Full wwPDB X-ray Structure Validation Report ⓘ

Mar 23, 2024 – 01:31 PM EDT

PDB ID	:	3UKA
Title	:	CRYSTAL STRUCTURE OF UDP-galactopyranose mutase from Aspergillus fumigatus
Authors	:	Van Straaten, K.E.; Sanders, D.A.R.
Deposited on	:	2011-11-09
Resolution	:	2.64 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:

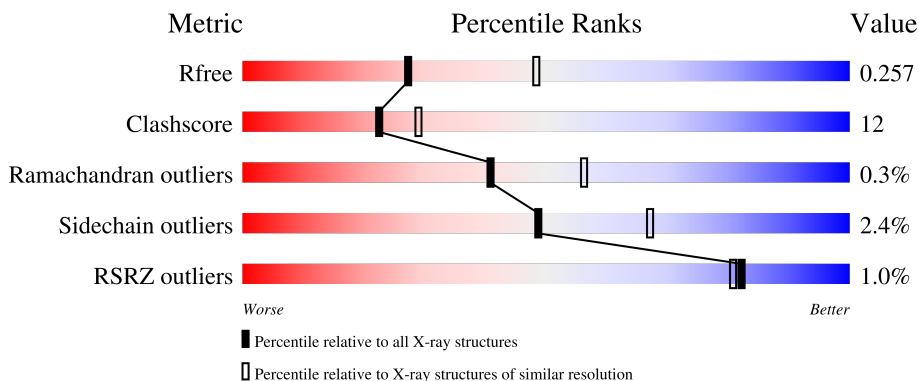|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.1

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 2.64 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		0.257
Clashscore		12
Ramachandran outliers		0.3%
Sidechain outliers		2.4%
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	1426 (2.66-2.62)
Clashscore	141614	1472 (2.66-2.62)
Ramachandran outliers	138981	1446 (2.66-2.62)
Sidechain outliers	138945	1446 (2.66-2.62)
RSRZ outliers	127900	1408 (2.66-2.62)

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.

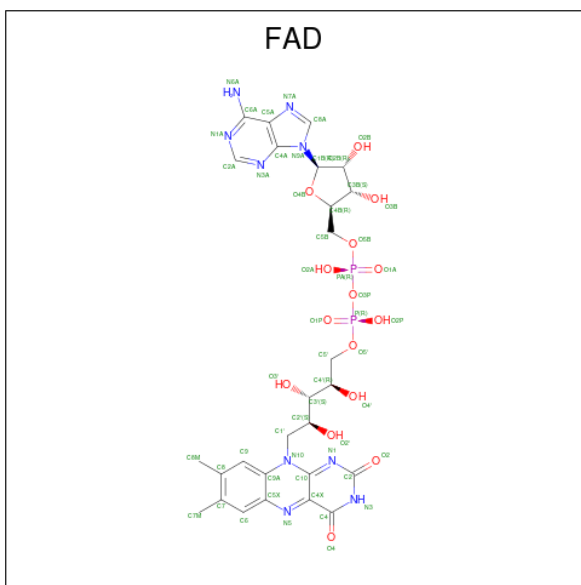| Mol	Chain	Length	Quality of chain
1	A	509	78% 21% ••
1	B	509	77% 21% ••
1	C	509	76% 21% •
1	D	509	74% 24% •

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 16506 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 UDP-galactopyranose mutase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	506	Total	C	N	O	S	Se	0	0	0
			3970	2517	681	751	7	14			
1	B	505	Total	C	N	O	S	Se	0	0	0
			3963	2512	680	750	7	14			
1	C	509	Total	C	N	O	S	Se	0	1	0
			4010	2545	688	756	7	14			
1	D	509	Total	C	N	O	S	Se	0	0	0
			3996	2534	686	755	7	14			

- Molecule 2 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
2	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

Continued on next page...

Continued from previous page...

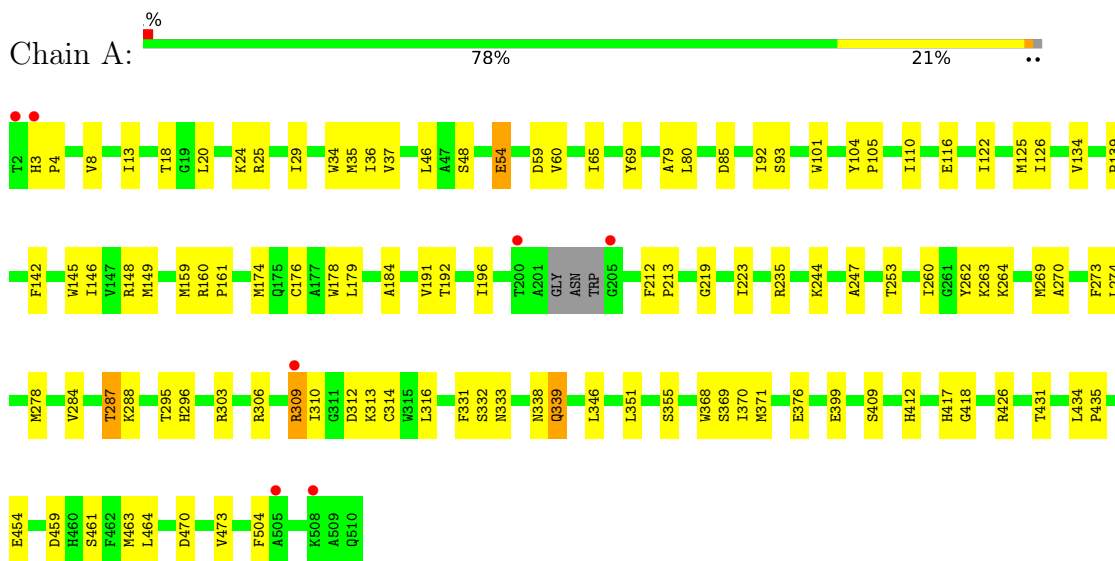| Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	D	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 3 is water.

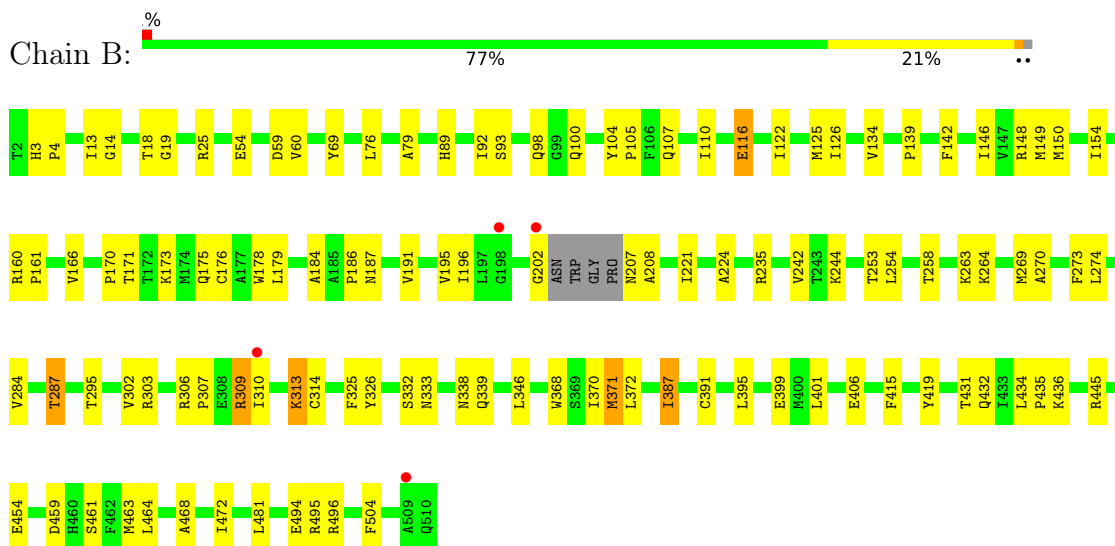| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	72	Total	O	0	0
			72	72		
3	B	122	Total	O	0	0
			122	122		
3	C	99	Total	O	0	0
			99	99		
3	D	62	Total	O	0	0
			62	62		

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.
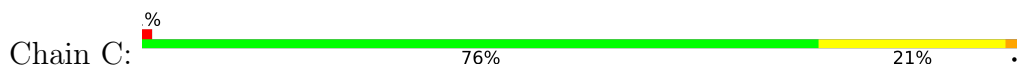
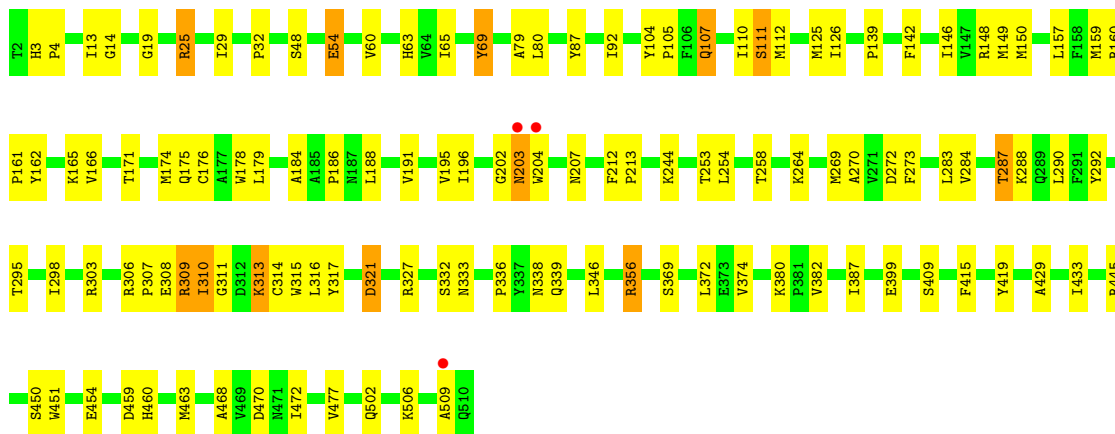- Molecule 1: UDP-galactopyranose mutase
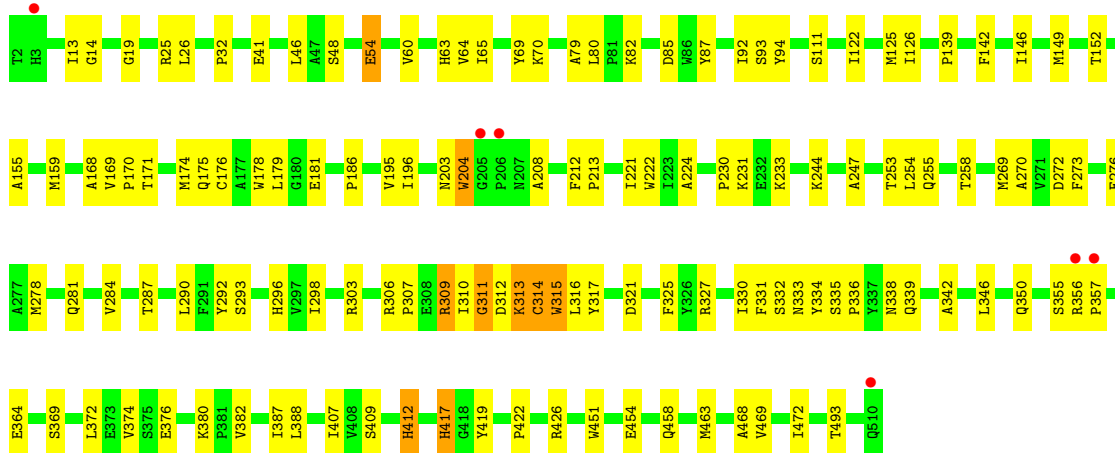
Chain A:

