08	111.50
1	A	27	ILE	N-CA-C	5.50	116.14	110.36
1	A	254	ALA	N-CA-C	-5.43	99.67	108.52
1	A	451	ASN	CA-C-N	5.33	125.66	119.47
1	A	451	ASN	C-N-CA	5.33	125.66	119.47
1	A	471	ALA	N-CA-C	-5.29	105.69	111.82
1	A	484	THR	N-CA-C	5.25	117.83	109.65
3	G	48	PRO	N-CA-C	5.19	119.36	110.95
3	G	8	THR	CB-CA-C	-5.17	100.67	109.51
1	A	106	GLY	N-CA-C	-5.16	107.92	114.16
1	A	211	LYS	N-CA-C	-5.14	101.33	109.76
1	A	491	PRO	CA-C-N	5.12	125.41	119.47
1	A	491	PRO	C-N-CA	5.12	125.41	119.47
1	A	144	TRP	N-CA-C	5.07	117.19	111.11
1	A	289	VAL	N-CA-C	-5.03	101.07	108.11
1	A	393	PHE	N-CA-C	5.03	117.31	109.52
1	A	275	ASP	N-CA-C	-5.00	103.44	110.50

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	G	16	GLU	Mainchain

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	3790	0	3728	90	0
2	B	2689	0	2645	55	0
3	G	587	0	511	23	0
4	A	1	0	0	0	0
5	A	86	0	60	6	0
6	G	11	0	6	1	0
7	A	146	0	0	3	0
7	B	112	0	0	2	0
7	G	38	0	0	1	0
All	All	7460	0	6950	157	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 11.

