



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 4, 2024 – 12:17 PM EST

PDB ID : 1N61
Title : Crystal Structure of the Cu,Mo-CO Dehydrogenase (CODH); Dithionite reduced state
Authors : Dobbek, H.; Gremer, L.; Kiefersauer, R.; Huber, R.; Meyer, O.
Deposited on : 2002-11-08
Resolution : 1.30 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 : 4.02b-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) : 2.36

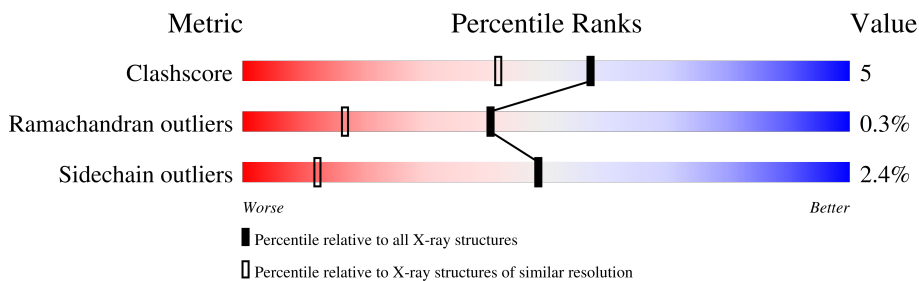
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.30 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	1101 (1.30-1.30)
Ramachandran outliers	138981	1058 (1.30-1.30)
Sidechain outliers	138945	1058 (1.30-1.30)

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	166	
1	D	166	
2	B	809	
2	E	809	
3	C	288	
3	F	288	

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 22269 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 Carbon monoxide dehydrogenase small chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	161	Total 1216	C 754	N 215	O 231	S 16	5	4	0
1	D	158	Total 1186	C 734	N 213	O 223	S 16	5	3	0

- Molecule 2 is a protein called Carbon monoxide dehydrogenase large chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	804	Total 6232	C 3959	N 1067	O 1163	S 43	76	8	0
2	E	795	Total 6171	C 3926	N 1052	O 1147	S 46	65	11	0

- Molecule 3 is a protein called Carbon monoxide dehydrogenase medium chain.

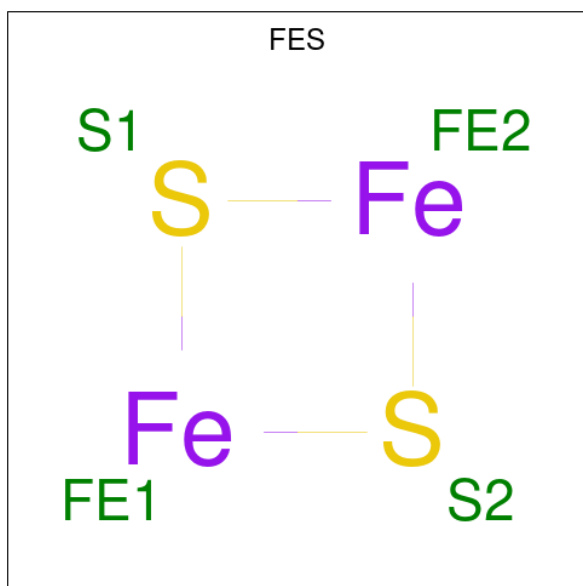
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	287	Total 2130	C 1345	N 373	O 400	S 12	26	6	0
3	F	286	Total 2114	C 1336	N 370	O 397	S 11	34	4	0

- Molecule 4 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	P		
4	A	1	5	4	1	0	0

- Molecule 5 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe_2S_2).



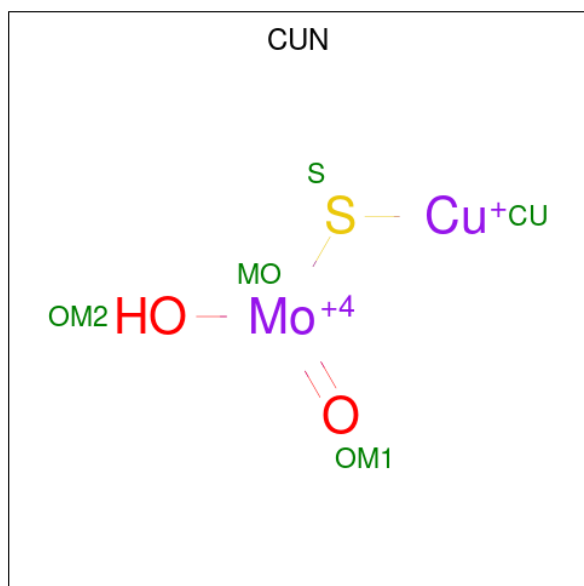
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	Fe	S		
5	A	1	4	2	2	0	0
5	A	1	4	2	2	0	0
5	D	1	4	2	2	0	0

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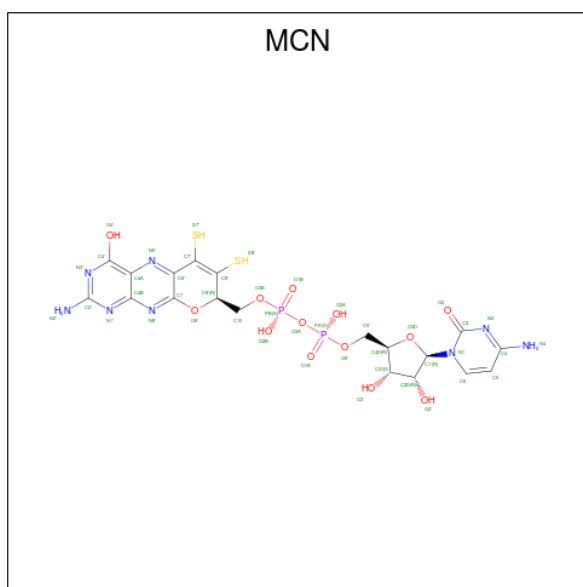
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	Fe	S		
5	D	1	4	2	2	0	0

- Molecule 6 is CU(I)-S-MO(IV)(=O)OH CLUSTER (three-letter code: CUN) (formula: CuHMoO_2S).



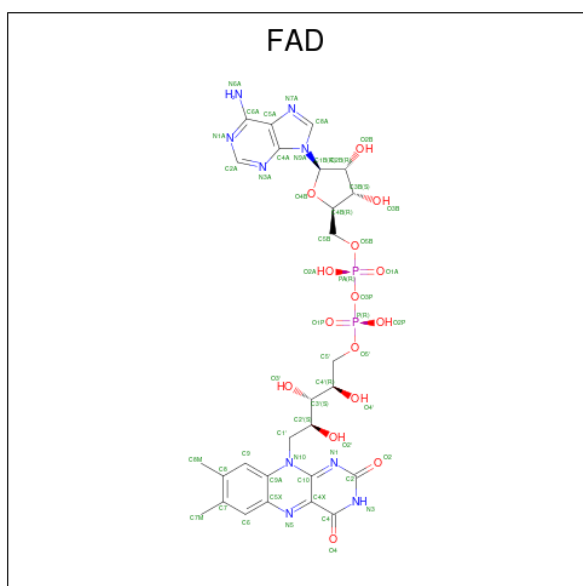
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	Cu	Mo	O	S		
6	B	1	5	1	1	2	1	0	0
6	E	1	5	1	1	2	1	0	0

- Molecule 7 is PTERIN CYTOSINE DINUCLEOTIDE (three-letter code: MCN) (formula: $\text{C}_{19}\text{H}_{22}\text{N}_8\text{O}_{13}\text{P}_2\text{S}_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	N	O	P			S
7	B	1	44	19	8	13	2	2	0	0
7	E	1	44	19	8	13	2	2	0	0

- Molecule 8 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
8	C	1	53	27	9	15	2	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
8	F	1	53	27	9	15	2	0	0

- Molecule 9 is water.


Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	207	Total 207	O 207	0	0
9	B	944	Total 944	O 944	0	0
9	C	401	Total 401	O 401	0	0
9	D	213	Total 213	O 213	0	0
9	E	902	Total 902	O 902	0	0
9	F	328	Total 328	O 328	0	0

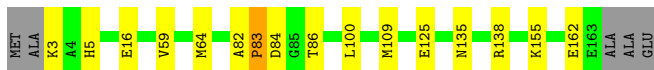
3 Residue-property plots [i](#)

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: Carbon monoxide dehydrogenase small chain

Chain A:  87% 9% ..