- Molecule 1: UDP-galactopyranose mutase

Chain B:

- Molecule 1: UDP-galactopyranose mutase

Chain C:

T2 H3 P4 I13 G14 G19 R25 I29 P32 S48 E54 V60 H63 V64 I65 Y69 A79 L80 Y87 I92 Y104 P105 F106 Q107 I110 S111 M112 M125 I126 P139 F142 I146 V147 R148 M149 M150 L157 F158 M159 R160

P161 Y162 K165 V166 T171 M174 Q175 C176 A177 W178 L179 L188 A184 A185 P186 N187 L188 V191 V195 I196 G202 N203 W204 N207 F212 P213 K244 T253 L254 T258 K264 M269 A270 V271 D272 F273 L283 V284 T287 K288 Q289 L290 F291 Y292

T295 I298 R303 R306 P307 E308 R309 I310 G311 D312 K313 C314 W315 L316 Y317 D321 R327 S332 N333 P336 Y337 N338 Q339 L346 R356 S369 L372 E373 V374 K380 P381 V382 I387 E399 S409 F415 Y419 A429 I433 R445

S450 W451 E454 D459 H460 M463 A468 V469 D470 N471 I472 V477 Q502 K506 A509 Q510

• Molecule 1: UDP-galactopyranose mutase

Chain D:

74%   24%   •

T2 H3 I13 G14 G19 R25 L26 P32 E41 L46 A47 S48 E54 V60 H63 V64 I65 Y69 K70 A79 L80 P81 K82 D85 W86 Y87 I92 S93 Y94 S111 I122 M125 I126 P139 F142 I146 M149 T152

A155 M159 A168 V169 P170 T171 M174 Q175 C176 A177 W178 L179 G180 E181 P186 V195 I196 N203 W204 G205 P206 N207 A208 F212 P213 I221 W222 I223 A224 P230 K231 E232 K233 K244 A247 T253 L254 Q255 T258 M269 A270 V271 D272 F273 E276

A277 M278 Q281 V284 T287 L290 F291 Y292 S293 H296 V297 I298 R303 R306 P307 E308 R309 I310 G311 D312 K313 C314 W315 L316 Y317 D321 F325 Y326 R327 I330 F331 S332 N333 Y334 S335 P336 Y337 N338 Q339 A342 L346 Q350 S355 R356 P357

E364 S369 L372 E373 V374 S375 E376 K380 P381 V382 I387 L388 I407 V408 S409 H412 H417 G418 Y419 P422 R426 W451 E454 Q458 M463 A468 V469 I472 T493 Q510

4   Data and refinement statistics   ⓘ

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	69.83Å 73.56Å 116.01Å 102.02° 101.07° 91.11°	Depositor
Resolution (Å)	19.72 – 2.64 19.72 – 2.42	Depositor EDS
% Data completeness (in resolution range)	97.9 (19.72-2.64) 96.4 (19.72-2.42)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	0.15	Depositor
$< I/\sigma(I) >$ [1]	1.38 (at 2.44Å)	Xtriage
Refinement program	PHENIX 1.7.1_743	Depositor
R, R_{free}	0.206 , 0.267 0.199 , 0.257	Depositor DCC
R_{free} test set	4136 reflections (5.10%)	wwPDB-VP
Wilson B-factor (Å^2)	30.8	Xtriage
Anisotropy	0.213	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.29 , 13.6	EDS
L-test for twinning[2]	$< |L| > = 0.46, < L^2 > = 0.28$	Xtriage
Estimated twinning fraction	0.026 for -k,-h,-l	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	16506	wwPDB-VP
Average B, all atoms (Å^2)	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.92% of the height of the origin peak. No significant pseudotranslation is detected.*

---

[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: 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	0.22	0/4052	0.39	0/5481
1	B	0.22	0/4044	0.39	0/5469
1	C	0.22	0/4097	0.39	0/5546
1	D	0.22	0/4081	0.39	0/5523
All	All	0.22	0/16274	0.39	0/22019

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 (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	3970	0	3894	86	0
1	B	3963	0	3887	83	0
1	C	4010	0	3923	98	0
1	D	3996	0	3914	103	0
2	A	53	0	30	2	0
2	B	53	0	30	4	0
2	C	53	0	30	2	0
2	D	53	0	30	2	0
3	A	72	0	0	6	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	122	0	0	3	0
3	C	99	0	0	1	0
3	D	62	0	0	4	0
All	All	16506	0	15738	371	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 12.

All (371) 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:C:356:ARG:HG3	1:C:356:ARG:HH11	1.04	1.12
1:C:356:ARG:HG3	1:C:356:ARG:NH1	1.82	0.88
1:B:306:ARG:HD3	1:B:333:ASN:HD21	1.41	0.86
1:A:313:LYS:HG3	1:A:333:ASN:HB3	1.61	0.83
1:C:313:LYS:H	1:C:313:LYS:HD2	1.45	0.81
1:D:332:SER:HA	1:D:339:GLN:NE2	1.96	0.80
1:A:244:LYS:HB3	1:A:253:THR:HB	1.65	0.79
1:C:92:ILE:HA	1:C:203:ASN:HB2	1.65	0.77
1:A:306:ARG:HH11	1:A:333:ASN:HD21	1.32	0.76
1:A:296:HIS:HD2	1:A:412:HIS:HE1	1.33	0.76
1:C:332:SER:HA	1:C:339:GLN:NE2	2.00	0.75
1:C:356:ARG:HH11	1:C:356:ARG:CG	1.92	0.74
1:C:306:ARG:HD3	1:C:333:ASN:HD21	1.52	0.74
1:D:159:MSE:N	3:D:534:HOH:O	2.20	0.73
1:D:313:LYS:HG3	1:D:314:CYS:H	1.53	0.73
1:C:313:LYS:HG3	1:C:333:ASN:HB3	1.72	0.72
1:A:125:MSE:HE1	1:A:191:VAL:HG21	1.74	0.70
1:D:338:ASN:HB2	1:D:339:GLN:NE2	2.06	0.70
1:D:54:GLU:HG3	1:D:409:SER:HB2	1.74	0.69
1:C:149:MSE:HB3	1:C:150:MSE:HE3	1.74	0.69
1:D:204:TRP:HB3	1:D:208:ALA:HB3	1.76	0.68
1:C:338:ASN:HB2	1:C:339:GLN:NE2	2.09	0.68
1:D:313:LYS:CG	1:D:314:CYS:H	2.07	0.68
1:B:309:ARG:NH2	1:B:399:GLU:O	2.27	0.67
2:B:600:FAD:PA	2:B:600:FAD:H5'1	2.34	0.66
1:A:54:GLU:HG3	1:A:409:SER:HB2	1.77	0.66
1:C:54:GLU:HG3	1:C:409:SER:HB2	1.77	0.65
1:B:125:MSE:HE1	1:B:191:VAL:HG21	1.77	0.65
1:A:92:ILE:HG23	1:A:314:CYS:HB3	1.77	0.65
1:B:338:ASN:HB2	1:B:339:GLN:HE21	1.62	0.65

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:150:MSE:HB2	1:B:154:ILE:HD12	1.79	0.65
1:B:338:ASN:HB2	1:B:339:GLN:NE2	2.12	0.65
1:C:202:GLY:O	1:C:204:TRP:N	2.30	0.64
1:A:296:HIS:HD2	1:A:412:HIS:CE1	2.15	0.64
1:C:332:SER:HB3	1:C:369:SER:H	1.63	0.64
1:C:92:ILE:HG13	1:C:314:CYS:SG	2.38	0.64
1:A:303:ARG:NH2	1:A:346:LEU:O	2.32	0.63
1:B:309:ARG:CD	1:B:309:ARG:H	2.10	0.63
1:C:502:GLN:O	1:C:506:LYS:HG2	1.99	0.63
1:A:80:LEU:HD23	1:A:85:ASP:HB3	1.81	0.62
1:D:422:PRO:HA	1:D:426:ARG:HD3	1.81	0.62
1:A:338:ASN:HB2	1:A:339:GLN:HE21	1.64	0.62
1:C:104:TYR:O	1:C:202:GLY:HA3	1.99	0.62
1:A:313:LYS:H	1:A:313:LYS:HD2	1.65	0.62
1:D:125:MSE:HE3	1:D:186:PRO:HB2	1.81	0.61
1:A:309:ARG:NH2	1:A:399:GLU:O	2.33	0.61
1:B:332:SER:HA	1:B:339:GLN:NE2	2.15	0.60
1:A:92:ILE:HG13	1:A:93:SER:N	2.16	0.60
1:C:506:LYS:O	1:C:509:ALA:HB3	2.02	0.60
1:C:309:ARG:NH1	1:C:399:GLU:O	2.35	0.60
1:D:306:ARG:HD3	1:D:333:ASN:HD21	1.67	0.60
1:C:142:PHE:CE1	1:C:179:LEU:HD11	2.36	0.60
1:D:13:ILE:HG21	1:D:269:MSE:HE3	1.83	0.60
2:B:600:FAD:O4'	2:B:600:FAD:O2'	2.15	0.59
1:C:303:ARG:NH2	1:C:346:LEU:O	2.35	0.59
1:A:149:MSE:SE	1:A:184:ALA:HA	2.51	0.59
1:C:92:ILE:CA	1:C:203:ASN:HB2	2.32	0.59
1:C:178:TRP:HB2	1:C:454:GLU:HG3	1.84	0.59
1:A:284:VAL:O	1:A:288:LYS:HG2	2.03	0.58
1:B:105:PRO:HD2	1:B:202:GLY:HA2	1.85	0.58
1:D:146:ILE:HD13	1:D:159:MSE:HB3	1.85	0.58
1:D:313:LYS:HG2	1:D:330:ILE:HG12	1.84	0.58
1:B:13:ILE:HG21	1:B:269:MSE:HE3	1.84	0.58
1:B:89:HIS:ND1	1:B:313:LYS:HD2	2.19	0.58
1:A:284:VAL:O	1:A:287:THR:HG22	2.04	0.58
1:A:142:PHE:HD2	1:A:174:MSE:HE3	1.67	0.58
1:D:139:PRO:HB2	1:D:176:CYS:SG	2.44	0.57
1:B:244:LYS:HB3	1:B:253:THR:HB	1.86	0.57
1:A:295:THR:HG23	1:A:418:GLY:HA3	1.86	0.57
1:A:122:ILE:HG13	1:C:196:ILE:HD11	1.87	0.57
2:A:600:FAD:H5'1	2:A:600:FAD:PA	2.45	0.57