All (157) 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:469:THR:HG22	1:A:476:THR:HG22	1.46	0.96
1:A:50:LEU:HD11	5:A:1002:HEC:HBB2	1.53	0.89
3:G:8:THR:HG21	3:G:43:TRQ:HD1	1.63	0.81
1:A:271:GLU:HG2	1:A:389:VAL:HG13	1.62	0.78
1:A:484:THR:HG21	3:G:16:GLU:O	1.83	0.77
1:A:347:ARG:NH1	1:A:361:VAL:HG21	2.02	0.73
5:A:1001:HEC:HMD3	5:A:1001:HEC:HBD2	1.74	0.69
3:G:79:LYS:HZ3	3:G:79:LYS:N	1.90	0.69
2:B:217:ALA:HB1	2:B:229:ALA:HB1	1.75	0.69
1:A:251:GLN:HG2	1:A:264:MET:HG3	1.73	0.68
1:A:241:ASN:HD22	1:A:250:ARG:HD2	1.58	0.68
2:B:198:LEU:HD11	6:G:101:PND:H3	1.75	0.67
1:A:394:GLU:HG2	1:A:411:TYR:CG	2.29	0.67
1:A:350:ALA:HB2	1:A:355:LYS:HD3	1.78	0.66
1:A:172:LYS:HA	1:A:172:LYS:HE2	1.79	0.65
1:A:218:TYR:CD2	1:A:222:THR:HG23	2.32	0.64
1:A:271:GLU:CG	1:A:389:VAL:HG13	2.29	0.63
1:A:469:THR:HG23	7:A:2096:HOH:O	1.99	0.62
1:A:285:ARG:HB3	1:A:285:ARG:HH11	1.65	0.62
1:A:324:VAL:HG11	1:A:327:GLN:HE21	1.64	0.62
1:A:285:ARG:HB3	1:A:285:ARG:NH1	2.14	0.61
1:A:115:PRO:HD3	1:A:162:LEU:HG	1.81	0.61
3:G:79:LYS:HZ3	3:G:79:LYS:H	1.48	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:328:THR:HB	1:A:329:PRO:HD2	1.82	0.60
2:B:19:TYR:O	2:B:20:PRO:C	2.44	0.60
1:A:220:ASP:OD2	1:A:222:THR:HG22	2.02	0.60
1:A:343:LYS:O	1:A:347:ARG:NH2	2.36	0.59
2:B:112:PRO:HG2	2:B:123:LYS:HB2	1.83	0.59
1:A:17:ILE:HG12	1:A:25:SER:HB3	1.83	0.59
1:A:279:VAL:HG23	1:A:287:LEU:HD21	1.84	0.58
1:A:98:GLU:HG2	1:A:138:GLN:HE21	1.68	0.58
2:B:208:HIS:HB3	2:B:241:LYS:HZ2	1.69	0.57
2:B:143:THR:HG21	7:B:372:HOH:O	2.05	0.56
3:G:8:THR:HG22	3:G:10:THR:HG23	1.87	0.56
1:A:193:LYS:NZ	1:A:222:THR:HG21	2.20	0.56
2:B:109:THR:HG21	2:B:150:VAL:HG11	1.87	0.56
2:B:18:ASN:ND2	2:B:20:PRO:HD2	2.20	0.55
2:B:204:GLN:H	2:B:345:GLN:NE2	2.04	0.55
1:A:241:ASN:ND2	1:A:250:ARG:NH1	2.55	0.55
1:A:303:THR:HB	1:A:333:ARG:HB3	1.88	0.55
1:A:416:TRP:CZ3	1:A:468:ALA:HB2	2.42	0.55
1:A:102:ARG:HH11	3:G:10:THR:HG21	1.72	0.55
2:B:295:HIS:HD2	2:B:296:THR:O	1.89	0.54
1:A:201:SER:HB3	1:A:213:GLU:HB3	1.89	0.54
2:B:18:ASN:HD21	2:B:337:GLY:N	2.05	0.54
1:A:145:LEU:HB3	1:A:146:PRO:HD3	1.89	0.54
2:B:63:HIS:HD2	7:G:108:HOH:O	1.90	0.54
1:A:103:CYS:HB2	7:A:2015:HOH:O	2.08	0.53
2:B:339:MET:HB3	2:B:342:THR:HG22	1.89	0.53
1:A:86:LEU:O	3:G:4:VAL:HG13	2.09	0.53
1:A:325:LEU:HD11	1:A:335:LYS:HE2	1.91	0.53
2:B:146:MET:HE1	2:B:163:VAL:HG11	1.91	0.53
1:A:322:THR:HG21	1:A:337:ARG:CZ	2.39	0.53
1:A:348:GLU:OE2	1:A:355:LYS:HB3	2.09	0.52
2:B:20:PRO:O	2:B:21:ASN:HB2	2.09	0.52
1:A:326:GLU:HB3	1:A:333:ARG:HG3	1.91	0.52
2:B:270:ILE:HB	2:B:282:LEU:HD21	1.92	0.52
1:A:127:LEU:HB3	2:B:122:VAL:HG21	1.90	0.52
1:A:485:VAL:HG11	3:G:30:MET:HB2	1.91	0.51
3:G:7:CYS:HA	3:G:16:GLU:CD	2.36	0.51
1:A:386:VAL:HG21	1:A:486:GLN:HG2	1.91	0.51
1:A:214:VAL:O	1:A:215:LYS:HD2	2.11	0.51
1:A:99:THR:HG21	1:A:152:VAL:HG21	1.93	0.50
1:A:350:ALA:HA	1:A:354:LEU:O	2.12	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:4:GLY:N	1:A:5:PRO:HD2	2.27	0.50
2:B:19:TYR:HB2	2:B:338:ASP:O	2.12	0.50
1:A:114:ARG:HB3	1:A:118:GLU:HB2	1.93	0.50
1:A:113:ARG:HD3	1:A:160:TYR:HB3	1.95	0.49
2:B:24:HIS:HD2	2:B:36:SER:OG	1.96	0.49
1:A:322:THR:O	1:A:323:GLU:HB2	2.13	0.49
1:A:218:TYR:HD2	1:A:222:THR:HG23	1.77	0.49
1:A:288:ALA:HA	1:A:357:VAL:HG11	1.95	0.49
2:B:152:LEU:HD22	2:B:202:PRO:HB3	1.95	0.49
1:A:298:GLY:O	1:A:337:ARG:HA	2.13	0.48
2:B:66:ASP:OD1	2:B:80:HIS:HE1	1.97	0.48
2:B:177:LYS:HG2	2:B:178:TYR:N	2.28	0.48
2:B:11:HIS:HD2	7:B:362:HOH:O	1.96	0.48
