



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 03:03 AM UTC

PDB ID : 1NOC / pdb_00001noc
Title : MURINE INDUCIBLE NITRIC OXIDE SYNTHASE OXYGENASE DOMAIN (DELTA 114) COMPLEXED WITH TYPE I E. COLI CHLORAMPHENICOL ACETYL TRANSFERASE AND IMIDAZOLE
Authors : Crane, B.R.; Arvai, A.S.; Getzoff, E.D.; Stuehr, D.J.; Tainer, J.A.
Deposited on : 1997-09-28
Resolution : 2.60 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

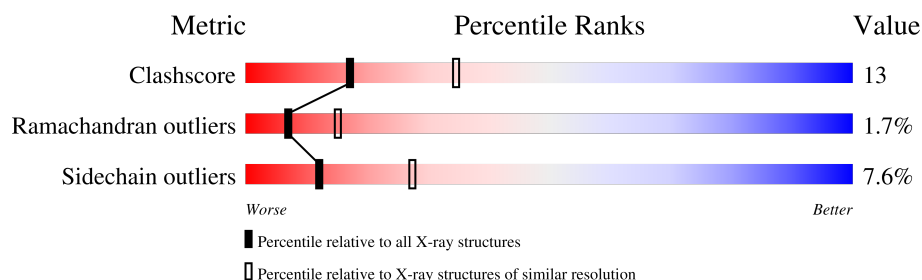
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 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	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (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 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	388	 69% 21% . . .
2	B	219	 63% 29% 5% .

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 4987 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.

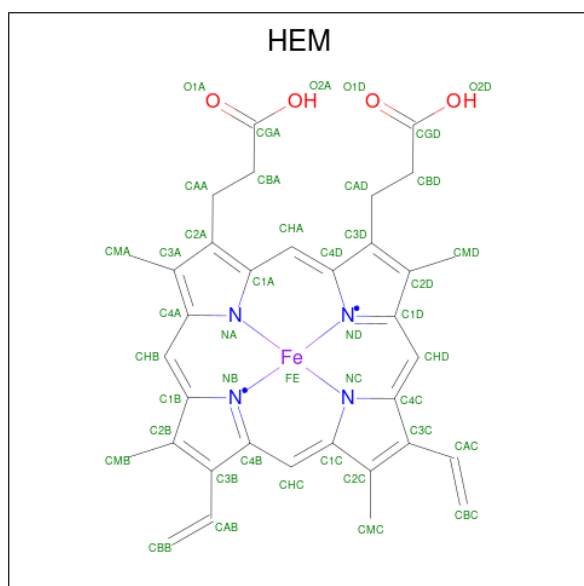
- Molecule 1 is a protein called INDUCIBLE NITRIC OXIDE SYNTHASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	372	Total	C	N	O	S	0	0	0
			3027	1943	517	550	17			

- Molecule 2 is a protein called TYPE 1 CHLORAMPHENICOL ACETYLTRANSFERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	213	Total	C	N	O	S	0	0	0
			1767	1148	290	316	13			

- Molecule 3 is PROTOPORPHYRIN IX CONTAINING FE (CCD ID: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).





Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	N	0	0
			5	3	2		
4	A	1	Total	C	N	0	0
			5	3	2		

- Molecule 5 is water.