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:332:SER:HA	1:A:339:GLN:NE2	2.20	0.57
1:C:110:ILE:C	1:C:112:MSE:H	2.08	0.57
1:C:203:ASN:ND2	1:C:203:ASN:O	2.37	0.56
1:B:309:ARG:H	1:B:309:ARG:HD3	1.67	0.56
1:C:149:MSE:SE	1:C:184:ALA:HA	2.56	0.56
1:D:92:ILE:HG22	1:D:93:SER:N	2.19	0.56
1:D:270:ALA:HB3	1:D:273:PHE:HD2	1.70	0.56
1:A:104:TYR:CD1	1:A:105:PRO:HA	2.40	0.56
1:C:92:ILE:CB	1:C:203:ASN:HB2	2.35	0.56
1:A:142:PHE:CE1	1:A:179:LEU:HD11	2.41	0.56
1:D:307:PRO:HD2	1:D:310:ILE:HD11	1.88	0.56
1:D:342:ALA:O	1:D:364:GLU:HB2	2.06	0.56
1:C:139:PRO:HB2	1:C:176:CYS:SG	2.45	0.55
1:B:142:PHE:CE1	1:B:179:LEU:HD11	2.42	0.55
1:B:178:TRP:HB2	1:B:454:GLU:HG3	1.87	0.55
1:A:59:ASP:HB3	3:A:518:HOH:O	2.05	0.55
1:D:82:LYS:HD3	1:D:85:ASP:OD2	2.06	0.55
1:D:142:PHE:CE1	1:D:179:LEU:HD11	2.41	0.55
1:D:254:LEU:HD12	1:D:258:THR:HB	1.89	0.55
1:B:98:GLN:O	1:B:100:GLN:HG2	2.06	0.55
1:B:307:PRO:HB2	1:B:310:ILE:HG22	1.88	0.55
1:C:254:LEU:HD12	1:C:258:THR:HB	1.89	0.55
1:D:312:ASP:O	1:D:313:LYS:HE3	2.06	0.55
1:B:110:ILE:HD11	1:B:122:ILE:HD11	1.88	0.54
1:B:142:PHE:O	1:B:146:ILE:HG13	2.06	0.54
1:D:303:ARG:NH2	1:D:346:LEU:O	2.39	0.54
1:D:204:TRP:HA	1:D:204:TRP:CE3	2.41	0.54
1:B:122:ILE:O	1:B:126:ILE:HG13	2.07	0.54
1:D:69:TYR:CD2	1:D:463:MSE:HG3	2.42	0.54
1:A:296:HIS:CD2	1:A:412:HIS:HE1	2.20	0.54
1:D:244:LYS:HB3	1:D:253:THR:HB	1.90	0.54
1:A:309:ARG:HH11	1:A:309:ARG:HB2	1.73	0.54
1:C:13:ILE:HG21	1:C:269:MSE:HE3	1.89	0.54
1:C:356:ARG:H	1:C:356:ARG:HD2	1.72	0.54
1:D:335:SER:HB3	1:D:338:ASN:OD1	2.08	0.54
1:B:264:LYS:HG3	1:B:472:ILE:HG23	1.89	0.53
1:A:212:PHE:CD2	1:A:213:PRO:HD2	2.43	0.53
1:D:65:ILE:HG21	1:D:315:TRP:CH2	2.43	0.53
1:A:146:ILE:HD13	1:A:159:MSE:HB3	1.91	0.53
1:A:338:ASN:HB2	1:A:339:GLN:NE2	2.24	0.53
1:A:296:HIS:HE1	1:A:376:GLU:OE2	1.92	0.53

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:92:ILE:HG13	1:A:93:SER:H	1.73	0.53
1:B:313:LYS:HD3	1:B:333:ASN:O	2.09	0.53
1:D:222:TRP:HZ2	1:D:458:GLN:HB3	1.73	0.53
1:A:126:ILE:HD13	1:C:188:LEU:HB3	1.91	0.52
1:B:303:ARG:NH2	1:B:346:LEU:O	2.41	0.52
1:B:310:ILE:HG13	1:B:310:ILE:O	2.09	0.52
1:C:111:SER:HB3	1:C:195:VAL:HA	1.91	0.52
1:B:166:VAL:HG22	1:B:326:TYR:CD1	2.45	0.52
1:D:48:SER:O	1:D:60:VAL:HG22	2.09	0.52
1:A:431:THR:O	1:A:435:PRO:HG2	2.09	0.52
1:D:79:ALA:HB1	1:D:224:ALA:CB	2.40	0.52
1:D:296:HIS:HE1	1:D:376:GLU:OE2	1.93	0.52
1:B:504:PHE:CD2	1:C:32:PRO:HB3	2.45	0.52
1:D:293:SER:OG	1:D:419:TYR:HB2	2.09	0.52
1:D:70:LYS:HG2	1:D:493:THR:HG22	1.92	0.51
1:C:270:ALA:HB3	1:C:273:PHE:HD2	1.74	0.51
1:D:290:LEU:HD13	1:D:451:TRP:CD2	2.45	0.51
1:C:212:PHE:CG	1:C:213:PRO:HD2	2.45	0.51
1:A:35:MSE:HG3	3:A:540:HOH:O	2.10	0.51
1:B:149:MSE:HB3	1:B:150:MSE:HE3	1.93	0.51
1:A:178:TRP:HB2	1:A:454:GLU:HG3	1.92	0.51
1:D:54:GLU:HG3	1:D:409:SER:CB	2.39	0.51
1:A:92:ILE:HG23	1:A:314:CYS:CB	2.40	0.51
1:B:148:ARG:O	1:B:186:PRO:HD3	2.11	0.51
1:D:69:TYR:CG	1:D:463:MSE:HG3	2.46	0.51
1:D:233:LYS:NZ	3:D:538:HOH:O	2.44	0.51
1:D:325:PHE:HA	1:D:374:VAL:HG22	1.93	0.51
1:C:284:VAL:O	1:C:288:LYS:HG2	2.11	0.51
1:D:306:ARG:CZ	1:D:311:GLY:HA2	2.41	0.51
1:D:14:GLY:O	1:D:19:GLY:HA3	2.11	0.50
1:A:306:ARG:HD3	1:A:333:ASN:HD21	1.77	0.50
1:C:315[B]:TRP:O	1:C:316:LEU:HD23	2.11	0.50
1:A:46:LEU:O	1:A:60:VAL:HG23	2.12	0.50
1:D:332:SER:HB3	1:D:369:SER:H	1.76	0.50
1:C:307:PRO:HD2	1:C:310:ILE:HD11	1.93	0.50
1:A:79:ALA:C	1:A:80:LEU:HD12	2.32	0.50
1:D:309:ARG:HD2	1:D:310:ILE:HG23	1.93	0.50
1:D:331:PHE:HA	1:D:334:TYR:CD1	2.46	0.50
1:B:207:ASN:CG	1:B:208:ALA:H	2.15	0.50
1:D:247:ALA:HB2	1:D:278:MSE:HE3	1.93	0.50
1:D:426:ARG:NH1	1:D:454:GLU:OE2	2.43	0.50