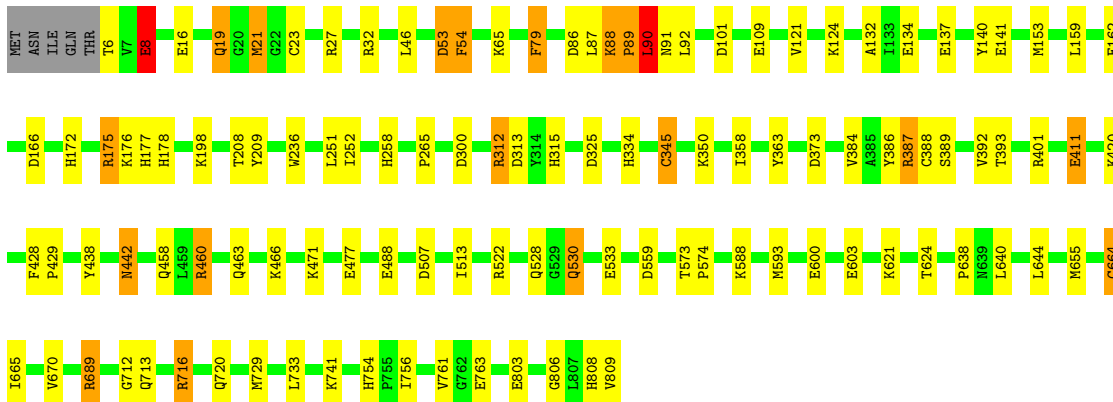
- Molecule 1: Carbon monoxide dehydrogenase small chain

Chain D:  84% 10% 5% ..




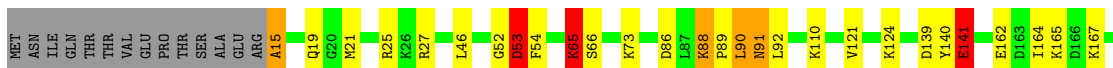
- Molecule 2: Carbon monoxide dehydrogenase large chain

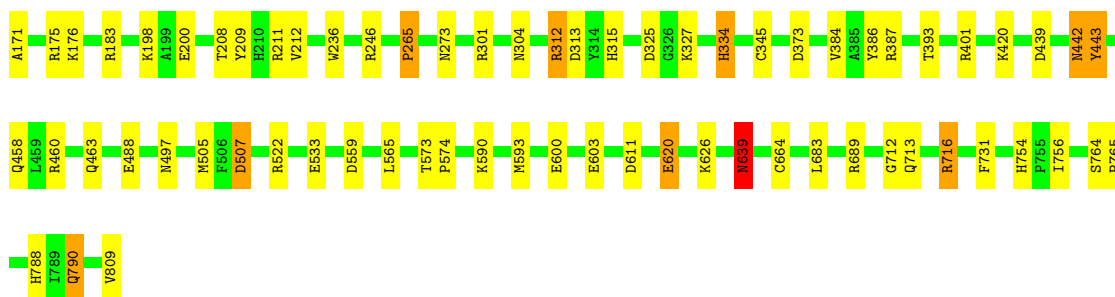
Chain B:  85% 12% ..



- Molecule 2: Carbon monoxide dehydrogenase large chain

Chain E:  86% 10% ..





- Molecule 3: Carbon monoxide dehydrogenase medium chain

Chain C: 90% 7%



- Molecule 3: Carbon monoxide dehydrogenase medium chain

Chain F: 91% 7%



4 Data and refinement statistics

Xtrriage (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	119.16Å 131.38Å 160.32Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	17.00 – 1.30	Depositor
% Data completeness (in resolution range)	(Not available) (17.00-1.30)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS, REFMAC	Depositor
R, R_{free}	0.142 , 0.184	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	22269	wwPDB-VP
Average B, all atoms (Å ²)	17.0	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: MCN, FES, FAD, PO4, CUN

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	0.77	1/1253 (0.1%)	0.87	2/1692 (0.1%)
1	D	1.39	6/1218 (0.5%)	1.12	6/1646 (0.4%)
2	B	0.95	22/6421 (0.3%)	1.00	31/8711 (0.4%)
2	E	1.20	24/6374 (0.4%)	0.95	31/8645 (0.4%)
3	C	1.03	5/2191 (0.2%)	0.95	9/2974 (0.3%)
3	F	1.63	6/2167 (0.3%)	1.03	12/2944 (0.4%)
All	All	1.16	64/19624 (0.3%)	0.98	91/26612 (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	4
1	D	0	2
2	B	1	22
2	E	0	12
3	C	0	5
3	F	0	4
All	All	1	49

All (64) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	F	240	LYS	CB-CG	-48.99	0.20	1.52
2	E	162	GLU	CD-OE1	41.31	1.71	1.25
3	F	280	GLU	CD-OE2	37.31	1.66	1.25
2	E	162	GLU	CD-OE2	-37.03	0.84	1.25
2	B	8	GLU	CD-OE2	33.04	1.61	1.25
1	D	160	PRO	C-O	27.12	1.77	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	142	GLU	CD-OE2	25.55	1.53	1.25
1	D	7	GLU	CD-OE1	-24.85	0.98	1.25
3	F	240	LYS	CG-CD	24.09	2.34	1.52
2	E	65	LYS	CE-NZ	-20.50	0.97	1.49
2	E	141	GLU	CG-CD	18.10	1.79	1.51
2	E	65	LYS	CD-CE	17.70	1.95	1.51
2	E	809	VAL	CB-CG2	17.68	1.90	1.52
3	C	287	LYS	CB-CG	16.77	1.97	1.52
2	E	90	LEU	CB-CG	15.29	1.97	1.52
1	D	160	PRO	CA-C	-13.87	1.25	1.52
2	E	620	GLU	CG-CD	13.69	1.72	1.51
3	F	280	GLU	CD-OE1	-13.33	1.10	1.25
2	B	411	GLU	CD-OE2	13.25	1.40	1.25
2	B	141	GLU	CG-CD	12.88	1.71	1.51
3	F	280	GLU	CG-CD	11.13	1.68	1.51
1	D	160	PRO	CB-CG	11.10	2.05	1.50
3	C	142	GLU	CD-OE1	-10.29	1.14	1.25
2	E	167	LYS	CD-CE	10.29	1.76	1.51
2	B	198	LYS	CE-NZ	10.09	1.74	1.49
2	E	73	LYS	CD-CE	9.72	1.75	1.51
2	B	664	CYS	CA-CB	9.19	1.74	1.53
2	B	124	LYS	CE-NZ	-8.97	1.26	1.49
3	C	280	GLU	CG-CD	8.47	1.64	1.51
2	B	471	LYS	CD-CE	8.22	1.71	1.51
2	B	664	CYS	CB-SG	-8.21	1.68	1.82
2	B	137	GLU	CG-CD	7.54	1.63	1.51
2	E	420	LYS	CD-CE	7.29	1.69	1.51
2	E	639	ASN	CG-ND2	-7.23	1.14	1.32
2	B	533	GLU	CD-OE2	7.22	1.33	1.25
2	E	66	SER	CB-OG	-7.21	1.32	1.42
2	E	664	CYS	CB-SG	-7.09	1.70	1.82
2	E	533	GLU	CD-OE2	7.01	1.33	1.25
2	B	638	PRO	CG-CD	6.97	1.73	1.50
2	E	171	ALA	CA-CB	6.93	1.67	1.52
2	E	200	GLU	CD-OE2	6.88	1.33	1.25
2	B	729	MET	SD-CE	-6.84	1.39	1.77
2	E	497	ASN	CG-ND2	6.72	1.49	1.32
2	E	141	GLU	CB-CG	6.40	1.64	1.52
1	A	155	LYS	CG-CD	6.34	1.74	1.52
2	B	655	MET	SD-CE	-6.33	1.42	1.77
2	E	458	GLN	CG-CD	-6.25	1.36	1.51
1	D	16	GLU	CD-OE1	-6.16	1.18	1.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	55	ARG	CD-NE	6.16	1.56	1.46
2	B	345	CYS	CB-SG	-5.83	1.72	1.81
2	B	655	MET	CG-SD	-5.82	1.66	1.81
3	F	90	LYS	CD-CE	5.77	1.65	1.51
2	B	89	PRO	C-N	5.76	1.47	1.34
2	B	141	GLU	CB-CG	5.58	1.62	1.52
2	E	716	ARG	CG-CD	5.58	1.65	1.51
2	E	809	VAL	CB-CG1	-5.47	1.41	1.52
2	B	88	LYS	C-N	-5.34	1.24	1.34
1	D	48	GLY	C-O	-5.25	1.15	1.23
2	E	626	LYS	CE-NZ	-5.21	1.36	1.49
2	B	16	GLU	CG-CD	5.16	1.59	1.51
2	B	176	LYS	CE-NZ	-5.14	1.36	1.49
2	B	664	CYS	N-CA	5.09	1.56	1.46
2	E	124	LYS	CD-CE	-5.08	1.38	1.51
2	B	65	LYS	CG-CD	-5.04	1.35	1.52

