wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 15, 2023 – 09:45 AM EDT

PDB ID	:	1T3Q
Title	:	Crystal structure of quinoline 2-Oxidoreductase from Pseudomonas Putida 86
Authors	:	Bonin, I.; Martins, B.M.; Purvanov, V.; Fetzner, S.; Huber, R.; Dobbek, H.
Deposited on	:	2004-04-27
Resolution	:	1.80 Å(reported)

The following versions of software and data (see references ⓘ) were used in the production of this report:

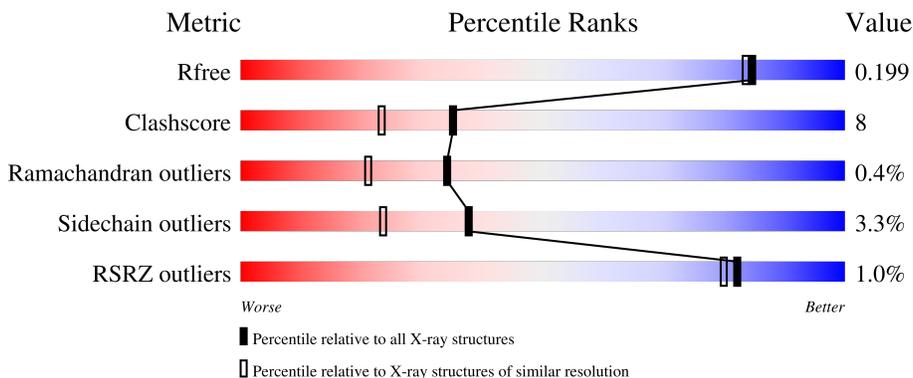|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

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 1.80 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	Percentile Ranks	Value
Rfree		0.199
Clashscore		8
Ramachandran outliers		0.4%
Sidechain outliers		3.3%
RSRZ outliers		1.0%

Worse   *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5950 (1.80-1.80)
Clashscore	141614	6793 (1.80-1.80)
Ramachandran outliers	138981	6697 (1.80-1.80)
Sidechain outliers	138945	6696 (1.80-1.80)
RSRZ outliers	127900	5850 (1.80-1.80)

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 <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	168	2% / 81% / 15% · ·
1	D	168	2% / 83% / 12% · ·
2	B	788	% / 83% / 15% ·
2	E	788	% / 83% / 15% ·
3	C	288	% / 81% / 17% ··

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Mol	Chain	Length	Quality of chain
3	F	288	% 84% 13% ..

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	GOL	A	3909	-	X	-	-
5	GOL	B	3902	-	X	-	-
5	GOL	B	3906	-	X	-	-
5	GOL	C	3907	-	X	-	-
5	GOL	C	3908	-	X	-	-
5	GOL	E	3901	-	X	-	-
5	GOL	E	3904	-	X	-	-
5	GOL	E	3905	-	X	-	-
5	GOL	F	3903	-	X	-	-

2 Entry composition ⓘ

There are 10 unique types of molecules in this entry. The entry contains 21323 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 quinoline 2-oxidoreductase small subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	162	Total 1201	C 733	N 220	O 234	S 14	23	0	0
1	D	162	Total 1201	C 733	N 220	O 234	S 14	34	0	0

- Molecule 2 is a protein called quinoline 2-oxidoreductase large subunit.

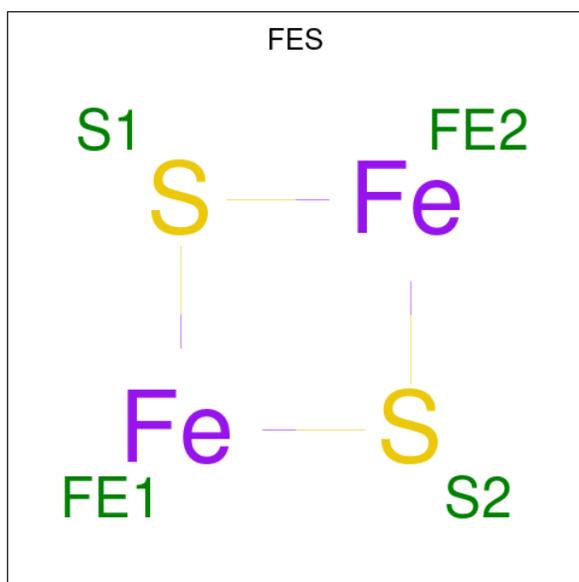| Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	786	Total 5899	C 3704	N 1043	O 1128	S 24	99	0	0
2	E	786	Total 5899	C 3704	N 1043	O 1128	S 24	84	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	465	GLU	ASP	SEE REMARK 999	UNP P72224
B	466	VAL	CYS	SEE REMARK 999	UNP P72224
E	465	GLU	ASP	SEE REMARK 999	UNP P72224
E	466	VAL	CYS	SEE REMARK 999	UNP P72224

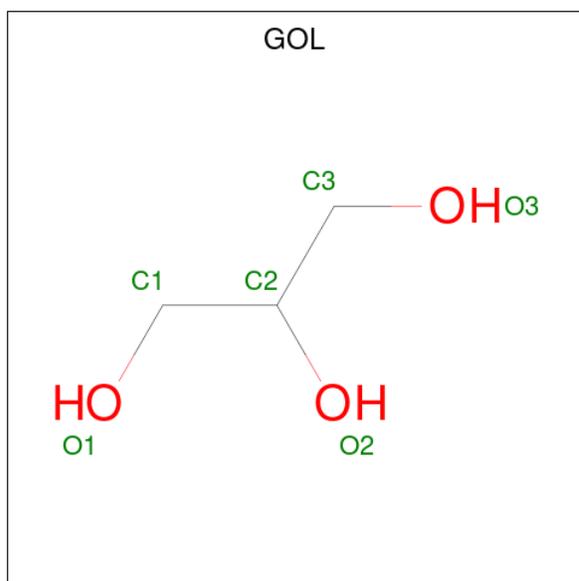- Molecule 3 is a protein called quinoline 2-oxidoreductase medium subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	285	Total 2139	C 1353	N 381	O 393	S 12	64	0	0
3	F	285	Total 2139	C 1353	N 381	O 393	S 12	51	0	0

- Molecule 4 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe_2S_2).