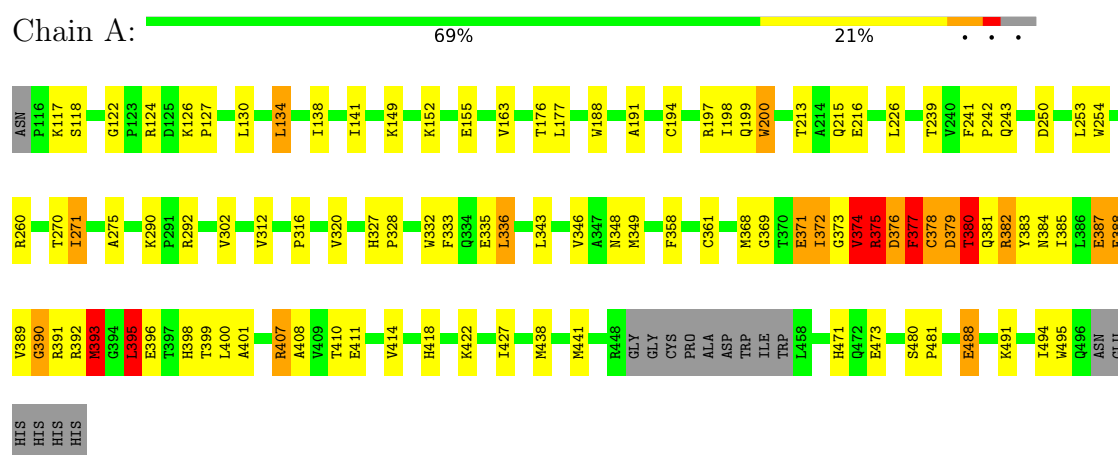
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	126	Total	O	0	0
			126	126		
5	B	14	Total	O	0	0
			14	14		

3 Residue-property plots

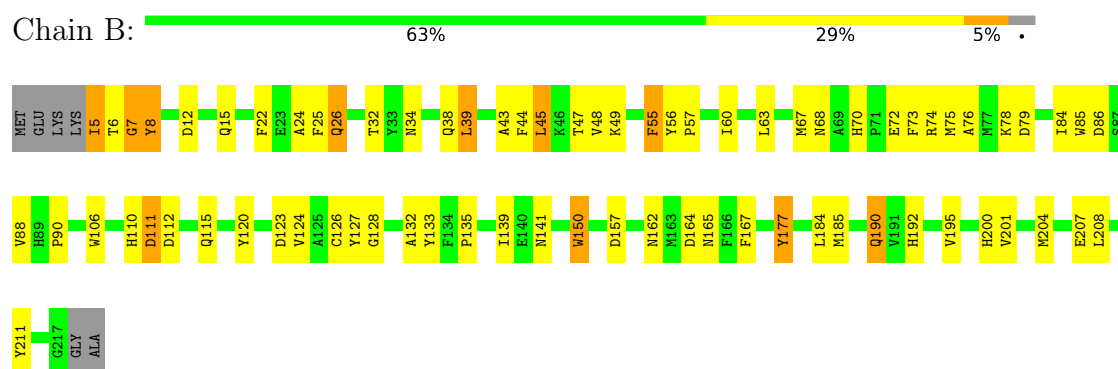
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded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



• Molecule 2: TYPE 1 CHLORAMPHENICOL ACETYLTRANSFERASE



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 3	Depositor
Cell constants a, b, c, α , β , γ	147.50Å 147.50Å 147.50Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	2.70 – 2.60	Depositor
% Data completeness (in resolution range)	98.9 (2.70-2.60)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
Refinement program	X-PLOR 3.8	Depositor
R, R_{free}	0.221 , 0.257	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	4987	wwPDB-VP
Average B, all atoms (Å ²)	63.0	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: IMD, HEM

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	0.47	0/3113	1.08	31/4232 (0.7%)
2	B	0.40	0/1826	0.91	4/2479 (0.2%)
All	All	0.44	0/4939	1.02	35/6711 (0.5%)

There are no bond length outliers.

