Full wwPDB X-ray Structure Validation Report (i)

Dec 10, 2023 – 08:46 am GMT

PDB ID	:	7R34
Title	:	Difference-refined structure of fatty acid photodecarboxylase 900 ps following 400-nm laser irradiation of the dark-state determined by SFX
Authors	:	Hadjidemetriou, K.; Coquelle, N.; Barends, T.R.M.; De Zitter, E.; Schlichting, I.; Colletier, J.P.; Weik, M.
Deposited on	:	2022-02-06
Resolution	:	2.00 Å(reported)

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

|		
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
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)	:	2.36

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 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	Percentile Ranks	Value
Rfree		0.373
Clashscore		9
Ramachandran outliers		0.8%
Sidechain outliers		4.9%
RSRZ outliers		1.9%

Worse ← → Better

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution
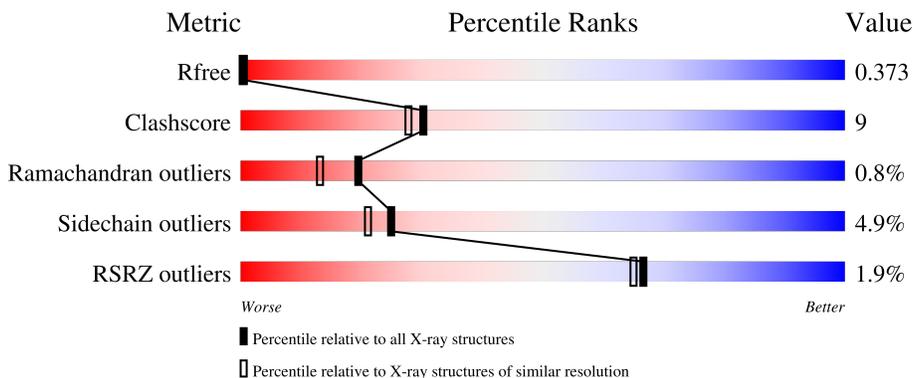
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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 <=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	578	77% ... 20% ..
1	B	578	73% ... 22% ..

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 9184 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 Fatty acid photodecarboxylase, chloroplastic.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	563	Total 4328	C 2702	N 778	O 833	S 15	0	15	0
1	B	562	Total 4302	C 2690	N 772	O 825	S 15	0	13	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	GLY	deletion	UNP A0A248QE08
B	?	-	GLY	deletion	UNP A0A248QE08

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$) (labeled as "Ligand of Interest" by depositor).


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

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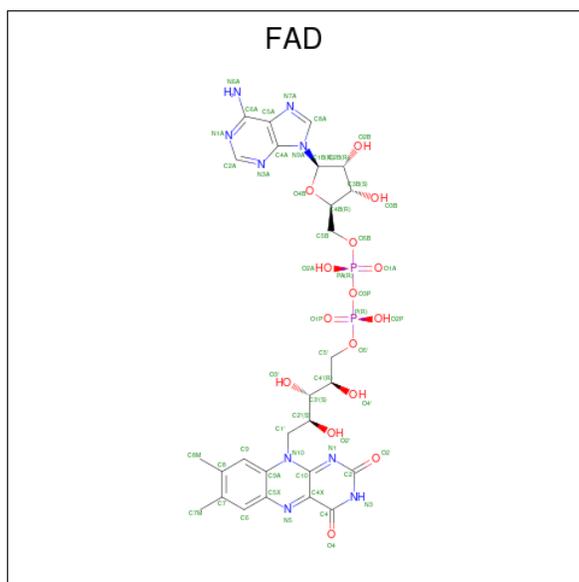
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	B	1	53	27	9	15	2	0	0

- Molecule 3 is STEARIC ACID (three-letter code: STE) (formula: $C_{18}H_{36}O_2$) (labeled as "Ligand of Interest" by depositor).

STE
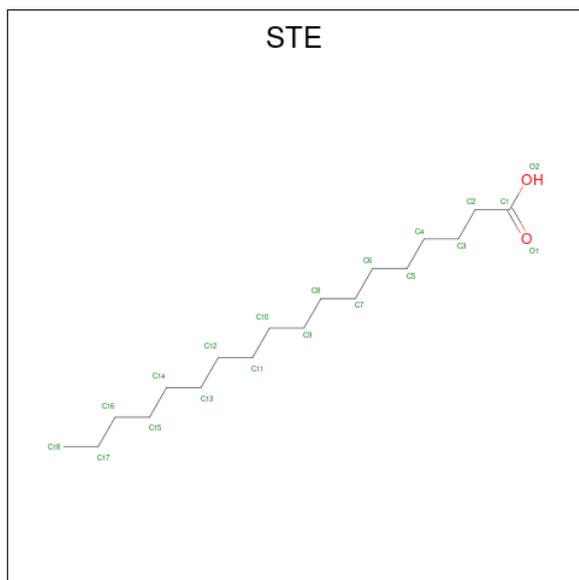
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total 17	C 17	0	0
3	A	1	Total 10	C 10	0	0
3	B	1	Total 17	C 17	0	0
3	B	1	Total 10	C 10	0	0