3:G:39:ASP:O	3:G:51:MET:HB2	2.13	0.48
2:B:15:ILE:HG21	2:B:72:LEU:HD21	1.96	0.48
2:B:234:GLY:HA2	2:B:249:GLU:HA	1.96	0.48
1:A:487:ARG:HG3	1:A:490:ASN:OD1	2.14	0.47
3:G:39:ASP:HB2	3:G:40:PRO:HD3	1.96	0.47
1:A:98:GLU:HG2	1:A:138:GLN:NE2	2.29	0.47
1:A:48:HIS:HB3	5:A:1002:HEC:HBC2	1.96	0.47
1:A:63:TYR:O	1:A:67:LYS:HE2	2.15	0.47
1:A:102:ARG:O	3:G:8:THR:HG22	2.15	0.47
2:B:318:LEU:HB2	2:B:332:ILE:HB	1.96	0.47
1:A:241:ASN:ND2	1:A:250:ARG:HH11	2.13	0.47
2:B:235:TYR:O	2:B:247:THR:HA	2.15	0.47
2:B:30:SER:O	2:B:32:THR:HG23	2.15	0.47
1:A:306:GLY:O	1:A:330:THR:HA	2.14	0.46
1:A:317:ALA:O	1:A:347:ARG:NH1	2.48	0.46
2:B:18:ASN:HD22	2:B:20:PRO:HD2	1.80	0.46
2:B:94:MET:HE1	3:G:51:MET:HE1	1.97	0.46
1:A:87:ASN:HA	3:G:4:VAL:HG22	1.98	0.46
1:A:418:VAL:HG12	1:A:431:VAL:HG13	1.98	0.46
3:G:63:ASN:CG	3:G:66:GLU:HG2	2.41	0.46
1:A:386:VAL:HG21	1:A:486:GLN:HB3	1.99	0.45
1:A:58:ARG:HH12	3:G:79:LYS:HZ1	1.63	0.45
1:A:102:ARG:HH11	3:G:10:THR:CG2	2.29	0.45
1:A:193:LYS:HZ1	1:A:222:THR:HG21	1.80	0.45
2:B:122:VAL:HG12	2:B:148:ARG:NH2	2.32	0.45
2:B:208:HIS:HB3	2:B:241:LYS:NZ	2.31	0.45
1:A:241:ASN:HD21	1:A:248:ASN:HB3	1.80	0.45
1:A:347:ARG:HH12	1:A:361:VAL:HG21	1.80	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:110:VAL:O	2:B:112:PRO:HD3	2.17	0.45
2:B:204:GLN:H	2:B:345:GLN:HE22	1.65	0.44
1:A:63:TYR:CE2	1:A:67:LYS:HE3	2.52	0.44
2:B:293:LEU:HD13	2:B:297:TYR:HD1	1.81	0.44
3:G:13:PRO:O	3:G:18:ASP:HA	2.16	0.44
2:B:242:THR:OG1	2:B:244:LYS:HD3	2.17	0.44
2:B:339:MET:HB3	2:B:342:THR:CG2	2.47	0.44
1:A:153:VAL:HB	1:A:154:PRO:HD3	2.00	0.44
1:A:171:GLN:NE2	7:A:2121:HOH:O	2.49	0.44
2:B:273:VAL:CG1	2:B:300:VAL:HG13	2.47	0.44
1:A:39:MET:O	1:A:43:ARG:HG3	2.18	0.43
1:A:249:LEU:HD12	1:A:264:MET:HE2	1.99	0.43
3:G:40:PRO:HA	3:G:51:MET:HE3	2.00	0.43
1:A:312:LYS:HA	1:A:313:PRO:HD3	1.87	0.43
1:A:386:VAL:HG21	1:A:486:GLN:CB	2.48	0.43
2:B:74:THR:O	2:B:75:CYS:HB2	2.19	0.43
1:A:250:ARG:HD3	1:A:267:ALA:HB2	2.00	0.43
1:A:304:LEU:HD11	1:A:349:VAL:HG11	1.99	0.43
2:B:197:VAL:HG22	2:B:214:TYR:HB3	2.01	0.43
3:G:16:GLU:O	3:G:17:VAL:HG23	2.17	0.43
1:A:271:GLU:HG2	1:A:389:VAL:CG1	2.41	0.43
1:A:155:ASP:O	1:A:159:ARG:HG3	2.18	0.43
1:A:326:GLU:HB3	1:A:333:ARG:CG	2.49	0.43
2:B:28:VAL:O	2:B:308:LYS:NZ	2.51	0.43
2:B:248:GLN:O	2:B:248:GLN:HG3	2.19	0.43
1:A:320:GLU:O	1:A:336:ALA:HA	2.18	0.43
1:A:388:LYS:HB3	1:A:445:PRO:HG2	2.01	0.43
2:B:18:ASN:HB2	2:B:24:HIS:CE1	2.54	0.42
2:B:271:TYR:N	2:B:271:TYR:CD2	2.86	0.42
1:A:122:LEU:CD1	5:A:1001:HEC:HMA2	2.49	0.42
2:B:277:LEU:HD13	2:B:326:LEU:CD2	2.49	0.42
2:B:190:LYS:HA	2:B:190:LYS:HD2	1.66	0.42
1:A:294:ILE:HD13	1:A:300:SER:HB3	2.01	0.42
1:A:418:VAL:HG11	1:A:464:LEU:HD13	2.00	0.42
2:B:247:THR:O	2:B:248:GLN:HB3	2.18	0.42
2:B:311:LEU:HB2	2:B:319:ALA:HB3	2.02	0.42
1:A:17:ILE:O	1:A:17:ILE:HG13	2.19	0.42
1:A:206:GLN:HG3	1:A:209:THR:OG1	2.19	0.42
3:G:37:CYS:HB2	3:G:43:TRQ:HZ3	1.79	0.42
2:B:20:PRO:HG2	2:B:22:ASN:ND2	2.34	0.41
1:A:250:ARG:NH1	1:A:267:ALA:HB2	2.35	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:122:LEU:HD11	5:A:1001:HEC:HMA2	2.02	0.41
2:B:250:PHE:O	2:B:251:ALA:HB2	2.20	0.41
2:B:18:ASN:HD21	2:B:337:GLY:H	1.66	0.41
3:G:33:ASP:O	3:G:33:ASP:CG	2.63	0.41
1:A:214:VAL:O	1:A:225:ASN:HA	2.21	0.41
1:A:458:THR:HA	3:G:29:PRO:HB3	2.02	0.41
2:B:334:LEU:HA	2:B:335:PRO:HD3	1.96	0.41
1:A:196:VAL:HG11	1:A:274:LEU:HD13	2.03	0.40
2:B:18:ASN:CB	2:B:24:HIS:HE1	2.34	0.40
1:A:456:MET:HG2	2:B:293:LEU:O	2.22	0.40
5:A:1002:HEC:HAD1	2:B:119:HIS:HA	2.03	0.40

