



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 12, 2026 – 12:26 PM UTC

PDB ID : 2BF4 / pdb_00002bf4
Title : A second FMN-binding site in yeast NADPH-cytochrome P450 reductase suggests a novel mechanism of electron transfer by diflavin reductases.
Authors : Podust, L.M.; Lepesheva, G.I.; Kim, Y.; Yermalitskaya, L.V.; Yermalitsky, V.N.; Lamb, D.C.; Kelly, S.L.; Waterman, M.R.
Deposited on : 2004-12-03
Resolution : 3.00 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

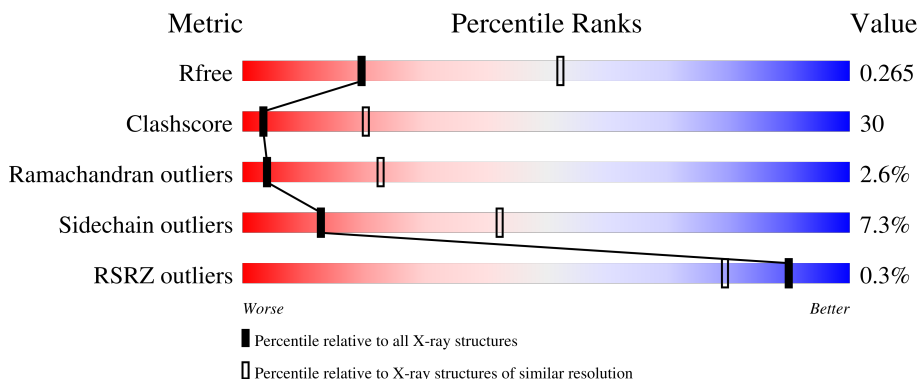
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	2672 (3.00-3.00)
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)
RSRZ outliers	180081	2671 (3.00-3.00)

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 $\leq 5\%$. 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	682	
1	B	682	

2 Entry composition [i](#)

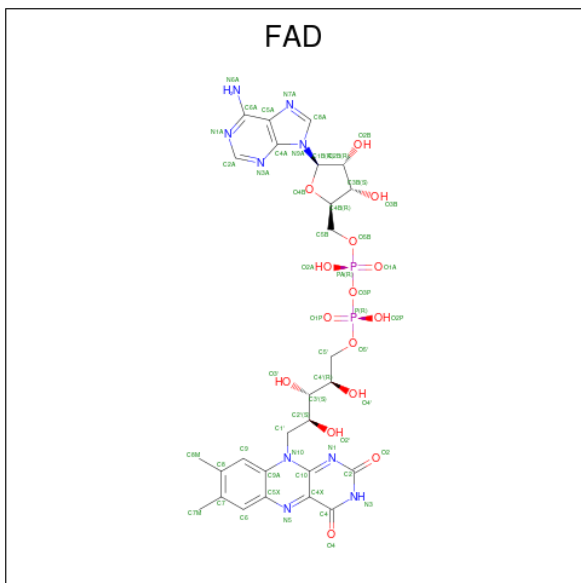
There are 6 unique types of molecules in this entry. The entry contains 10624 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 NADPH-CYTOCHROME P450 REDUCTASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	645	5074	3232	840	987	15	0	0	0
1	B	645	5074	3232	840	987	15	0	0	0

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (CCD ID: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



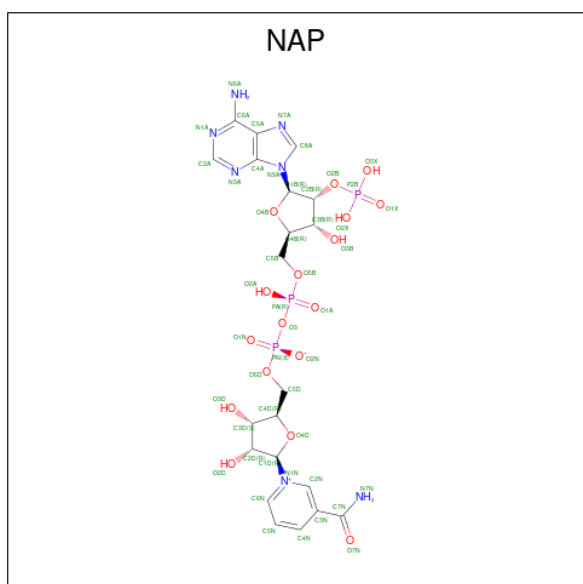
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	53	27	9	15	2	0	0
2	B	1	53	27	9	15	2	0	0

- Molecule 3 is FLAVIN MONONUCLEOTIDE (CCD ID: FMN) (formula: $C_{17}H_{21}N_4O_9P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
3	A	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
3	A	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
3	B	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
3	B	1	Total	C	N	O	P	0	0
			31	17	4	9	1		

- Molecule 4 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NAP) (formula: $C_{21}H_{28}N_7O_{17}P_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
4	A	1	Total	C	N	O	P	0	0
			40	15	6	16	3		
4	B	1	Total	C	N	O	P	0	0
			40	15	6	16	3		

- Molecule 5 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

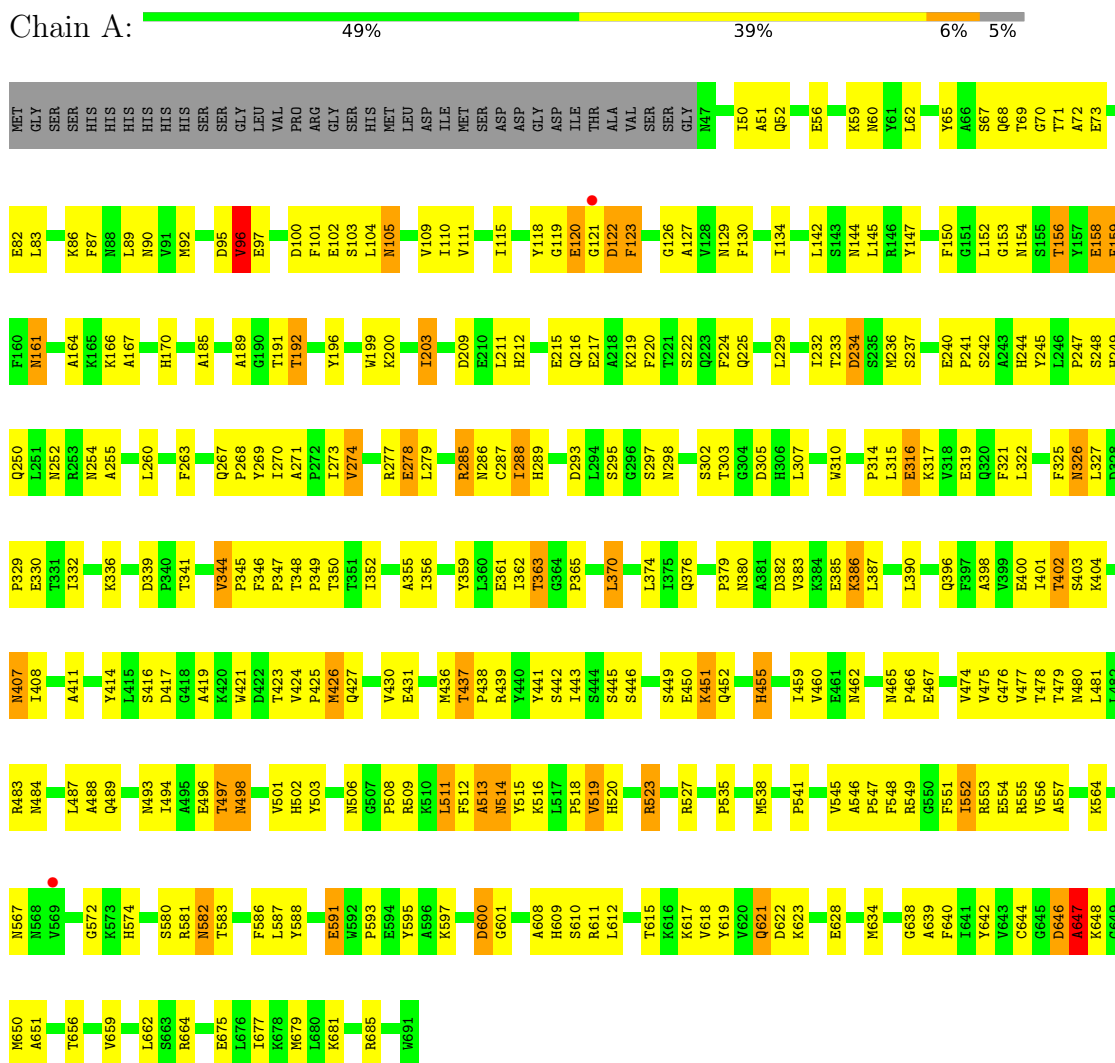
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	107	Total	O	0	0
			107	107		
6	B	44	Total	O	0	0
			44	44		

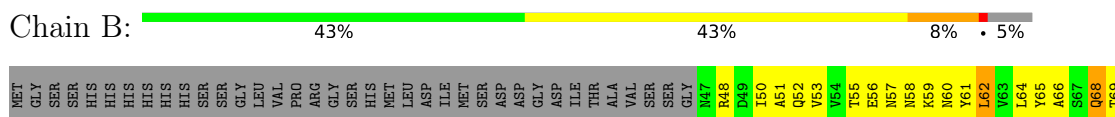
3 Residue-property plots

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: NADPH-CYTOCHROME P450 REDUCTASE



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4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	77.75Å 87.09Å 259.59Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.55 – 3.00 43.55 – 3.00	Depositor EDS
% Data completeness (in resolution range)	96.8 (43.55-3.00) 96.7 (43.55-3.00)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.79 (at 3.01Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.197 , 0.261 0.203 , 0.265	Depositor DCC
R_{free} test set	6726 reflections (9.92%)	wwPDB-VP
Wilson B-factor (Å ²)	52.9	Xtrriage
Anisotropy	0.523	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 64.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	10624	wwPDB-VP
Average B, all atoms (Å ²)	53.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.81% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ 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: FMN, SO4, FAD, NAP