- Molecule 4 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	209	Total 209	O 209	0	0
4	B	185	Total 185	O 185	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: Fatty acid photodecarboxylase, chloroplastic
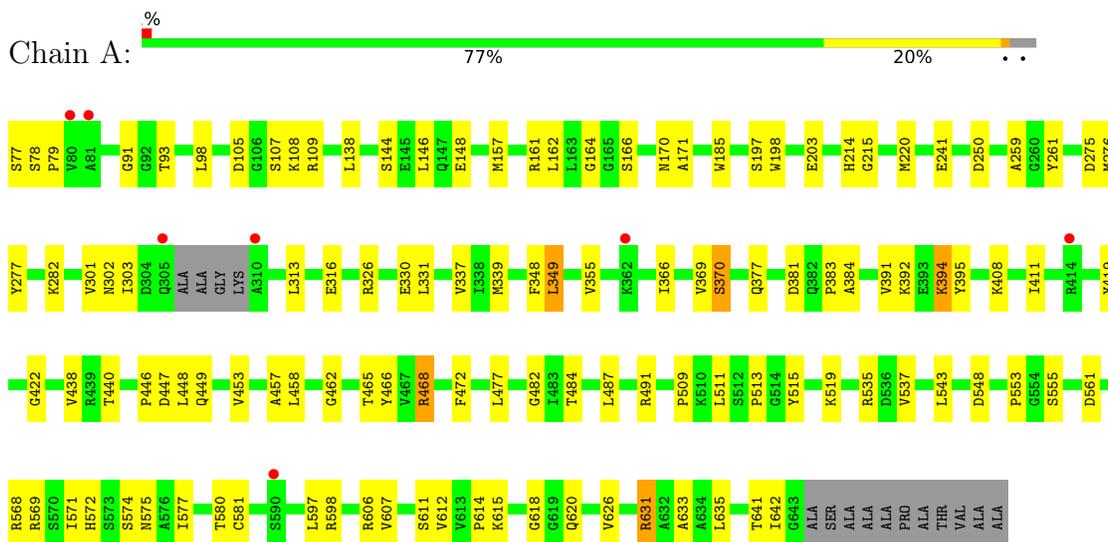
- Molecule 1: Fatty acid photodecarboxylase, chloroplastic
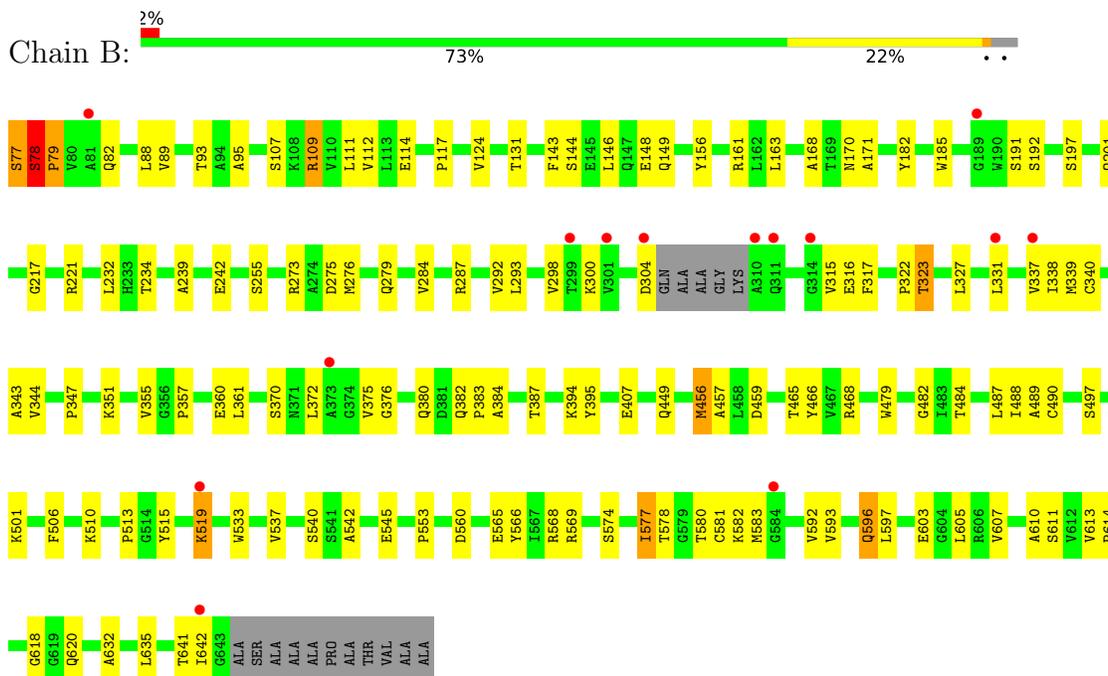
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	61.39Å 60.01Å 182.90Å 90.00° 90.60° 90.00°	Depositor
Resolution (Å)	10.00 – 2.00 10.00 – 2.00	Depositor EDS
% Data completeness (in resolution range)	100.0 (10.00-2.00) 97.0 (10.00-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.43 (at 2.01Å)	Xtriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, R_{free}	0.306 , 0.373 0.306 , 0.373	Depositor DCC
R_{free} test set	4478 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	25.9	Xtriage
Anisotropy	0.163	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 41.9	EDS
L-test for twinning[2]	$< |L| > = 0.48$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.018 for k,h,-l 0.024 for -k,-h,-l 0.237 for h,-k,-l	Xtriage
F_o,F_c correlation	0.89	EDS
Total number of atoms	9184	wwPDB-VP
Average B, all atoms (Å^2)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.07% 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 ⓘ

5.1   Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: FAD, STE

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	0.42	0/4428	0.62	0/6001
1	B	0.41	0/4403	0.61	0/5969
All	All	0.42	0/8831	0.62	0/11970

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	4328	0	4264	71	0
1	B	4302	0	4252	87	0
2	A	53	0	31	6	0
2	B	53	0	31	6	0
3	A	27	0	49	6	0
3	B	27	0	49	3	0
4	A	209	0	0	12	1
4	B	185	0	0	7	0
All	All	9184	0	8676	162	1

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 9.