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	491/494 (99%)	470 (96%)	20 (4%)	1 (0%)	43	42
2	B	335/349 (96%)	317 (95%)	16 (5%)	2 (1%)	21	17
3	G	74/79 (94%)	67 (90%)	7 (10%)	0	100	100
All	All	900/922 (98%)	854 (95%)	43 (5%)	3 (0%)	36	35

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	21	ASN
2	B	274	LEU
1	A	323	GLU

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	387/387 (100%)	362 (94%)	25 (6%)	15	12
2	B	291/300 (97%)	277 (95%)	14 (5%)	23	21
3	G	61/63 (97%)	53 (87%)	8 (13%)	4	2
All	All	739/750 (98%)	692 (94%)	47 (6%)	16	12

All (47) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	9	GLN
1	A	21	ASN
1	A	35	GLU
1	A	50	LEU
1	A	127	LEU
1	A	151	GLN
1	A	162	LEU
1	A	163	GLU
1	A	172	LYS
1	A	197	ARG
1	A	206	GLN
1	A	213	GLU
1	A	232	LEU
1	A	271	GLU
1	A	274	LEU
1	A	299	GLU
1	A	301	GLU
1	A	303	THR
1	A	348	GLU
1	A	407	LEU
1	A	417	LYS
1	A	418	VAL
1	A	470	LEU
1	A	484	THR
1	A	486	GLN
2	B	60	LEU