FES

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

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

GOL

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total 6	C 3	O 3	0	0
5	B	1	Total 6	C 3	O 3	0	0
5	B	1	Total 6	C 3	O 3	0	0
5	C	1	Total 6	C 3	O 3	0	0
5	C	1	Total 6	C 3	O 3	0	0
5	E	1	Total 6	C 3	O 3	0	0
5	E	1	Total 6	C 3	O 3	0	0
5	E	1	Total 6	C 3	O 3	0	0
5	F	1	Total 6	C 3	O 3	0	0

- Molecule 6 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	B	1	Total 5	O 4	S 1	0	0
6	B	1	Total 5	O 4	S 1	0	0
6	B	1	Total 5	O 4	S 1	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	B	1	Total 5	O 4	S 1	0	0
6	E	1	Total 5	O 4	S 1	0	0
6	E	1	Total 5	O 4	S 1	0	0
6	E	1	Total 5	O 4	S 1	0	0
6	E	1	Total 5	O 4	S 1	0	0

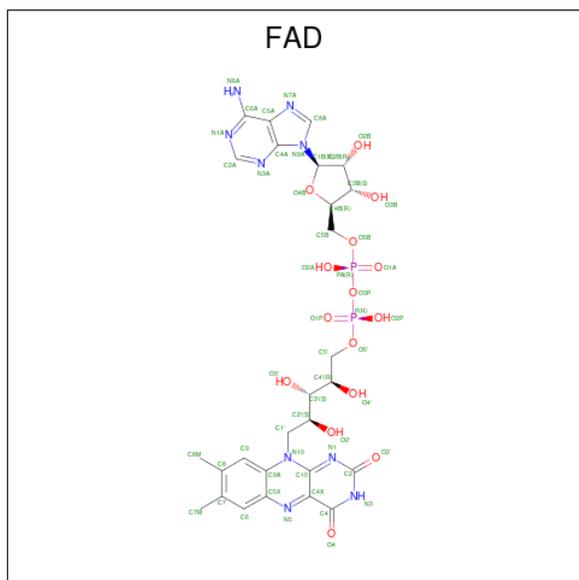- Molecule 7 is PTERIN CYTOSINE DINUCLEOTIDE (three-letter code: MCN) (formula: $C_{19}H_{22}N_8O_{13}P_2S_2$).
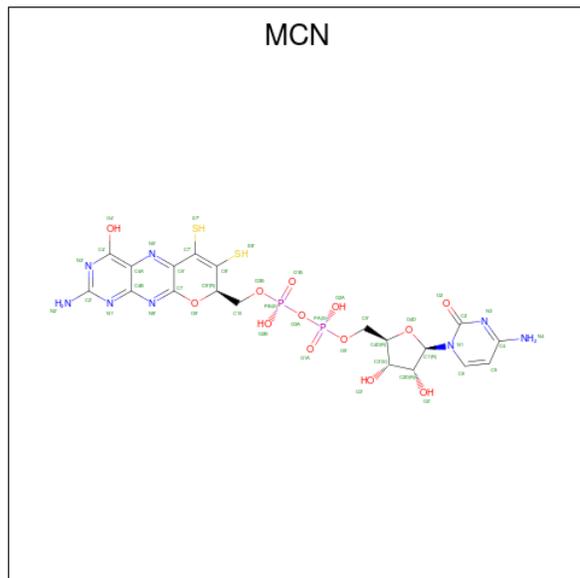
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
7	B	1	Total 44	C 19	N 8	O 13	P 2	S 2	0	0
7	E	1	Total 44	C 19	N 8	O 13	P 2	S 2	0	0

- Molecule 8 is DIOXOSULFIDOMOLYBDENUM(VI) ION (three-letter code: SMO) (formula: MoO_2S).
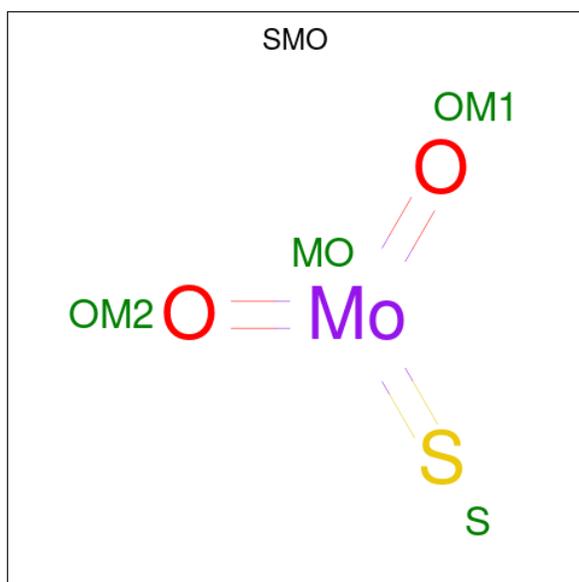
SMO

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
8	B	1	Total	Mo	O	S	0	0
			4	1	2	1		
8	E	1	Total	Mo	O	S	0	0
			4	1	2	1		

- Molecule 9 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).