All (162) 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:B:449:GLN:OE1	4:B:801:HOH:O	1.99	0.81
1:A:568[A]:ARG:NH1	4:A:805:HOH:O	2.20	0.73
1:B:459:ASP:OD2	1:B:468[C]:ARG:NH2	2.25	0.70
1:B:323:THR:O	1:B:323:THR:OG1	2.05	0.69
1:A:277:TYR:OH	1:A:282:LYS:NZ	2.25	0.69
1:A:598:ARG:HG2	1:A:606:ARG:HD3	1.75	0.68
1:B:382:GLN:O	1:B:574:SER:OG	2.11	0.68
1:A:339:MET:HB2	1:A:607:VAL:HG22	1.76	0.67
1:A:453:VAL:HG11	3:A:702:STE:H92	1.77	0.67
1:B:395:TYR:OH	1:B:545:GLU:OE2	2.08	0.67
1:A:571:ILE:O	4:A:801:HOH:O	2.12	0.67
1:A:259:ALA:HB2	1:A:446:PRO:HG3	1.77	0.66
1:A:381:ASP:HB3	1:A:515:TYR:HE1	1.60	0.66
1:B:383:PRO:HD2	1:B:489:ALA:HB3	1.77	0.66
1:B:131:THR:HG22	1:B:466:TYR:CD2	2.30	0.66
1:B:170:ASN:HB2	2:B:701:FAD:C5X	2.25	0.66
1:B:501:LYS:HG3	1:B:510:LYS:HB2	1.78	0.65
1:B:620:GLN:HB3	2:B:701:FAD:C2	2.27	0.64
1:B:82:GLN:OE1	1:B:109:ARG:NH2	2.31	0.64
1:B:484:THR:HG21	3:B:702:STE:H62	1.80	0.63
1:B:351:LYS:HE2	1:B:357:PRO:HD2	1.81	0.63
1:A:214:HIS:NE2	1:A:250:ASP:OD2	2.27	0.61
1:B:149:GLN:O	1:B:568[B]:ARG:NH1	2.31	0.61
1:B:144:SER:HB2	1:B:513:PRO:HD3	1.84	0.60
1:B:77:SER:O	1:B:77:SER:OG	2.19	0.60
1:A:185:TRP:CG	1:A:614:PRO:HG2	2.37	0.59
1:A:449:GLN:OE1	4:A:802:HOH:O	2.15	0.59
1:A:620:GLN:HB3	2:A:701:FAD:C2	2.33	0.58
1:B:331:LEU:HD11	1:B:337:VAL:HG23	1.84	0.58
1:A:144:SER:HB2	1:A:513:PRO:HD3	1.85	0.58
1:B:185:TRP:CG	1:B:614:PRO:HG2	2.39	0.58
1:B:376:GLY:O	1:B:497:SER:HA	2.04	0.57
1:A:392:LYS:HG3	1:A:548:ASP:HB2	1.86	0.57
1:A:241:GLU:OE1	1:A:261:TYR:OH	2.17	0.57
1:B:355:VAL:HG12	1:B:372:LEU:HD12	1.87	0.57
1:B:582:LYS:HG3	1:B:614:PRO:HA	1.87	0.57
1:A:138:LEU:HD13	1:A:162:LEU:HD13	1.87	0.57
1:B:596:GLN:HG2	1:B:635:LEU:HD21	1.86	0.57
1:A:331:LEU:HD11	1:A:337:VAL:HG23	1.87	0.56
1:B:79:PRO:HG3	1:B:317:PHE:HZ	1.71	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:620:GLN:O	4:A:803:HOH:O	2.17	0.56
1:B:339:MET:HB2	1:B:607:VAL:HA	1.88	0.56
1:A:440:THR:OG1	1:A:447:ASP:OD2	2.24	0.56
1:B:407[A]:GLU:H	1:B:407[A]:GLU:CD	2.10	0.55
1:A:170:ASN:HB2	2:A:701:FAD:C5X	2.37	0.55
1:B:221:ARG:NH1	4:B:817:HOH:O	2.38	0.55
1:B:185:TRP:CD1	1:B:614:PRO:HG2	2.41	0.55
1:A:457:ALA:HA	1:A:465:THR:HG21	1.88	0.54
1:A:275:ASP:OD1	1:A:277:TYR:HB3	2.08	0.53
1:B:93:THR:HG23	1:B:276:MET:HG3	1.91	0.53
1:A:484:THR:HG21	3:A:702:STE:H61	1.90	0.52
1:A:384:ALA:HA	1:A:487:LEU:O	2.09	0.52
1:B:300[B]:LYS:NZ	1:B:316:GLU:OE2	2.41	0.52
1:B:351:LYS:HE3	1:B:375:VAL:HG12	1.92	0.52
1:A:391:VAL:HG13	1:A:482:GLY:HA2	1.91	0.52
1:A:575:ASN:HD22	2:A:701:FAD:HM73	1.75	0.51
1:B:88:LEU:HD23	1:B:338:ILE:HB	1.92	0.51
1:B:456:MET:HB2	1:B:482:GLY:HA3	1.92	0.51
1:A:466:TYR:HE1	3:A:702:STE:H72	1.75	0.51
1:A:348:PHE:CD1	1:A:509:PRO:HB3	2.45	0.51
1:A:635:LEU:HD22	1:A:642:ILE:HD13	1.93	0.50
1:B:89:VAL:HG13	1:B:298:VAL:HG21	1.92	0.50
1:B:560:ASP:OD1	4:B:802:HOH:O	2.19	0.50
1:A:166:SER:O	1:A:170:ASN:HB3	2.12	0.50
1:A:408:LYS:HB3	4:A:829:HOH:O	2.12	0.50
1:B:382:GLN:HG2	1:B:490:CYS:HA	1.94	0.49
1:B:316:GLU:HG3	1:B:327:LEU:O	2.12	0.49
1:B:88:LEU:HD12	1:B:112:VAL:HG22	1.95	0.49
1:A:220:MET:SD	1:A:626:VAL:HG11	2.53	0.49
1:A:411:ILE:HD13	3:A:703:STE:H141	1.93	0.49
1:B:191:SER:OG	1:B:192:SER:N	2.46	0.49
1:A:157:MET:SD	1:A:513:PRO:HG3	2.52	0.48
1:B:171:ALA:HB3	2:B:701:FAD:O4	2.13	0.48
1:B:596:GLN:HE21	1:B:635:LEU:HD11	1.78	0.48
1:A:98:LEU:HD23	1:A:633:ALA:HB2	1.95	0.48
1:B:221:ARG:HG2	1:B:279:GLN:NE2	2.29	0.48
1:B:78:SER:H	1:B:79:PRO:CD	2.26	0.48
1:B:383:PRO:HB3	1:B:515:TYR:CD1	2.49	0.48
1:B:112:VAL:HB	1:B:292:VAL:HG22	1.96	0.48
1:B:347:PRO:HG2	1:B:580:THR:HB	1.96	0.47