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# $ Z > 5$	RMSZ	# $ Z > 5$
1	A	0.47	0/5191	0.99	16/7047 (0.2%)
1	B	0.45	1/5191 (0.0%)	0.98	24/7047 (0.3%)
All	All	0.46	1/10382 (0.0%)	0.99	40/14094 (0.3%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	538	MET	SD-CE	-5.00	1.67	1.79

All (40) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	419	ALA	N-CA-C	8.10	121.14	111.33
1	B	422	ASP	N-CA-C	-8.08	98.51	110.23
1	A	407	ASN	N-CA-C	-7.30	99.41	110.14
1	B	477	VAL	N-CA-C	7.20	117.19	110.42
1	A	647	ALA	N-CA-C	6.87	125.43	110.80
1	B	273	ILE	N-CA-C	-6.78	95.23	109.34
1	A	549	ARG	N-CA-C	-6.54	104.07	111.07
1	B	402	THR	N-CA-C	6.50	118.03	111.07
1	A	158	GLU	N-CA-C	-6.49	100.88	110.48
1	A	234	ASP	N-CA-C	-6.44	105.06	113.17

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	648	LYS	N-CA-C	-6.38	97.20	110.80
1	B	549	ARG	N-CA-C	-6.18	104.62	111.36
1	B	646	ASP	N-CA-C	-6.12	102.41	110.43
1	A	288	ILE	N-CA-C	6.09	117.79	108.71
1	B	407	ASN	N-CA-C	-6.00	101.12	110.42
1	B	458	SER	N-CA-C	5.96	118.53	107.99
1	B	395	ASP	N-CA-C	5.95	117.45	110.97
1	A	127	ALA	N-CA-C	-5.93	103.81	113.19
1	B	111	VAL	N-CA-C	5.86	116.32	108.11
1	A	129	ASN	N-CA-C	-5.84	104.82	111.07
1	B	328	ASP	CA-C-N	5.80	125.49	119.05
1	B	328	ASP	C-N-CA	5.80	125.49	119.05
1	A	344	VAL	CA-C-N	5.71	124.90	118.97
1	A	344	VAL	C-N-CA	5.71	124.90	118.97
1	A	402	THR	N-CA-C	5.66	117.92	111.02
1	A	564	LYS	N-CA-C	-5.53	105.74	112.88
1	B	424	VAL	CA-C-N	5.52	125.45	119.76
1	B	424	VAL	C-N-CA	5.52	125.45	119.76
1	B	359	TYR	N-CA-C	5.48	120.62	113.88
1	B	600	ASP	N-CA-C	5.40	122.31	110.80
1	A	145	LEU	N-CA-C	5.34	117.97	109.96
1	A	591	GLU	N-CA-C	5.33	116.90	111.14
1	B	223	GLN	N-CA-C	-5.33	106.78	113.28
1	B	531	ASN	CA-C-N	5.26	124.98	119.82
1	B	531	ASN	C-N-CA	5.26	124.98	119.82
1	B	481	LEU	N-CA-C	-5.25	105.46	111.07
1	B	99	TYR	N-CA-C	5.22	116.92	109.14
1	A	274	VAL	N-CA-C	5.01	117.35	111.09
1	B	344	VAL	CA-C-N	5.01	126.10	119.84
1	B	344	VAL	C-N-CA	5.01	126.10	119.84

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	441	TYR	Sidechain

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	5074	0	4968	279	0
1	B	5074	0	4968	338	0
2	A	53	0	31	3	0
2	B	53	0	31	4	0
3	A	62	0	38	2	0
3	B	62	0	38	1	0
4	A	40	0	19	2	0
4	B	40	0	19	1	0
5	A	15	0	0	0	0
6	A	107	0	0	7	0
6	B	44	0	0	3	0
All	All	10624	0	10112	618	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 30.

All (618) 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:619:TYR:HB3	1:B:621:GLN:HE22	1.08	1.13
1:A:233:THR:HG22	1:A:234:ASP:H	1.16	1.06
1:A:361:GLU:HG2	1:A:436:MET:HA	1.36	1.05
1:A:232:ILE:HD12	1:A:236:MET:HE2	1.37	1.03
1:B:445:SER:HB2	1:B:450:GLU:HG3	1.43	1.01
1:B:416:SER:HB2	1:B:419:ALA:HB3	1.38	1.00
1:A:67:SER:HB2	1:A:72:ALA:HB3	1.41	0.99
1:B:625:LYS:O	1:B:628:GLU:HG3	1.62	0.99
1:B:225:GLN:HB3	1:B:336:LYS:HB2	1.45	0.96
1:A:60:ASN:HD22	1:A:90:ASN:H	1.04	0.93
1:B:619:TYR:CB	1:B:621:GLN:HE22	1.81	0.93
1:B:60:ASN:HD22	1:B:90:ASN:H	1.13	0.92
1:A:647:ALA:CB	1:A:650:MET:HB3	2.00	0.91
1:B:59:LYS:HD3	1:B:90:ASN:OD1	1.72	0.90
1:A:621:GLN:H	1:A:621:GLN:HE21	1.11	0.90
1:A:523:ARG:HH11	1:A:523:ARG:HB2	1.36	0.89
1:B:446:SER:O	1:B:450:GLU:HG2	1.72	0.89
1:A:600:ASP:CG	1:A:601:GLY:N	2.28	0.89
1:B:322:LEU:HD13	1:B:329:PRO:HG3	1.54	0.86
1:B:539:ILE:HG23	1:B:620:VAL:HG11	1.57	0.86