All (91) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	7	GLU	OE1-CD-OE2	-21.23	97.83	123.30
2	B	89	PRO	O-C-N	-20.23	90.33	122.70
2	E	15	ALA	N-CA-CB	17.55	134.67	110.10
3	F	280	GLU	OE1-CD-OE2	-17.54	102.26	123.30
2	B	8	GLU	OE1-CD-OE2	16.56	143.17	123.30
2	B	141	GLU	CA-CB-CG	15.15	146.73	113.40
2	B	8	GLU	CG-CD-OE2	-14.14	90.02	118.30
2	B	471	LYS	CD-CE-NZ	-13.97	79.56	111.70
3	C	287	LYS	CA-CB-CG	-13.81	83.01	113.40
2	B	89	PRO	CA-C-N	13.44	146.77	117.20
2	E	162	GLU	CG-CD-OE2	13.17	144.63	118.30
3	F	240	LYS	CB-CG-CD	12.78	144.84	111.60
1	D	7	GLU	CG-CD-OE1	12.15	142.60	118.30
1	D	160	PRO	CB-CA-C	-11.88	82.29	112.00
2	B	79	PHE	CZ-CE2-CD2	-11.36	106.47	120.10
2	E	162	GLU	CG-CD-OE1	-11.25	95.79	118.30
3	F	240	LYS	CG-CD-CE	10.71	144.04	111.90
3	F	29	ARG	NE-CZ-NH2	-10.61	115.00	120.30
3	C	142	GLU	OE1-CD-OE2	-10.56	110.62	123.30
3	F	240	LYS	CA-CB-CG	10.45	136.39	113.40
2	B	141	GLU	CG-CD-OE1	-9.90	98.49	118.30
2	E	809	VAL	CA-CB-CG1	9.82	125.64	110.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	141	GLU	CG-CD-OE2	9.80	137.89	118.30
1	A	109	MET	CG-SD-CE	9.70	115.72	100.20
3	F	280	GLU	CG-CD-OE2	9.45	137.19	118.30
3	F	158	PHE	CD1-CE1-CZ	-9.21	109.05	120.10
1	D	160	PRO	N-CD-CG	8.99	116.69	103.20
2	E	141	GLU	CG-CD-OE1	-8.96	100.39	118.30
1	D	109	MET	CG-SD-CE	8.60	113.96	100.20
2	B	401	ARG	NE-CZ-NH1	8.40	124.50	120.30
2	E	90	LEU	CA-CB-CG	-8.04	96.80	115.30
1	D	16	GLU	OE1-CD-OE2	7.76	132.62	123.30
2	B	411	GLU	OE1-CD-OE2	-7.74	114.01	123.30
3	C	285	ARG	NE-CZ-NH1	-7.35	116.62	120.30
3	C	142	GLU	CG-CD-OE1	7.35	133.00	118.30
2	B	559	ASP	CB-CG-OD1	7.21	124.78	118.30
2	E	401	ARG	NE-CZ-NH2	-6.97	116.81	120.30
2	E	620	GLU	CG-CD-OE2	-6.91	104.49	118.30
2	E	809	VAL	CG1-CB-CG2	-6.84	99.95	110.90
2	E	53	ASP	CB-CG-OD1	6.79	124.41	118.30
2	E	458	GLN	CB-CG-CD	6.63	128.83	111.60
2	E	620	GLU	CG-CD-OE1	6.61	131.53	118.30
3	F	240	LYS	CB-CA-C	6.54	123.47	110.40
3	C	95	ARG	NE-CZ-NH2	-6.49	117.06	120.30
2	B	689[A]	ARG	NE-CZ-NH2	-6.43	117.09	120.30
2	B	689[B]	ARG	NE-CZ-NH2	-6.43	117.09	120.30
2	B	176	LYS	CD-CE-NZ	-6.39	96.99	111.70
2	E	611	ASP	CB-CG-OD2	6.31	123.98	118.30
2	B	401	ARG	NE-CZ-NH2	-6.24	117.18	120.30
2	E	809	VAL	CA-CB-CG2	-6.16	101.66	110.90
2	E	162	GLU	OE1-CD-OE2	-6.12	115.96	123.30
2	B	175	ARG	NE-CZ-NH2	-6.08	117.26	120.30
3	C	10	ARG	NE-CZ-NH2	-5.95	117.33	120.30
2	B	6	THR	CB-CA-C	-5.82	95.89	111.60
2	E	559	ASP	CB-CG-OD1	5.81	123.53	118.30
3	F	55	ARG	NE-CZ-NH1	5.80	123.20	120.30
2	E	439	ASP	CB-CG-OD1	5.74	123.47	118.30
2	E	689	ARG	NE-CZ-NH2	-5.73	117.43	120.30
2	E	401	ARG	NE-CZ-NH1	5.71	123.16	120.30
2	B	101	ASP	CB-CG-OD1	5.65	123.39	118.30
2	E	443	TYR	CB-CG-CD2	-5.58	117.65	121.00
3	F	56	ASP	CB-CG-OD2	5.58	123.32	118.30
2	B	124	LYS	CD-CE-NZ	-5.57	98.89	111.70
3	F	158	PHE	CG-CD1-CE1	5.56	126.92	120.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	639	ASN	CB-CG-OD1	-5.56	110.48	121.60
2	E	25	ARG	NE-CZ-NH1	5.48	123.04	120.30
2	E	246	ARG	NE-CZ-NH2	-5.46	117.57	120.30
2	B	638	PRO	N-CD-CG	-5.45	95.02	103.20
2	E	325	ASP	CB-CG-OD1	-5.45	113.39	118.30
2	E	86	ASP	CB-CG-OD2	5.43	123.19	118.30
2	B	175	ARG	NE-CZ-NH1	5.42	123.01	120.30
2	B	166	ASP	CB-CG-OD2	5.39	123.15	118.30
3	C	166	LEU	CB-CG-CD2	-5.37	101.86	111.00
2	E	301	ARG	NE-CZ-NH2	-5.34	117.63	120.30
2	E	211	ARG	NE-CZ-NH2	-5.33	117.63	120.30
2	B	460	ARG	NE-CZ-NH2	-5.30	117.65	120.30
2	E	25	ARG	NE-CZ-NH2	-5.28	117.66	120.30
3	C	44	ARG	NE-CZ-NH1	-5.27	117.67	120.30
2	E	507	ASP	CB-CG-OD2	5.24	123.02	118.30
3	F	55	ARG	NE-CZ-NH2	-5.19	117.71	120.30
2	B	137	GLU	CB-CG-CD	-5.17	100.23	114.20
2	B	300	ASP	CB-CG-OD2	5.16	122.94	118.30
1	A	83	PRO	CB-CA-C	-5.14	99.15	112.00
2	B	89	PRO	C-N-CA	5.14	134.55	121.70
2	E	325	ASP	CB-CG-OD2	5.12	122.91	118.30
2	B	79	PHE	CE1-CZ-CE2	5.11	129.19	120.00
2	B	86	ASP	CB-CG-OD2	5.08	122.87	118.30
2	B	53	ASP	CB-CG-OD1	5.07	122.86	118.30
2	E	458	GLN	CG-CD-OE1	-5.06	111.48	121.60
3	C	145	ARG	NE-CZ-NH1	-5.02	117.79	120.30
2	B	32	ARG	NE-CZ-NH2	-5.02	117.79	120.30

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	B	90	LEU	CA

All (49) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	138	ARG	Sidechain
1	A	162	GLU	Mainchain
1	A	82	ALA	Mainchain
1	A	83	PRO	Mainchain
2	B	109	GLU	Sidechain
2	B	134	GLU	Sidechain