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	401	ALA	N-CA-C	-11.41	101.61	114.62
1	A	379	ASP	N-CA-C	9.89	123.73	108.30
1	A	292	ARG	N-CA-C	-9.28	93.61	108.73
1	A	375	ARG	N-CA-C	-7.34	103.23	113.37
1	A	373	GLY	N-CA-C	7.24	130.34	113.18
1	A	378	CYS	N-CA-C	6.86	125.42	110.80
1	A	348	ASN	N-CA-C	6.78	120.45	112.72
1	A	380	THR	N-CA-C	-6.61	105.12	113.72
1	A	122	GLY	CA-C-N	6.45	126.97	120.14
1	A	122	GLY	C-N-CA	6.45	126.97	120.14
1	A	343	LEU	N-CA-C	6.39	120.20	108.69
1	A	176	THR	N-CA-C	-6.17	101.81	110.50
1	A	371	GLU	N-CA-C	6.16	121.86	113.97
2	B	55	PHE	N-CA-C	6.14	117.77	111.14
1	A	495	TRP	N-CA-C	5.81	118.66	110.23
2	B	8	TYR	N-CA-C	5.72	118.53	108.75
1	A	149	LYS	N-CA-C	-5.66	105.20	111.36
1	A	253	LEU	N-CA-C	-5.65	99.30	108.52
1	A	316	PRO	CA-C-N	5.62	125.72	119.32
1	A	316	PRO	C-N-CA	5.62	125.72	119.32
1	A	473	GLU	N-CA-C	5.62	122.76	110.80
1	A	396	GLU	N-CA-C	5.53	118.18	109.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	384	ASN	N-CA-C	5.51	116.97	111.07
1	A	488	GLU	CA-C-N	5.48	126.69	119.84
1	A	488	GLU	C-N-CA	5.48	126.69	119.84
1	A	471	HIS	N-CA-C	-5.37	102.03	110.36
2	B	7	GLY	N-CA-C	-5.36	100.48	113.18
1	A	358	PHE	CA-C-N	5.29	124.90	119.56
1	A	358	PHE	C-N-CA	5.29	124.90	119.56
1	A	191	ALA	CA-C-N	5.24	126.39	119.84
1	A	191	ALA	C-N-CA	5.24	126.39	119.84
1	A	250	ASP	N-CA-C	5.24	118.23	110.48
1	A	200	TRP	N-CA-C	5.17	118.69	112.38
1	A	395	LEU	N-CA-C	5.05	121.56	110.80
2	B	111	ASP	N-CA-C	5.04	117.43	111.33

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	3027	0	2932	71	0
2	B	1767	0	1655	48	0
3	A	43	0	30	1	0
4	A	10	0	9	1	0
5	A	126	0	0	3	0
5	B	14	0	0	0	0
All	All	4987	0	4626	119	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 13.

All (119) 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:377:PHE:HA	1:A:382:ARG:HG3	1.33	1.07