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:600:ASP:CG	1:A:601:GLY:H	1.83	0.86
1:A:60:ASN:ND2	1:A:90:ASN:H	1.74	0.85
1:B:81:LYS:HA	1:B:81:LYS:HE2	1.59	0.85
1:B:619:TYR:HB3	1:B:621:GLN:NE2	1.92	0.85
1:B:538:MET:HE2	1:B:548:PHE:HB3	1.57	0.85
1:B:535:PRO:HB2	1:B:639:ALA:HB2	1.57	0.84
1:B:197:MET:HE1	1:B:369:GLN:HG2	1.58	0.84
1:A:621:GLN:HE21	1:A:621:GLN:N	1.76	0.84
1:B:220:PHE:H	1:B:376:GLN:HE22	1.22	0.84
1:A:380:ASN:ND2	1:A:383:VAL:H	1.75	0.83
1:B:541:PRO:HG3	1:B:620:VAL:HG21	1.60	0.82
1:B:669:THR:HB	1:B:672:GLU:HG3	1.60	0.82
1:B:621:GLN:NE2	1:B:621:GLN:H	1.77	0.82
1:B:621:GLN:HE21	1:B:621:GLN:N	1.78	0.82
1:B:656:THR:O	1:B:659:VAL:HG12	1.78	0.81
1:B:647:ALA:HB1	1:B:650:MET:HB3	1.62	0.81
1:A:310:TRP:HB2	1:A:518:PRO:HB2	1.62	0.81
1:B:324:ILE:HD13	1:B:413:LYS:HG3	1.62	0.81
1:B:582:ASN:ND2	1:B:584:ASP:H	1.78	0.80
1:A:390:LEU:HD23	1:A:396:GLN:HG2	1.62	0.80
1:A:475:VAL:HB	1:A:480:ASN:ND2	1.96	0.80
1:A:52:GLN:HG2	1:A:56:GLU:OE2	1.83	0.78
1:B:310:TRP:HB2	1:B:518:PRO:HB2	1.65	0.78
1:B:265:LEU:HD12	1:B:265:LEU:H	1.48	0.78
1:B:542:GLY:O	1:B:545:VAL:HG22	1.84	0.78
1:A:647:ALA:HB1	1:A:650:MET:HB3	1.62	0.78
1:A:225:GLN:HB3	1:A:336:LYS:HB3	1.66	0.78
1:A:233:THR:HG22	1:A:234:ASP:N	1.95	0.78
1:B:232:ILE:HA	1:B:236:MET:HE2	1.64	0.78
1:A:390:LEU:CD2	1:A:396:GLN:HG2	2.14	0.77
1:B:659:VAL:HB	1:B:677:ILE:HD11	1.67	0.77
1:B:225:GLN:HG2	1:B:336:LYS:HD3	1.67	0.76
1:B:484:ASN:ND2	1:B:503:TYR:H	1.83	0.76
1:B:567:ASN:HD22	1:B:567:ASN:H	1.31	0.76
1:B:621:GLN:H	1:B:621:GLN:HE21	1.30	0.76
1:B:547:PRO:HG2	1:B:644:CYS:SG	2.27	0.75
1:A:426:MET:O	1:A:430:VAL:HG23	1.87	0.74
1:B:555:ARG:HG3	1:B:571:LEU:HD21	1.67	0.74
1:A:621:GLN:H	1:A:621:GLN:NE2	1.85	0.74
1:A:647:ALA:HB2	1:A:650:MET:HB3	1.67	0.74
1:B:610:SER:O	1:B:617:LYS:HG3	1.87	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:197:MET:HE1	1:B:369:GLN:CG	2.16	0.74
1:B:647:ALA:CB	1:B:650:MET:HG2	2.18	0.74
1:B:260:LEU:HA	1:B:298:ASN:OD1	1.88	0.74
1:A:51:ALA:HB2	1:A:103:SER:O	1.89	0.73
1:B:646:ASP:HB2	1:B:691:TRP:CZ3	2.24	0.73
1:B:659:VAL:CB	1:B:677:ILE:HD11	2.18	0.73
1:A:523:ARG:HH11	1:A:523:ARG:CB	2.02	0.73
1:A:445:SER:HB3	1:A:455:HIS:CG	2.25	0.72
1:A:647:ALA:HB2	1:A:650:MET:HE3	1.70	0.72
1:A:100:ASP:HB3	1:A:102:GLU:OE1	1.90	0.72
1:B:404:LYS:HG2	1:B:468:LEU:HD11	1.70	0.72
1:A:92:MET:HG3	1:A:341:THR:HG21	1.70	0.72
1:A:380:ASN:ND2	1:A:382:ASP:HB3	2.05	0.71
1:A:459:ILE:HD13	4:A:753:NAP:H52N	1.73	0.71
1:A:450:GLU:O	1:A:452:GLN:N	2.24	0.71
1:A:523:ARG:HB2	1:A:523:ARG:NH1	2.03	0.71
1:A:60:ASN:HD22	1:A:90:ASN:N	1.86	0.71
1:A:185:ALA:HB1	1:A:192:THR:HG22	1.72	0.71
1:B:445:SER:HB3	1:B:455:HIS:CG	2.26	0.71
1:A:69:THR:HB	3:A:751:FMN:O2P	1.90	0.70
1:A:59:LYS:HD2	1:A:90:ASN:ND2	2.06	0.70
1:A:608:ALA:HB1	1:A:618:VAL:HG12	1.73	0.70
1:B:275:LYS:HB3	1:B:291:GLU:OE1	1.91	0.70
1:A:600:ASP:OD1	1:A:601:GLY:N	2.23	0.70
1:B:233:THR:HB	1:B:236:MET:HG3	1.71	0.70
1:B:390:LEU:HD22	1:B:397:PHE:HA	1.72	0.69
1:A:307:LEU:HD11	1:A:519:VAL:CG1	2.22	0.69
1:A:555:ARG:HE	1:A:574:HIS:HE1	1.39	0.69
1:A:278:GLU:OE2	1:A:286:ASN:HB3	1.93	0.69
1:B:61:TYR:HA	1:B:109:VAL:CG1	2.23	0.69
1:A:546:ALA:HB3	1:A:547:PRO:HD3	1.74	0.69
1:B:61:TYR:HA	1:B:109:VAL:HG11	1.75	0.69
1:B:538:MET:HE2	1:B:548:PHE:CB	2.22	0.68
1:A:233:THR:CG2	1:A:234:ASP:H	1.99	0.68
1:A:675:GLU:O	1:A:679:MET:HG3	1.92	0.68
1:B:535:PRO:HB2	1:B:639:ALA:CB	2.24	0.68
1:B:512:PHE:O	1:B:514:ASN:N	2.27	0.68
1:B:97:GLU:HG3	1:B:126:GLY:O	1.94	0.68
1:A:380:ASN:HD21	1:A:383:VAL:H	1.39	0.68
1:A:487:LEU:HD13	1:A:497:THR:HG21	1.75	0.67
1:B:567:ASN:H	1:B:567:ASN:ND2	1.90	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:567:ASN:HD22	1:B:567:ASN:N	1.90	0.67
1:A:59:LYS:HD2	1:A:90:ASN:HD21	1.59	0.67
1:B:272:PRO:HA	1:B:516:LYS:HG2	1.75	0.67
1:A:236:MET:HE1	1:A:332:ILE:HD13	1.76	0.67
1:A:234:ASP:HB3	1:A:247:PRO:HB2	1.77	0.67
1:B:352:ILE:O	1:B:356:ILE:HG12	1.94	0.67
1:A:105:ASN:HD21	1:A:144:ASN:H	1.42	0.67
1:B:60:ASN:ND2	1:B:90:ASN:H	1.89	0.66
1:B:220:PHE:H	1:B:376:GLN:NE2	1.92	0.66
1:A:508:PRO:O	1:A:511:LEU:HB2	1.95	0.66
1:B:419:ALA:O	1:B:420:LYS:HB2	1.93	0.66
1:B:80:SER:O	1:B:84:VAL:HG23	1.95	0.66
1:B:236:MET:HE1	1:B:332:ILE:HG21	1.76	0.66
1:B:273:ILE:N	6:B:2016:HOH:O	2.29	0.66
1:B:581:ARG:HD3	1:B:611:ARG:HD2	1.78	0.66
1:B:265:LEU:HD12	1:B:265:LEU:N	2.11	0.65
1:B:460:VAL:HA	1:B:479:THR:HB	1.77	0.65
1:B:125:ASP:O	1:B:128:VAL:HG23	1.96	0.65
1:B:647:ALA:HB3	1:B:650:MET:HG2	1.79	0.65
1:A:572:GLY:O	1:A:574:HIS:HD2	1.80	0.65
1:A:646:ASP:O	1:A:647:ALA:HB3	1.96	0.65
1:B:196:TYR:HD2	1:B:197:MET:HE2	1.62	0.65
1:B:476:GLY:HA3	2:B:750:FAD:O2P	1.97	0.65
1:B:508:PRO:O	1:B:511:LEU:HB2	1.97	0.65
1:A:273:ILE:O	1:A:489:GLN:NE2	2.30	0.64
1:B:629:ASP:O	1:B:633:GLU:HB2	1.97	0.64
1:B:123:PHE:N	1:B:123:PHE:CD2	2.65	0.64
1:B:123:PHE:N	1:B:123:PHE:HD2	1.94	0.64
1:B:268:PRO:HB3	1:B:310:TRP:CE2	2.33	0.64
1:A:92:MET:HG3	1:A:341:THR:CG2	2.27	0.64
1:A:244:HIS:H	1:A:244:HIS:CD2	2.14	0.64
1:B:555:ARG:HE	1:B:574:HIS:CE1	2.16	0.64
1:B:234:ASP:HB3	1:B:247:PRO:HB2	1.78	0.64
1:B:621:GLN:HA	1:B:624:LEU:HD12	1.79	0.64
1:A:386:LYS:HE3	1:A:400:GLU:OE1	1.98	0.64
1:B:123:PHE:CD1	1:B:131:GLU:HB2	2.33	0.64
1:B:321:PHE:CE2	1:B:356:ILE:HD12	2.33	0.64
1:B:233:THR:HG22	1:B:235:SER:H	1.63	0.64
1:B:448:LEU:HB2	1:B:554:GLU:OE1	1.98	0.63
1:A:97:GLU:HB2	1:A:126:GLY:O	1.98	0.63
1:B:529:PRO:HD3	1:B:642:TYR:OH	1.98	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:647:ALA:HB3	1:B:650:MET:CG	2.28	0.63
1:B:546:ALA:HB3	1:B:547:PRO:HD3	1.81	0.63
1:B:483:ARG:HH12	1:B:498:ASN:HB2	1.63	0.63
1:A:254:ASN:HB3	1:A:260:LEU:HD11	1.79	0.63
1:A:493:ASN:HD22	1:A:496:GLU:CG	2.11	0.63
1:B:53:VAL:HG21	1:B:99:TYR:HE2	1.63	0.62
1:A:269:TYR:CE1	1:A:297:SER:HB3	2.35	0.62
1:A:120:GLU:HB3	1:A:122:ASP:OD1	2.00	0.62
1:A:651:ALA:HB3	6:A:2013:HOH:O	2.00	0.62
1:A:484:ASN:HD22	1:A:502:HIS:HA	1.65	0.61
1:B:57:ASN:O	1:B:58:ASN:HB2	1.99	0.61
1:B:674:THR:HA	1:B:677:ILE:HD12	1.82	0.61
1:A:279:LEU:HD21	1:A:588:TYR:CZ	2.35	0.61
1:A:315:LEU:HD12	1:A:502:HIS:CD2	2.35	0.61
1:B:142:LEU:HD13	1:B:145:LEU:HD12	1.82	0.61
1:B:580:SER:O	1:B:609:HIS:HA	2.00	0.61
1:B:652:LYS:O	1:B:656:THR:HB	2.01	0.61
1:B:168:GLU:HG3	1:B:182:LEU:HD12	1.82	0.61
1:B:647:ALA:CB	1:B:650:MET:CG	2.78	0.61
1:A:279:LEU:CD1	1:A:289:HIS:HB2	2.31	0.61
1:B:497:THR:HG22	1:B:498:ASN:H	1.64	0.61
1:A:541:PRO:HG2	1:A:650:MET:HG3	1.83	0.60
1:A:123:PHE:CD1	1:A:123:PHE:N	2.70	0.60
1:B:274:VAL:CG2	1:B:293:ASP:HB2	2.31	0.60
1:A:288:ILE:HD11	1:A:483:ARG:HG3	1.84	0.60
1:A:270:ILE:HD12	1:A:511:LEU:HD22	1.83	0.60