1:A:394:LYS:HE2	1:A:395:TYR:CZ	2.49	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:355:VAL:O	1:B:375:VAL:HG21	2.14	0.47
1:A:468:ARG:HA	1:A:468:ARG:HD3	1.67	0.47
1:A:316:GLU:OE2	1:A:326:ARG:HD2	2.14	0.47
1:A:349:LEU:HD11	2:A:701:FAD:N6A	2.30	0.47
1:A:355:VAL:HG13	1:A:370:SER:HB3	1.96	0.47
1:A:581:CYS:O	1:A:612:VAL:HA	2.15	0.47
1:B:242:GLU:CD	1:B:540[A]:SER:HB2	2.35	0.46
1:A:472:PHE:CZ	1:A:477:LEU:HB2	2.50	0.46
1:B:578:THR:HG22	1:B:610:ALA:HB1	1.96	0.46
1:A:203:GLU:OE1	1:A:214:HIS:HA	2.15	0.46
1:A:383:PRO:HB2	1:A:571:ILE:HD11	1.98	0.46
1:A:574:SER:OG	4:A:807:HOH:O	2.21	0.46
3:A:702:STE:H21	4:A:890:HOH:O	2.16	0.46
1:B:114:GLU:HG2	1:B:163:LEU:HD23	1.98	0.46
1:A:93:THR:HG23	1:A:276:MET:HG3	1.97	0.46
1:B:242:GLU:CD	1:B:540[B]:SER:HB2	2.36	0.46
1:A:535:ARG:NH2	1:A:553:PRO:HG2	2.32	0.45
1:B:597:LEU:HD12	1:B:632:ALA:HB2	1.98	0.45
1:A:466:TYR:HE1	3:A:702:STE:H91	1.81	0.45
1:A:185:TRP:CE2	1:A:614:PRO:HD2	2.51	0.45
1:B:372:LEU:HD13	1:B:592:VAL:HG13	1.98	0.45
1:B:239:ALA:HB2	1:B:542:ALA:HB3	1.97	0.45
1:B:384:ALA:HA	1:B:487:LEU:O	2.16	0.45
1:B:95:ALA:HB2	1:B:340:CYS:HB3	1.98	0.45
1:B:343:ALA:HA	1:B:611[A]:SER:OG	2.16	0.44
1:A:537:VAL:HG12	1:A:543:LEU:HD12	1.98	0.44
1:B:191:SER:HA	4:B:876:HOH:O	2.18	0.44
1:B:361:LEU:HD23	1:B:361:LEU:HA	1.82	0.44
1:B:124:VAL:HG13	1:B:168:ALA:O	2.18	0.44
1:B:457:ALA:HB1	1:B:465:THR:HG21	2.00	0.44
1:A:462:GLY:H	1:A:572:HIS:CE1	2.36	0.44
1:A:215:GLY:O	4:A:806:HOH:O	2.21	0.44
1:A:581:CYS:H	1:A:611[B]:SER:HB2	1.83	0.44
1:B:357:PRO:HG2	1:B:360:GLU:HB3	1.99	0.44
1:B:182:TYR:O	1:B:185:TRP:HB2	2.18	0.43
1:B:581:CYS:HB2	1:B:611[B]:SER:OG	2.18	0.43
1:B:107:SER:N	4:B:834:HOH:O	2.51	0.43
1:B:578:THR:HB	1:B:613:VAL:HB	2.00	0.43
2:A:701:FAD:H9	2:A:701:FAD:H1'1	1.81	0.43
1:A:91:GLY:O	1:A:164:GLY:N	2.44	0.43
1:A:198:TRP:CG	1:A:631:ARG:HG3	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:203:GLU:OE1	1:A:215:GLY:N	2.44	0.42
1:B:275:ASP:OD1	4:B:804:HOH:O	2.22	0.42
1:B:284:VAL:HB	1:B:287:ARG:HD2	2.01	0.42
1:A:491:ARG:CZ	1:A:618:GLY:HA3	2.50	0.42
1:A:568[A]:ARG:NH1	4:A:821:HOH:O	2.35	0.42
1:B:355:VAL:HG13	1:B:370:SER:HB3	2.02	0.42
1:B:583:MET:HA	1:B:593:VAL:O	2.19	0.42
1:B:95:ALA:HB2	1:B:340:CYS:CB	2.50	0.42
1:A:419:TYR:OH	4:A:804:HOH:O	2.19	0.42
1:A:138:LEU:O	1:A:161:ARG:N	2.44	0.41
1:B:170:ASN:HB2	2:B:701:FAD:C9A	2.49	0.41
1:B:533:TRP:CH2	1:B:537:VAL:HG21	2.54	0.41
1:A:303:ILE:HG21	1:A:369:VAL:HG11	2.02	0.41
1:A:302:ASN:O	1:A:313:LEU:N	2.50	0.41
1:B:111:LEU:HD11	1:B:293:LEU:HD12	2.01	0.41
1:B:322:PRO:HA	1:B:506:PHE:CE2	2.56	0.41
1:A:105:ASP:OD2	1:A:107:SER:OG	2.39	0.41
1:A:458:LEU:O	4:A:808:HOH:O	2.21	0.41
1:B:232:LEU:HD23	1:B:232:LEU:HA	1.66	0.41
1:B:387:THR:HG22	1:B:553:PRO:HD3	2.02	0.41
1:A:377:GLN:O	1:A:580:THR:HA	2.21	0.41
1:B:479:TRP:HB3	4:B:830:HOH:O	2.21	0.41
1:A:511:LEU:HA	1:A:511:LEU:HD12	1.71	0.41
1:B:168:ALA:HA	1:B:273:ARG:HD3	2.02	0.41
1:B:553:PRO:HB3	1:B:566:TYR:CD1	2.55	0.41
2:B:701:FAD:H9	2:B:701:FAD:H1'1	1.85	0.41
3:B:702:STE:H112	3:B:702:STE:H81	1.69	0.41
1:A:171:ALA:HB3	2:A:701:FAD:O4	2.21	0.41
1:A:438:VAL:HB	1:A:448:LEU:HD23	2.03	0.41
1:A:569[A]:ARG:NH2	4:A:812:HOH:O	2.29	0.41
1:B:380:GLN:O	1:B:577:ILE:HA	2.21	0.41
1:B:117:PRO:HD2	1:B:161:ARG:O	2.21	0.40
1:B:488:ILE:HD13	1:B:574:SER:HB3	2.02	0.40
1:A:313:LEU:HD23	1:A:313:LEU:HA	1.76	0.40
1:B:79:PRO:HG3	1:B:317:PHE:CZ	2.53	0.40
1:B:143:PHE:CE2	1:B:156:TYR:HB2	2.56	0.40
1:B:466:TYR:HE1	3:B:702:STE:H72	1.85	0.40
1:B:519:LYS:H	1:B:519:LYS:HG2	1.49	0.40
1:A:326:ARG:HD3	1:A:326:ARG:HA	1.75	0.40
1:B:114:GLU:OE1	2:B:701:FAD:O3B	2.38	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the sym-