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Mol	Chain	Res	Type	Group
2	B	140	TYR	Mainchain
2	B	162	GLU	Sidechain
2	B	19	GLN	Sidechain
2	B	27	ARG	Sidechain
2	B	312	ARG	Sidechain
2	B	363	TYR	Sidechain
2	B	387	ARG	Sidechain
2	B	411	GLU	Sidechain
2	B	54	PHE	Peptide
2	B	600	GLU	Sidechain
2	B	689[A]	ARG	Sidechain
2	B	689[B]	ARG	Sidechain
2	B	716	ARG	Sidechain
2	B	79	PHE	Sidechain
2	B	8	GLU	Sidechain
2	B	88	LYS	Mainchain
2	B	89	PRO	Peptide,Mainchain
2	B	90	LEU	Peptide,Mainchain
3	C	10	ARG	Sidechain
3	C	27	ASP	Sidechain
3	C	286	ALA	Peptide
3	C	44	ARG	Sidechain
3	C	59	ASP	Sidechain
1	D	138	ARG	Sidechain
1	D	83	PRO	Mainchain
2	E	140	TYR	Mainchain
2	E	141	GLU	Sidechain
2	E	175	ARG	Sidechain
2	E	27	ARG	Sidechain
2	E	312	ARG	Sidechain
2	E	334	HIS	Sidechain
2	E	387	ARG	Sidechain
2	E	443	TYR	Sidechain
2	E	53	ASP	Mainchain
2	E	600	GLU	Sidechain
2	E	620	GLU	Mainchain
2	E	88	LYS	Mainchain
3	F	141	PRO	Mainchain
3	F	163	PRO	Mainchain
3	F	29	ARG	Sidechain
3	F	86	PHE	Sidechain

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	1216	0	1189	14	0
1	D	1186	0	1167	15	0
2	B	6232	0	6114	66	1
2	E	6171	0	6049	59	1
3	C	2130	0	2183	19	0
3	F	2114	0	2167	14	0
4	A	5	0	0	1	0
5	A	8	0	0	0	0
5	D	8	0	0	0	0
6	B	5	0	0	1	0
6	E	5	0	0	0	0
7	B	44	0	17	0	0
7	E	44	0	17	0	0
8	C	53	0	31	1	0
8	F	53	0	31	3	0
9	A	207	0	0	2	1
9	B	944	0	0	21	0
9	C	401	0	0	6	0
9	D	213	0	0	4	0
9	E	902	0	0	8	1
9	F	328	0	0	3	0
All	All	22269	0	18965	185	2

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 5.

All (185) 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)
2:E:593[B]:MET:HG2	2:E:603:GLU:OE1	1.25	1.31
2:E:593[A]:MET:HG2	2:E:603:GLU:OE1	1.25	1.28
1:A:59:VAL:HG11	1:A:64[A]:MET:CE	1.70	1.20
2:B:21[A]:MET:CE	9:B:4470:HOH:O	1.86	1.19
2:B:92:LEU:HD21	2:B:252:ILE:HG23	1.25	1.16
2:E:716:ARG:NE	9:E:5338:HOH:O	1.83	1.09