1:B:154:ASN:ND2	1:B:156:THR:H	1.98	0.60
1:B:168:GLU:HG3	1:B:182:LEU:CD1	2.32	0.60
1:B:321:PHE:O	1:B:324:ILE:HG22	2.02	0.60
1:A:647:ALA:HB1	1:A:650:MET:CB	2.31	0.59
1:B:443:ILE:HG23	1:B:454:VAL:HG13	1.83	0.59
1:A:120:GLU:HG2	1:A:159:PHE:CD2	2.37	0.59
1:A:307:LEU:HD11	1:A:519:VAL:HG13	1.83	0.59
1:B:369:GLN:O	1:B:369:GLN:NE2	2.35	0.59
1:B:539:ILE:HD13	1:B:624:LEU:HD11	1.85	0.59
1:B:65:TYR:CE1	1:B:95:ASP:HA	2.38	0.59
1:A:123:PHE:N	1:A:123:PHE:HD1	1.99	0.59
1:A:321:PHE:HD2	1:A:356:ILE:HD13	1.66	0.59
1:A:621:GLN:HE22	4:A:753:NAP:H2A	1.67	0.59
1:B:621:GLN:O	1:B:624:LEU:HB2	2.03	0.59
1:B:422:ASP:O	1:B:423:THR:HG23	2.02	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:499:LEU:HD22	1:B:501:VAL:O	2.02	0.58
1:A:403:SER:O	1:A:467:GLU:HG3	2.04	0.58
1:B:677:ILE:HG22	1:B:681:LYS:HE3	1.85	0.58
1:B:560:GLU:OE1	1:B:561:SER:N	2.36	0.58
1:A:322:LEU:HD13	1:A:329:PRO:HG3	1.85	0.58
1:B:646:ASP:HA	1:B:691:TRP:O	2.03	0.58
1:A:68:GLN:HB3	1:A:118:TYR:CZ	2.39	0.58
1:A:158:GLU:O	1:A:159:PHE:HB2	2.04	0.57
1:A:379:PRO:HD3	1:A:421:TRP:CE3	2.39	0.57
1:B:107:VAL:HG12	1:B:109:VAL:H	1.68	0.57
1:A:245:TYR:HB3	1:A:511:LEU:HD11	1.85	0.57
1:A:268:PRO:HD3	1:A:310:TRP:CH2	2.38	0.57
1:B:407:ASN:ND2	2:B:750:FAD:H61A	2.02	0.57
1:B:66:ALA:O	1:B:124:PRO:HG2	2.04	0.57
1:B:96:VAL:CG1	1:B:130:PHE:HB2	2.35	0.57
1:B:118:TYR:O	1:B:122:ASP:OD2	2.22	0.57
1:B:252:ASN:HD21	1:B:260:LEU:HB2	1.68	0.57
1:B:646:ASP:O	1:B:647:ALA:HB2	2.05	0.57
1:A:260:LEU:HA	1:A:298:ASN:OD1	2.05	0.57
1:B:416:SER:HB2	1:B:419:ALA:CB	2.26	0.56
1:A:154:ASN:OD1	1:A:156:THR:HB	2.06	0.56
1:A:279:LEU:HD23	1:A:587:LEU:HD22	1.87	0.56
1:A:484:ASN:ND2	1:A:502:HIS:HA	2.20	0.56
1:B:577:PHE:HB3	1:B:620:VAL:HG13	1.87	0.56
1:B:646:ASP:HB2	1:B:691:TRP:CE3	2.39	0.56
1:A:321:PHE:CD2	1:A:356:ILE:HD13	2.41	0.56
1:A:446:SER:OG	1:A:554:GLU:OE1	2.22	0.56
1:B:51:ALA:HB2	1:B:103:SER:O	2.05	0.56
1:B:369:GLN:HE21	1:B:369:GLN:C	2.14	0.56
1:B:619:TYR:CB	1:B:621:GLN:NE2	2.59	0.56
1:A:547:PRO:HG2	1:A:644:CYS:SG	2.45	0.56
1:B:292:PHE:HA	6:B:2016:HOH:O	2.05	0.56
1:B:552:ILE:HD12	1:B:592:TRP:HZ3	1.70	0.56
1:B:274:VAL:HG21	1:B:293:ASP:HB2	1.85	0.56
1:A:105:ASN:ND2	1:A:142:LEU:HA	2.20	0.56
1:A:446:SER:O	1:A:450:GLU:HB2	2.05	0.56
1:B:196:TYR:CD2	1:B:197:MET:HE2	2.41	0.56
1:B:498:ASN:O	1:B:499:LEU:C	2.49	0.56
1:A:538:MET:HE1	1:A:552:ILE:HD11	1.87	0.56
1:A:581:ARG:HD3	1:A:611:ARG:HD2	1.88	0.55
1:B:134:ILE:HG22	1:B:170:HIS:HB2	1.87	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:279:LEU:HD11	1:A:289:HIS:HB2	1.87	0.55
1:B:288:ILE:HD12	1:B:486:GLN:HG3	1.89	0.55
1:B:104:LEU:HD21	1:B:145:LEU:HD11	1.87	0.55
1:A:515:TYR:N	1:A:515:TYR:CD2	2.73	0.55
1:A:677:ILE:HG22	1:A:681:LYS:HE3	1.89	0.55
1:B:50:ILE:HG23	1:B:51:ALA:N	2.21	0.55
1:B:91:VAL:HG12	1:B:92:MET:N	2.21	0.55
1:A:498:ASN:N	1:A:498:ASN:OD1	2.39	0.55
1:B:178:ARG:NH1	1:B:180:GLY:O	2.40	0.55
1:B:322:LEU:CD1	1:B:329:PRO:HG3	2.30	0.55
1:A:380:ASN:HD21	1:A:382:ASP:HB3	1.70	0.55
1:A:580:SER:O	1:A:609:HIS:HA	2.07	0.55
1:B:265:LEU:H	1:B:265:LEU:CD1	2.19	0.55
1:A:158:GLU:C	1:A:159:PHE:HD1	2.15	0.55
1:A:460:VAL:HA	1:A:479:THR:HB	1.89	0.55
1:A:475:VAL:HB	1:A:480:ASN:HD21	1.70	0.55
1:B:398:ALA:HA	1:B:402:THR:HB	1.89	0.55
1:B:659:VAL:CG2	1:B:677:ILE:HD11	2.37	0.55
1:A:411:ALA:O	1:A:414:TYR:HB3	2.07	0.54
1:A:287:CYS:HA	1:A:459:ILE:HA	1.89	0.54
1:B:237:SER:HA	1:B:246:LEU:HD21	1.90	0.54
1:A:339:ASP:OD2	1:A:341:THR:HB	2.07	0.54
1:A:555:ARG:HE	1:A:574:HIS:CE1	2.21	0.54
1:B:111:VAL:O	1:B:147:TYR:HA	2.08	0.54
1:B:307:LEU:HD22	1:B:454:VAL:HG11	1.89	0.54
1:B:467:GLU:O	1:B:469:PRO:HD3	2.08	0.54
1:B:567:ASN:O	1:B:568:ASN:O	2.25	0.54
1:A:385:GLU:HA	1:A:385:GLU:OE1	2.08	0.54
1:A:400:GLU:C	1:A:401:ILE:HD12	2.33	0.54
1:A:608:ALA:HB2	1:A:623:LYS:HG3	1.90	0.54
1:B:154:ASN:ND2	1:B:188:GLY:CA	2.71	0.54
1:B:608:ALA:HB1	1:B:618:VAL:HG12	1.90	0.54
1:A:380:ASN:HD21	1:A:383:VAL:HG23	1.72	0.53
1:B:305:ASP:OD1	1:B:527:ARG:NH2	2.41	0.53
1:B:582:ASN:HD21	1:B:584:ASP:HB2	1.73	0.53
1:A:236:MET:HE1	1:A:332:ILE:HG21	1.89	0.53
1:B:59:LYS:CD	1:B:90:ASN:OD1	2.51	0.53
1:A:82:GLU:OE1	1:A:200:LYS:HD2	2.09	0.53
1:A:236:MET:CE	1:A:332:ILE:HG21	2.38	0.53
1:A:476:GLY:HA3	2:A:750:FAD:O2P	2.09	0.53
1:A:610:SER:HB2	1:A:617:LYS:HG3	1.89	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:60:ASN:HD22	1:B:90:ASN:N	1.94	0.53
1:B:407:ASN:O	1:B:408:ILE:C	2.51	0.53
1:A:449:SER:HB3	1:A:557:ALA:HB2	1.90	0.53
1:B:273:ILE:O	1:B:273:ILE:HG22	2.09	0.53
1:B:109:VAL:CG1	1:B:110:ILE:N	2.72	0.53
1:B:497:THR:HG22	1:B:498:ASN:N	2.23	0.53
1:B:489:GLN:HA	1:B:515:TYR:CE1	2.44	0.53
1:B:200:LYS:O	1:B:203:ILE:HG22	2.09	0.52
1:B:316:GLU:HG3	1:B:501:VAL:HG12	1.90	0.52
1:B:539:ILE:HG23	1:B:620:VAL:CG1	2.35	0.52
1:A:252:ASN:C	1:A:252:ASN:ND2	2.66	0.52
1:B:144:ASN:N	1:B:144:ASN:HD22	2.07	0.52
1:B:252:ASN:ND2	1:B:260:LEU:HB2	2.24	0.52
1:A:123:PHE:HD1	1:A:123:PHE:H	1.56	0.52
1:B:337:PRO:HG3	1:B:344:VAL:HG22	1.92	0.52
1:B:575:ILE:HG22	1:B:634:MET:HE1	1.91	0.52
1:B:567:ASN:ND2	1:B:567:ASN:N	2.55	0.52
1:B:576:LEU:HD23	1:B:577:PHE:N	2.25	0.52
1:A:51:ALA:HB3	1:A:103:SER:HB2	1.91	0.52
1:B:448:LEU:HD23	1:B:448:LEU:O	2.09	0.52
1:B:83:LEU:HG	1:B:89:LEU:HD12	1.92	0.52
1:B:271:ALA:O	1:B:516:LYS:HA	2.10	0.51
1:B:306:HIS:HD2	1:B:522:ARG:NH1	2.08	0.51
1:B:449:SER:HB2	1:B:450:GLU:OE2	2.10	0.51
1:B:627:TYR:O	1:B:628:GLU:C	2.54	0.51
1:A:222:SER:HA	1:A:431:GLU:OE2	2.10	0.51
1:B:406:PHE:HB3	1:B:410:ASP:HB2	1.91	0.51
1:B:220:PHE:N	1:B:376:GLN:HE22	1.99	0.51
1:B:515:TYR:N	1:B:515:TYR:CD2	2.75	0.51
1:A:437:THR:CG2	6:A:2058:HOH:O	2.59	0.51
1:B:251:LEU:HD21	1:B:259:GLN:CD	2.35	0.51
1:A:443:ILE:HG22	1:A:445:SER:H	1.76	0.51
1:B:232:ILE:HD13	1:B:238:LEU:HD21	1.93	0.51
1:B:569:VAL:O	1:B:570:SER:HB2	2.10	0.51
1:B:68:GLN:HB3	1:B:118:TYR:CZ	2.46	0.51
1:B:513:ALA:HB3	1:B:516:LYS:HD2	1.93	0.51
1:B:659:VAL:HG23	1:B:677:ILE:HD11	1.92	0.51
1:A:416:SER:HB3	1:A:419:ALA:HB3	1.93	0.51
1:A:514:ASN:HB2	6:A:2068:HOH:O	2.11	0.51
1:B:197:MET:HE1	1:B:369:GLN:CB	2.41	0.51
1:A:268:PRO:HB3	1:A:310:TRP:CE2	2.46	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:591:GLU:HB3	1:A:595:TYR:CE1	2.46	0.50
1:B:348:THR:HA	1:B:349:PRO:C	2.36	0.50
1:B:379:PRO:HD2	1:B:383:VAL:HG11	1.93	0.50
1:A:316:GLU:HG3	1:A:501:VAL:HG12	1.92	0.50
1:B:110:ILE:CD1	1:B:211:LEU:HD21	2.42	0.50
1:A:50:ILE:HG23	1:A:51:ALA:N	2.26	0.50
1:A:407:ASN:O	1:A:408:ILE:C	2.55	0.50
1:A:535:PRO:HB2	1:A:639:ALA:HB2	1.92	0.50
1:A:274:VAL:HG11	1:A:293:ASP:HB2	1.94	0.50
1:A:401:ILE:HD12	1:A:401:ILE:N	2.27	0.50