metry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:931:HOH:O	4:A:935:HOH:O[2_555]	2.15	0.05

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	573/578 (99%)	534 (93%)	35 (6%)	4 (1%)	22	16
1	B	571/578 (99%)	536 (94%)	30 (5%)	5 (1%)	17	11
All	All	1144/1156 (99%)	1070 (94%)	65 (6%)	9 (1%)	19	13

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	78	SER
1	B	217	GLY
1	B	577	ILE
1	A	577	ILE
1	B	79	PRO
1	B	618	GLY
1	A	422	GLY
1	A	78	SER
1	A	79	PRO

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	452/442 (102%)	430 (95%)	22 (5%)	25	21
1	B	449/442 (102%)	423 (94%)	26 (6%)	20	15
All	All	901/884 (102%)	853 (95%)	48 (5%)	25	18

All (48) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	77	SER
1	A	108	LYS
1	A	109[A]	ARG
1	A	109[B]	ARG
1	A	146	LEU
1	A	148[A]	GLU
1	A	148[B]	GLU
1	A	197	SER
1	A	301	VAL
1	A	330	GLU
1	A	349	LEU
1	A	366	ILE
1	A	370	SER
1	A	394	LYS
1	A	468	ARG
1	A	519	LYS
1	A	555	SER
1	A	561	ASP
1	A	597	LEU
1	A	615	LYS
1	A	631	ARG
1	A	641	THR
1	B	77	SER
1	B	78	SER
1	B	109	ARG
1	B	146	LEU
1	B	148	GLU
1	B	197	SER
1	B	201	GLN
1	B	234[A]	THR
1	B	234[B]	THR
1	B	255	SER
1	B	304	ASP
1	B	315	VAL
1	B	323	THR

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Mol	Chain	Res	Type
1	B	344	VAL
1	B	394	LYS
1	B	456	MET
1	B	519	LYS
1	B	565[A]	GLU
1	B	565[B]	GLU
1	B	569[A]	ARG
1	B	569[B]	ARG
1	B	596	GLN
1	B	603	GLU
1	B	605	LEU
1	B	641	THR
1	B	642	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	596	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 ⓘ

6 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	#$|Z| > 2$
2	FAD	B	701	-	53,58,58	0.64	0	68,89,89	0.90	2 (2%)
3	STE	B	702	-	16,16,19	0.24	0	15,15,19	0.81	0
3	STE	B	703	-	9,9,19	0.36	0	8,8,19	0.37	0
3	STE	A	703	-	9,9,19	0.26	0	8,8,19	0.60	0
2	FAD	A	701	-	53,58,58	0.66	0	68,89,89	0.80	2 (2%)
3	STE	A	702	-	16,16,19	0.24	0	15,15,19	0.72	0

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
2	FAD	B	701	-	-	4/30/50/50	0/6/6/6
3	STE	B	702	-	-	8/14/14/17	-
3	STE	B	703	-	-	4/7/7/17	-
3	STE	A	703	-	-	0/7/7/17	-
2	FAD	A	701	-	-	1/30/50/50	0/6/6/6
3	STE	A	702	-	-	8/14/14/17	-

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	701	FAD	O4B-C1B-C2B	-3.04	102.48	106.93
2	A	701	FAD	O4B-C1B-C2B	-2.88	102.71	106.93
2	A	701	FAD	C5A-C6A-N6A	2.46	124.08	120.35
2	B	701	FAD	C5A-C6A-N6A	2.27	123.80	120.35

There are no chirality outliers.

All (25) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	701	FAD	PA-O3P-P-O5'
3	B	703	STE	C14-C15-C16-C17
3	A	702	STE	C10-C11-C12-C13

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Mol	Chain	Res	Type	Atoms
3	A	702	STE	C13-C14-C15-C16
3	B	702	STE	C6-C7-C8-C9
3	B	703	STE	C12-C13-C14-C15
3	A	702	STE	C7-C8-C9-C10
3	B	703	STE	C10-C11-C12-C13
3	B	702	STE	C13-C14-C15-C16
3	B	702	STE	C3-C4-C5-C6
3	A	702	STE	C5-C6-C7-C8
3	A	702	STE	C11-C12-C13-C14
3	B	702	STE	C4-C5-C6-C7
3	B	702	STE	C12-C13-C14-C15
3	A	702	STE	C1-C2-C3-C4
3	B	702	STE	C5-C6-C7-C8
2	B	701	FAD	O4B-C4B-C5B-O5B
3	B	703	STE	C15-C16-C17-C18
2	A	701	FAD	O4B-C4B-C5B-O5B
2	B	701	FAD	P-O3P-PA-O1A
3	B	702	STE	C11-C10-C9-C8
3	A	702	STE	C2-C3-C4-C5
3	B	702	STE	C7-C8-C9-C10
3	A	702	STE	C4-C5-C6-C7
2	B	701	FAD	P-O3P-PA-O2A

There are no ring outliers.