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:59:VAL:HG11	1:D:64[A]:MET:CE	1.84	1.07
2:E:65:LYS:HE2	2:E:141:GLU:OE2	1.55	1.06
1:D:59:VAL:HG11	1:D:64[A]:MET:HE1	1.32	1.06
2:E:88:LYS:HB2	2:E:89:PRO:HD3	1.41	1.03
2:B:21[A]:MET:HE1	9:B:4470:HOH:O	1.53	1.00
1:A:59:VAL:HG11	1:A:64[A]:MET:HE1	1.01	0.99
1:D:118[A]:GLN:OE1	9:D:5051:HOH:O	1.81	0.99
2:E:90:LEU:O	2:E:92:LEU:CD1	2.13	0.96
2:B:713:GLN:OE1	9:B:4856:HOH:O	1.85	0.95
2:E:639:ASN:HB3	9:E:5819:HOH:O	1.66	0.94
1:A:59:VAL:CG1	1:A:64[A]:MET:HE1	1.95	0.94
1:D:3:LYS:N	9:D:5049:HOH:O	2.00	0.93
1:D:92:GLU:HG3	9:D:5072:HOH:O	1.69	0.91
2:B:21[A]:MET:HE2	9:B:4470:HOH:O	1.52	0.91
2:B:92:LEU:CD2	2:B:252:ILE:HG23	2.01	0.90
1:D:11:ASN:HD21	1:D:76:THR:H	1.23	0.87
1:A:59:VAL:CG1	1:A:64[A]:MET:CE	2.51	0.87
3:C:280:GLU:HG3	9:C:4128:HOH:O	1.76	0.85
2:E:334:HIS:ND1	9:E:5775:HOH:O	2.10	0.84
2:E:208:THR:H	2:E:790:GLN:HE22	1.23	0.83
2:E:65:LYS:CE	2:E:141:GLU:OE2	2.26	0.83
2:B:19:GLN:OE1	2:B:23[A]:CYS:SG	2.37	0.83
2:B:460:ARG:HH11	2:B:463:GLN:HE22	1.28	0.81
2:B:528:GLN:H	2:B:530:GLN:HE22	1.28	0.81
2:B:713:GLN:CD	9:B:4856:HOH:O	2.20	0.76
2:E:460:ARG:HH11	2:E:463:GLN:HE22	1.32	0.76
2:B:593:MET:HE2	2:B:640:LEU:HD21	1.67	0.75
2:E:639:ASN:HB3	9:E:5654:HOH:O	1.86	0.75
1:D:59:VAL:CG1	1:D:64[A]:MET:CE	2.64	0.73
2:E:21[A]:MET:HE3	2:E:756:ILE:HD12	1.71	0.73
2:E:273:ASN:HD21	2:E:304:ASN:HD21	1.37	0.73
2:E:713[A]:GLN:CD	2:E:731:PHE:CZ	2.63	0.72
2:E:90:LEU:CB	2:E:92:LEU:HD13	2.22	0.70
2:B:53:ASP:CG	9:B:4860:HOH:O	2.30	0.69
2:E:88:LYS:CB	2:E:89:PRO:HD3	2.20	0.69
1:A:84:ASP:OD1	1:A:86:THR:HG23	1.94	0.68
2:B:593:MET:CE	2:B:640:LEU:HD21	2.24	0.67
2:B:46:LEU:HD11	2:B:236[B]:TRP:CZ3	2.29	0.67
2:B:87:LEU:O	2:B:90:LEU:HA	1.95	0.67
2:B:21[A]:MET:HE1	2:B:756:ILE:HG21	1.77	0.66
1:D:59:VAL:HG11	1:D:64[A]:MET:HE3	1.76	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:90:LEU:O	2:E:92:LEU:HD12	1.94	0.66
2:E:91:ASN:C	2:E:92:LEU:HD12	2.16	0.65
1:D:59:VAL:CG1	1:D:64[A]:MET:HE1	2.20	0.65
2:E:713[A]:GLN:HG2	2:E:731:PHE:CE1	2.32	0.65
3:F:102:ALA:CB	3:F:106[A]:ILE:HG21	2.27	0.65
2:B:803:GLU:OE1	2:B:808:HIS:HD2	1.80	0.63
1:A:125:GLU:OE2	2:B:741[A]:LYS:HD3	1.98	0.63
2:B:528:GLN:H	2:B:530:GLN:NE2	1.95	0.63
2:E:141:GLU:CD	2:E:141:GLU:CB	2.67	0.63
2:E:754:HIS:HD2	2:E:756:ILE:H	1.46	0.63
2:B:522:ARG:NH1	9:B:4858:HOH:O	2.25	0.61
1:D:159:VAL:N	1:D:160:PRO:HD2	2.14	0.61
1:A:135:ASN:HD21	3:C:105:GLN:HE22	1.46	0.61
3:F:280:GLU:OE2	3:F:280:GLU:OE1	2.18	0.61
1:A:5:HIS:HD2	4:A:3001:PO4:O2	1.85	0.60
2:E:713[A]:GLN:NE2	2:E:731:PHE:CZ	2.69	0.60
1:D:160:PRO:O	1:D:160:PRO:CA	2.50	0.60
2:E:716:ARG:CZ	9:E:5338:HOH:O	2.34	0.60
2:B:530:GLN:HE21	2:B:530:GLN:H	1.48	0.60
2:B:741[B]:LYS:HE3	9:B:4640:HOH:O	2.01	0.60
1:D:118[A]:GLN:NE2	9:D:4974:HOH:O	2.36	0.59
2:B:754:HIS:HD2	2:B:756:ILE:H	1.50	0.59
6:B:3921:CUN:OM1	6:B:3921:CUN:MO	1.72	0.58
2:B:670:VAL:O	2:B:808:HIS:HE1	1.86	0.58
2:E:90:LEU:HB2	2:E:92:LEU:HD13	1.85	0.58
2:E:92:LEU:HD12	2:E:92:LEU:N	2.18	0.58
2:E:603:GLU:HG3	9:E:5491:HOH:O	2.04	0.57
3:F:106[B]:ILE:HD13	8:F:4931:FAD:C7	2.34	0.57
2:E:208:THR:OG1	2:E:315:HIS:HD2	1.87	0.57
1:A:5:HIS:HE1	1:A:16:GLU:OE2	1.86	0.57
2:E:88:LYS:HB2	2:E:89:PRO:CD	2.27	0.57
2:E:19:GLN:NE2	9:E:5283:HOH:O	2.37	0.56
3:C:204[A]:MET:HG3	3:C:286:ALA:CB	2.36	0.56
1:A:3:LYS:N	9:A:4040:HOH:O	2.39	0.56
1:A:135:ASN:ND2	3:C:105:GLN:HE22	2.03	0.55
2:B:588:LYS:HD2	9:B:4246:HOH:O	2.06	0.55
2:E:713[A]:GLN:CG	2:E:731:PHE:CE1	2.89	0.55
2:E:90:LEU:O	2:E:92:LEU:HD11	2.06	0.55
2:B:720:GLN:HG3	9:B:4723:HOH:O	2.07	0.54
3:C:240:LYS:HB3	3:C:241:PRO:HD3	1.89	0.54
2:E:46:LEU:HD11	2:E:236[B]:TRP:CZ3	2.42	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:593[B]:MET:HE2	2:E:603:GLU:OE1	2.08	0.54
3:C:118:ASN:HD22	8:C:3932:FAD:H4B	1.73	0.54
3:C:158:PHE:HB2	9:C:4252:HOH:O	2.08	0.54
2:B:573:THR:HB	2:B:574:PRO:HD3	1.90	0.53
2:B:716:ARG:CZ	9:B:4268:HOH:O	2.56	0.53
2:B:325:ASP:O	2:B:420:LYS:HE2	2.09	0.53
2:E:754:HIS:CD2	2:E:756:ILE:H	2.26	0.53
2:E:90:LEU:C	2:E:92:LEU:CD1	2.77	0.53
3:F:45:LEU:HD12	9:F:5161:HOH:O	2.09	0.53
2:B:716:ARG:NE	9:B:4268:HOH:O	2.42	0.52
3:F:118:ASN:HD22	8:F:4931:FAD:H4B	1.75	0.52
2:E:90:LEU:O	2:E:92:LEU:HD13	2.06	0.52
2:B:806:GLY:O	2:B:809:VAL:HG22	2.10	0.52
2:B:442:ASN:C	2:B:442:ASN:HD22	2.12	0.52
3:C:204[A]:MET:HG3	3:C:286:ALA:HB1	1.92	0.51
2:B:754:HIS:CD2	2:B:756:ILE:H	2.28	0.51
2:B:713:GLN:NE2	2:B:733:LEU:HD23	2.24	0.51
2:B:741[A]:LYS:CD	9:B:4308:HOH:O	2.58	0.51
2:B:665:ILE:N	2:B:665:ILE:HD12	2.25	0.51
1:A:59:VAL:HG11	1:A:64[A]:MET:HE3	1.84	0.51
2:B:334:HIS:HE1	2:B:373:ASP:OD2	1.93	0.51
2:E:21[A]:MET:HE3	2:E:756:ILE:CD1	2.41	0.50
2:E:590:LYS:HA	2:E:593[A]:MET:HE2	1.94	0.50
2:B:53:ASP:CB	9:B:4860:HOH:O	2.60	0.50
2:B:458:GLN:HG2	9:B:4236:HOH:O	2.10	0.50
2:E:90:LEU:C	2:E:92:LEU:HD13	2.32	0.50
2:B:466:LYS:HE2	2:B:477:GLU:HG2	1.93	0.50
2:B:53:ASP:HB2	9:B:4860:HOH:O	2.11	0.50
2:B:350:LYS:HE3	9:B:4657:HOH:O	2.12	0.50
2:B:593:MET:HG2	2:B:603:GLU:OE2	2.12	0.50
1:D:96:MET:HE2	1:D:96:MET:HA	1.94	0.49
3:F:79:HIS:HD2	9:F:5192:HOH:O	1.94	0.49
2:E:788:HIS:HE2	2:E:790:GLN:NE2	2.10	0.49
3:C:221[A]:ASN:ND2	9:C:4132:HOH:O	2.43	0.49
2:E:522:ARG:NH1	9:E:5403:HOH:O	2.44	0.49
2:B:153:MET:HA	2:B:177:HIS:CE1	2.49	0.48
3:F:137:GLU:HG2	3:F:146:ILE:CD1	2.44	0.48
2:B:513:ILE:HD12	2:B:644:LEU:HD23	1.96	0.48
2:E:442:ASN:HD22	2:E:442:ASN:C	2.16	0.48
2:B:741[A]:LYS:HD2	9:B:4308:HOH:O	2.11	0.48
2:E:593[B]:MET:HG2	2:E:603:GLU:CD	2.22	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:59:VAL:CG1	1:D:64[A]:MET:HE3	2.41	0.47
3:F:102:ALA:CB	3:F:106[A]:ILE:CG2	2.92	0.47
3:F:106[B]:ILE:HD13	8:F:4931:FAD:C8	2.45	0.47
2:B:664:CYS:C	2:B:665:ILE:HD12	2.35	0.47
3:C:222:THR:HB	3:C:223:PRO:HD2	1.97	0.46
1:D:5:His:HA	1:D:18:LEU:HD12	1.97	0.46
2:B:624:THR:HB	9:B:4150:HOH:O	2.15	0.46
3:C:204[A]:MET:HE1	3:C:238:LEU:HD12	1.98	0.46
2:E:92:LEU:CD1	2:E:92:LEU:N	2.79	0.46
3:C:204[A]:MET:CE	3:C:238:LEU:HD12	2.46	0.46
3:C:285:ARG:CZ	9:C:4141:HOH:O	2.65	0.45
2:E:88:LYS:CB	2:E:89:PRO:CD	2.88	0.45
3:C:221[A]:ASN:ND2	9:C:4117:HOH:O	2.50	0.45
2:E:212:VAL:HB	2:E:713[A]:GLN:NE2	2.32	0.45
2:B:208:THR:OG1	2:B:315:His:HD2	1.99	0.45
2:B:21[A]:MET:CE	2:B:756:ILE:HG21	2.47	0.45
2:E:53:ASP:CG	2:E:54:PHE:H	2.21	0.44
2:E:764:SER:N	2:E:765:PRO:HD2	2.31	0.44
2:B:175:ARG:NH2	2:B:178:His:O	2.50	0.44
2:B:809:VAL:O	2:B:809:VAL:HG23	2.17	0.44
3:F:137:GLU:HG2	3:F:146:ILE:HD13	1.98	0.44
2:B:334:His:HD2	9:B:4196:HOH:O	2.01	0.44
2:B:460:ARG:NH1	2:B:463:GLN:HE22	2.06	0.44
2:B:530:GLN:NE2	2:B:530:GLN:H	2.16	0.43
2:B:803:GLU:OE1	2:B:808:His:CD2	2.66	0.43
3:F:28:ALA:O	3:F:29:ARG:HD2	2.17	0.43
2:B:121:VAL:HG11	2:B:132:ALA:HB3	2.00	0.43
3:F:221:ASN:ND2	9:F:5112:HOH:O	2.50	0.43
3:C:138:LEU:HD23	3:C:167:LEU:HA	1.99	0.43
2:B:384:VAL:HG13	2:B:388:CYS:SG	2.59	0.43
3:C:287:LYS:CA	9:C:4089:HOH:O	2.66	0.43
2:E:505:MET:HA	2:E:565:LEU:HG	1.99	0.43
1:A:3:LYS:CA	9:A:4040:HOH:O	2.67	0.43
2:E:52:GLY:HA2	2:E:121:VAL:O	2.18	0.43
2:E:164:ILE:HG13	2:E:165:LYS:HG2	2.01	0.43
2:E:208:THR:H	2:E:790:GLN:NE2	2.02	0.43
2:E:345:CYS:SG	2:E:384:VAL:HG23	2.59	0.43
2:E:713[A]:GLN:NE2	2:E:731:PHE:HZ	2.16	0.42
2:B:53:ASP:CG	2:B:54:PHE:H	2.23	0.42
3:F:222:THR:HB	3:F:223:PRO:HD2	2.01	0.42
2:B:389:SER:HB2	2:B:392:VAL:HB	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:683:LEU:C	2:E:683:LEU:HD23	2.40	0.42
2:E:573:THR:HB	2:E:574:PRO:HD3	2.02	0.41
2:B:172:HIS:HD2	9:B:4630:HOH:O	2.02	0.41
2:B:428:PHE:HA	2:B:429:PRO:C	2.41	0.41
2:B:345:CYS:SG	2:B:384:VAL:HG23	2.60	0.41
2:E:183:ARG:HD2	2:E:373:ASP:OD1	2.21	0.41
1:A:59:VAL:CG1	1:A:64[A]:MET:HE3	2.45	0.41
2:B:387:ARG:HA	2:B:763:GLU:HG2	2.03	0.41
3:F:243:LEU:HD13	3:F:243:LEU:HA	1.93	0.41
2:E:713[A]:GLN:CG	2:E:731:PHE:CZ	3.04	0.40
2:B:621:LYS:HA	2:B:621:LYS:HD2	1.93	0.40
2:B:358:ILE:HD11	2:B:438:TYR:CE1	2.57	0.40