1:B:194:GLU:OE1	1:B:368:ARG:NH1	2.45	0.50
1:A:120:GLU:HG2	1:A:121:GLY:H	1.77	0.50
1:A:220:PHE:N	1:A:376:GLN:HE22	2.10	0.50
1:A:71:THR:HG22	1:A:152:LEU:CD2	2.41	0.50
1:A:439:ARG:HG3	1:A:478:THR:OG1	2.12	0.50
1:A:512:PHE:O	1:A:514:ASN:N	2.45	0.50
1:B:154:ASN:ND2	1:B:188:GLY:HA3	2.26	0.50
1:B:287:CYS:HA	1:B:459:ILE:HA	1.94	0.50
1:A:310:TRP:CD1	1:A:310:TRP:N	2.80	0.50
1:A:363:THR:HG22	6:A:2038:HOH:O	2.12	0.50
1:A:628:GLU:OE1	1:A:664:ARG:NH1	2.44	0.50
1:B:377:PHE:HB2	1:B:424:VAL:HG22	1.94	0.50
1:A:134:ILE:HG23	1:A:170:HIS:HB2	1.94	0.49
1:A:513:ALA:O	1:A:514:ASN:O	2.30	0.49
1:B:69:THR:HB	3:B:751:FMN:O2P	2.13	0.49
1:A:659:VAL:HG22	1:A:677:ILE:HG13	1.95	0.49
1:B:157:TYR:CE1	1:B:690:VAL:HG23	2.47	0.49
1:B:411:ALA:O	1:B:415:LEU:HG	2.12	0.49
1:A:427:GLN:HG3	6:A:2056:HOH:O	2.10	0.49
1:B:245:TYR:HB3	1:B:511:LEU:HD11	1.95	0.49
1:A:365:PRO:HG3	2:A:750:FAD:C2A	2.43	0.49
1:A:423:THR:HG22	1:A:423:THR:O	2.13	0.49
1:B:52:GLN:O	1:B:56:GLU:HG3	2.12	0.49
1:A:518:PRO:O	1:A:519:VAL:HG23	2.12	0.49
1:B:558:PHE:CZ	1:B:562:GLN:NE2	2.81	0.49
1:A:396:GLN:NE2	1:A:400:GLU:OE2	2.42	0.49
1:B:238:LEU:HD12	1:B:509:ARG:HG3	1.95	0.49
1:B:647:ALA:HB1	1:B:650:MET:CB	2.40	0.49
1:B:157:TYR:HE1	1:B:690:VAL:HG23	1.78	0.48
1:B:348:THR:HA	1:B:349:PRO:O	2.13	0.48
1:B:459:ILE:HG22	1:B:543:THR:HG21	1.94	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:647:ALA:C	1:B:649:GLY:H	2.21	0.48
1:B:310:TRP:CB	1:B:518:PRO:HB2	2.39	0.48
1:B:422:ASP:O	1:B:423:THR:OG1	2.25	0.48
1:B:608:ALA:HB2	1:B:623:LYS:HG3	1.96	0.48
1:B:170:HIS:O	1:B:173:ALA:HB3	2.12	0.48
1:B:232:ILE:HA	1:B:236:MET:CE	2.38	0.48
1:B:237:SER:O	1:B:350:THR:HA	2.14	0.48
1:B:380:ASN:ND2	1:B:382:ASP:HB3	2.28	0.48
1:B:407:ASN:HD21	2:B:750:FAD:H61A	1.60	0.48
1:B:493:ASN:HD22	1:B:496:GLU:CD	2.21	0.48
1:A:346:PHE:HB2	1:A:347:PRO:CD	2.43	0.48
1:A:493:ASN:HD22	1:A:496:GLU:HG3	1.78	0.48
1:B:555:ARG:NE	1:B:574:HIS:CE1	2.80	0.48
1:A:229:LEU:HB2	1:A:332:ILE:CG2	2.42	0.48
1:B:541:PRO:HG3	1:B:620:VAL:CG2	2.37	0.48
1:B:647:ALA:CB	1:B:650:MET:HB3	2.37	0.48
1:B:669:THR:HG22	1:B:670:THR:N	2.29	0.48
1:A:555:ARG:NH2	6:A:2079:HOH:O	2.46	0.48
1:B:657:ALA:O	1:B:661:ILE:HG13	2.13	0.48
1:B:263:PHE:O	1:B:520:HIS:HB2	2.14	0.48
1:A:87:PHE:CE2	1:A:215:GLU:HG2	2.48	0.47
1:A:252:ASN:C	1:A:252:ASN:HD22	2.21	0.47
1:A:450:GLU:OE2	1:A:553:ARG:NH1	2.47	0.47
1:B:96:VAL:HG11	1:B:130:PHE:CG	2.49	0.47
1:B:408:ILE:O	1:B:412:LEU:HG	2.14	0.47
1:A:288:ILE:HD12	1:A:288:ILE:N	2.29	0.47
1:A:348:THR:HB	1:A:349:PRO:HA	1.95	0.47
1:B:586:PHE:C	1:B:586:PHE:HD2	2.22	0.47
1:B:650:MET:HG3	1:B:651:ALA:N	2.27	0.47
1:B:69:THR:HG22	1:B:69:THR:O	2.14	0.47
1:A:232:ILE:HA	1:A:236:MET:CE	2.45	0.47
1:A:623:LYS:HE2	1:A:623:LYS:HA	1.96	0.47
1:B:607:VAL:HG12	1:B:608:ALA:N	2.28	0.47
1:A:59:LYS:O	1:A:109:VAL:HG11	2.14	0.47
1:A:69:THR:O	1:A:69:THR:HG22	2.14	0.47
1:A:274:VAL:CG1	1:A:293:ASP:HB2	2.44	0.47
1:A:325:PHE:O	1:A:326:ASN:CB	2.62	0.47
1:A:398:ALA:HA	1:A:402:THR:HB	1.97	0.47
1:A:484:ASN:HD21	1:A:502:HIS:HB2	1.79	0.47
1:B:236:MET:O	1:B:509:ARG:NH2	2.48	0.47
1:B:315:LEU:HD12	1:B:502:HIS:CD2	2.50	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:422:ASP:O	1:B:423:THR:CB	2.62	0.47
1:B:437:THR:HG23	1:B:438:PRO:HD2	1.97	0.47
1:A:189:ALA:O	1:A:191:THR:HG23	2.15	0.47
1:A:545:VAL:HG22	1:A:545:VAL:O	2.15	0.47
1:A:199:TRP:CZ2	1:A:203:ILE:HG13	2.49	0.47
1:A:310:TRP:CB	1:A:518:PRO:HB2	2.41	0.47
1:B:61:TYR:CA	1:B:109:VAL:HG11	2.42	0.47
1:B:134:ILE:C	1:B:136:ASN:H	2.22	0.47
1:B:590:ASP:O	1:B:593:PRO:HD2	2.15	0.47
1:A:232:ILE:CD1	1:A:236:MET:HE2	2.27	0.46
1:A:240:GLU:HG3	1:A:511:LEU:HD12	1.97	0.46
1:A:269:TYR:CE2	1:A:271:ALA:HB2	2.50	0.46
1:B:468:LEU:HD12	1:B:468:LEU:N	2.30	0.46
1:A:646:ASP:O	1:A:647:ALA:CB	2.63	0.46
1:B:631:VAL:O	1:B:632:PHE:C	2.58	0.46
1:B:631:VAL:O	1:B:635:ILE:HG13	2.15	0.46
1:B:586:PHE:C	1:B:586:PHE:CD2	2.92	0.46
1:B:260:LEU:O	1:B:263:PHE:CZ	2.69	0.46
1:A:586:PHE:C	1:A:586:PHE:CD2	2.93	0.46
1:A:327:LEU:HD22	1:A:426:MET:HG2	1.98	0.46
1:A:352:ILE:HG12	1:A:426:MET:HE2	1.97	0.46
1:A:442:SER:HB3	1:A:547:PRO:HG3	1.98	0.46
1:A:474:VAL:HG12	2:A:750:FAD:O2B	2.16	0.46
1:B:156:THR:HG21	1:B:648:LYS:HA	1.97	0.46
1:B:579:GLY:O	1:B:580:SER:HB3	2.15	0.46
1:B:671:ASP:OD1	1:B:671:ASP:N	2.45	0.46
1:A:69:THR:O	1:A:69:THR:CG2	2.64	0.46
1:A:277:ARG:HG3	1:A:289:HIS:HB3	1.96	0.46
1:B:53:VAL:HG21	1:B:99:TYR:CE2	2.48	0.46
1:B:449:SER:OG	1:B:557:ALA:HB2	2.15	0.46
1:B:462:ASN:ND2	1:B:500:PRO:HG2	2.31	0.46
1:B:625:LYS:HE2	1:B:664:ARG:NH2	2.31	0.46
1:B:662:LEU:HD23	1:B:662:LEU:HA	1.84	0.46
1:A:150:PHE:CZ	1:A:185:ALA:HB2	2.51	0.46
1:B:110:ILE:HD12	1:B:211:LEU:HD21	1.98	0.46
1:A:123:PHE:CZ	1:A:167:ALA:HB2	2.51	0.45
1:B:610:SER:HB3	1:B:619:TYR:HE2	1.81	0.45
1:A:82:GLU:OE2	1:A:86:LYS:HE3	2.17	0.45
1:A:247:PRO:CD	1:A:509:ARG:NH1	2.79	0.45
1:B:154:ASN:C	1:B:154:ASN:HD22	2.24	0.45
1:B:503:TYR:CD1	1:B:503:TYR:N	2.85	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:279:LEU:HD13	1:A:289:HIS:HB2	1.98	0.45
1:B:154:ASN:ND2	1:B:154:ASN:C	2.73	0.45
1:B:306:HIS:HE1	1:B:689:ASP:OD2	1.99	0.45
1:A:288:ILE:HD13	1:A:460:VAL:CG2	2.47	0.45
1:B:194:GLU:HG3	1:B:394:LYS:HE3	1.98	0.45
1:B:407:ASN:N	1:B:410:ASP:OD2	2.40	0.45
1:A:245:TYR:HE1	1:A:267:GLN:NE2	2.14	0.45
1:B:328:ASP:OD1	1:B:330:GLU:N	2.50	0.45
1:B:555:ARG:NE	1:B:574:HIS:HE1	2.14	0.45
1:B:646:ASP:OD1	1:B:647:ALA:N	2.49	0.45
1:A:217:GLU:OE1	1:A:219:LYS:NZ	2.50	0.45
1:A:361:GLU:OE2	1:A:439:ARG:NH1	2.47	0.45
1:B:68:GLN:HE21	1:B:68:GLN:HA	1.82	0.45
1:B:450:GLU:O	1:B:452:GLN:N	2.46	0.45
1:A:493:ASN:HD22	1:A:496:GLU:HG2	1.81	0.45
1:B:407:ASN:O	1:B:410:ASP:N	2.50	0.45
1:A:379:PRO:HD3	1:A:421:TRP:CZ3	2.52	0.45
1:A:638:GLY:HA2	1:A:685:ARG:NH2	2.31	0.45
1:B:545:VAL:O	1:B:546:ALA:C	2.60	0.45
3:A:752:FMN:HM81	6:A:2033:HOH:O	2.17	0.44
1:A:295:SER:C	1:A:297:SER:H	2.25	0.44
1:A:513:ALA:HB3	1:A:516:LYS:HD2	1.98	0.44
1:A:586:PHE:C	1:A:586:PHE:HD2	2.24	0.44
1:B:610:SER:HB2	1:B:617:LYS:HG2	1.99	0.44
1:B:643:VAL:O	1:B:688:GLU:HA	2.17	0.44
1:A:51:ALA:CB	1:A:103:SER:HB2	2.47	0.44
1:B:371:PHE:HE2	1:B:401:ILE:HG13	1.81	0.44
1:B:467:GLU:HB3	1:B:468:LEU:HD12	1.99	0.44
1:B:610:SER:HB2	1:B:617:LYS:HE2	2.00	0.44
1:B:669:THR:CB	1:B:672:GLU:HG3	2.39	0.44
1:B:673:ALA:O	1:B:677:ILE:HG13	2.18	0.44
1:A:437:THR:HG22	1:A:438:PRO:O	2.17	0.44
1:B:617:LYS:NZ	4:B:753:NAP:O1X	2.49	0.44
1:A:110:ILE:HD12	1:A:211:LEU:HD21	2.00	0.44
1:A:348:THR:HA	1:A:349:PRO:C	2.43	0.44
1:B:244:HIS:HB2	1:B:267:GLN:OE1	2.17	0.44
1:B:371:PHE:CE2	1:B:401:ILE:HG13	2.52	0.44