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:407:ARG:HG2	1:A:407:ARG:HH11	1.18	1.05
1:A:392:ARG:HH22	1:A:408:ALA:HA	1.33	0.91
2:B:34:ASN:HD21	2:B:190:GLN:HB2	1.36	0.89
1:A:332:TRP:HZ2	1:A:392:ARG:HB3	1.43	0.83
1:A:332:TRP:CZ2	1:A:392:ARG:HB3	2.13	0.83
1:A:374:VAL:C	1:A:376:ASP:H	1.83	0.82
1:A:333:PHE:O	1:A:336:LEU:HD22	1.80	0.81
1:A:270:THR:HG22	1:A:380:THR:HG21	1.67	0.74
1:A:407:ARG:HG2	1:A:407:ARG:NH1	1.93	0.71
2:B:34:ASN:ND2	2:B:190:GLN:HB2	2.06	0.71
1:A:141:ILE:HD11	1:A:163:VAL:HG21	1.72	0.70
1:A:124:ARG:HD3	5:A:1012:HOH:O	1.91	0.70
1:A:385:ILE:O	1:A:389:VAL:HG23	1.92	0.69
1:A:390:GLY:O	1:A:395:LEU:HA	1.92	0.69
2:B:177:TYR:H	2:B:177:TYR:HD1	1.39	0.69
2:B:5:ILE:HG12	2:B:6:THR:N	2.06	0.68
1:A:372:ILE:N	1:A:375:ARG:HH21	1.92	0.67
1:A:374:VAL:C	1:A:376:ASP:N	2.52	0.66
2:B:72:GLU:HA	2:B:75:MET:HE2	1.77	0.66
1:A:407:ARG:HH11	1:A:407:ARG:CG	2.02	0.66
1:A:141:ILE:CD1	1:A:163:VAL:HG21	2.27	0.65
2:B:45:LEU:HD22	2:B:49:LYS:HE3	1.78	0.65
1:A:377:PHE:N	1:A:377:PHE:CD1	2.64	0.63
1:A:391:ARG:HA	1:A:395:LEU:CD1	2.29	0.63
2:B:43:ALA:O	2:B:47:THR:HG23	1.98	0.62
2:B:7:GLY:HA2	2:B:86:ASP:H	1.63	0.62
1:A:260:ARG:HB3	5:A:980:HOH:O	2.01	0.61
2:B:22:PHE:O	2:B:26:GLN:HB3	2.00	0.61
2:B:26:GLN:O	2:B:26:GLN:HG3	2.00	0.59
1:A:389:VAL:CG1	1:A:392:ARG:HH12	2.15	0.59
1:A:346:VAL:HG11	1:A:349:MET:CE	2.32	0.59
2:B:63:LEU:O	2:B:67:MET:HG2	2.03	0.59
1:A:391:ARG:HA	1:A:395:LEU:HD13	1.85	0.58
2:B:150:TRP:HA	2:B:150:TRP:CE3	2.39	0.57
1:A:213:THR:OG1	1:A:216:GLU:HG3	2.05	0.57
2:B:56:TYR:O	2:B:60:ILE:HG13	2.05	0.57
1:A:389:VAL:CG1	1:A:392:ARG:NH1	2.68	0.56
1:A:392:ARG:HD2	1:A:393:MET:HB2	1.88	0.56
1:A:398:HIS:HD2	1:A:399:THR:OG1	1.90	0.55
2:B:70:HIS:HB2	2:B:73:PHE:HD2	1.71	0.54
1:A:376:ASP:O	1:A:378:CYS:N	2.39	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:389:VAL:HG12	1:A:392:ARG:NH1	2.21	0.54
2:B:85:TRP:CD2	2:B:141:ASN:HB3	2.44	0.53
1:A:399:THR:HG22	1:A:400:LEU:N	2.23	0.53
2:B:207:GLU:O	2:B:211:TYR:HD2	1.91	0.53
1:A:239:THR:O	1:A:361:CYS:HA	2.09	0.52
2:B:177:TYR:HD1	2:B:177:TYR:N	2.07	0.52
1:A:410:THR:O	1:A:414:VAL:HG23	2.09	0.52
2:B:165:ASN:HD22	2:B:165:ASN:N	2.08	0.52
1:A:392:ARG:HH22	1:A:408:ALA:CA	2.14	0.52
2:B:67:MET:HE3	2:B:73:PHE:HB3	1.92	0.52
2:B:39:LEU:HD22	2:B:208:LEU:HD12	1.92	0.51
2:B:177:TYR:N	2:B:177:TYR:CD1	2.77	0.51
1:A:124:ARG:HH12	1:A:127:PRO:HA	1.76	0.51
1:A:332:TRP:O	1:A:335:GLU:HB2	2.11	0.51
2:B:32:THR:HG22	2:B:192:HIS:HA	1.93	0.51
1:A:369:GLY:HA2	1:A:427:ILE:HD11	1.92	0.50
2:B:177:TYR:CE1	2:B:184:LEU:HB2	2.46	0.50