FAD

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

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

- Molecule 10 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	192	Total 192	O 192	0	0
10	B	806	Total 806	O 806	0	0
10	C	272	Total 272	O 272	0	0
10	D	178	Total 178	O 178	0	0
10	E	776	Total 776	O 776	0	0
10	F	309	Total 309	O 309	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 and electron density. 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. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). 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.
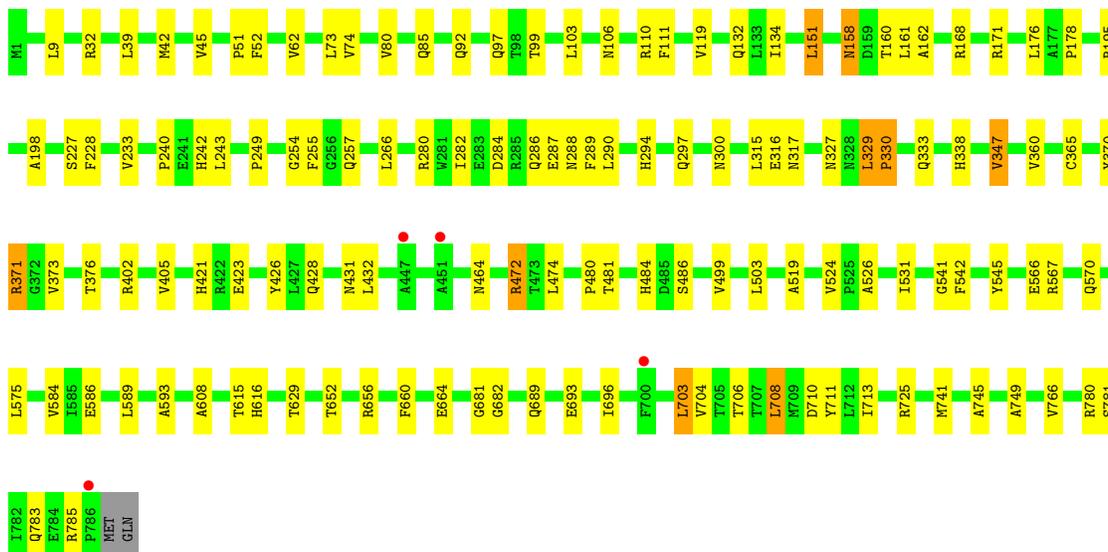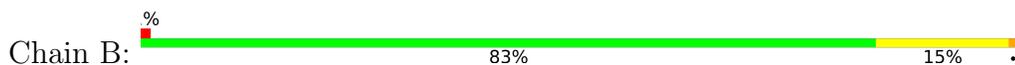
- Molecule 1: quinoline 2-oxidoreductase small subunit
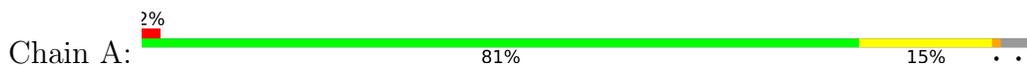
Chain A:

- Molecule 1: quinoline 2-oxidoreductase small subunit

Chain D:

- Molecule 2: quinoline 2-oxidoreductase large subunit

Chain B:

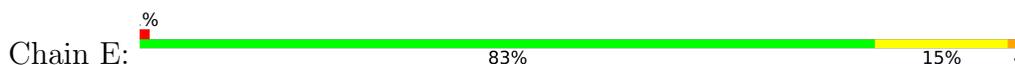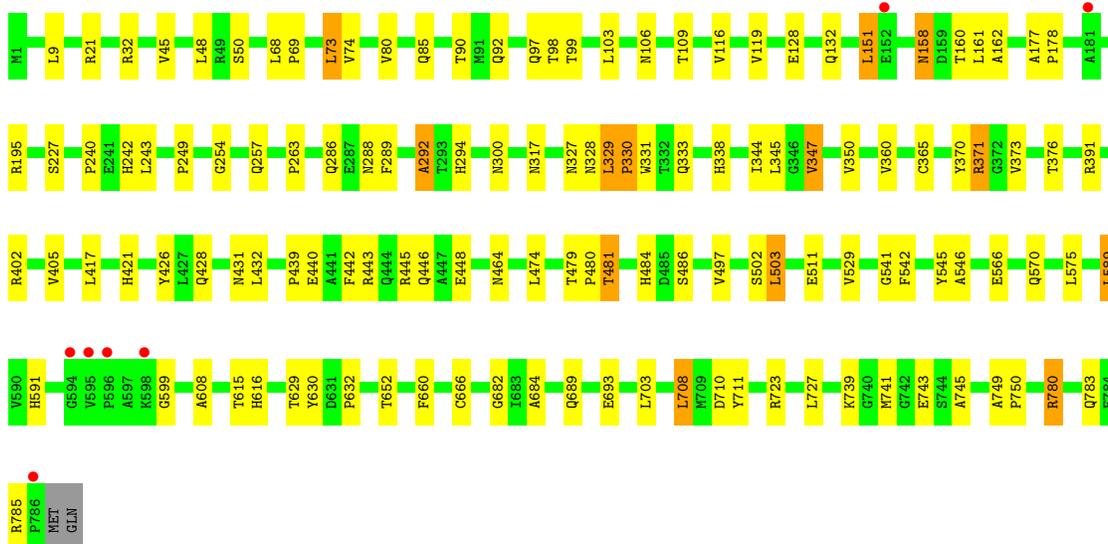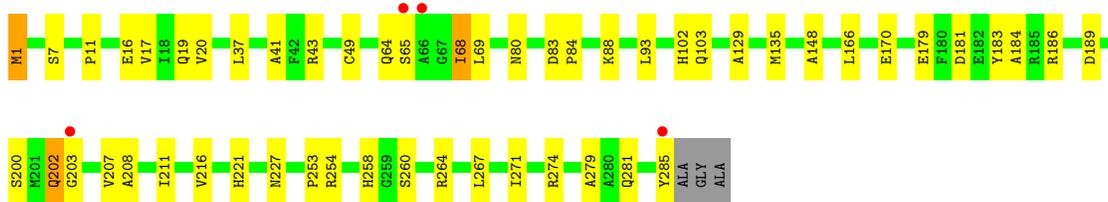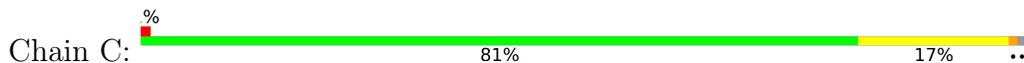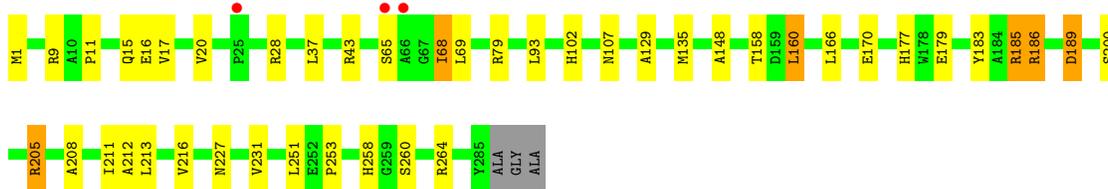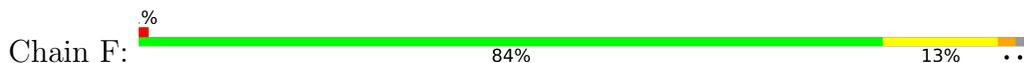- Molecule 2: quinoline 2-oxidoreductase large subunit