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:356:ARG:H	1:C:356:ARG:CD	2.25	0.49
1:A:116:GLU:HG3	3:A:515:HOH:O	2.12	0.49
1:B:139:PRO:HB2	1:B:176:CYS:SG	2.52	0.49
1:A:368:TRP:CZ3	1:A:370:ILE:HD11	2.48	0.49
1:C:63:HIS:CE1	1:C:65:ILE:HG22	2.47	0.49
1:A:306:ARG:HH11	1:A:333:ASN:ND2	2.05	0.49
1:B:149:MSE:SE	1:B:184:ALA:HA	2.63	0.49
1:D:142:PHE:HD2	1:D:174:MSE:HE3	1.77	0.49
1:B:142:PHE:HB3	1:B:171:THR:O	2.13	0.49
1:A:270:ALA:HB3	1:A:273:PHE:HD2	1.76	0.48
1:B:13:ILE:HD13	1:B:242:VAL:HG21	1.95	0.48
1:B:434:LEU:HB2	1:B:435:PRO:HD3	1.95	0.48
1:A:461:SER:HA	1:A:464:LEU:HD12	1.95	0.48
1:B:89:HIS:CE1	1:B:313:LYS:HD2	2.48	0.48
1:D:122:ILE:O	1:D:126:ILE:HG13	2.13	0.48
1:D:169:VAL:HG13	1:D:170:PRO:HD2	1.95	0.48
2:C:600:FAD:H5'1	2:C:600:FAD:PA	2.54	0.48
1:D:314:CYS:SG	1:D:315:TRP:N	2.85	0.48
1:A:34:TRP:HZ3	1:A:36:ILE:HG22	1.79	0.48
1:B:284:VAL:O	1:B:287:THR:HG22	2.14	0.48
1:C:60:VAL:HB	1:C:415:PHE:CZ	2.49	0.48
1:A:247:ALA:HB2	1:A:278:MSE:HE3	1.95	0.48
2:A:600:FAD:H9	2:A:600:FAD:H1'1	1.65	0.48
1:D:79:ALA:HB1	1:D:224:ALA:HB3	1.95	0.48
1:A:125:MSE:CE	1:A:191:VAL:HG21	2.42	0.48
1:A:69:TYR:CD2	1:A:463:MSE:HG3	2.49	0.48
1:D:203:ASN:O	1:D:204:TRP:HB2	2.14	0.48
1:D:296:HIS:HD2	1:D:412:HIS:CE1	2.32	0.48
1:A:13:ILE:HG21	1:A:269:MSE:HE3	1.95	0.47
1:D:292:TYR:CZ	1:D:417:HIS:CE1	3.03	0.47
1:A:92:ILE:CG2	1:A:314:CYS:HB3	2.45	0.47
1:A:263:LYS:O	1:A:264:LYS:HD3	2.13	0.47
1:B:69:TYR:CD2	1:B:463:MSE:HG3	2.49	0.47
1:C:149:MSE:O	1:C:186:PRO:HB3	2.15	0.47
1:A:37:VAL:HG12	1:A:235:ARG:HB3	1.96	0.47
1:A:92:ILE:HG21	1:A:312:ASP:HB3	1.97	0.47
1:A:160:ARG:N	1:A:161:PRO:HD2	2.30	0.47
1:A:332:SER:CB	1:A:369:SER:H	2.28	0.47
1:B:14:GLY:O	1:B:19:GLY:HA3	2.14	0.47
1:B:468:ALA:O	1:B:472:ILE:HG13	2.14	0.47
1:C:178:TRP:HB2	1:C:454:GLU:CG	2.45	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:388:LEU:HD12	1:D:412:HIS:HB2	1.96	0.47
1:B:170:PRO:HG2	1:B:173:LYS:HG2	1.97	0.47
1:B:79:ALA:HB1	1:B:224:ALA:HB3	1.96	0.47
2:B:600:FAD:H9	2:B:600:FAD:H1'1	1.67	0.47
1:D:315:TRP:O	1:D:316:LEU:HD23	2.15	0.47
1:B:195:VAL:HG11	1:D:196:ILE:HG12	1.97	0.46
1:A:101:TRP:CH2	1:A:316:LEU:HD13	2.49	0.46
1:A:351:LEU:HD12	1:A:355:SER:OG	2.14	0.46
1:B:59:ASP:H	1:B:371:MSE:HE1	1.78	0.46
1:C:283:LEU:O	1:C:287:THR:HB	2.15	0.46
1:D:350:GLN:HG3	1:D:407:ILE:HD12	1.96	0.46
1:A:104:TYR:CG	1:A:105:PRO:HA	2.51	0.46
1:C:92:ILE:HG13	1:C:314:CYS:CB	2.45	0.46
1:D:382:VAL:CG1	1:D:387:ILE:HD12	2.45	0.46
1:D:382:VAL:HG11	1:D:387:ILE:HD12	1.97	0.46
1:A:139:PRO:HG3	1:A:148:ARG:HD2	1.97	0.46
1:A:295:THR:HG22	3:A:569:HOH:O	2.14	0.46
1:B:495:ARG:O	1:B:496:ARG:HD2	2.16	0.46
1:D:230:PRO:HG2	1:D:233:LYS:HD2	1.96	0.46
1:D:284:VAL:O	1:D:287:THR:HG22	2.15	0.46
1:A:212:PHE:CG	1:A:213:PRO:HD2	2.51	0.46
1:B:307:PRO:HB2	1:B:310:ILE:CG2	2.46	0.46
1:C:125:MSE:HE3	1:C:186:PRO:HB2	1.98	0.46
1:C:295:THR:HG21	1:C:419:TYR:CE1	2.51	0.46
1:A:20:LEU:O	1:A:24:LYS:HG2	2.15	0.46
1:C:126:ILE:HA	1:C:188:LEU:HD11	1.96	0.46
1:C:332:SER:CB	1:C:369:SER:H	2.29	0.46
1:D:65:ILE:HD12	3:D:545:HOH:O	2.15	0.46
1:D:212:PHE:CG	1:D:213:PRO:HD2	2.51	0.46
1:A:65:ILE:HG12	3:A:527:HOH:O	2.15	0.46
1:A:134:VAL:HG22	1:B:134:VAL:HG22	1.97	0.46
1:D:63:HIS:HE2	1:D:315:TRP:HZ3	1.64	0.46
1:B:303:ARG:NH1	1:B:406:GLU:OE1	2.49	0.46
1:A:139:PRO:HB2	1:A:176:CYS:SG	2.56	0.45
1:C:382:VAL:CG1	1:C:387:ILE:HD12	2.46	0.45
1:B:254:LEU:HD12	1:B:258:THR:HB	1.98	0.45
1:A:434:LEU:HB2	1:A:435:PRO:HD3	1.98	0.45
1:C:315[A]:TRP:HD1	1:C:317:TYR:CZ	2.34	0.45
1:D:178:TRP:HB2	1:D:454:GLU:HG3	1.98	0.45
1:B:264:LYS:HG3	1:B:472:ILE:CG2	2.47	0.45
1:C:191:VAL:O	1:C:195:VAL:HG23	2.16	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:264:LYS:HG3	1:C:472:ILE:HG23	1.99	0.45
1:C:374:VAL:HG11	1:C:387:ILE:HD11	1.99	0.45
1:D:152:THR:HA	1:D:155:ALA:HB3	1.97	0.45
1:A:504:PHE:CD2	1:D:32:PRO:HB3	2.52	0.45
1:C:292:TYR:HB3	1:C:451:TRP:CZ2	2.51	0.45
1:B:3:HIS:HA	1:B:4:PRO:HD3	1.84	0.45
1:B:309:ARG:HD3	1:B:309:ARG:N	2.31	0.45
1:B:160:ARG:N	1:B:161:PRO:HD2	2.32	0.45
1:B:368:TRP:CZ3	1:B:370:ILE:HD11	2.52	0.45
1:C:298:ILE:HB	1:C:372:LEU:CD1	2.47	0.45
1:C:54:GLU:HG3	1:C:409:SER:CB	2.45	0.44
1:D:231:LYS:HE3	1:D:231:LYS:HB2	1.84	0.44
1:C:160:ARG:N	1:C:161:PRO:HD2	2.33	0.44
1:C:87:TYR:CE2	1:C:336:PRO:HD2	2.52	0.44
1:C:298:ILE:HB	1:C:372:LEU:HD11	1.99	0.44
1:C:374:VAL:HG21	1:C:387:ILE:HD11	1.97	0.44
1:A:459:ASP:O	1:A:463:MSE:HG2	2.18	0.44
1:C:69:TYR:OH	1:C:460:HIS:HD2	2.00	0.44
1:C:338:ASN:HB2	1:C:339:GLN:HE21	1.82	0.44
1:D:87:TYR:CE2	1:D:336:PRO:HD2	2.53	0.44
1:D:355:SER:OG	1:D:356:ARG:N	2.51	0.44
1:C:290:LEU:HD13	1:C:451:TRP:CD2	2.52	0.44
1:D:92:ILE:CG2	1:D:93:SER:N	2.80	0.44
1:D:315:TRP:N	1:D:315:TRP:CD2	2.85	0.44
1:A:145:TRP:CZ2	1:A:149:MSE:HG3	2.53	0.44
1:A:313:LYS:HD2	1:A:313:LYS:N	2.30	0.44
1:D:168:ALA:HB1	1:D:380:LYS:HB3	2.00	0.44
1:C:92:ILE:O	1:C:314:CYS:HB2	2.18	0.43
1:C:445:ARG:HA	1:C:450:SER:OG	2.18	0.43
1:D:298:ILE:HB	1:D:372:LEU:HD11	2.00	0.43
2:B:600:FAD:O1A	3:B:545:HOH:O	2.21	0.43
1:C:459:ASP:O	1:C:463:MSE:HG2	2.17	0.43
1:D:313:LYS:HG2	1:D:330:ILE:CG1	2.48	0.43
1:A:8:VAL:O	1:A:262:TYR:HA	2.18	0.43
1:B:274:LEU:HD22	3:B:519:HOH:O	2.17	0.43
1:B:431:THR:O	1:B:435:PRO:HG2	2.18	0.43
1:C:104:TYR:CD1	1:C:105:PRO:HA	2.53	0.43
1:D:26:LEU:HG	1:D:469:VAL:HG21	2.00	0.43
1:D:332:SER:CB	1:D:369:SER:H	2.31	0.43
1:A:18:THR:OG1	1:A:461:SER:HB3	2.17	0.43
1:C:92:ILE:HG13	1:C:314:CYS:HB3	1.99	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:116:GLU:HG3	3:B:555:HOH:O	2.18	0.43
1:C:14:GLY:O	1:C:19:GLY:HA3	2.17	0.43
1:C:165:LYS:HA	1:C:380:LYS:HE3	2.00	0.43
1:C:146:ILE:HD13	1:C:159:MSE:HB3	2.00	0.43
1:C:429:ALA:O	1:C:433:ILE:HG13	2.18	0.43
1:D:111:SER:HB3	1:D:195:VAL:HA	2.01	0.43
1:D:80:LEU:HB3	1:D:85:ASP:HB3	2.01	0.43
1:B:459:ASP:O	1:B:463:MSE:HG2	2.19	0.43
1:D:468:ALA:O	1:D:472:ILE:HG13	2.18	0.43
1:C:63:HIS:HB2	3:C:550:HOH:O	2.19	0.43
1:B:309:ARG:CD	1:B:309:ARG:N	2.80	0.42
1:D:388:LEU:O	1:D:388:LEU:HD23	2.18	0.42
1:B:263:LYS:O	1:B:264:LYS:HD3	2.19	0.42
1:C:316:LEU:O	1:C:327:ARG:HA	2.20	0.42
1:C:107:GLN:H	1:C:107:GLN:HG3	1.56	0.42
1:A:48:SER:O	1:A:60:VAL:HG22	2.20	0.42
1:A:309:ARG:HB2	1:A:309:ARG:NH1	2.33	0.42
1:B:18:THR:OG1	1:B:461:SER:HB3	2.19	0.42
1:B:270:ALA:HB3	1:B:273:PHE:HD2	1.84	0.42
1:D:149:MSE:O	1:D:186:PRO:HB3	2.20	0.42
1:D:281:GLN:NE2	3:D:543:HOH:O	2.52	0.42
1:D:306:ARG:NE	1:D:311:GLY:HA2	2.35	0.42
1:B:309:ARG:HG2	1:B:309:ARG:HH11	1.84	0.42
1:C:204:TRP:NE1	1:C:207:ASN:OD1	2.42	0.42
1:D:63:HIS:NE2	1:D:315:TRP:CZ3	2.87	0.42
1:A:54:GLU:HG3	1:A:409:SER:CB	2.45	0.42
1:B:122:ILE:HG13	1:D:196:ILE:HD11	2.00	0.42
1:C:125:MSE:SE	1:C:191:VAL:HG21	2.70	0.42
1:A:35:MSE:SE	1:A:260:ILE:HD13	2.70	0.42
1:C:315[A]:TRP:CD2	1:C:315[A]:TRP:N	2.87	0.42
1:C:309:ARG:H	1:C:309:ARG:HG3	1.40	0.42
1:C:321:ASP:OD2	1:C:321:ASP:N	2.52	0.42
1:B:196:ILE:HD11	1:D:122:ILE:HG13	2.00	0.42
1:D:46:LEU:O	1:D:60:VAL:HG23	2.19	0.42
2:D:600:FAD:PA	2:D:600:FAD:H5'1	2.59	0.42
1:C:79:ALA:C	1:C:80:LEU:HD12	2.41	0.42
1:A:110:ILE:HD11	1:A:122:ILE:HD11	2.02	0.41
1:A:219:GLY:O	1:A:223:ILE:HG13	2.19	0.41
1:B:92:ILE:O	1:B:314:CYS:HB2	2.19	0.41
1:B:104:TYR:CG	1:B:105:PRO:HA	2.55	0.41
1:B:445:ARG:NE	1:B:481:LEU:HD22	2.35	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:3:HIS:HA	1:C:4:PRO:HD3	1.88	0.41
1:C:25:ARG:O	1:C:29:ILE:HG13	2.20	0.41
1:A:29:ILE:HD13	1:A:473:VAL:HG11	2.02	0.41
1:A:368:TRP:HB3	3:A:578:HOH:O	2.21	0.41
1:B:313:LYS:HB3	1:B:333:ASN:HB3	2.01	0.41
1:B:432:GLN:O	1:B:436:LYS:HG3	2.20	0.41
1:C:295:THR:HG21	1:C:419:TYR:CD1	2.55	0.41
2:C:600:FAD:H1'1	2:C:600:FAD:H9	1.59	0.41
1:D:213:PRO:HD3	1:D:221:ILE:HD11	2.01	0.41
1:A:192:THR:O	1:A:196:ILE:HG13	2.21	0.41
1:A:331:PHE:CD1	1:A:371:MSE:HE3	2.56	0.41
1:B:494:GLU:HG2	1:C:477:VAL:HA	2.02	0.41
1:A:274:LEU:O	1:A:278:MSE:HG3	2.21	0.41
1:D:70:LYS:CG	1:D:493:THR:HG22	2.49	0.41
1:D:356:ARG:HA	1:D:357:PRO:HD3	1.89	0.41
1:B:387:ILE:HD13	1:B:387:ILE:O	2.21	0.41
1:D:64:VAL:CG2	1:D:458:GLN:HB2	2.51	0.41
1:D:315:TRP:HD1	1:D:317:TYR:CZ	2.39	0.41
1:D:316:LEU:O	1:D:327:ARG:HA	2.20	0.41
2:D:600:FAD:H1'1	2:D:600:FAD:H9	1.59	0.41
1:B:107:GLN:CD	1:B:107:GLN:H	2.24	0.41
1:C:48:SER:O	1:C:60:VAL:HG22	2.20	0.41
1:C:272:ASP:OD1	1:C:272:ASP:N	2.54	0.41
1:A:3:HIS:HA	1:A:4:PRO:HD3	1.94	0.41
1:C:171:THR:HA	1:C:174:MSE:HE3	2.02	0.41
1:C:310:ILE:H	1:C:310:ILE:HG12	1.58	0.41
1:C:468:ALA:O	1:C:472:ILE:HG13	2.20	0.41
1:D:313:LYS:CG	1:D:314:CYS:N	2.78	0.41
1:A:310:ILE:HG13	1:A:310:ILE:O	2.21	0.41
1:B:125:MSE:CE	1:B:191:VAL:HG21	2.47	0.41
1:B:325:PHE:HB3	1:B:372:LEU:HD13	2.02	0.41
1:C:125:MSE:CE	1:C:186:PRO:HB2	2.51	0.41
1:C:244:LYS:HB3	1:C:253:THR:HB	2.03	0.41
1:D:94:TYR:HB2	1:D:316:LEU:HD22	2.02	0.41
1:B:79:ALA:HB1	1:B:224:ALA:CB	2.51	0.41
1:B:60:VAL:HB	1:B:415:PHE:CZ	2.56	0.40
1:B:302:VAL:HG21	1:B:401:LEU:HD21	2.02	0.40
1:B:391:CYS:O	1:B:395:LEU:HG	2.20	0.40
1:C:162:TYR:O	1:C:166:VAL:HG23	2.21	0.40
1:D:272:ASP:O	1:D:276:GLU:HG3	2.21	0.40
1:A:69:TYR:CE2	1:A:463:MSE:HG3	2.55	0.40