All (2) 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)
2:B:458:GLN:NE2	9:E:5418:HOH:O[4_477]	1.23	0.97
2:E:15:ALA:N	9:A:4033:HOH:O[4_577]	1.69	0.51

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	162/166 (98%)	159 (98%)	3 (2%)	0	100	100
1	D	159/166 (96%)	156 (98%)	3 (2%)	0	100	100
2	B	810/809 (100%)	783 (97%)	22 (3%)	5 (1%)	25	4
2	E	804/809 (99%)	772 (96%)	29 (4%)	3 (0%)	34	10
3	C	291/288 (101%)	288 (99%)	3 (1%)	0	100	100
3	F	288/288 (100%)	283 (98%)	5 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	2514/2526 (100%)	2441 (97%)	65 (3%)	8 (0%)	41	17

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	90	LEU
2	B	312	ARG
2	B	265	PRO
2	B	712	GLY
2	E	312	ARG
2	E	712	GLY
2	E	265	PRO
2	B	761	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	133/131 (102%)	132 (99%)	1 (1%)	81	58
1	D	129/131 (98%)	127 (98%)	2 (2%)	62	28
2	B	656/653 (100%)	640 (98%)	16 (2%)	49	12
2	E	651/653 (100%)	633 (97%)	18 (3%)	43	8
3	C	217/212 (102%)	209 (96%)	8 (4%)	34	3
3	F	214/212 (101%)	210 (98%)	4 (2%)	57	20
All	All	2000/1992 (100%)	1951 (98%)	49 (2%)	49	10

All (49) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	100	LEU
2	B	8	GLU
2	B	21[A]	MET
2	B	21[B]	MET

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Mol	Chain	Res	Type
2	B	90	LEU
2	B	91	ASN
2	B	159	LEU
2	B	209	TYR
2	B	251	LEU
2	B	258	HIS
2	B	313	ASP
2	B	386	TYR
2	B	393	THR
2	B	442	ASN
2	B	488	GLU
2	B	507	ASP
2	B	530	GLN
3	C	26	GLU
3	C	45	LEU
3	C	59	ASP
3	C	106	ILE
3	C	158	PHE
3	C	221[A]	ASN
3	C	221[B]	ASN
3	C	287	LYS
1	D	18	LEU
1	D	100	LEU
2	E	65	LYS
2	E	91	ASN
2	E	110	LYS
2	E	139	ASP
2	E	141	GLU
2	E	176	LYS
2	E	198	LYS
2	E	209	TYR
2	E	265	PRO
2	E	313	ASP
2	E	327	LYS
2	E	386	TYR
2	E	393	THR
2	E	442	ASN
2	E	488	GLU
2	E	507	ASP
2	E	639	ASN
2	E	790	GLN
3	F	10	ARG

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Mol	Chain	Res	Type
3	F	87	LEU
3	F	221	ASN
3	F	240	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (38) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	5	HIS
1	A	34	ASN
1	A	135	ASN
2	B	115	ASN
2	B	172	HIS
2	B	258	HIS
2	B	273	ASN
2	B	304	ASN
2	B	315	HIS
2	B	334	HIS
2	B	442	ASN
2	B	463	GLN
2	B	530	GLN
2	B	592	GLN
2	B	639	ASN
2	B	698	GLN
2	B	754	HIS
2	B	808	HIS
3	C	118	ASN
1	D	11	ASN
2	E	19	GLN
2	E	59	HIS
2	E	91	ASN
2	E	115	ASN
2	E	273	ASN
2	E	315	HIS
2	E	334	HIS
2	E	442	ASN
2	E	463	GLN
2	E	597	HIS
2	E	698	GLN
2	E	754	HIS
2	E	790	GLN
2	E	804	GLN
3	F	78	GLN

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Mol	Chain	Res	Type
3	F	79	HIS
3	F	118	ASN
3	F	221	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

11 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
7	MCN	E	4920	6	41,48,48	2.67	11 (26%)	49,74,74	1.82	9 (18%)
5	FES	A	3907	1	0,4,4	-	-	-		
6	CUN	B	3921	2,7,9	0,4,4	-	-	-		
7	MCN	B	3920	6	41,48,48	2.73	7 (17%)	49,74,74	1.71	7 (14%)
5	FES	A	3908	1	0,4,4	-	-	-		
5	FES	D	4907	1	0,4,4	-	-	-		
6	CUN	E	4921	2,7,9	0,4,4	-	-	-		
8	FAD	F	4931	-	53,58,58	1.20	3 (5%)	68,89,89	1.27	7 (10%)
5	FES	D	4908	1	0,4,4	-	-	-		
8	FAD	C	3932	-	53,58,58	1.09	3 (5%)	68,89,89	1.08	5 (7%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	PO4	A	3001	-	4,4,4	0.87	0	6,6,6	1.45	1 (16%)

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
7	MCN	E	4920	6	-	2/22/54/54	0/5/5/5
5	FES	A	3907	1	-	-	0/1/1/1
7	MCN	B	3920	6	-	2/22/54/54	0/5/5/5
5	FES	A	3908	1	-	-	0/1/1/1
5	FES	D	4907	1	-	-	0/1/1/1
8	FAD	F	4931	-	-	1/30/50/50	0/6/6/6
5	FES	D	4908	1	-	-	0/1/1/1
8	FAD	C	3932	-	-	2/30/50/50	0/6/6/6

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	E	4920	MCN	C6'-N5'	12.12	1.49	1.32
7	B	3920	MCN	C6'-N5'	9.31	1.45	1.32
7	B	3920	MCN	C10-C9'	8.06	1.62	1.52
7	B	3920	MCN	O9'-C7	7.02	1.44	1.35
7	B	3920	MCN	C6'-C7	6.35	1.53	1.43
7	E	4920	MCN	C7-N8'	5.65	1.44	1.30
8	F	4931	FAD	C4X-N5	4.96	1.40	1.30
7	B	3920	MCN	C7-N8'	4.87	1.42	1.30
7	E	4920	MCN	O9'-C7	4.60	1.41	1.35
8	C	3932	FAD	C4X-N5	4.56	1.39	1.30
7	E	4920	MCN	C2-N3	3.83	1.44	1.36
7	E	4920	MCN	O9'-C9'	-3.38	1.37	1.44
7	E	4920	MCN	O2-C2	3.14	1.29	1.23
8	F	4931	FAD	C5'-C4'	2.99	1.56	1.51
7	E	4920	MCN	C10-C9'	-2.89	1.48	1.52
7	E	4920	MCN	C6'-C7	2.87	1.47	1.43
7	E	4920	MCN	C6-C5	2.73	1.41	1.35
8	F	4931	FAD	C2A-N3A	2.62	1.36	1.32
7	B	3920	MCN	C4A-N5'	2.28	1.41	1.37
7	E	4920	MCN	C2-N1	-2.27	1.35	1.40
7	B	3920	MCN	O4D-C1'	-2.26	1.36	1.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	C	3932	FAD	C10-N1	2.16	1.37	1.33
7	E	4920	MCN	C4A-N5'	2.12	1.41	1.37
8	C	3932	FAD	C4A-N3A	-2.03	1.32	1.35