Chain E:
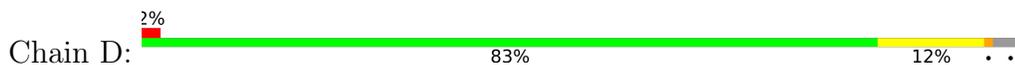
• Molecule 3: quinoline 2-oxidoreductase medium subunit

• Molecule 3: quinoline 2-oxidoreductase medium subunit

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	278.32Å 72.10Å 202.65Å 90.00° 127.98° 90.00°	Depositor
Resolution (Å)	19.29 – 1.80 19.29 – 1.75	Depositor EDS
% Data completeness (in resolution range)	96.2 (19.29-1.80) 95.1 (19.29-1.75)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$<I/\sigma(I)>$ [1]	4.23 (at 1.75Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.186 , 0.207 0.178 , 0.199	Depositor DCC
R_{free} test set	13956 reflections (4.61%)	wwPDB-VP
Wilson B-factor (Å^2)	17.3	Xtriage
Anisotropy	0.299	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 58.4	EDS
L-test for twinning[2]	$<|L|> = 0.48$, $<L^2> = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	21323	wwPDB-VP
Average B, all atoms (Å^2)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.09% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $<|L|>$, $<L^2>$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

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, SMO, GOL, SO4, FAD

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	0.32	0/1214	0.63	1/1638 (0.1%)
1	D	0.29	0/1214	0.62	1/1638 (0.1%)
2	B	0.31	0/6002	0.64	0/8169
2	E	0.30	0/6002	0.63	0/8169
3	C	0.29	0/2177	0.59	0/2951
3	F	0.29	0/2177	0.58	0/2951
All	All	0.30	0/18786	0.62	2/25516 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	145	THR	N-CA-C	5.04	124.59	111.00
1	D	145	THR	N-CA-C	5.01	124.52	111.00

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	1201	0	1196	20	0
1	D	1201	0	1196	19	0
2	B	5899	0	5916	103	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	E	5899	0	5916	97	0
3	C	2139	0	2176	39	0
3	F	2139	0	2176	36	0
4	A	8	0	0	0	0
4	D	8	0	0	1	0
5	A	6	0	4	1	0
5	B	12	0	8	1	0
5	C	12	0	8	0	0
5	E	18	0	12	1	0
5	F	6	0	4	2	0
6	B	20	0	0	1	0
6	E	20	0	0	0	0
7	B	44	0	17	2	0
7	E	44	0	17	1	0
8	B	4	0	0	1	0
8	E	4	0	0	1	0
9	C	53	0	31	0	0
9	F	53	0	31	0	0
10	A	192	0	0	4	0
10	B	806	0	0	11	0
10	C	272	0	0	4	0
10	D	178	0	0	2	0
10	E	776	0	0	10	0
10	F	309	0	0	6	0
All	All	21323	0	18708	301	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 8.

The worst 5 of 301 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:347:VAL:HG13	2:E:405:VAL:HG23	1.45	0.98
2:E:402:ARG:HE	2:E:431:ASN:HD21	1.15	0.94
2:E:97:GLN:HE22	2:E:162:ALA:H	1.18	0.91
2:B:402:ARG:HE	2:B:431:ASN:HD21	1.15	0.90
1:D:86:LEU:HD21	1:D:119:ARG:HD2	1.50	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	160/168 (95%)	157 (98%)	3 (2%)	0	100	100
1	D	160/168 (95%)	156 (98%)	4 (2%)	0	100	100
2	B	784/788 (100%)	764 (97%)	16 (2%)	4 (0%)	29	15
2	E	784/788 (100%)	762 (97%)	17 (2%)	5 (1%)	25	12
3	C	283/288 (98%)	276 (98%)	7 (2%)	0	100	100
3	F	283/288 (98%)	280 (99%)	3 (1%)	0	100	100
All	All	2454/2488 (99%)	2395 (98%)	50 (2%)	9 (0%)	34	21

5 of 9 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	371	ARG
2	E	371	ARG
2	E	373	VAL
2	B	373	VAL
2	B	741	MET

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	129/134 (96%)	127 (98%)	2 (2%)	62	54
1	D	129/134 (96%)	127 (98%)	2 (2%)	62	54
2	B	618/620 (100%)	601 (97%)	17 (3%)	43	30

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	E	618/620 (100%)	600 (97%)	18 (3%)	42	29
3	C	218/218 (100%)	205 (94%)	13 (6%)	19	7
3	F	218/218 (100%)	206 (94%)	12 (6%)	21	8
All	All	1930/1944 (99%)	1866 (97%)	64 (3%)	38	23

5 of 64 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	F	135	MET
3	F	166	LEU
3	C	88	LYS
3	C	69	LEU
3	F	185	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 71 such sidechains are listed below:

Mol	Chain	Res	Type
2	E	616	HIS
2	E	678	GLN
3	F	107	ASN
2	B	689	GLN
2	B	678	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 monosaccharides in this entry.