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:139:PRO:HG3	1:C:148:ARG:HD2	2.03	0.40
1:D:204:TRP:HA	1:D:204:TRP:HE3	1.85	0.40
1:B:92:ILE:HG12	1:B:93:SER:N	2.35	0.40
1:B:295:THR:HG21	1:B:419:TYR:CE1	2.57	0.40
1:C:25:ARG:O	1:C:25:ARG:HG3	2.20	0.40
1:C:92:ILE:CG1	1:C:314:CYS:HB3	2.51	0.40
1:B:187:ASN:O	1:B:191:VAL:HG23	2.21	0.40
1:B:461:SER:HA	1:B:464:LEU:HD12	2.03	0.40
1:D:125:MSE:CE	1:D:186:PRO:HB2	2.50	0.40
1:D:171:THR:HA	1:D:174:MSE:HE3	2.04	0.40
1:D:298:ILE:HB	1:D:372:LEU:CD1	2.51	0.40
1:D:321:ASP:N	1:D:321:ASP:OD2	2.55	0.40
1:B:76:LEU:HD22	1:B:221:ILE:CG2	2.52	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	502/509 (99%)	483 (96%)	18 (4%)	1 (0%)	47	64
1	B	501/509 (98%)	483 (96%)	17 (3%)	1 (0%)	47	64
1	C	508/509 (100%)	488 (96%)	17 (3%)	3 (1%)	25	37
1	D	507/509 (100%)	474 (94%)	31 (6%)	2 (0%)	34	48
All	All	2018/2036 (99%)	1928 (96%)	83 (4%)	7 (0%)	41	56

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	203	ASN
1	D	314	CYS

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	235	ARG
1	C	111	SER
1	A	426	ARG
1	C	311	GLY
1	D	311	GLY

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	429/417 (103%)	422 (98%)	7 (2%)	62	78
1	B	428/417 (103%)	419 (98%)	9 (2%)	53	71
1	C	432/417 (104%)	418 (97%)	14 (3%)	39	56
1	D	431/417 (103%)	419 (97%)	12 (3%)	43	61
All	All	1720/1668 (103%)	1678 (98%)	42 (2%)	49	67

All (42) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	ARG
1	A	54	GLU
1	A	287	THR
1	A	309	ARG
1	A	339	GLN
1	A	417	HIS
1	A	470	ASP
1	B	25	ARG
1	B	54	GLU
1	B	116	GLU
1	B	175	GLN
1	B	287	THR
1	B	309	ARG
1	B	313	LYS
1	B	371	MSE
1	B	387	ILE

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	C	25	ARG
1	C	54	GLU
1	C	69	TYR
1	C	107	GLN
1	C	157	LEU
1	C	175	GLN
1	C	287	THR
1	C	308	GLU
1	C	309	ARG
1	C	310	ILE
1	C	313	LYS
1	C	321	ASP
1	C	356	ARG
1	C	470	ASP
1	D	25	ARG
1	D	41	GLU
1	D	54	GLU
1	D	175	GLN
1	D	181	GLU
1	D	204	TRP
1	D	255	GLN
1	D	309	ARG
1	D	313	LYS
1	D	315	TRP
1	D	412	HIS
1	D	417	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	90	GLN
1	A	296	HIS
1	A	333	ASN
1	A	339	GLN
1	A	412	HIS
1	B	333	ASN
1	B	339	GLN
1	C	333	ASN
1	C	339	GLN
1	D	296	HIS
1	D	333	ASN
1	D	339	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 ⓘ

4 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	C	600	-	53,58,58	2.04	15 (28%)	68,89,89	1.68	14 (20%)
2	FAD	B	600	-	53,58,58	2.01	14 (26%)	68,89,89	1.66	15 (22%)
2	FAD	D	600	-	53,58,58	2.05	15 (28%)	68,89,89	1.72	15 (22%)
2	FAD	A	600	-	53,58,58	2.00	13 (24%)	68,89,89	1.65	14 (20%)

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	C	600	-	-	15/30/50/50	0/6/6/6
2	FAD	B	600	-	-	15/30/50/50	0/6/6/6
2	FAD	D	600	-	-	17/30/50/50	0/6/6/6
2	FAD	A	600	-	-	17/30/50/50	0/6/6/6

All (57) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	600	FAD	C10-N1	5.47	1.44	1.33
2	D	600	FAD	C10-N1	5.45	1.44	1.33
2	D	600	FAD	C1'-C2'	5.44	1.60	1.52
2	C	600	FAD	C10-N1	5.39	1.44	1.33
2	A	600	FAD	C10-N1	5.34	1.44	1.33
2	B	600	FAD	C2B-C3B	-5.01	1.39	1.53
2	C	600	FAD	C1'-C2'	4.95	1.59	1.52
2	A	600	FAD	C1'-C2'	4.93	1.59	1.52
2	C	600	FAD	C2B-C3B	-4.80	1.40	1.53
2	A	600	FAD	C2B-C3B	-4.76	1.40	1.53
2	D	600	FAD	C2B-C3B	-4.74	1.40	1.53
2	B	600	FAD	C1'-C2'	4.53	1.59	1.52
2	D	600	FAD	C7M-C7	4.23	1.59	1.51
2	C	600	FAD	C7M-C7	4.15	1.59	1.51
2	A	600	FAD	C7M-C7	4.11	1.59	1.51
2	B	600	FAD	C7M-C7	4.00	1.59	1.51
2	B	600	FAD	C2-N1	3.59	1.45	1.36
2	D	600	FAD	C2-N1	3.53	1.45	1.36
2	C	600	FAD	C2-N1	3.53	1.45	1.36
2	A	600	FAD	C2-N1	3.38	1.44	1.36
2	C	600	FAD	O3'-C3'	-3.24	1.35	1.43
2	C	600	FAD	C4X-N5	3.22	1.37	1.30
2	B	600	FAD	O3'-C3'	-3.16	1.35	1.43
2	D	600	FAD	C4X-N5	3.16	1.36	1.30
2	A	600	FAD	C4X-N5	3.15	1.36	1.30
2	A	600	FAD	O3'-C3'	-3.15	1.35	1.43
2	D	600	FAD	O3'-C3'	-3.15	1.35	1.43
2	B	600	FAD	C9A-C5X	-2.97	1.36	1.41
2	B	600	FAD	C4X-N5	2.97	1.36	1.30
2	B	600	FAD	C4'-C3'	-2.92	1.48	1.53
2	C	600	FAD	C9A-C5X	-2.84	1.36	1.41
2	C	600	FAD	C9A-N10	-2.80	1.36	1.41
2	A	600	FAD	C9A-C5X	-2.79	1.36	1.41
2	A	600	FAD	C4'-C3'	-2.77	1.48	1.53
2	A	600	FAD	C1'-N10	-2.75	1.41	1.48
2	A	600	FAD	C9A-N10	-2.75	1.36	1.41
2	C	600	FAD	C4'-C3'	-2.74	1.48	1.53
2	D	600	FAD	C9A-N10	-2.73	1.36	1.41
2	D	600	FAD	C9A-C5X	-2.72	1.36	1.41
2	B	600	FAD	C9A-N10	-2.72	1.36	1.41
2	B	600	FAD	C1'-N10	-2.70	1.41	1.48
2	C	600	FAD	O4'-C4'	2.64	1.48	1.43

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	600	FAD	C1'-N10	-2.62	1.41	1.48
2	D	600	FAD	O4'-C4'	2.59	1.48	1.43
2	D	600	FAD	C4'-C3'	-2.47	1.48	1.53
2	D	600	FAD	C1'-N10	-2.47	1.41	1.48
2	D	600	FAD	P-O1P	2.46	1.59	1.50
2	A	600	FAD	O4'-C4'	2.42	1.48	1.43
2	A	600	FAD	P-O1P	2.40	1.59	1.50
2	B	600	FAD	O4'-C4'	2.37	1.48	1.43
2	B	600	FAD	P-O1P	2.30	1.59	1.50
2	C	600	FAD	P-O1P	2.27	1.58	1.50
2	C	600	FAD	C5'-C4'	2.12	1.54	1.51
2	D	600	FAD	C5'-C4'	2.11	1.54	1.51
2	C	600	FAD	O5B-C5B	-2.02	1.37	1.44
2	D	600	FAD	O5B-C5B	-2.00	1.37	1.44
2	B	600	FAD	O5B-C5B	-2.00	1.37	1.44