1:B:422:ASP:O	1:B:423:THR:CG2	2.66	0.44
1:B:526:PHE:O	1:B:527:ARG:NH1	2.48	0.44
1:A:619:TYR:HB2	1:A:622:ASP:OD2	2.18	0.44
1:B:380:ASN:ND2	1:B:383:VAL:H	2.16	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:610:SER:HA	1:B:618:VAL:H	1.83	0.44
1:A:424:VAL:HA	1:A:425:PRO:HD3	1.83	0.44
1:B:419:ALA:O	1:B:420:LYS:CB	2.62	0.44
1:B:625:LYS:HE2	1:B:664:ARG:HH22	1.82	0.44
1:B:75:TYR:CD2	1:B:78:LYS:HD2	2.53	0.43
1:A:254:ASN:OD1	1:A:254:ASN:C	2.61	0.43
1:A:370:LEU:HD22	1:A:374:LEU:CD1	2.49	0.43
1:B:448:LEU:HB2	1:B:554:GLU:CD	2.43	0.43
1:A:158:GLU:C	1:A:159:PHE:CD1	2.95	0.43
1:A:244:HIS:CD2	1:A:267:GLN:HG2	2.52	0.43
1:A:548:PHE:HA	1:A:551:PHE:HB2	2.00	0.43
1:B:582:ASN:CG	1:B:583:THR:N	2.75	0.43
1:A:209:ASP:O	1:A:212:HIS:HD2	2.01	0.43
1:A:285:ARG:NH1	1:A:581:ARG:HD2	2.33	0.43
1:A:314:PRO:HB2	1:A:317:LYS:HG2	2.01	0.43
1:A:330:GLU:OE1	1:A:330:GLU:HA	2.18	0.43
1:A:416:SER:O	1:A:417:ASP:HB2	2.19	0.43
1:B:252:ASN:ND2	1:B:252:ASN:C	2.76	0.43
1:B:390:LEU:HD21	1:B:396:GLN:HG2	1.99	0.43
1:A:159:PHE:CD1	1:A:159:PHE:N	2.86	0.43
1:A:247:PRO:C	1:A:249:HIS:H	2.25	0.43
1:A:288:ILE:HG12	1:A:483:ARG:HA	1.99	0.43
1:A:481:LEU:HA	1:A:503:TYR:CE1	2.53	0.43
1:B:196:TYR:O	1:B:197:MET:C	2.61	0.43
1:B:560:GLU:O	1:B:563:LYS:HB3	2.18	0.43
1:B:607:VAL:O	1:B:623:LYS:HE3	2.18	0.43
1:A:494:ILE:O	1:A:494:ILE:HG22	2.17	0.43
1:A:600:ASP:OD1	1:A:600:ASP:C	2.61	0.43
1:A:65:TYR:CE1	1:A:73:GLU:HB2	2.54	0.43
1:A:101:PHE:N	1:A:101:PHE:CD1	2.87	0.43
1:A:111:VAL:O	1:A:147:TYR:HA	2.18	0.43
1:A:242:SER:HB2	1:A:244:HIS:HD2	1.82	0.43
1:A:582:ASN:HB2	1:A:583:THR:H	1.71	0.43
1:A:380:ASN:HD22	1:A:382:ASP:N	2.16	0.43
1:A:519:VAL:CG1	1:A:520:HIS:N	2.82	0.43
1:B:104:LEU:HD21	1:B:145:LEU:CD1	2.49	0.43
1:B:582:ASN:HD21	1:B:584:ASP:H	1.63	0.43
1:A:158:GLU:O	1:A:159:PHE:CB	2.67	0.43
1:B:407:ASN:HB2	1:B:410:ASP:OD2	2.19	0.43
1:B:677:ILE:O	1:B:680:LEU:N	2.52	0.43
1:B:331:THR:HB	1:B:352:ILE:HG13	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:603:PHE:CD2	1:B:604:GLU:N	2.86	0.42
1:A:356:ILE:HG23	1:A:362:ILE:HG21	2.01	0.42
1:A:380:ASN:ND2	1:A:382:ASP:CB	2.78	0.42
1:B:197:MET:HE1	1:B:369:GLN:HB2	2.01	0.42
1:B:324:ILE:HG23	1:B:325:PHE:CD1	2.54	0.42
1:A:355:ALA:HA	1:A:359:TYR:CD1	2.55	0.42
1:B:552:ILE:CD1	1:B:592:TRP:HZ3	2.32	0.42
1:A:287:CYS:C	1:A:288:ILE:HD12	2.44	0.42
1:B:62:LEU:CD1	1:B:64:LEU:HD21	2.50	0.42
1:B:295:SER:HA	1:B:452:GLN:OE1	2.20	0.42
1:B:609:HIS:CB	1:B:612:LEU:HG	2.48	0.42
1:A:121:GLY:O	1:A:166:LYS:HE3	2.19	0.42
1:A:245:TYR:CE1	1:A:267:GLN:NE2	2.88	0.42
1:B:365:PRO:HG3	2:B:750:FAD:C2A	2.50	0.42
1:B:380:ASN:HD21	1:B:382:ASP:HB3	1.83	0.42
1:B:569:VAL:O	1:B:570:SER:CB	2.67	0.42
1:B:582:ASN:HD21	1:B:584:ASP:CB	2.32	0.42
1:A:552:ILE:O	1:A:556:VAL:HG23	2.19	0.42
1:A:118:TYR:O	1:A:120:GLU:O	2.38	0.42
1:B:272:PRO:O	1:B:273:ILE:CB	2.67	0.42
1:B:579:GLY:HA2	1:B:608:ALA:O	2.20	0.42
1:A:120:GLU:CG	1:A:121:GLY:H	2.33	0.42
1:B:74:ASP:OD2	1:B:78:LYS:HE2	2.20	0.42
1:B:530:SER:O	1:B:532:PRO:HD3	2.19	0.42
1:A:62:LEU:HB3	1:A:111:VAL:HG22	2.01	0.42
1:B:542:GLY:C	1:B:544:GLY:N	2.78	0.42
1:A:302:SER:O	1:A:303:THR:C	2.62	0.42
1:A:327:LEU:CD2	1:A:426:MET:HG2	2.50	0.42
1:A:450:GLU:HG2	1:A:455:HIS:CE1	2.55	0.42
1:B:249:HIS:HB3	6:B:2013:HOH:O	2.20	0.42
1:B:558:PHE:CD1	1:B:558:PHE:C	2.97	0.42
1:A:96:VAL:HG13	1:A:130:PHE:HB2	2.02	0.41
1:A:120:GLU:HG2	1:A:159:PHE:CE2	2.54	0.41
1:A:450:GLU:O	1:A:451:LYS:C	2.63	0.41
1:B:238:LEU:HD12	1:B:509:ARG:CG	2.50	0.41
1:B:445:SER:HB3	1:B:455:HIS:ND1	2.34	0.41
1:B:588:TYR:HD2	1:B:591:GLU:OE2	2.03	0.41
1:A:325:PHE:O	1:A:326:ASN:HB3	2.20	0.41
1:B:138:GLU:O	1:B:141:ALA:HB2	2.20	0.41
1:B:144:ASN:N	1:B:144:ASN:ND2	2.68	0.41
1:B:507:GLY:HA3	1:B:512:PHE:CD1	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:541:PRO:HD2	1:B:650:MET:HE2	2.01	0.41
1:B:582:ASN:ND2	1:B:583:THR:H	2.18	0.41
1:A:86:LYS:O	1:A:216:GLN:HG2	2.20	0.41
1:A:224:PHE:CZ	1:A:345:PRO:HD3	2.56	0.41
1:A:305:ASP:OD1	1:A:527:ARG:NH2	2.44	0.41
1:B:241:PRO:HB2	1:B:242:SER:H	1.68	0.41
1:A:115:ILE:HG21	1:A:164:ALA:HA	2.03	0.41
1:B:96:VAL:HG11	1:B:130:PHE:CB	2.51	0.41
1:B:484:ASN:HD21	1:B:503:TYR:H	1.61	0.41
1:B:514:ASN:HD22	1:B:514:ASN:HA	1.50	0.41
1:B:659:VAL:HB	1:B:677:ILE:CD1	2.44	0.41
1:A:400:GLU:O	1:A:404:LYS:HD2	2.20	0.41
1:A:465:ASN:HA	1:A:466:PRO:HD3	1.87	0.41
1:B:272:PRO:HA	1:B:516:LYS:CG	2.47	0.41
1:B:416:SER:HB3	1:B:421:TRP:HE1	1.85	0.41
1:B:581:ARG:HB3	1:B:611:ARG:HB2	2.02	0.41
1:A:314:PRO:HG3	1:A:503:TYR:CE2	2.56	0.41
1:A:612:LEU:HD23	1:A:612:LEU:HA	1.91	0.41
1:B:263:PHE:CD2	1:B:269:TYR:HB2	2.55	0.41
1:B:304:GLY:HA3	1:B:526:PHE:O	2.21	0.41
1:B:680:LEU:CD2	1:B:685:ARG:HB3	2.51	0.41
1:A:260:LEU:O	1:A:263:PHE:CZ	2.73	0.41
1:B:48:ARG:HB3	1:B:100:ASP:OD2	2.20	0.41
1:B:328:ASP:OD1	1:B:328:ASP:C	2.63	0.41
1:B:506:ASN:O	1:B:510:LYS:HA	2.21	0.41
1:A:67:SER:OG	1:A:70:GLY:N	2.54	0.41
1:A:150:PHE:CE1	1:A:196:TYR:HA	2.55	0.41
1:A:224:PHE:CE2	1:A:344:VAL:HA	2.56	0.41
1:A:236:MET:CE	1:A:332:ILE:HD13	2.47	0.41
1:A:237:SER:O	1:A:350:THR:HA	2.21	0.41
1:A:254:ASN:O	1:A:255:ALA:C	2.64	0.41
1:A:385:GLU:OE1	1:A:385:GLU:CA	2.69	0.41
1:A:593:PRO:O	1:A:597:LYS:HG3	2.21	0.41
1:B:302:SER:O	1:B:303:THR:C	2.63	0.41
1:B:607:VAL:CG1	1:B:608:ALA:N	2.83	0.41
1:B:666:LYS:HB2	1:B:668:ILE:CD1	2.51	0.41
1:B:680:LEU:HD22	1:B:685:ARG:HB3	2.02	0.41
1:B:686:TYR:C	1:B:686:TYR:CD2	2.99	0.41
1:A:216:GLN:O	1:A:217:GLU:C	2.64	0.41
1:A:634:MET:HE2	1:A:634:MET:HB3	1.96	0.41
1:A:647:ALA:CB	1:A:650:MET:CB	2.85	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:291:GLU:OE2	1:B:455:HIS:NE2	2.53	0.41
1:B:610:SER:CB	1:B:619:TYR:HE2	2.33	0.41
1:A:512:PHE:O	1:A:513:ALA:C	2.64	0.40
1:B:85:ALA:O	1:B:218:ALA:HA	2.21	0.40
1:B:654:VAL:O	1:B:658:LEU:HG	2.21	0.40
1:A:118:TYR:O	1:A:119:GLY:C	2.63	0.40
1:A:153:GLY:HA3	1:A:161:ASN:HD22	1.86	0.40
1:A:535:PRO:HB2	1:A:639:ALA:CB	2.51	0.40
1:B:109:VAL:HG12	1:B:110:ILE:O	2.22	0.40
1:B:467:GLU:C	1:B:468:LEU:HD12	2.46	0.40
1:A:95:ASP:O	1:A:97:GLU:N	2.54	0.40
1:A:640:PHE:HB3	1:A:642:TYR:CE1	2.57	0.40
1:B:227:THR:O	1:B:333:PHE:HA	2.22	0.40
1:B:323:SER:O	1:B:326:ASN:N	2.52	0.40
1:A:225:GLN:CD	1:A:336:LYS:HD3	2.47	0.40
1:A:270:ILE:CD1	1:A:511:LEU:HD22	2.50	0.40
1:A:619:TYR:N	1:A:622:ASP:OD2	2.42	0.40
1:B:251:LEU:O	1:B:253:ARG:HG3	2.21	0.40
1:B:272:PRO:O	1:B:273:ILE:HB	2.22	0.40
1:A:83:LEU:HG	1:A:89:LEU:HD12	2.03	0.40
1:A:416:SER:HB3	1:A:419:ALA:O	2.20	0.40
1:A:437:THR:HG23	1:A:438:PRO:HD2	2.04	0.40
1:A:506:ASN:O	1:A:512:PHE:HB2	2.20	0.40
1:B:548:PHE:HA	1:B:551:PHE:HB2	2.03	0.40