5.6 Ligand geometry ⓘ

27 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	#$\|Z\| > 2$
6	SO4	E	3104	-	4,4,4	0.26	0	6,6,6	0.07	0
6	SO4	B	3101	-	4,4,4	0.28	0	6,6,6	0.05	0
6	SO4	B	3105	-	4,4,4	0.26	0	6,6,6	0.06	0
7	MCN	B	4921	8	41,48,48	3.34	14 (34%)	49,74,74	2.05	13 (26%)
8	SMO	E	4922	7	0,3,3	-	-	-		
5	GOL	B	3902	-	5,5,5	4.51	5 (100%)	5,5,5	5.78	3 (60%)
6	SO4	B	3102	-	4,4,4	0.27	0	6,6,6	0.05	0
6	SO4	B	3100	-	4,4,4	0.25	0	6,6,6	0.05	0
4	FES	A	4908	1	0,4,4	-	-	-		
4	FES	D	4909	1	0,4,4	-	-	-		
4	FES	D	4910	1	0,4,4	-	-	-		
9	FAD	C	4931	-	53,58,58	1.96	20 (37%)	68,89,89	1.20	8 (11%)
5	GOL	E	3904	-	5,5,5	4.54	5 (100%)	5,5,5	5.80	3 (60%)
9	FAD	F	4932	-	53,58,58	1.96	18 (33%)	68,89,89	1.20	7 (10%)
5	GOL	E	3901	-	5,5,5	4.52	5 (100%)	5,5,5	5.77	3 (60%)
5	GOL	F	3903	-	5,5,5	4.52	5 (100%)	5,5,5	5.77	3 (60%)
5	GOL	E	3905	-	5,5,5	4.51	5 (100%)	5,5,5	5.71	3 (60%)
5	GOL	C	3907	-	5,5,5	4.51	5 (100%)	5,5,5	5.75	3 (60%)
6	SO4	E	3103	-	4,4,4	0.25	0	6,6,6	0.07	0
7	MCN	E	4920	8	41,48,48	3.37	15 (36%)	49,74,74	2.06	14 (28%)
4	FES	A	4907	1	0,4,4	-	-	-		
5	GOL	A	3909	-	5,5,5	4.51	5 (100%)	5,5,5	5.76	3 (60%)
6	SO4	E	3106	-	4,4,4	0.27	0	6,6,6	0.04	0
6	SO4	E	3107	-	4,4,4	0.30	0	6,6,6	0.05	0
8	SMO	B	4923	7	0,3,3	-	-	-		
5	GOL	B	3906	-	5,5,5	4.57	5 (100%)	5,5,5	5.77	3 (60%)
5	GOL	C	3908	-	5,5,5	4.53	5 (100%)	5,5,5	5.76	3 (60%)

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	8	-	6/22/54/54	0/5/5/5
5	GOL	B	3902	-	-	2/4/4/4	-
5	GOL	E	3904	-	-	2/4/4/4	-
9	FAD	C	4931	-	-	11/30/50/50	0/6/6/6
9	FAD	F	4932	-	-	12/30/50/50	0/6/6/6
5	GOL	E	3901	-	-	2/4/4/4	-
4	FES	A	4907	1	-	-	0/1/1/1
5	GOL	A	3909	-	-	3/4/4/4	-
5	GOL	F	3903	-	-	2/4/4/4	-
4	FES	A	4908	1	-	-	0/1/1/1
4	FES	D	4909	1	-	-	0/1/1/1
4	FES	D	4910	1	-	-	0/1/1/1
5	GOL	E	3905	-	-	3/4/4/4	-
7	MCN	B	4921	8	-	5/22/54/54	0/5/5/5
5	GOL	C	3907	-	-	3/4/4/4	-
5	GOL	B	3906	-	-	2/4/4/4	-
5	GOL	C	3908	-	-	3/4/4/4	-

The worst 5 of 112 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	E	4920	MCN	C6'-N5'	14.07	1.52	1.32
7	B	4921	MCN	C6'-N5'	13.99	1.52	1.32
7	E	4920	MCN	C7-N8'	8.44	1.51	1.30
7	B	4921	MCN	C7-N8'	8.18	1.50	1.30
5	C	3907	GOL	C3-C2	-7.53	1.20	1.51

The worst 5 of 69 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	E	3904	GOL	O3-C3-C2	10.60	161.02	110.20
5	B	3906	GOL	O3-C3-C2	10.51	160.61	110.20
5	E	3901	GOL	O3-C3-C2	10.49	160.48	110.20
5	A	3909	GOL	O3-C3-C2	10.47	160.41	110.20
5	C	3908	GOL	O3-C3-C2	10.45	160.32	110.20

There are no chirality outliers.
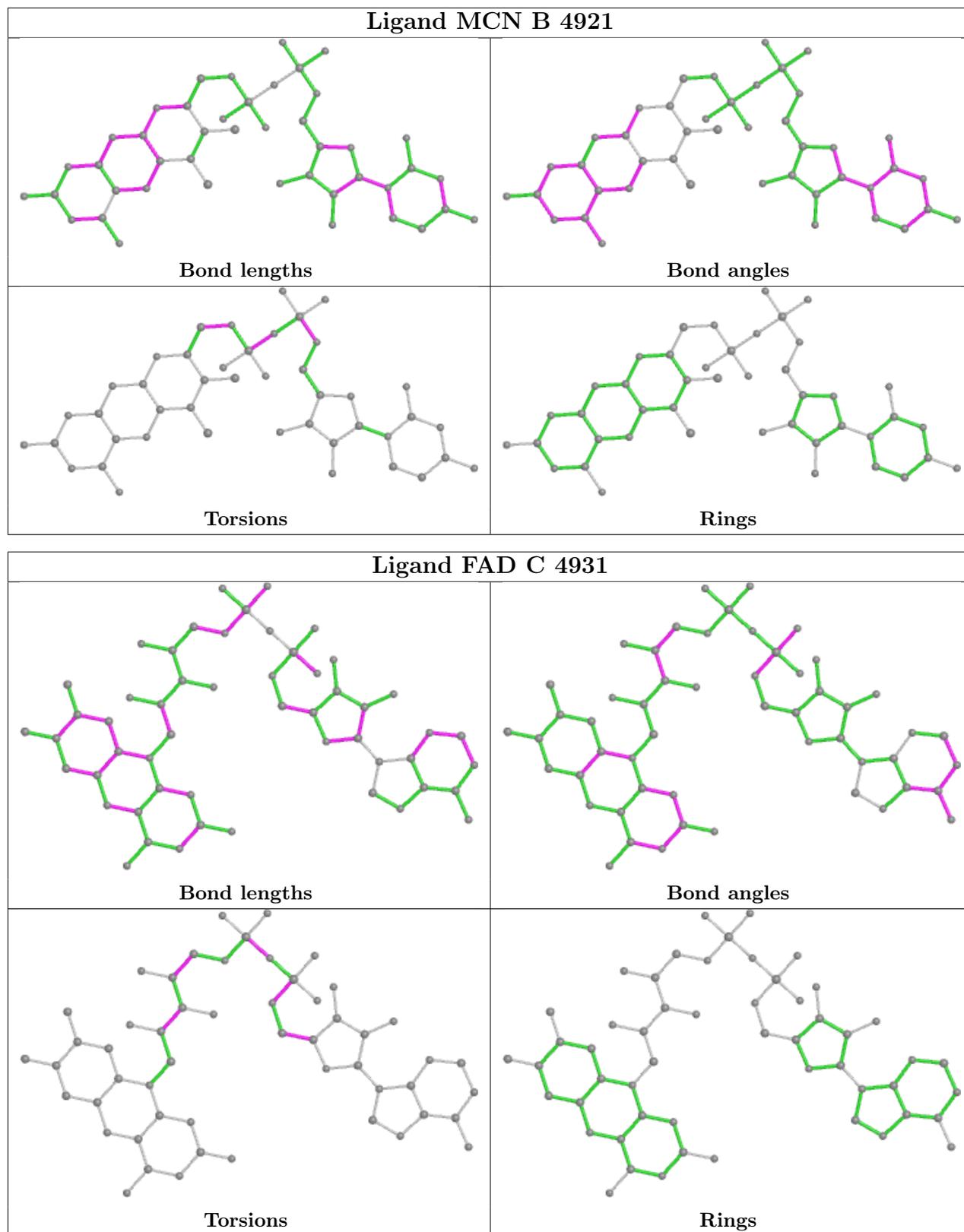
5 of 56 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	3909	GOL	O1-C1-C2-C3
5	A	3909	GOL	C1-C2-C3-O3
5	B	3902	GOL	O1-C1-C2-C3
5	B	3902	GOL	C1-C2-C3-O3
5	B	3906	GOL	C1-C2-C3-O3