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Mol	Chain	Res	Type
2	B	92	ARG
2	B	109	THR
2	B	143	THR
2	B	236	LEU
2	B	244	LYS
2	B	271	TYR
2	B	274	LEU
2	B	277	LEU
2	B	286	LYS
2	B	288	ILE
2	B	309	LEU
2	B	326	LEU
2	B	345	GLN
3	G	4	VAL
3	G	8	THR
3	G	10	THR
3	G	25	SER
3	G	33	ASP
3	G	34	LEU
3	G	77	LYS
3	G	79	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	9	GLN
1	A	51	GLN
1	A	138	GLN
1	A	171	GLN
1	A	189	HIS
1	A	241	ASN
1	A	327	GLN
1	A	382	ASN
1	A	451	ASN
1	A	489	ASN
2	B	11	HIS
2	B	18	ASN
2	B	22	ASN
2	B	24	HIS
2	B	63	HIS
2	B	80	HIS
2	B	111	ASN

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Mol	Chain	Res	Type
2	B	295	HIS
2	B	345	GLN
3	G	55	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

1 non-standard protein/DNA/RNA residue is 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	TRQ	G	43	3,6	15,16,18	1.69	4 (26%)	13,22,26	1.84	3 (23%)

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	TRQ	G	43	3,6	-	0/5/16/21	0/2/2/2

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	G	43	TRQ	CE3-CZ3	4.18	1.43	1.33
3	G	43	TRQ	CH2-CZ3	-3.07	1.41	1.49
3	G	43	TRQ	CE3-CD2	2.44	1.45	1.40
3	G	43	TRQ	CE2-CZ2	-2.33	1.41	1.45

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	G	43	TRQ	O7-CZ2-CH2	-3.87	114.51	120.81
3	G	43	TRQ	CZ3-CH2-CZ2	3.73	121.66	113.35
3	G	43	TRQ	O7-CZ2-CE2	3.19	127.19	122.86

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	G	43	TRQ	2	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 1 is 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	$\# Z > 2$
6	PND	G	101	3	10,11,11	5.60	2 (20%)	11,14,14	2.49	5 (45%)
5	HEC	A	1002	1	50,50,50	0.92	1 (2%)	68,82,82	1.24	7 (10%)
5	HEC	A	1001	1	50,50,50	1.07	2 (4%)	68,82,82	1.48	13 (19%)

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
6	PND	G	101	3	-	0/4/6/6	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	HEC	A	1002	1	1/1/3/7	2/14/54/54	-
5	HEC	A	1001	1	1/1/3/7	3/14/54/54	-

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	G	101	PND	O4-N4	12.49	1.44	1.22
6	G	101	PND	C4-N4	-12.22	1.16	1.45
5	A	1001	HEC	O2A-CGA	-2.56	1.22	1.30
5	A	1001	HEC	C4D-C3D	-2.52	1.40	1.45
5	A	1002	HEC	CMB-C2B	2.10	1.55	1.50

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	G	101	PND	C2-C3-C4	-4.57	114.02	120.08
5	A	1001	HEC	CAB-C3B-C4B	3.85	129.79	124.79
5	A	1002	HEC	CBC-CAC-C3C	3.54	122.03	112.42
6	G	101	PND	C3-C4-N4	-3.53	116.26	119.34
5	A	1001	HEC	C2B-C1B-NB	3.34	113.76	109.90
5	A	1001	HEC	CAC-C3C-C4C	3.33	129.50	124.91
5	A	1002	HEC	CAB-C3B-C4B	3.33	129.12	124.79
5	A	1001	HEC	CBC-CAC-C3C	3.26	121.26	112.42
6	G	101	PND	C5-C6-C1	-3.25	116.56	120.30
5	A	1002	HEC	C2B-C1B-NB	3.13	113.52	109.90
6	G	101	PND	C3-C2-C1	2.99	123.74	120.30
5	A	1001	HEC	C3D-C4D-ND	2.84	113.09	110.35
5	A	1001	HEC	CAB-C3B-C2B	-2.76	122.49	127.56
5	A	1001	HEC	C1D-C2D-C3D	-2.74	104.10	106.98
5	A	1001	HEC	CBA-CAA-C2A	-2.73	104.99	112.53
5	A	1001	HEC	CAC-C3C-C2C	-2.52	122.91	126.89
5	A	1002	HEC	CBB-CAB-C3B	2.43	119.02	112.42
5	A	1001	HEC	CAD-C3D-C4D	-2.40	120.52	124.70
5	A	1002	HEC	CAB-C3B-C2B	-2.39	123.17	127.56
5	A	1002	HEC	CAC-C3C-C4C	2.32	128.11	124.91
5	A	1001	HEC	CAD-C3D-C2D	2.32	132.21	127.87
6	G	101	PND	C5-C4-N4	2.06	121.14	119.34
5	A	1001	HEC	CHA-C4D-C3D	-2.06	121.77	124.77
5	A	1002	HEC	C1D-C2D-C3D	-2.03	104.85	106.98
5	A	1001	HEC	CBD-CAD-C3D	2.02	118.12	112.53