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	643/682 (94%)	579 (90%)	50 (8%)	14 (2%)	5 26

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	643/682 (94%)	544 (85%)	80 (12%)	19 (3%)	3	19
All	All	1286/1364 (94%)	1123 (87%)	130 (10%)	33 (3%)	4	23

All (33) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	241	PRO
1	A	451	LYS
1	A	513	ALA
1	A	514	ASN
1	B	241	PRO
1	B	272	PRO
1	B	273	ILE
1	B	423	THR
1	B	513	ALA
1	B	514	ASN
1	B	568	ASN
1	B	647	ALA
1	A	96	VAL
1	A	477	VAL
1	A	497	THR
1	A	567	ASN
1	A	647	ALA
1	B	125	ASP
1	B	600	ASP
1	A	120	GLU
1	A	326	ASN
1	A	488	ALA
1	B	526	PHE
1	A	248	SER
1	B	420	LYS
1	B	491	ASN
1	B	565	GLY
1	B	628	GLU
1	B	648	LYS
1	B	649	GLY
1	A	646	ASP
1	B	665	GLY
1	B	324	ILE

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	561/592 (95%)	527 (94%)	34 (6%)	17	49
1	B	561/592 (95%)	513 (91%)	48 (9%)	10	36
All	All	1122/1184 (95%)	1040 (93%)	82 (7%)	13	42

All (82) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	96	VAL
1	A	104	LEU
1	A	105	ASN
1	A	122	ASP
1	A	123	PHE
1	A	156	THR
1	A	159	PHE
1	A	161	ASN
1	A	192	THR
1	A	203	ILE
1	A	250	GLN
1	A	278	GLU
1	A	285	ARG
1	A	316	GLU
1	A	319	GLU
1	A	363	THR
1	A	370	LEU
1	A	386	LYS
1	A	387	LEU
1	A	426	MET
1	A	437	THR
1	A	455	HIS
1	A	462	ASN
1	A	498	ASN
1	A	511	LEU
1	A	519	VAL
1	A	523	ARG

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Mol	Chain	Res	Type
1	A	552	ILE
1	A	582	ASN
1	A	600	ASP
1	A	615	THR
1	A	621	GLN
1	A	656	THR
1	A	662	LEU
1	B	55	THR
1	B	62	LEU
1	B	68	GLN
1	B	123	PHE
1	B	132	ASP
1	B	145	LEU
1	B	161	ASN
1	B	168	GLU
1	B	182	LEU
1	B	228	VAL
1	B	236	MET
1	B	240	GLU
1	B	252	ASN
1	B	265	LEU
1	B	273	ILE
1	B	316	GLU
1	B	339	ASP
1	B	369	GLN
1	B	377	PHE
1	B	387	LEU
1	B	389	LEU
1	B	426	MET
1	B	427	GLN
1	B	436	MET
1	B	449	SER
1	B	467	GLU
1	B	478	THR
1	B	481	LEU
1	B	499	LEU
1	B	511	LEU
1	B	514	ASN
1	B	526	PHE
1	B	545	VAL
1	B	560	GLU
1	B	561	SER

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Mol	Chain	Res	Type
1	B	562	GLN
1	B	567	ASN
1	B	568	ASN
1	B	571	LEU
1	B	576	LEU
1	B	583	THR
1	B	600	ASP
1	B	615	THR
1	B	621	GLN
1	B	633	GLU
1	B	650	MET
1	B	656	THR
1	B	671	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (51) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	60	ASN
1	A	98	ASN
1	A	105	ASN
1	A	144	ASN
1	A	148	ASN
1	A	161	ASN
1	A	170	HIS
1	A	212	HIS
1	A	216	GLN
1	A	223	GLN
1	A	225	GLN
1	A	244	HIS
1	A	250	GLN
1	A	252	ASN
1	A	267	GLN
1	A	286	ASN
1	A	376	GLN
1	A	380	ASN
1	A	435	GLN
1	A	462	ASN
1	A	480	ASN
1	A	484	ASN
1	A	493	ASN
1	A	502	HIS
1	A	574	HIS