There are no ring outliers.

10 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	3101	SO4	1	0
7	B	4921	MCN	2	0
8	E	4922	SMO	1	0
4	D	4910	FES	1	0
5	E	3904	GOL	1	0
5	F	3903	GOL	2	0
7	E	4920	MCN	1	0
5	A	3909	GOL	1	0
8	B	4923	SMO	1	0
5	B	3906	GOL	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 then 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 MCN B 4921

Bond lengths

Bond angles

Torsions

Rings

Ligand FAD C 4931

Bond lengths

Bond angles

Torsions

Rings

Ligand FAD F 4932

Bond lengths

Bond angles

Torsions

Rings

Ligand MCN E 4920

Bond lengths

Bond angles

Torsions

Rings
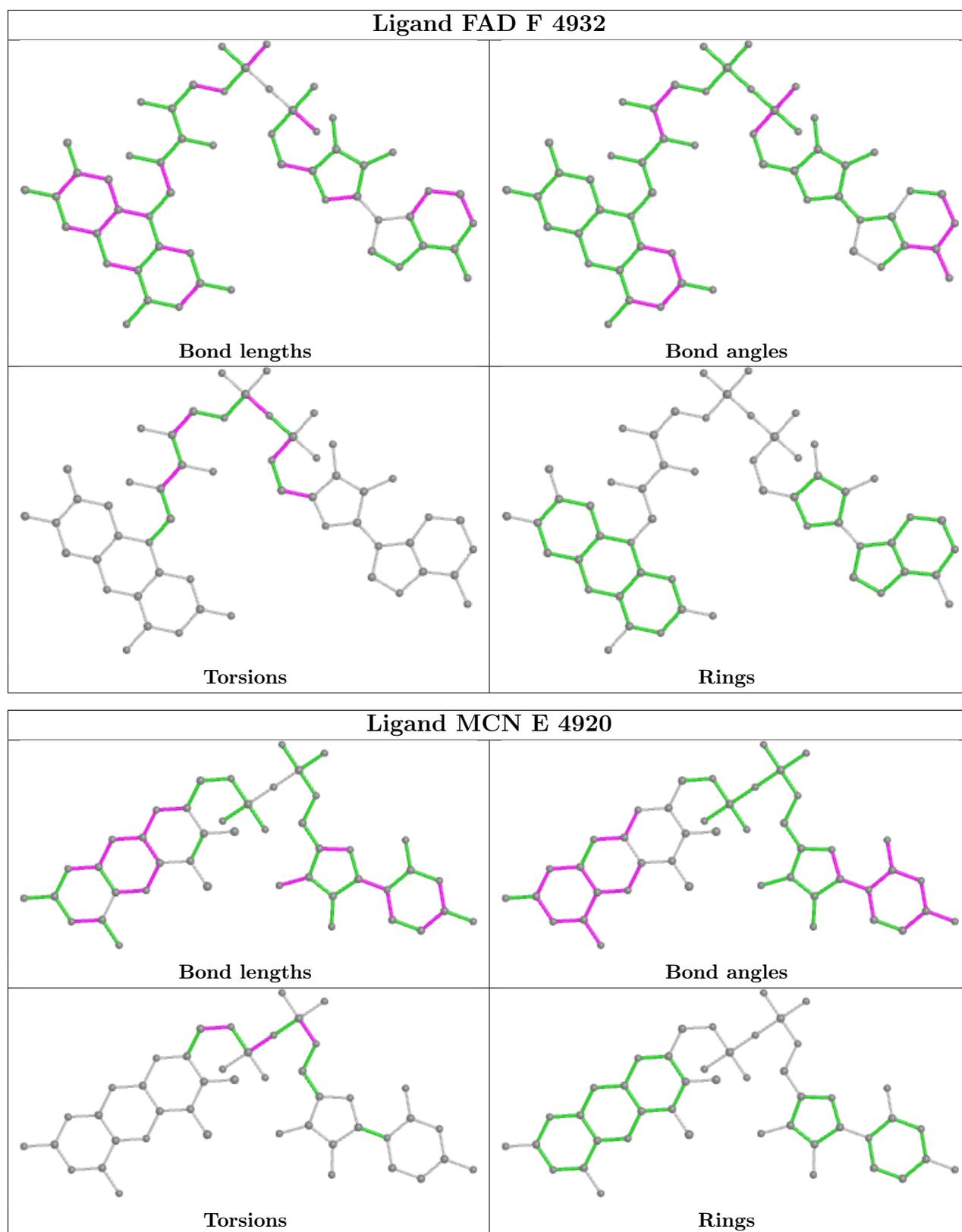
5.7   Other polymers ⓘ

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 ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	\<RSRZ\>	#RSRZ>2			OWAB(Å²)	Q<0.9
1	A	162/168 (96%)	-0.41	4 (2%)	57	52	14, 20, 33, 64	6 (3%)
1	D	162/168 (96%)	-0.48	3 (1%)	66	63	16, 22, 35, 59	8 (4%)
2	B	786/788 (99%)	-0.61	4 (0%)	91	89	13, 21, 33, 54	26 (3%)
2	E	786/788 (99%)	-0.48	7 (0%)	84	82	15, 23, 37, 59	26 (3%)
3	C	285/288 (98%)	-0.31	4 (1%)	75	72	17, 26, 39, 58	18 (6%)
3	F	285/288 (98%)	-0.30	3 (1%)	80	78	18, 26, 38, 50	15 (5%)
All	All	2466/2488 (99%)	-0.47	25 (1%)	82	80	13, 23, 36, 64	99 (4%)