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	E	4920	MCN	O9'-C7-N8'	-6.54	107.19	115.30
7	B	3920	MCN	N1'-C2'-N3'	-5.56	119.81	127.22
7	E	4920	MCN	N1'-C2'-N3'	-5.54	119.84	127.22
7	B	3920	MCN	O9'-C7-N8'	-5.30	108.73	115.30
7	B	3920	MCN	C2'-N1'-C4B	4.54	120.54	115.36
8	F	4931	FAD	C9A-C5X-N5	-3.78	118.33	122.43
8	F	4931	FAD	N3A-C2A-N1A	-3.42	123.34	128.68
7	B	3920	MCN	N2'-C2'-N1'	3.36	123.26	117.79
7	E	4920	MCN	C7-N8'-C4B	3.26	119.38	116.61
7	B	3920	MCN	C2'-N3'-C4'	3.19	124.47	116.43
8	F	4931	FAD	C4X-C10-N10	3.01	120.88	116.48
4	A	3001	PO4	O3-P-O2	2.98	117.53	107.97
8	C	3932	FAD	C5A-C6A-N6A	2.85	124.68	120.35
7	E	4920	MCN	O2-C2-N3	-2.65	118.02	122.33
8	F	4931	FAD	C5X-C9A-N10	2.65	120.69	117.95
7	E	4920	MCN	C2'-N3'-C4'	2.59	122.97	116.43
8	C	3932	FAD	N3A-C2A-N1A	-2.59	124.63	128.68
8	C	3932	FAD	O4B-C1B-C2B	-2.46	103.34	106.93
8	C	3932	FAD	C4X-C4-N3	2.38	119.23	113.19
8	F	4931	FAD	C10-C4X-N5	-2.37	119.82	124.86
7	E	4920	MCN	C5-C6-N1	-2.34	117.89	121.81
7	E	4920	MCN	C2'-N1'-C4B	2.27	117.95	115.36
8	C	3932	FAD	C4X-C10-N10	2.20	119.70	116.48
8	F	4931	FAD	O4'-C4'-C5'	-2.16	105.07	109.92
7	B	3920	MCN	O5'-PA-O1A	-2.15	100.65	109.07
8	F	4931	FAD	C6-C5X-N5	2.15	122.26	118.51
7	E	4920	MCN	C6-N1-C2	2.03	124.01	120.49
7	E	4920	MCN	C3'-C2D-C1'	2.01	105.25	101.43
7	B	3920	MCN	O4'-C4'-C4A	2.01	123.43	119.67

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	B	3920	MCN	C10-O3B-PB-O1B

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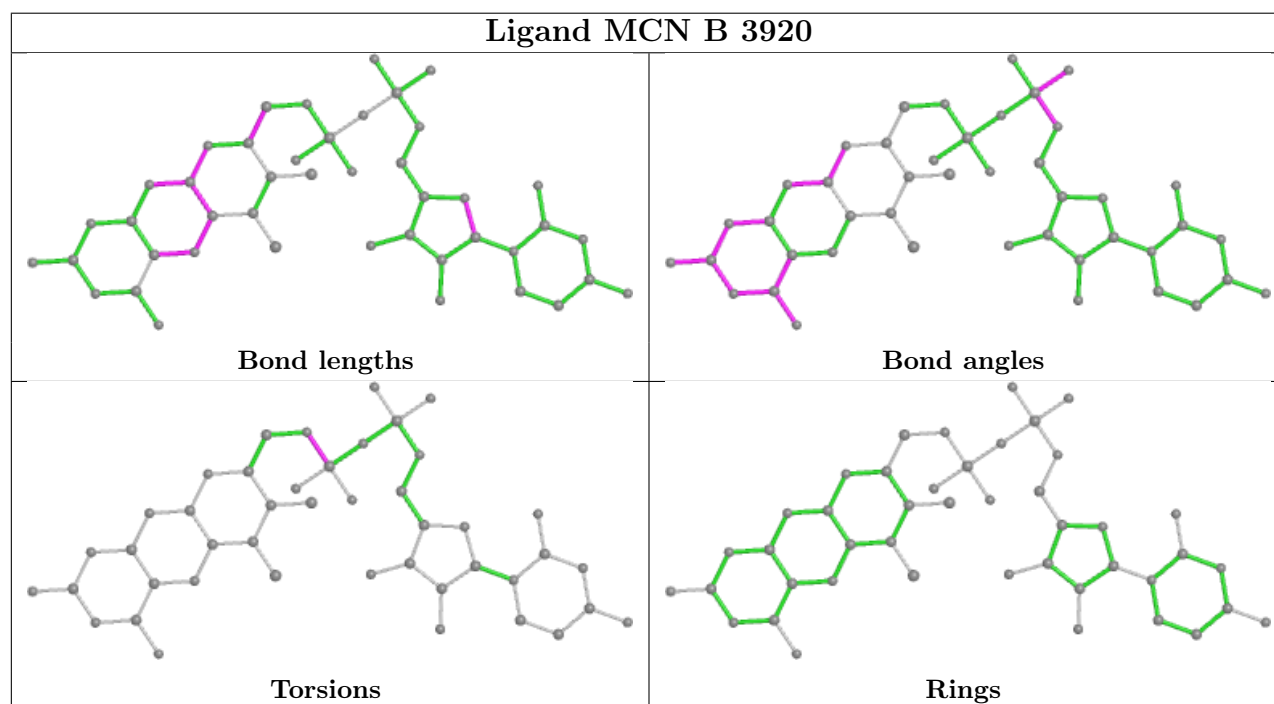
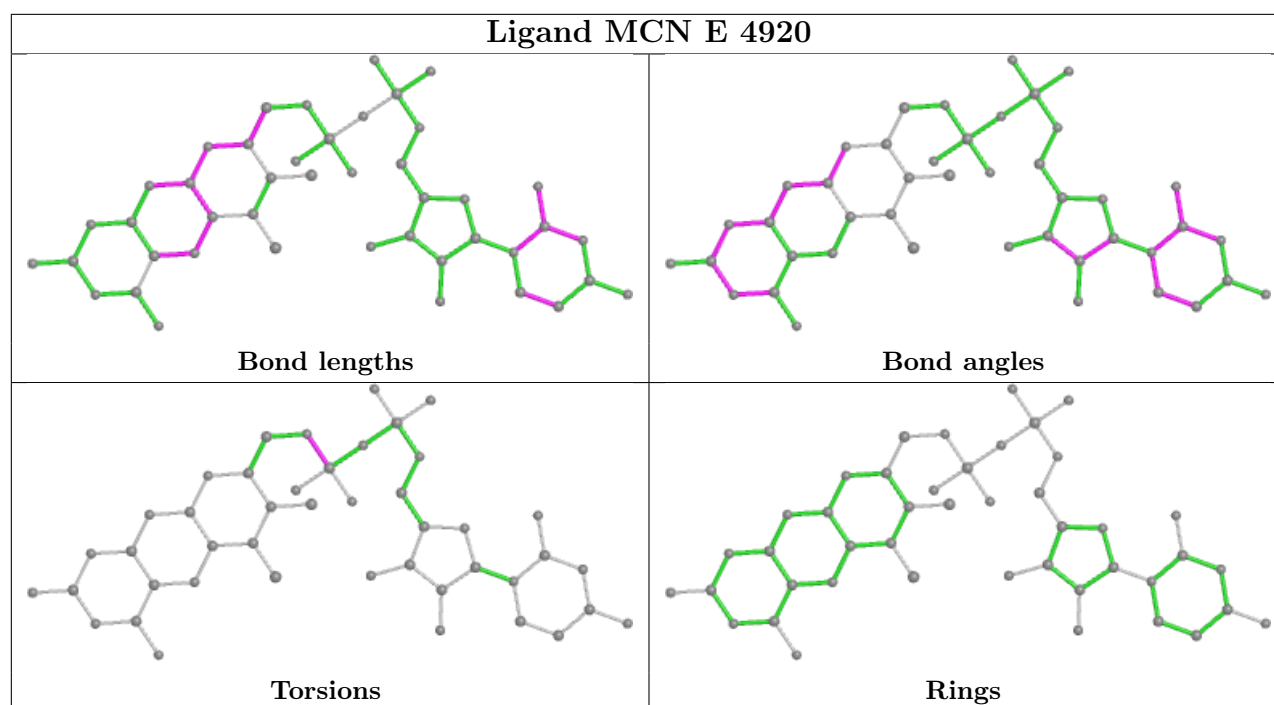
Mol	Chain	Res	Type	Atoms
7	E	4920	MCN	C10-O3B-PB-O1B
7	B	3920	MCN	C10-O3B-PB-O3A
7	E	4920	MCN	C10-O3B-PB-O3A
8	C	3932	FAD	PA-O3P-P-O1P
8	C	3932	FAD	PA-O3P-P-O2P
8	F	4931	FAD	PA-O3P-P-O2P