1:A:346:VAL:HG11	1:A:349:MET:HE3	1.94	0.49
1:A:418:HIS:O	1:A:422:LYS:HG2	2.12	0.49
2:B:132:ALA:O	2:B:135:PRO:HD3	2.12	0.49
2:B:67:MET:CE	2:B:73:PHE:HB3	2.43	0.49
1:A:488:GLU:HB2	1:A:491:LYS:HE2	1.94	0.49
2:B:55:PHE:HE2	2:B:185:MET:HE1	1.77	0.49
2:B:90:PRO:O	2:B:106:TRP:HA	2.13	0.48
2:B:26:GLN:HE22	2:B:167:PHE:HZ	1.61	0.48
1:A:320:VAL:HG23	1:A:320:VAL:O	2.13	0.48
1:A:194:CYS:O	1:A:197:ARG:HG2	2.13	0.48
2:B:110:HIS:CE1	2:B:112:ASP:HB3	2.49	0.47
1:A:346:VAL:HG11	1:A:349:MET:HE2	1.94	0.47
2:B:68:ASN:HA	2:B:74:ARG:HD3	1.95	0.47
2:B:120:TYR:O	2:B:124:VAL:HG23	2.14	0.47
2:B:162:ASN:HD21	2:B:164:ASP:HB2	1.80	0.47
1:A:480:SER:HA	1:A:481:PRO:C	2.39	0.47
1:A:134:LEU:HD22	1:A:138:ILE:HD11	1.97	0.47
1:A:372:ILE:N	1:A:375:ARG:NH2	2.60	0.47
1:A:271:ILE:HD13	1:A:275:ALA:HA	1.97	0.46
1:A:400:LEU:O	2:B:15:GLN:HB2	2.15	0.46
2:B:76:ALA:HA	2:B:167:PHE:HD2	1.80	0.46
2:B:75:MET:HG2	2:B:84:ILE:HG12	1.97	0.46
2:B:150:TRP:HA	2:B:150:TRP:HE3	1.82	0.45
2:B:201:VAL:O	2:B:204:MET:HG3	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:243:GLN:NE2	5:A:905:HOH:O	2.49	0.45
2:B:123:ASP:O	2:B:127:TYR:HD2	2.00	0.45
1:A:438:MET:SD	1:A:441:MET:HE3	2.57	0.45
2:B:57:PRO:HB3	2:B:120:TYR:CE2	2.51	0.45
1:A:241:PHE:HB3	1:A:242:PRO:HD2	1.99	0.44
3:A:901:HEM:C1C	4:A:902:IMD:H5	2.52	0.44
1:A:377:PHE:HA	1:A:382:ARG:CG	2.24	0.44
1:A:387:GLU:HG3	1:A:388:GLU:N	2.31	0.44
1:A:254:TRP:HB2	1:A:302:VAL:HB	2.00	0.44
1:A:130:LEU:HD23	1:A:134:LEU:HB2	1.98	0.44
1:A:188:TRP:CE3	1:A:200:TRP:HA	2.53	0.43
1:A:389:VAL:O	1:A:391:ARG:N	2.51	0.43
1:A:332:TRP:CH2	1:A:392:ARG:CB	3.01	0.43
1:A:379:ASP:OD1	1:A:381:GLN:HB2	2.18	0.43
2:B:72:GLU:HG3	2:B:200:HIS:HB3	2.01	0.43
1:A:332:TRP:CD1	1:A:332:TRP:C	2.97	0.43
1:A:389:VAL:C	1:A:391:ARG:N	2.76	0.42
2:B:24:ALA:C	2:B:26:GLN:H	2.27	0.42
2:B:70:HIS:HB2	2:B:73:PHE:CD2	2.53	0.42
2:B:78:LYS:HG3	2:B:79:ASP:N	2.34	0.42
2:B:165:ASN:N	2:B:165:ASN:ND2	2.67	0.42
1:A:152:LYS:HB3	1:A:155:GLU:HB2	2.00	0.42
1:A:332:TRP:CZ2	1:A:392:ARG:CB	2.95	0.42
2:B:44:PHE:O	2:B:48:VAL:HG23	2.20	0.42
1:A:399:THR:CG2	1:A:400:LEU:N	2.83	0.42
1:A:376:ASP:O	1:A:376:ASP:OD1	2.38	0.41
1:A:198:ILE:HD13	1:A:198:ILE:HA	1.84	0.41
2:B:75:MET:HE3	2:B:195:VAL:HB	2.03	0.41
1:A:327:HIS:CG	1:A:328:PRO:HD2	2.55	0.41
1:A:368:MET:HE3	1:A:368:MET:HB3	1.94	0.41
2:B:124:VAL:O	2:B:128:GLY:N	2.53	0.40
1:A:389:VAL:C	1:A:391:ARG:H	2.29	0.40
1:A:418:HIS:CE1	1:A:422:LYS:HG3	2.57	0.40
1:A:391:ARG:CA	1:A:395:LEU:HD13	2.50	0.40
1:A:438:MET:SD	1:A:441:MET:CE	3.10	0.40
2:B:88:VAL:HA	2:B:141:ASN:HD22	1.84	0.40