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
5	A	1001	HEC	NA
5	A	1002	HEC	NA

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	1001	HEC	C4D-C3D-CAD-CBD
5	A	1001	HEC	C2D-C3D-CAD-CBD
5	A	1001	HEC	C3D-CAD-CBD-CGD
5	A	1002	HEC	CAD-CBD-CGD-O1D
5	A	1002	HEC	CAD-CBD-CGD-O2D

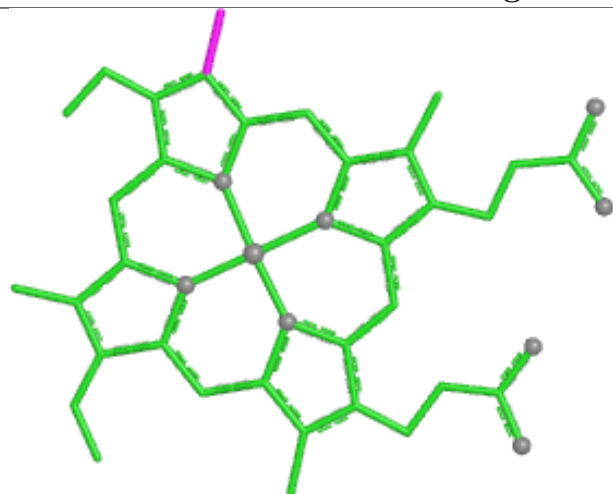
There are no ring outliers.

3 monomers are involved in 7 short contacts:

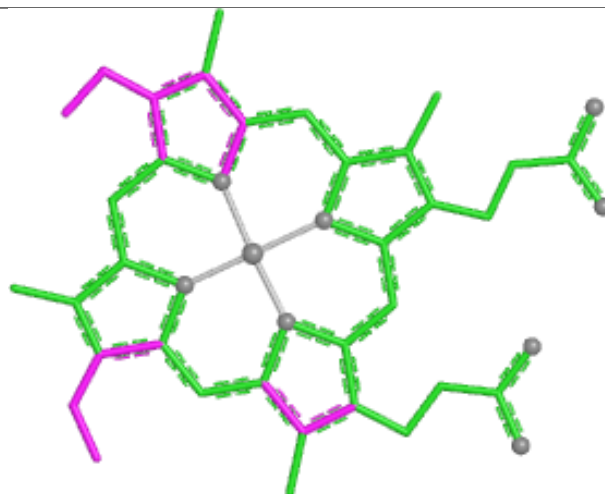
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	G	101	PND	1	0
5	A	1002	HEC	3	0
5	A	1001	HEC	3	0

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.