5 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	701	FAD	6	0
3	B	702	STE	3	0
3	A	703	STE	1	0
2	A	701	FAD	6	0
3	A	702	STE	5	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less 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 FAD B 701	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand STE B 702	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand STE B 703	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand STE A 703

Bond lengths

Bond angles

Torsions

Rings

Ligand FAD A 701

Bond lengths

Bond angles

Torsions

Rings

Ligand STE A 702

Bond lengths

Bond angles

Torsions

Rings
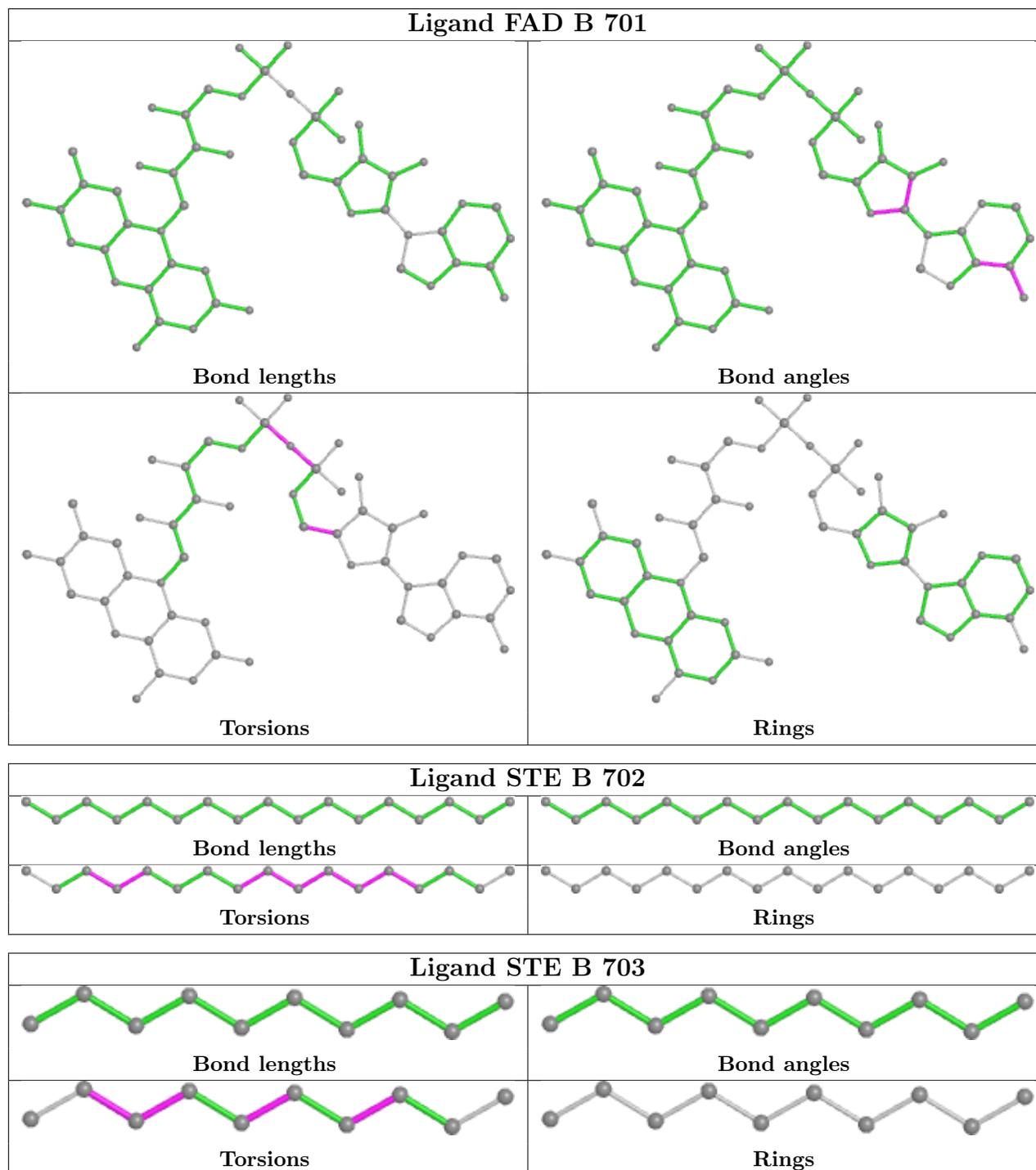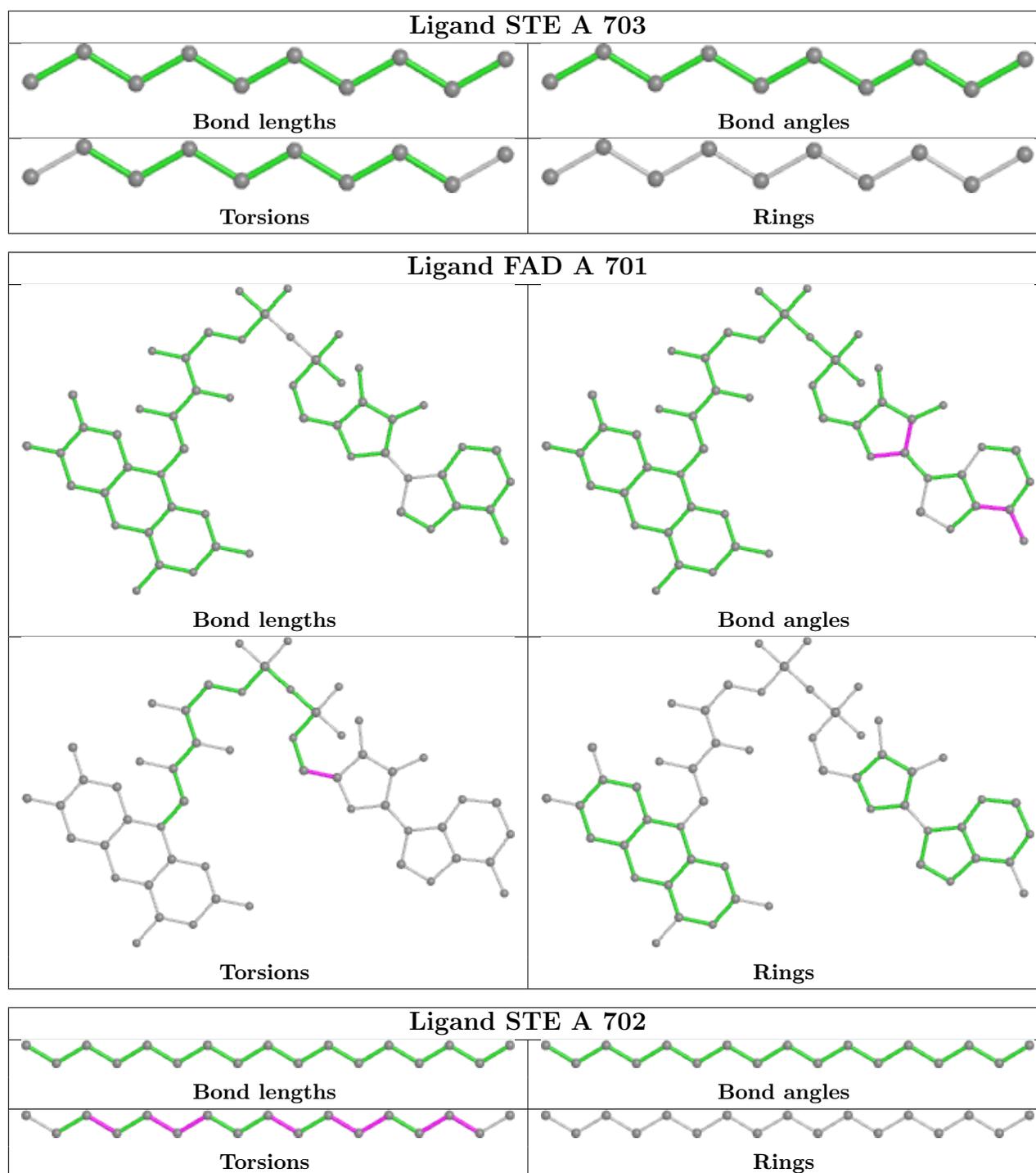
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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(Å^2)	Q<0.9
1	A	563/578 (97%)	-0.30	7 (1%)	79	78	16, 28, 59, 86	0
1	B	562/578 (97%)	-0.13	14 (2%)	57	56	15, 33, 65, 79	0
All	All	1125/1156 (97%)	-0.21	21 (1%)	66	65	15, 31, 63, 86	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	81	ALA	4.9
1	B	81	ALA	3.9
1	B	642	ILE	3.9
1	A	80	VAL	3.7
1	B	304	ASP	3.6
1	A	305[A]	GLN	3.4
1	A	362	LYS	3.1
1	B	310	ALA	3.1
1	B	301	VAL	3.0
1	A	310	ALA	2.9
1	B	314	GLY	2.9
1	B	373	ALA	2.7
1	B	189	GLY	2.7
1	B	584	GLY	2.3
1	A	590	SER	2.3
1	B	299	THR	2.2
1	A	414[A]	ARG	2.2
1	B	337	VAL	2.2
1	B	519	LYS	2.1
1	B	311	GLN	2.1
1	B	331	LEU	2.1