There are no symmetry-related clashes.

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	368/388 (95%)	332 (90%)	27 (7%)	9 (2%)	4	9
2	B	211/219 (96%)	187 (89%)	23 (11%)	1 (0%)	24	46
All	All	579/607 (95%)	519 (90%)	50 (9%)	10 (2%)	7	15

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	372	ILE
1	A	376	ASP
1	A	377	PHE
1	A	374	VAL
1	A	393	MET
1	A	395	LEU
1	A	383	TYR
1	A	390	GLY
2	B	25	PHE
1	A	117	LYS

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	324/340 (95%)	301 (93%)	23 (7%)	13	31
2	B	190/194 (98%)	174 (92%)	16 (8%)	10	23
All	All	514/534 (96%)	475 (92%)	39 (8%)	12	27

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	118	SER
1	A	126	LYS
1	A	134	LEU
1	A	177	LEU
1	A	199	GLN
1	A	215	GLN
1	A	226	LEU
1	A	271	ILE
1	A	290	LYS
1	A	312	VAL
1	A	336	LEU
1	A	371	GLU
1	A	374	VAL
1	A	375	ARG
1	A	377	PHE
1	A	380	THR
1	A	382	ARG
1	A	387	GLU
1	A	388	GLU
1	A	393	MET
1	A	407	ARG
1	A	411	GLU
1	A	494	ILE
2	B	5	ILE
2	B	8	TYR
2	B	12	ASP
2	B	26	GLN
2	B	38	GLN
2	B	39	LEU
2	B	45	LEU
2	B	111	ASP
2	B	115	GLN
2	B	126	CYS
2	B	133	TYR
2	B	139	ILE
2	B	150	TRP
2	B	157	ASP
2	B	177	TYR
2	B	190	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (24) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	136	HIS
1	A	142	ASN
1	A	199	GLN
1	A	202	ASN
1	A	243	GLN
1	A	257	GLN
1	A	381	GLN
1	A	384	ASN
1	A	398	HIS
1	A	418	HIS
1	A	421	GLN
1	A	430	HIS
1	A	442	GLN
1	A	443	ASN
1	A	486	GLN
2	B	26	GLN
2	B	34	ASN
2	B	35	GLN
2	B	38	GLN
2	B	61	HIS
2	B	141	ASN
2	B	162	ASN
2	B	165	ASN
2	B	200	HIS

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](#)

3 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	$\# Z > 2$
4	IMD	A	903	-	5,5,5	0.39	0	5,5,5	0.75	0
4	IMD	A	902	3	5,5,5	0.39	0	5,5,5	0.62	0
3	HEM	A	901	4,1	50,50,50	1.24	4 (8%)	67,82,82	1.17	4 (5%)

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
4	IMD	A	903	-	-	-	0/1/1/1
4	IMD	A	902	3	-	-	0/1/1/1
3	HEM	A	901	4,1	-	8/14/54/54	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	901	HEM	CAB-C3B	-3.74	1.37	1.47
3	A	901	HEM	CAC-C3C	-2.58	1.40	1.47
3	A	901	HEM	C1B-NB	-2.51	1.35	1.40
3	A	901	HEM	O2D-CGD	-2.00	1.24	1.30

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	901	HEM	C2B-C1B-NB	2.59	112.81	109.84
3	A	901	HEM	CMA-C3A-C2A	2.50	130.94	125.62
3	A	901	HEM	C4C-C3C-C2C	-2.31	104.81	106.81
3	A	901	HEM	CHB-C4A-C3A	-2.07	121.42	127.43

There are no chirality outliers.