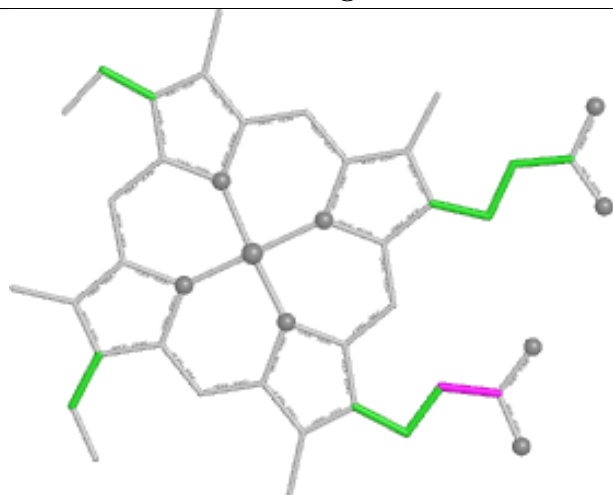
Ligand HEC A 1002



Bond lengths



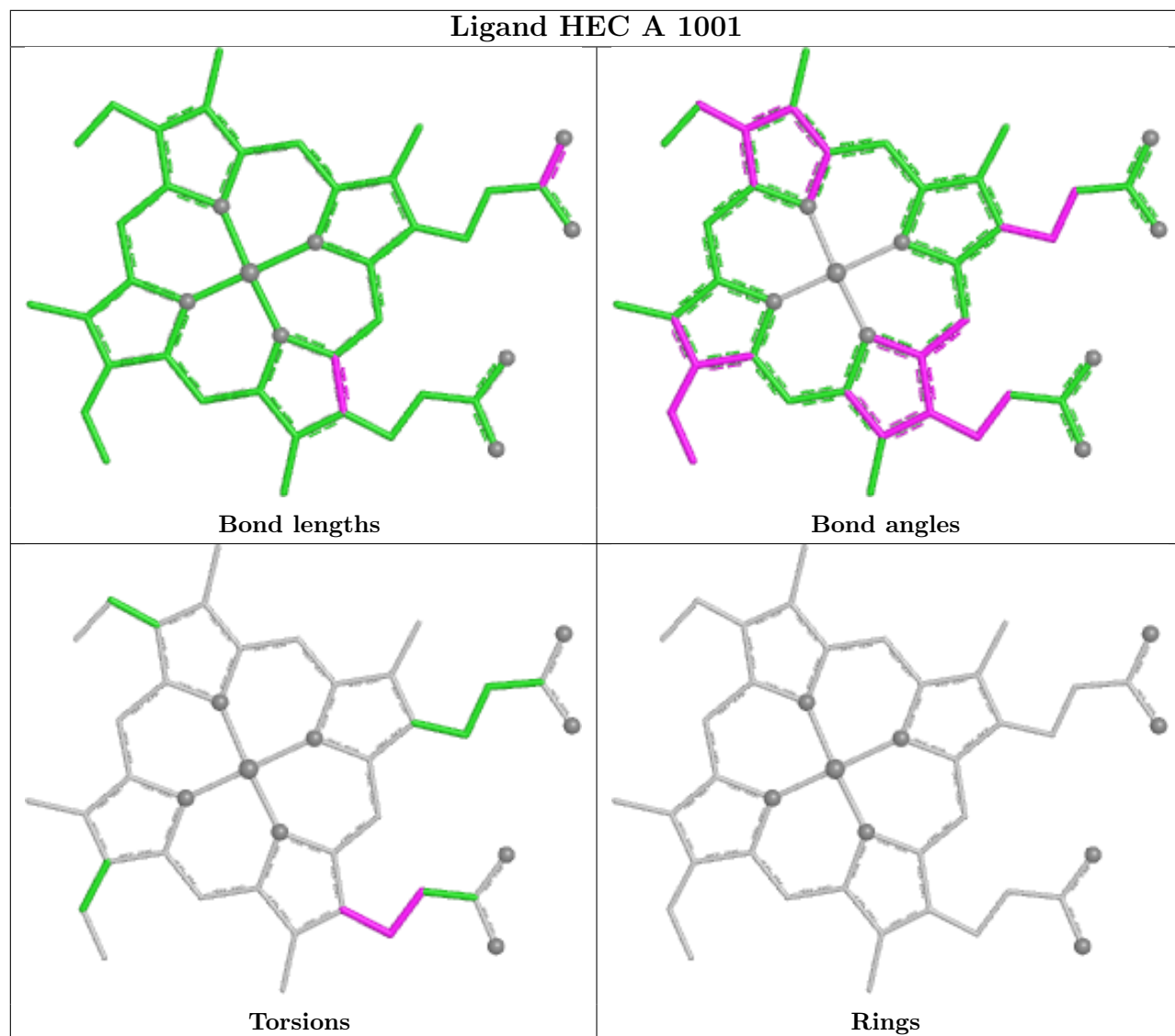
Bond angles



Torsions



Rings



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.