All (58) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	600	FAD	O5B-PA-O1A	-4.70	90.72	109.07
2	B	600	FAD	O5B-PA-O1A	-4.52	91.40	109.07
2	A	600	FAD	O5B-PA-O1A	-4.43	91.77	109.07
2	D	600	FAD	N3A-C2A-N1A	-4.29	121.97	128.68
2	C	600	FAD	N3A-C2A-N1A	-4.28	121.99	128.68
2	D	600	FAD	O5B-PA-O1A	-4.27	92.38	109.07
2	B	600	FAD	N3A-C2A-N1A	-4.24	122.06	128.68
2	A	600	FAD	N3A-C2A-N1A	-4.17	122.16	128.68
2	C	600	FAD	O5'-P-O1P	-3.84	94.08	109.07
2	D	600	FAD	O5'-C5'-C4'	3.79	119.48	109.36
2	B	600	FAD	O5'-C5'-C4'	3.72	119.30	109.36
2	D	600	FAD	O5'-P-O1P	-3.67	94.73	109.07
2	A	600	FAD	O5'-P-O1P	-3.60	94.99	109.07
2	D	600	FAD	P-O3P-PA	-3.48	120.89	132.83
2	B	600	FAD	O5'-P-O1P	-3.44	95.64	109.07
2	C	600	FAD	O5'-C5'-C4'	3.39	118.41	109.36
2	A	600	FAD	O5'-C5'-C4'	3.23	117.98	109.36
2	A	600	FAD	P-O3P-PA	-3.10	122.19	132.83
2	D	600	FAD	C4-N3-C2	-3.06	119.98	125.64
2	B	600	FAD	C3B-C2B-C1B	2.97	105.45	100.98
2	D	600	FAD	C3B-C2B-C1B	2.96	105.43	100.98
2	C	600	FAD	C4-N3-C2	-2.96	120.18	125.64
2	B	600	FAD	O2A-PA-O5B	2.91	121.27	107.75

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	600	FAD	C3B-C2B-C1B	2.90	105.35	100.98
2	B	600	FAD	C4-N3-C2	-2.89	120.31	125.64
2	A	600	FAD	C4-N3-C2	-2.83	120.41	125.64
2	A	600	FAD	O2A-PA-O5B	2.81	120.79	107.75
2	C	600	FAD	P-O3P-PA	-2.81	123.19	132.83
2	D	600	FAD	O2P-P-O5'	2.80	120.75	107.75
2	C	600	FAD	O2A-PA-O5B	2.74	120.46	107.75
2	C	600	FAD	C4X-C4-N3	2.68	120.00	113.19
2	D	600	FAD	C4X-C4-N3	2.64	119.89	113.19
2	A	600	FAD	C4X-C4-N3	2.64	119.89	113.19
2	C	600	FAD	O2P-P-O5'	2.63	119.96	107.75
2	B	600	FAD	C4X-C4-N3	2.61	119.81	113.19
2	B	600	FAD	O4-C4-C4X	-2.52	119.93	126.60
2	D	600	FAD	O2A-PA-O5B	2.51	119.39	107.75
2	C	600	FAD	C3B-C2B-C1B	2.51	104.75	100.98
2	A	600	FAD	C10-C4X-N5	-2.50	119.55	124.86
2	D	600	FAD	C1'-C2'-C3'	2.48	116.71	109.79
2	B	600	FAD	O5B-C5B-C4B	2.47	117.49	108.99
2	C	600	FAD	C10-C4X-N5	-2.46	119.64	124.86
2	D	600	FAD	C10-C4X-N5	-2.45	119.67	124.86
2	B	600	FAD	P-O3P-PA	-2.44	124.45	132.83
2	B	600	FAD	O2P-P-O5'	2.42	119.00	107.75
2	A	600	FAD	O2P-P-O5'	2.40	118.89	107.75
2	B	600	FAD	C10-C4X-N5	-2.38	119.81	124.86
2	D	600	FAD	O4-C4-C4X	-2.38	120.29	126.60
2	C	600	FAD	O4-C4-C4X	-2.35	120.36	126.60
2	A	600	FAD	O5B-C5B-C4B	2.34	117.03	108.99
2	A	600	FAD	O4-C4-C4X	-2.26	120.61	126.60
2	A	600	FAD	C1'-C2'-C3'	2.22	115.99	109.79
2	B	600	FAD	C1'-C2'-C3'	2.15	115.80	109.79
2	D	600	FAD	O5B-C5B-C4B	2.13	116.33	108.99
2	C	600	FAD	C1'-C2'-C3'	2.10	115.66	109.79
2	D	600	FAD	C4X-C10-N1	-2.09	119.88	124.73
2	C	600	FAD	O5B-C5B-C4B	2.02	115.95	108.99
2	B	600	FAD	C4X-C10-N1	-2.00	120.09	124.73

There are no chirality outliers.

All (64) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	600	FAD	C5B-O5B-PA-O1A
2	A	600	FAD	C1'-C2'-C3'-O3'

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
2	A	600	FAD	C1'-C2'-C3'-C4'
2	A	600	FAD	C5'-O5'-P-O2P
2	A	600	FAD	C5'-O5'-P-O3P
2	B	600	FAD	C5B-O5B-PA-O1A
2	B	600	FAD	C1'-C2'-C3'-O3'
2	B	600	FAD	C1'-C2'-C3'-C4'
2	B	600	FAD	O2'-C2'-C3'-O3'
2	B	600	FAD	O2'-C2'-C3'-C4'
2	B	600	FAD	C5'-O5'-P-O3P
2	C	600	FAD	C5B-O5B-PA-O1A
2	C	600	FAD	C1'-C2'-C3'-O3'
2	C	600	FAD	C1'-C2'-C3'-C4'
2	C	600	FAD	C3'-C4'-C5'-O5'
2	C	600	FAD	C5'-O5'-P-O1P
2	C	600	FAD	C5'-O5'-P-O2P
2	C	600	FAD	C5'-O5'-P-O3P
2	D	600	FAD	C5B-O5B-PA-O1A
2	D	600	FAD	C1'-C2'-C3'-O3'
2	D	600	FAD	C1'-C2'-C3'-C4'
2	D	600	FAD	C3'-C4'-C5'-O5'
2	D	600	FAD	O4'-C4'-C5'-O5'
2	D	600	FAD	C5'-O5'-P-O1P
2	D	600	FAD	C5'-O5'-P-O2P
2	D	600	FAD	C5'-O5'-P-O3P
2	B	600	FAD	O3'-C3'-C4'-O4'
2	A	600	FAD	O2'-C2'-C3'-C4'
2	A	600	FAD	C2'-C3'-C4'-O4'
2	B	600	FAD	C2'-C3'-C4'-O4'
2	C	600	FAD	O2'-C2'-C3'-C4'
2	B	600	FAD	O3'-C3'-C4'-C5'
2	B	600	FAD	C2'-C3'-C4'-C5'
2	A	600	FAD	O3'-C3'-C4'-O4'
2	B	600	FAD	O4B-C4B-C5B-O5B
2	A	600	FAD	O3'-C3'-C4'-C5'
2	A	600	FAD	C2'-C3'-C4'-C5'
2	A	600	FAD	O2'-C2'-C3'-O3'
2	C	600	FAD	O2'-C2'-C3'-O3'
2	D	600	FAD	O2'-C2'-C3'-O3'
2	C	600	FAD	O4'-C4'-C5'-O5'
2	C	600	FAD	C2'-C3'-C4'-O4'
2	D	600	FAD	O2'-C2'-C3'-C4'
2	D	600	FAD	C2'-C3'-C4'-O4'

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
2	A	600	FAD	O4B-C4B-C5B-O5B
2	A	600	FAD	C2'-C1'-N10-C10
2	C	600	FAD	C2'-C1'-N10-C10
2	D	600	FAD	C2'-C1'-N10-C10
2	A	600	FAD	C5B-O5B-PA-O2A
2	A	600	FAD	C5'-O5'-P-O1P
2	B	600	FAD	C5B-O5B-PA-O2A
2	B	600	FAD	C5'-O5'-P-O1P
2	B	600	FAD	C5'-O5'-P-O2P
2	C	600	FAD	C5B-O5B-PA-O2A
2	D	600	FAD	C5B-O5B-PA-O2A
2	D	600	FAD	O4B-C4B-C5B-O5B
2	D	600	FAD	O3'-C3'-C4'-O4'
2	C	600	FAD	O4B-C4B-C5B-O5B
2	C	600	FAD	O3'-C3'-C4'-O4'
2	D	600	FAD	C2'-C3'-C4'-C5'
2	A	600	FAD	C5B-O5B-PA-O3P
2	B	600	FAD	C3B-C4B-C5B-O5B
2	A	600	FAD	C3B-C4B-C5B-O5B
2	D	600	FAD	O3'-C3'-C4'-C5'

There are no ring outliers.

4 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	600	FAD	2	0
2	B	600	FAD	4	0
2	D	600	FAD	2	0
2	A	600	FAD	2	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 C 600