The worst 5 of 25 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	7	SER	16.0
2	E	594	GLY	6.2
1	A	8	GLN	5.8
1	D	166	GLY	5.1
2	E	786	PRO	3.8

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

WORLDWIDE
wwPDB
PROTEIN DATA BANK

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	GOL	B	3902	6/6	0.51	0.29	49,52,52,53	0
5	GOL	C	3908	6/6	0.60	0.24	55,57,57,57	0
6	SO4	B	3102	5/5	0.61	0.25	100,100,101,101	0
5	GOL	A	3909	6/6	0.63	0.21	44,50,51,52	0
6	SO4	E	3106	5/5	0.64	0.24	100,100,100,101	0
5	GOL	E	3901	6/6	0.66	0.17	67,67,68,68	0
5	GOL	F	3903	6/6	0.74	0.23	64,65,65,66	0
6	SO4	B	3100	5/5	0.82	0.31	92,93,93,93	0
6	SO4	B	3105	5/5	0.84	0.21	69,69,70,70	0
5	GOL	B	3906	6/6	0.87	0.21	41,44,46,47	0
5	GOL	C	3907	6/6	0.88	0.12	26,31,33,35	0
6	SO4	E	3103	5/5	0.89	0.15	73,74,74,74	0
5	GOL	E	3904	6/6	0.91	0.18	27,33,39,46	0
6	SO4	B	3101	5/5	0.91	0.18	59,59,60,61	0
5	GOL	E	3905	6/6	0.92	0.09	24,26,27,27	0
6	SO4	E	3107	5/5	0.95	0.18	37,38,38,40	0
7	MCN	B	4921	44/44	0.95	0.10	13,20,25,26	0
7	MCN	E	4920	44/44	0.95	0.09	19,24,26,29	0
6	SO4	E	3104	5/5	0.96	0.16	68,68,69,69	0
9	FAD	F	4932	53/53	0.96	0.07	9,20,22,24	1
9	FAD	C	4931	53/53	0.97	0.06	10,19,22,24	0