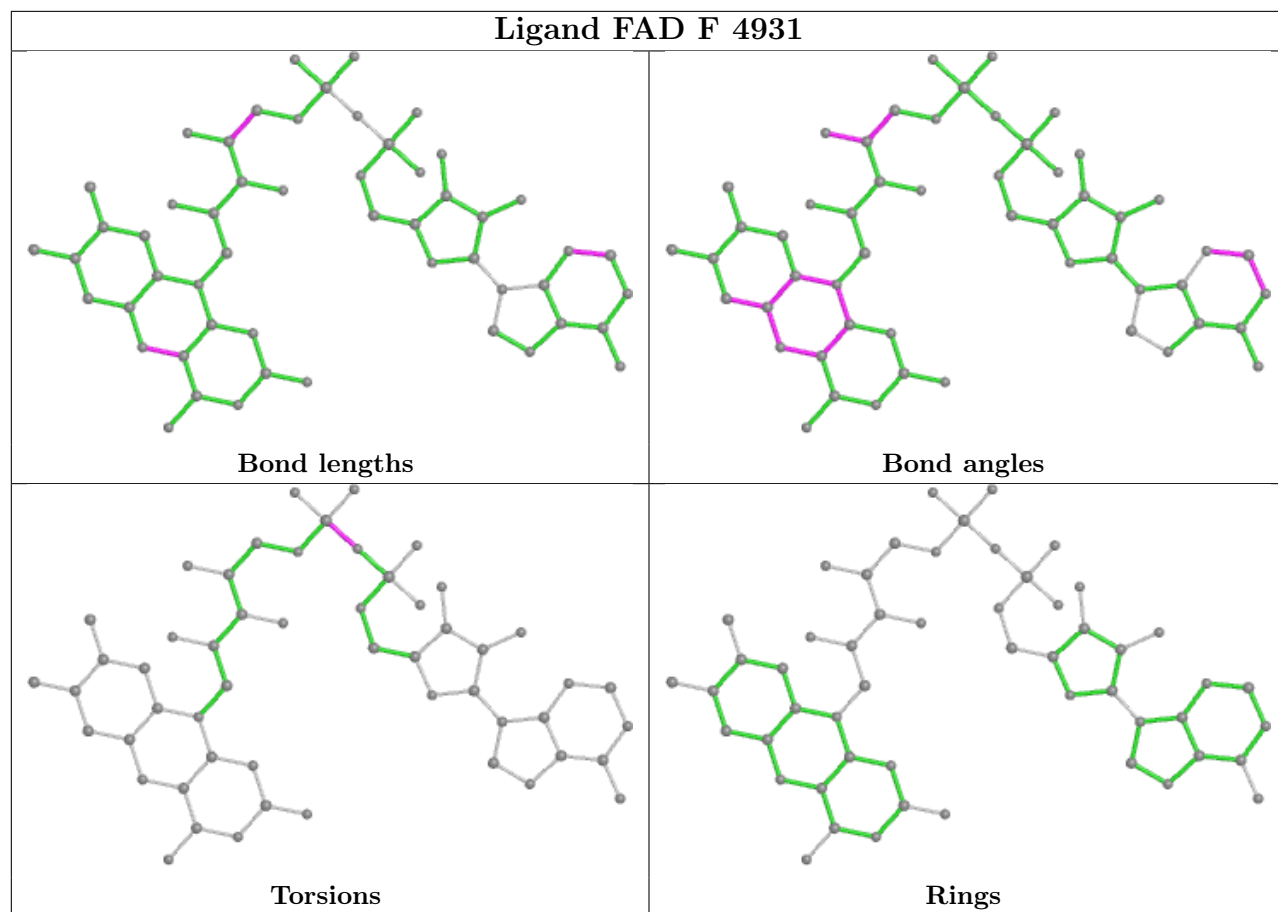
There are no ring outliers.

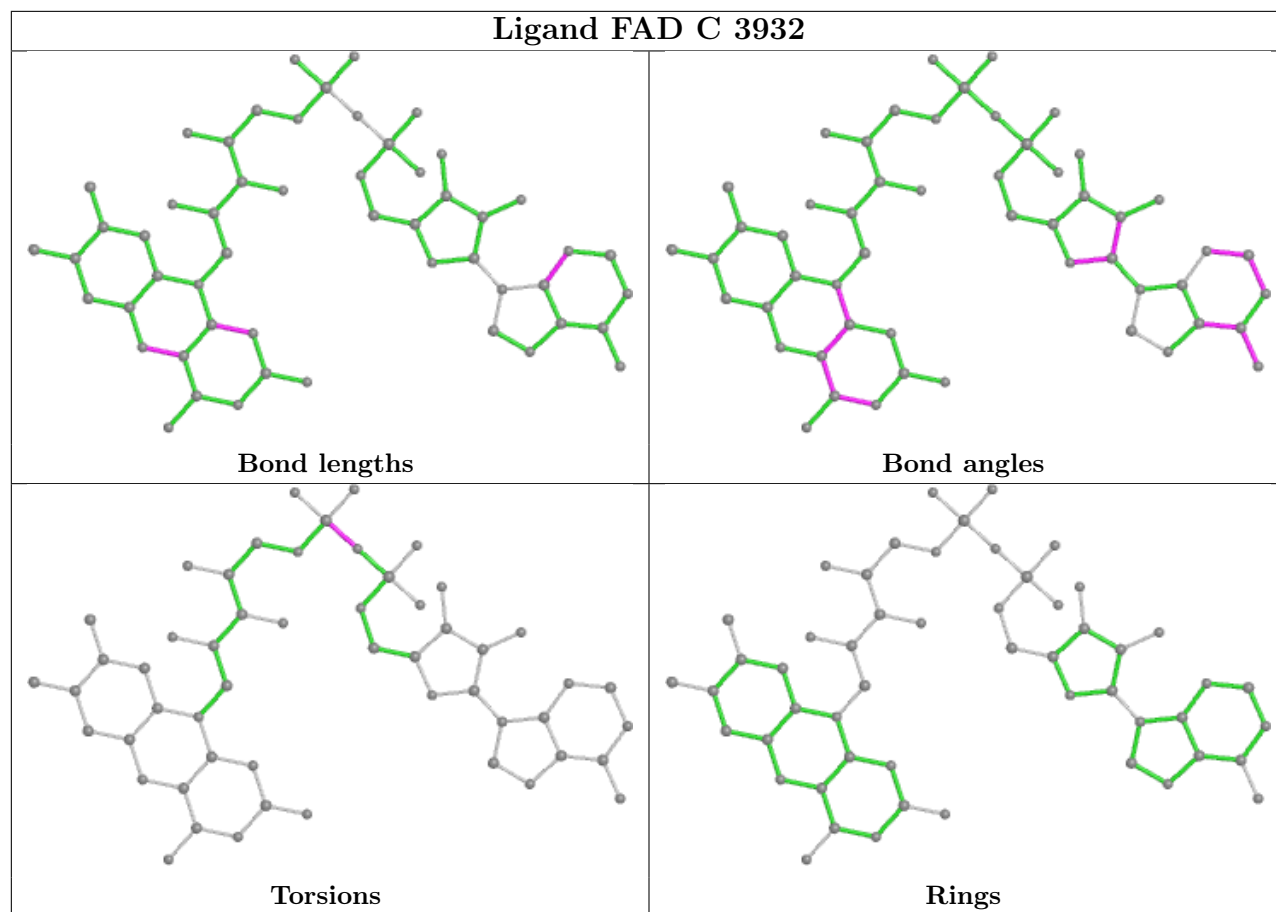
4 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	3921	CUN	1	0
8	F	4931	FAD	3	0
8	C	3932	FAD	1	0
4	A	3001	PO4	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.