Bond lengths

Bond angles

Torsions

Rings

Ligand FAD B 600

Bond lengths

Bond angles

Torsions

Rings

Ligand FAD D 600

Bond lengths

Bond angles

Torsions

Rings

Ligand FAD A 600

Bond lengths

Bond angles

Torsions

Rings
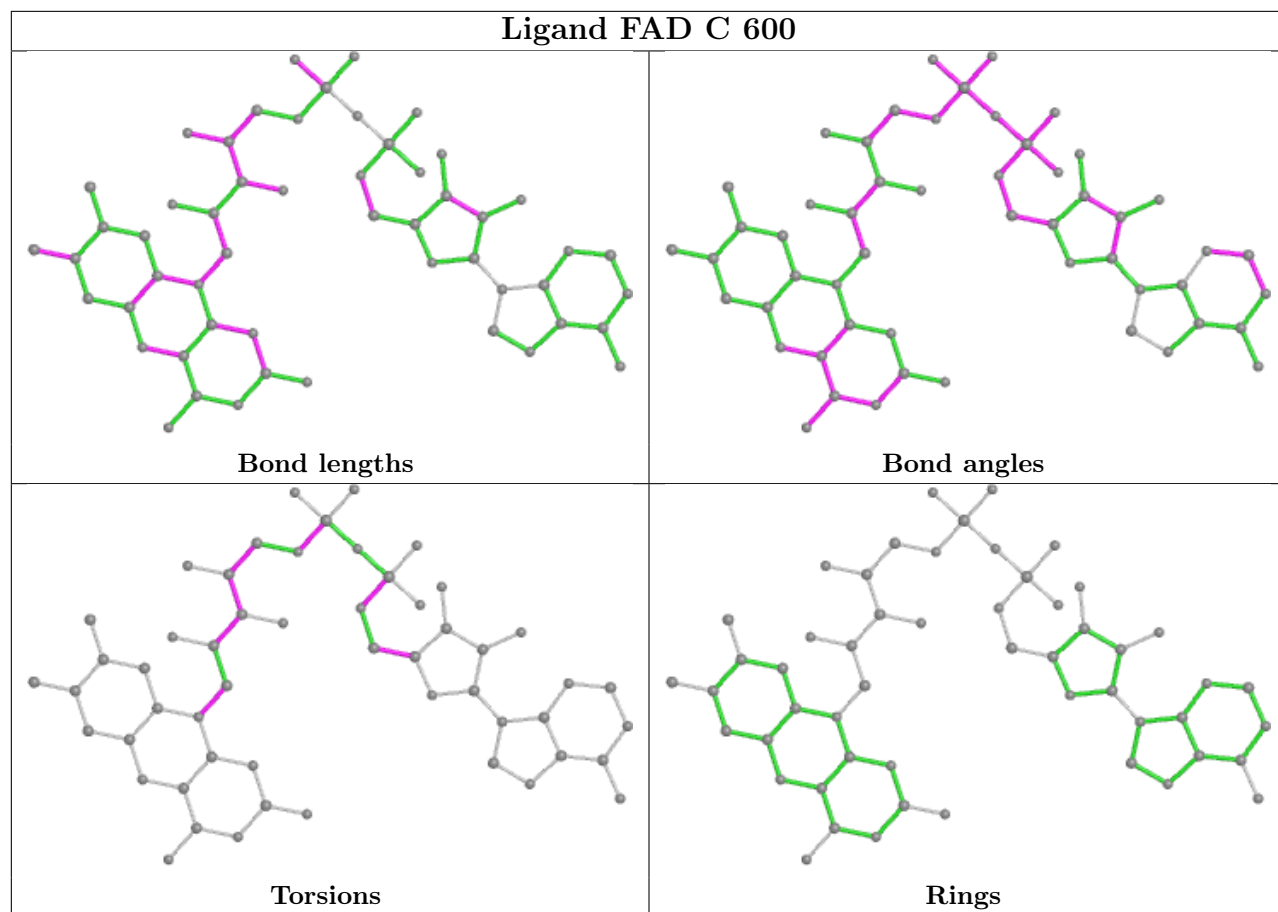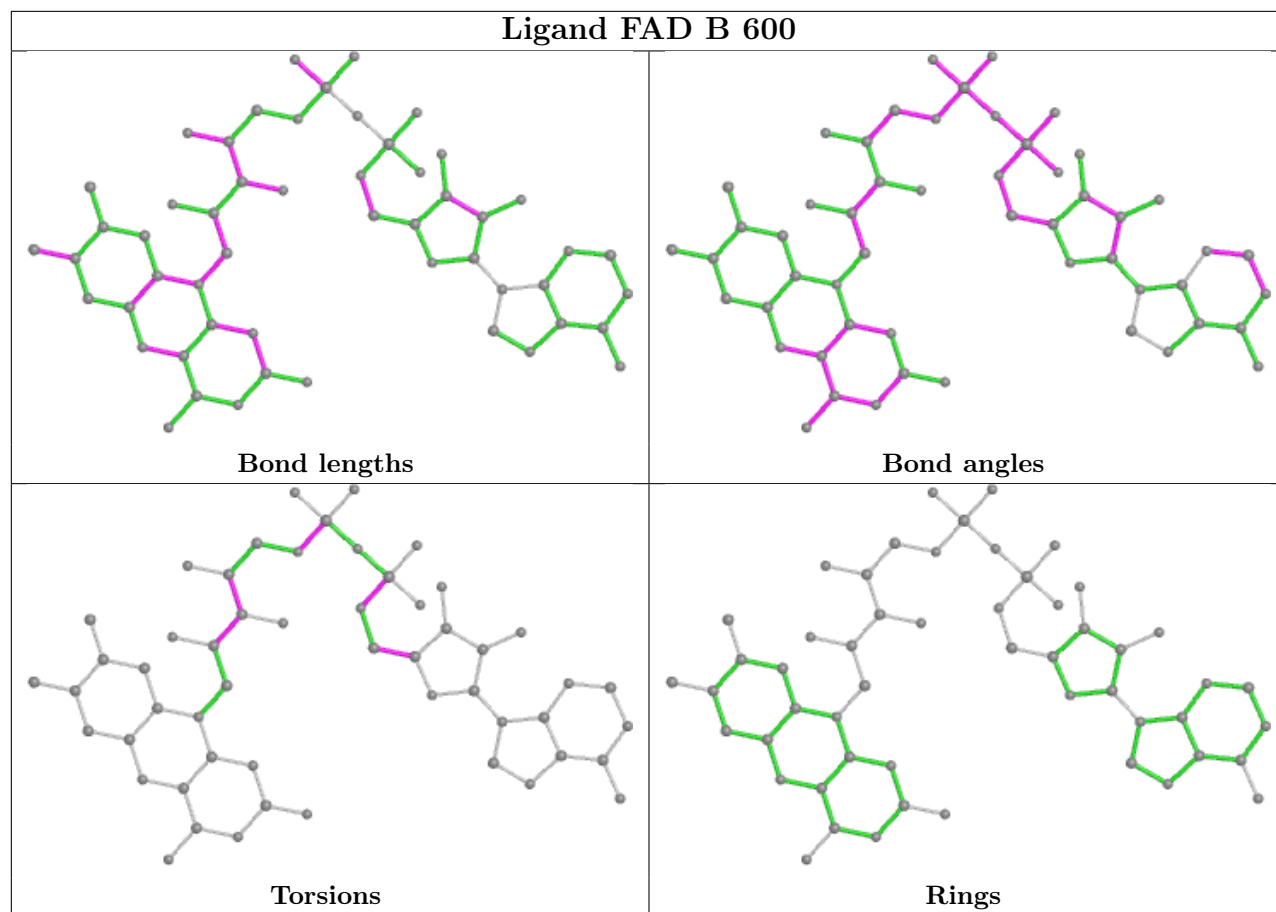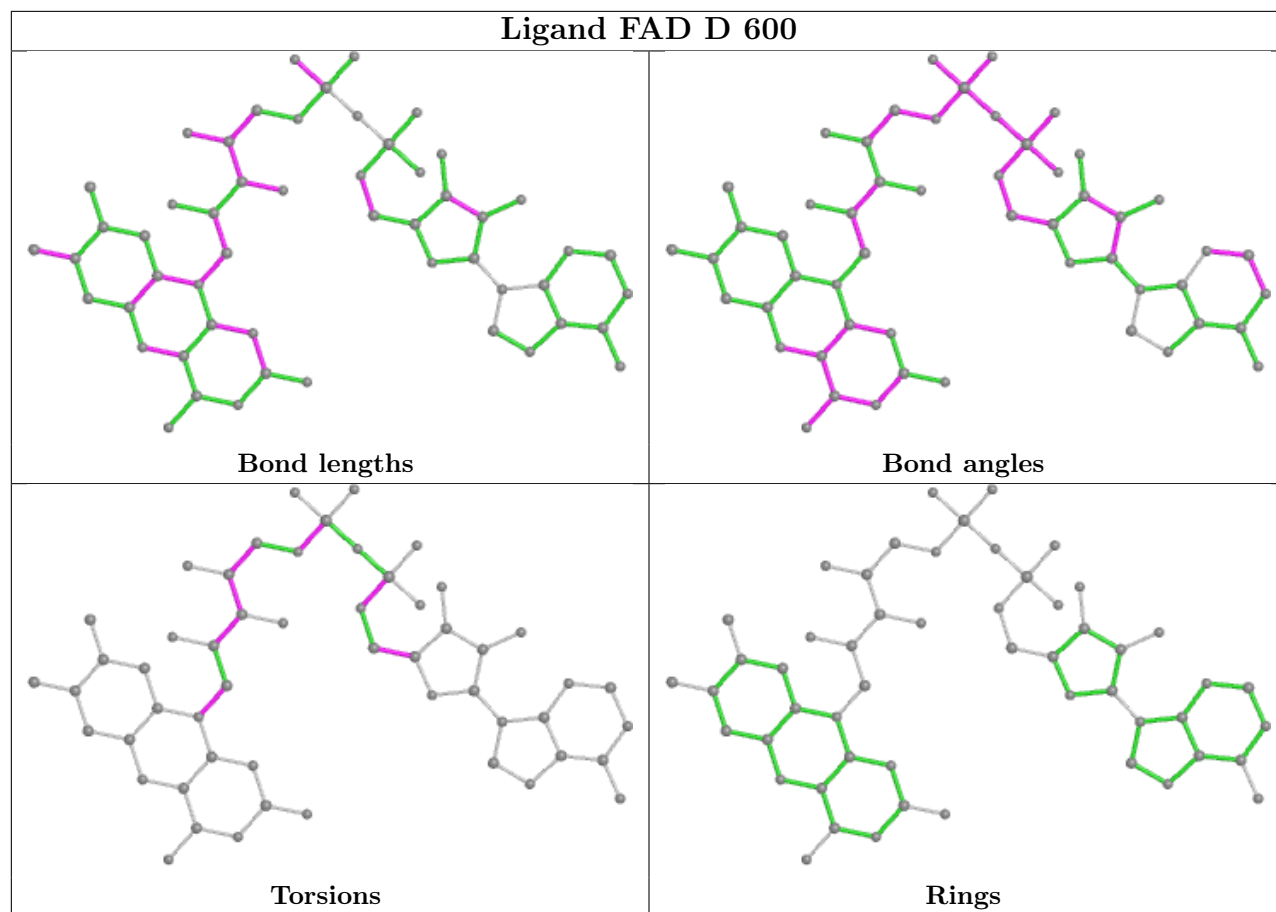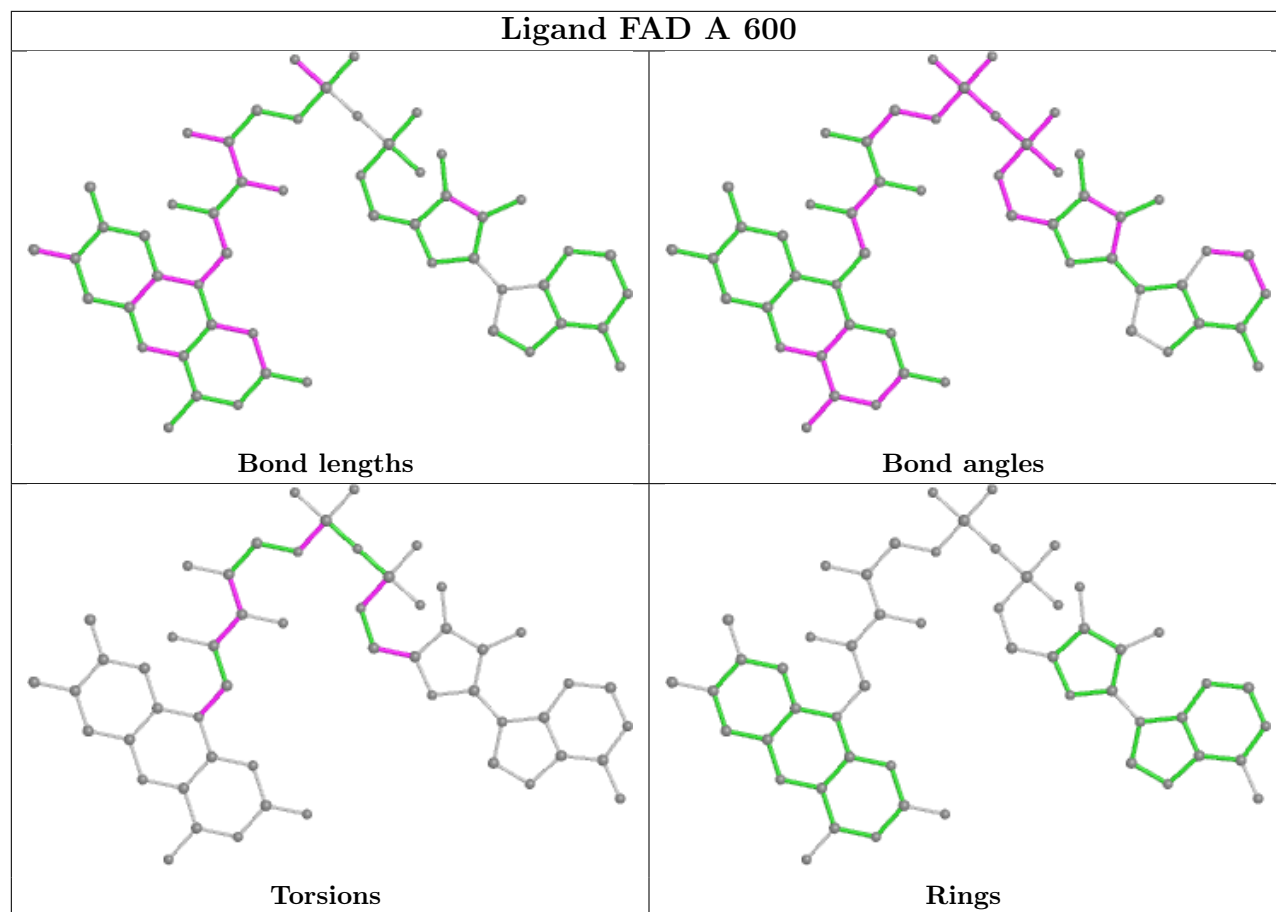
5.7 Other polymers ⓘ