8	SMO	B	4923	4/4	0.97	0.16	26,27,28,28	0
8	SMO	E	4922	4/4	0.99	0.13	27,28,28,29	0
4	FES	A	4907	4/4	0.99	0.04	14,15,16,18	0
4	FES	D	4910	4/4	0.99	0.03	14,15,16,17	0
4	FES	A	4908	4/4	1.00	0.03	16,17,17,18	0
4	FES	D	4909	4/4	1.00	0.03	16,16,17,17	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.
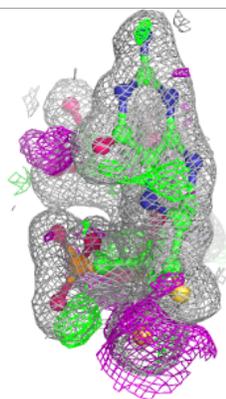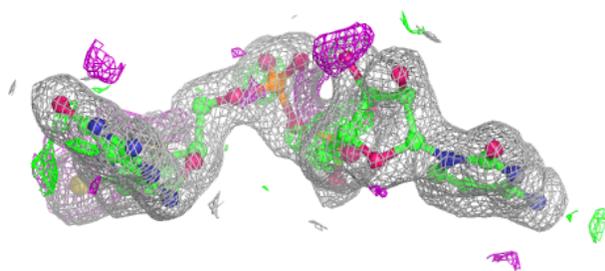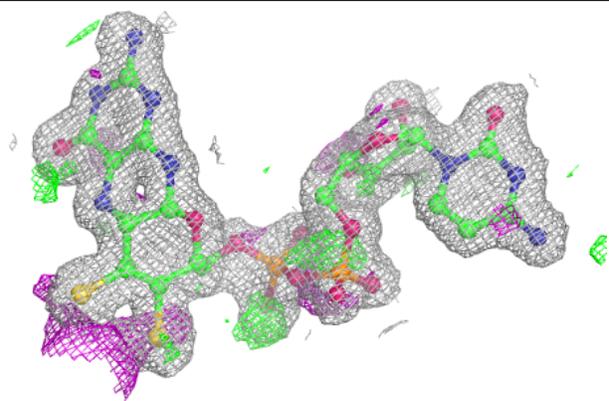
Electron density around MCN B 4921:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
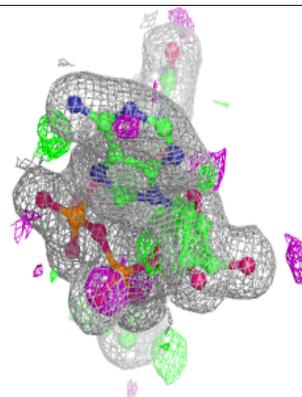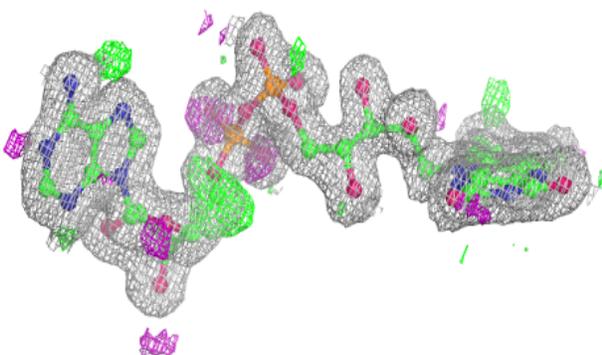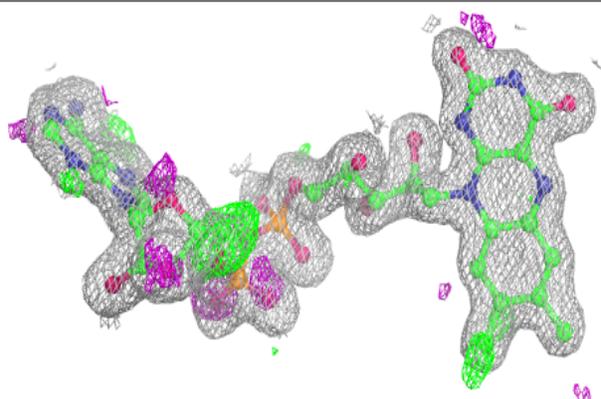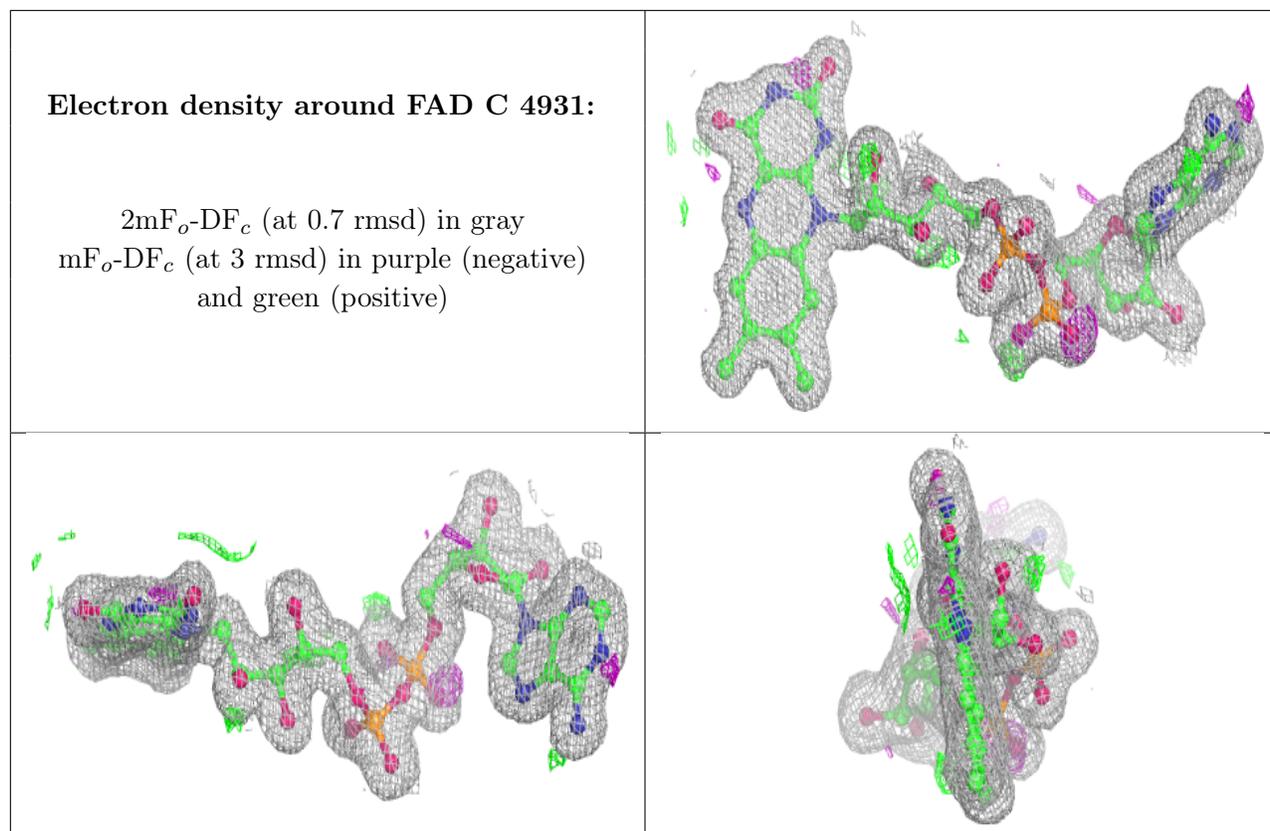mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
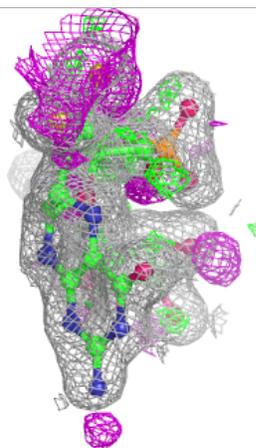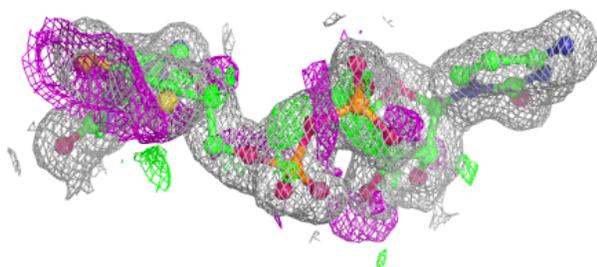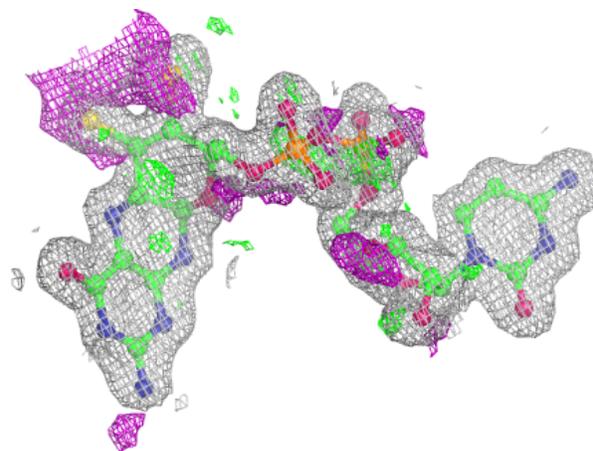
Electron density around MCN E 4920:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around FAD F 4932:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around FAD C 4931:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

6.5　Other polymers ⓘ

There are no such residues in this entry.