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.

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
3	STE	B	703	10/20	0.91	0.15	18,28,39,51	0
3	STE	A	703	10/20	0.92	0.13	33,40,43,49	0
3	STE	B	702	17/20	0.93	0.12	15,27,39,62	0
3	STE	A	702	17/20	0.94	0.11	9,25,33,46	0
2	FAD	A	701	53/53	0.95	0.10	13,24,49,58	0
2	FAD	B	701	53/53	0.96	0.09	14,26,41,50	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 STE B 703:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
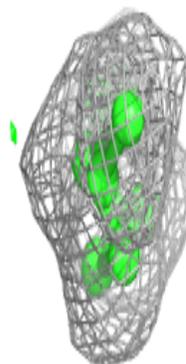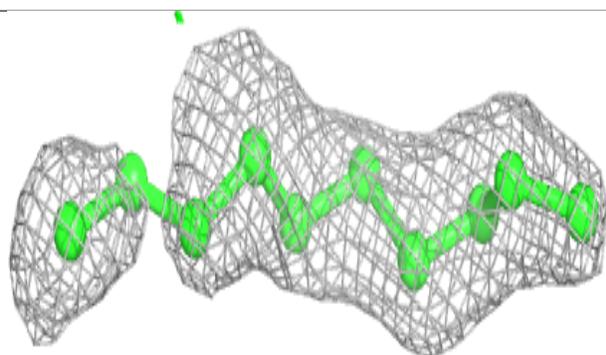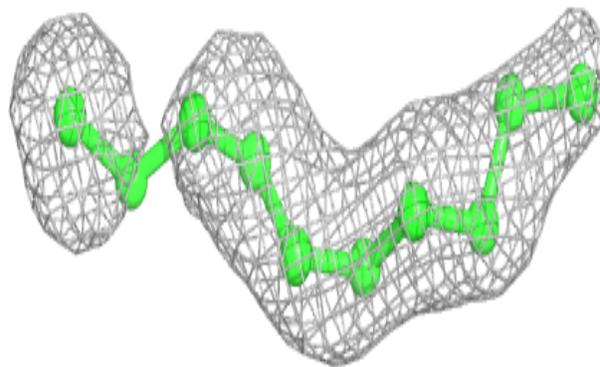
Electron density around STE A 703:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
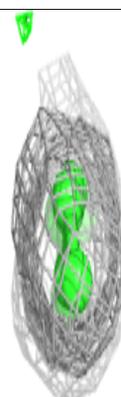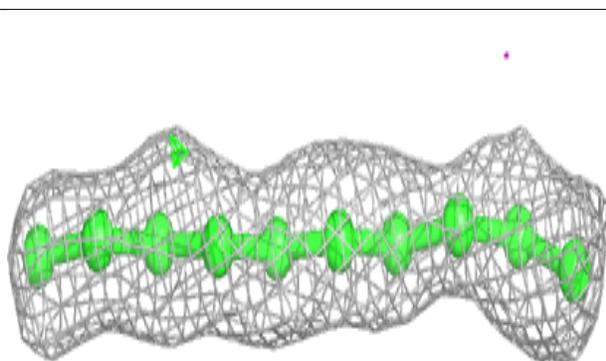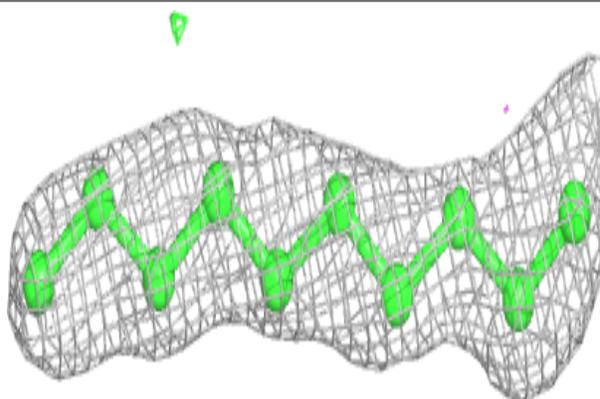
Electron density around STE B 702:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
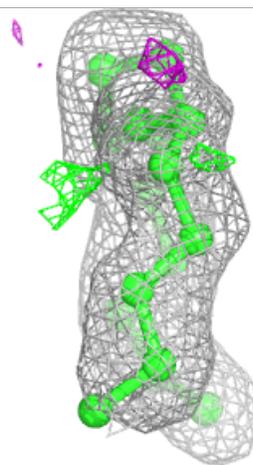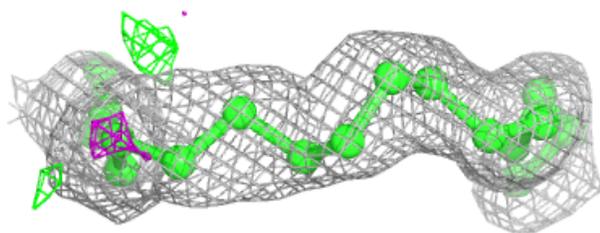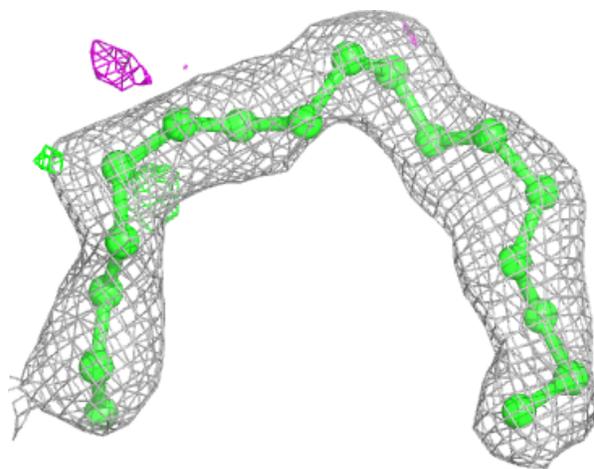
Electron density around STE A 702:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
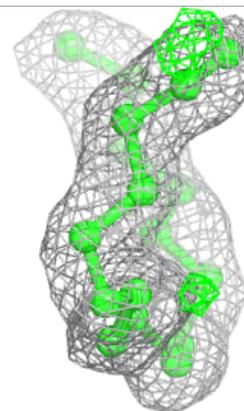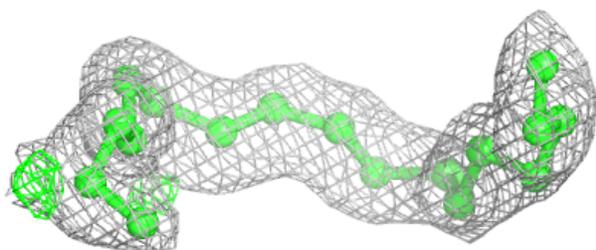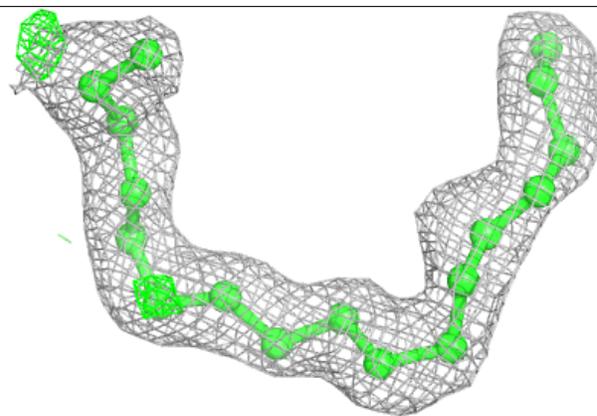
Electron density around FAD A 701:

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

Electron density around FAD B 701:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.