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 (i)

6.1 Protein, DNA and RNA chains (i)

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	492/509 (96%)	-0.67	7 (1%)	75	73	21, 40, 73, 123	0
1	B	491/509 (96%)	-0.66	4 (0%)	86	85	18, 35, 70, 115	0
1	C	495/509 (97%)	-0.69	3 (0%)	89	88	18, 35, 73, 118	0
1	D	495/509 (97%)	-0.54	6 (1%)	79	77	22, 43, 75, 121	1 (0%)
All	All	1973/2036 (96%)	-0.64	20 (1%)	82	81	18, 38, 73, 123	1 (0%)

All (20) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	509	ALA	8.2
1	D	205	GLY	6.4
1	A	3	HIS	5.4
1	A	205	GLY	5.3
1	D	510	GLN	4.4
1	A	200	THR	4.4
1	C	203	ASN	3.2
1	A	508	LYS	3.1
1	B	509	ALA	3.0
1	D	3	HIS	2.9
1	B	310	ILE	2.8
1	A	309	ARG	2.7
1	D	206	PRO	2.6
1	A	2	THR	2.5
1	B	202	GLY	2.4
1	C	204	TRP	2.3
1	B	198	GLY	2.3
1	D	356	ARG	2.2
1	A	505	ALA	2.1
1	D	357	PRO	2.0

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
2	FAD	D	600	53/53	0.94	0.13	30,61,79,90	0
2	FAD	A	600	53/53	0.96	0.12	24,44,66,78	0
2	FAD	C	600	53/53	0.98	0.11	14,29,50,60	0
2	FAD	B	600	53/53	0.98	0.11	3,26,44,60	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 FAD D 600:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
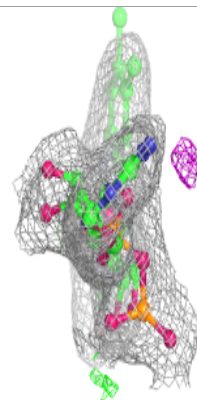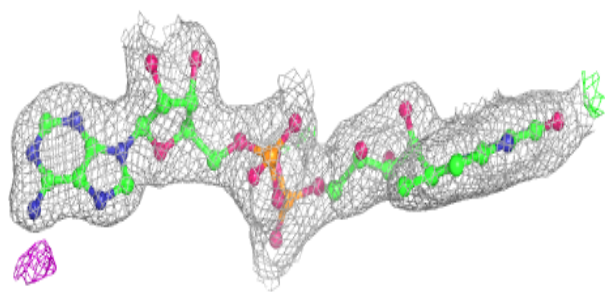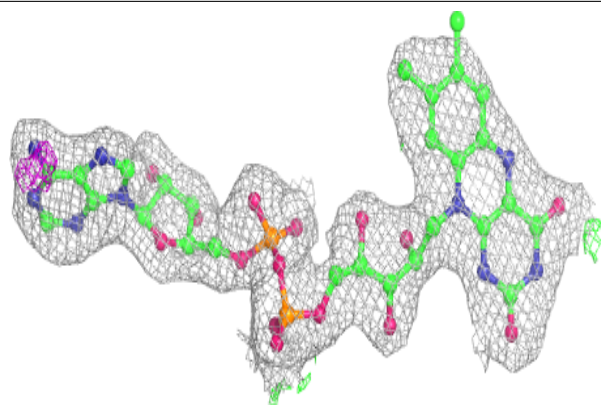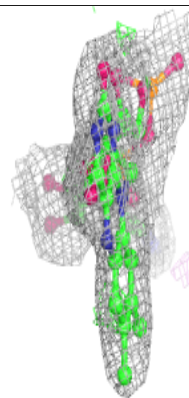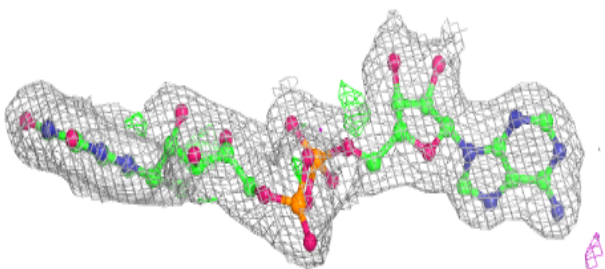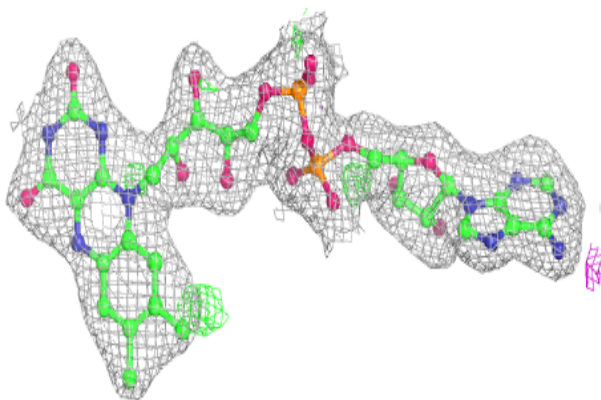mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
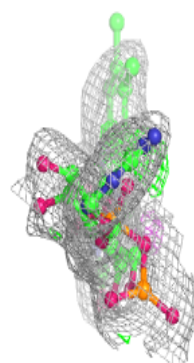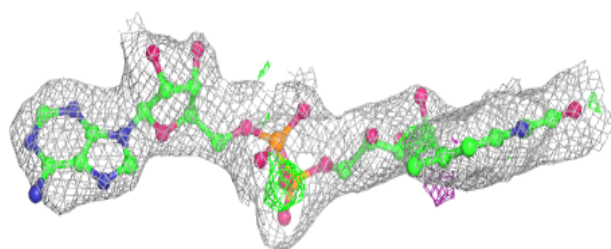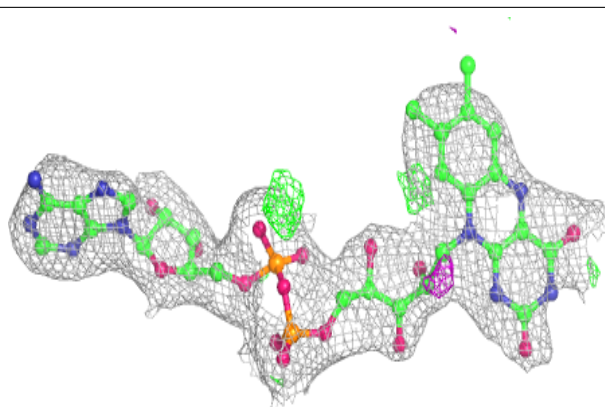
Electron density around FAD A 600:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
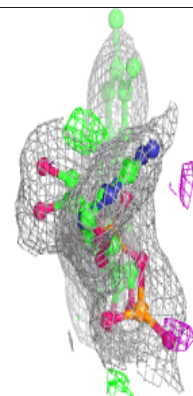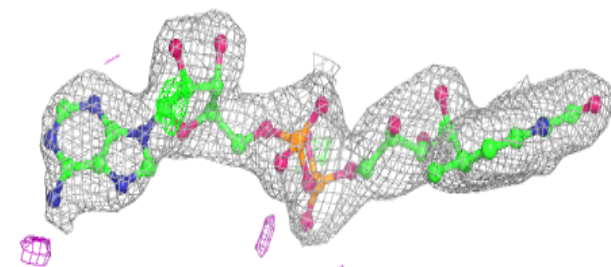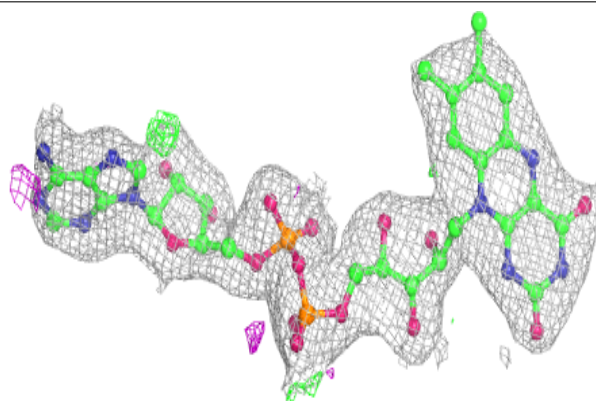
Electron density around FAD C 600:

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

Electron density around FAD B 600:

$2mF_o\text{-}DF_c$ (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.