All (8) torsion outliers are listed below:

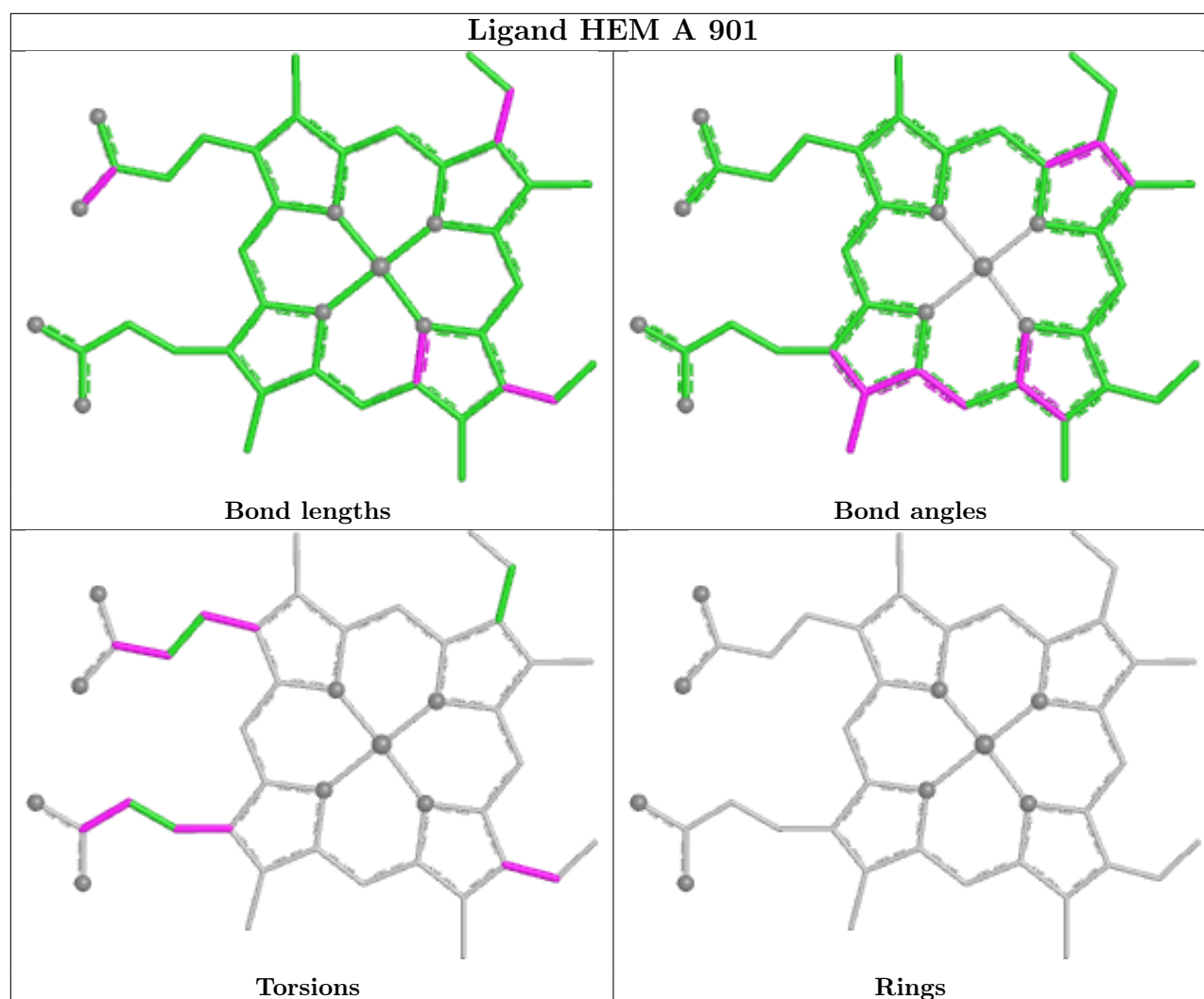
Mol	Chain	Res	Type	Atoms
3	A	901	HEM	C1A-C2A-CAA-CBA
3	A	901	HEM	C4D-C3D-CAD-CBD
3	A	901	HEM	C2B-C3B-CAB-CBB
3	A	901	HEM	C4B-C3B-CAB-CBB
3	A	901	HEM	CAD-CBD-CGD-O1D
3	A	901	HEM	CAA-CBA-CGA-O1A
3	A	901	HEM	CAA-CBA-CGA-O2A
3	A	901	HEM	CAD-CBD-CGD-O2D

There are no ring outliers.

2 monomers are involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	902	IMD	1	0
3	A	901	HEM	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

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.