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Mol	Chain	Res	Type
1	A	582	ASN
1	A	621	GLN
1	A	630	GLN
1	B	60	ASN
1	B	68	GLN
1	B	98	ASN
1	B	144	ASN
1	B	148	ASN
1	B	154	ASN
1	B	249	HIS
1	B	252	ASN
1	B	286	ASN
1	B	306	HIS
1	B	320	GLN
1	B	369	GLN
1	B	376	GLN
1	B	380	ASN
1	B	407	ASN
1	B	484	ASN
1	B	493	ASN
1	B	514	ASN
1	B	531	ASN
1	B	567	ASN
1	B	574	HIS
1	B	582	ASN
1	B	621	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry

11 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	FMN	B	751	-	33,33,33	1.51	6 (18%)	48,50,50	1.38	6 (12%)
2	FAD	B	750	-	58,58,58	1.55	10 (17%)	85,89,89	0.92	4 (4%)
5	SO4	A	761	-	4,4,4	0.37	0	6,6,6	0.12	0
5	SO4	A	760	-	4,4,4	0.38	0	6,6,6	0.16	0
3	FMN	A	752	-	33,33,33	1.58	5 (15%)	48,50,50	1.41	7 (14%)
2	FAD	A	750	-	58,58,58	1.52	9 (15%)	85,89,89	0.88	3 (3%)
4	NAP	A	753	-	42,43,52	1.53	5 (11%)	62,67,80	1.88	13 (20%)
5	SO4	A	762	-	4,4,4	0.36	0	6,6,6	0.08	0
3	FMN	A	751	-	33,33,33	1.39	5 (15%)	48,50,50	1.37	6 (12%)
4	NAP	B	753	-	42,43,52	1.41	8 (19%)	62,67,80	1.88	15 (24%)
3	FMN	B	752	-	33,33,33	1.56	7 (21%)	48,50,50	1.39	7 (14%)

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
3	FMN	B	751	-	-	0/18/18/18	0/3/3/3
2	FAD	B	750	-	-	10/34/50/50	0/6/6/6
3	FMN	A	752	-	-	6/18/18/18	0/3/3/3
2	FAD	A	750	-	-	10/34/50/50	0/6/6/6
4	NAP	A	753	-	-	7/27/59/67	0/4/4/5
3	FMN	A	751	-	-	0/18/18/18	0/3/3/3
4	NAP	B	753	-	-	7/27/59/67	0/4/4/5
3	FMN	B	752	-	-	3/18/18/18	0/3/3/3

All (55) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	750	FAD	C4X-N5	5.58	1.42	1.30
2	B	750	FAD	C4X-N5	5.58	1.42	1.30
3	A	752	FMN	C10-N10	4.19	1.46	1.37
3	B	752	FMN	C10-N10	4.11	1.46	1.37
4	A	753	NAP	C2B-C1B	-3.98	1.43	1.53
2	B	750	FAD	C9-C8	3.93	1.45	1.39
3	B	751	FMN	C9-C8	-3.87	1.34	1.39
4	A	753	NAP	C5A-N7A	-3.86	1.32	1.39
4	A	753	NAP	C4A-N3A	3.84	1.41	1.34
3	B	751	FMN	C4A-N5	3.83	1.39	1.30
3	A	752	FMN	C4A-N5	3.66	1.38	1.30
4	B	753	NAP	C5A-N7A	-3.64	1.32	1.39
3	B	751	FMN	C10-N10	3.60	1.45	1.37
3	A	751	FMN	C4A-N5	3.56	1.38	1.30
3	B	752	FMN	C4A-N5	3.51	1.38	1.30
2	B	750	FAD	C9A-C5X	3.42	1.46	1.41
3	A	751	FMN	C9-C8	-3.39	1.35	1.39
2	A	750	FAD	PA-O3P	-3.33	1.55	1.59
4	B	753	NAP	C2B-C1B	-3.32	1.44	1.53
2	A	750	FAD	C4A-N3A	3.27	1.40	1.34
2	B	750	FAD	C4A-N3A	3.21	1.40	1.34
4	B	753	NAP	C4A-N3A	3.15	1.40	1.34
3	A	751	FMN	C10-N10	3.11	1.44	1.37
2	A	750	FAD	C6-C5X	3.02	1.44	1.40
2	B	750	FAD	C6-C5X	2.96	1.44	1.40
4	A	753	NAP	PN-O3	-2.88	1.56	1.59
2	A	750	FAD	C10-N1	2.88	1.39	1.33
3	A	752	FMN	C9-C8	-2.85	1.35	1.39
2	A	750	FAD	C9A-N10	2.82	1.46	1.41
2	B	750	FAD	C9A-N10	2.79	1.46	1.41
2	A	750	FAD	C9A-C5X	2.77	1.45	1.41
4	B	753	NAP	PA-O3	2.75	1.62	1.59
2	A	750	FAD	C9-C8	2.73	1.43	1.39
2	B	750	FAD	C10-N1	2.67	1.38	1.33
3	A	752	FMN	C6-C5A	2.63	1.44	1.40
3	B	752	FMN	C6-C5A	2.50	1.43	1.40
3	A	752	FMN	C5'-C4'	2.50	1.55	1.51
2	B	750	FAD	PA-O3P	-2.48	1.56	1.59
3	B	751	FMN	C6-C5A	2.43	1.43	1.40
2	B	750	FAD	C5'-C4'	-2.37	1.48	1.51
3	B	752	FMN	C4'-C3'	2.34	1.57	1.53
3	B	752	FMN	C5'-C4'	2.32	1.55	1.51
3	B	752	FMN	C9A-C5A	2.25	1.44	1.41

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	751	FMN	P-O2P	-2.24	1.46	1.54
4	A	753	NAP	P2B-O2X	-2.23	1.46	1.54
3	A	751	FMN	P-O2P	-2.19	1.46	1.54
4	B	753	NAP	C2A-N1A	2.19	1.37	1.33
4	B	753	NAP	C8A-N7A	2.16	1.35	1.31
2	B	750	FAD	C2A-N1A	2.14	1.37	1.33
2	A	750	FAD	C5A-C4A	-2.13	1.35	1.39
3	A	751	FMN	P-O3P	-2.04	1.47	1.54
4	B	753	NAP	C4A-N9A	-2.04	1.33	1.37
4	B	753	NAP	P2B-O2X	-2.04	1.47	1.54
3	B	751	FMN	P-O3P	-2.02	1.47	1.54
3	B	752	FMN	P-O3P	-2.02	1.47	1.54

All (61) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	753	NAP	O4D-C1D-N1N	-5.58	101.68	110.57
4	A	753	NAP	O4D-C1D-N1N	-5.48	101.84	110.57
4	A	753	NAP	N3A-C4A-N9A	4.97	135.62	127.17
4	A	753	NAP	C5A-C4A-N3A	-4.93	119.93	126.72
4	A	753	NAP	N3A-C2A-N1A	-4.92	121.13	128.58
4	B	753	NAP	C5A-C4A-N3A	-4.91	119.95	126.72
4	B	753	NAP	N3A-C2A-N1A	-4.74	121.41	128.58
4	B	753	NAP	N3A-C4A-N9A	4.72	135.20	127.17
3	A	752	FMN	C9A-C5A-N5	4.08	126.79	122.45
3	B	752	FMN	C9A-C5A-N5	3.99	126.69	122.45
3	A	751	FMN	C9A-C5A-N5	3.83	126.53	122.45
3	B	751	FMN	C9A-C5A-N5	3.81	126.50	122.45
4	A	753	NAP	C4A-N9A-C1B	-3.33	118.85	126.63
3	B	751	FMN	C5A-N5-C4A	-3.28	112.78	118.09
4	B	753	NAP	C4A-N9A-C1B	-3.28	118.97	126.63
3	A	751	FMN	C5A-N5-C4A	-3.19	112.93	118.09
3	A	751	FMN	O2-C2-N3	3.09	124.52	118.58
3	A	752	FMN	C5A-N5-C4A	-3.08	113.11	118.09
3	B	751	FMN	O2-C2-N3	3.03	124.40	118.58
4	A	753	NAP	C2A-N3A-C4A	2.98	119.12	111.83
3	B	752	FMN	C5A-N5-C4A	-2.97	113.28	118.09
2	B	750	FAD	C4X-C10-N10	2.96	120.72	116.48
4	B	753	NAP	C2A-N3A-C4A	2.94	119.00	111.83
3	B	752	FMN	O2-C2-N3	2.90	124.16	118.58
4	B	753	NAP	C1B-N9A-C8A	2.79	133.29	127.09
3	A	751	FMN	C10-N1-C2	2.77	122.85	116.85

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	753	NAP	C1B-N9A-C8A	2.76	133.22	127.09
3	A	752	FMN	O2-C2-N3	2.75	123.85	118.58
3	B	752	FMN	C10-N1-C2	2.74	122.78	116.85
3	A	752	FMN	C10-N1-C2	2.73	122.75	116.85
3	B	751	FMN	C10-N1-C2	2.73	122.75	116.85
4	B	753	NAP	O4B-C1B-C2B	-2.63	102.06	106.59
2	B	750	FAD	C4'-C3'-C2'	-2.59	109.26	113.57
4	A	753	NAP	O4B-C1B-C2B	-2.56	102.18	106.59
2	A	750	FAD	C4X-C10-N10	2.46	120.00	116.48
3	A	751	FMN	O3P-P-O2P	2.39	116.75	107.80
3	B	751	FMN	O3P-P-O2P	2.37	116.70	107.80
2	A	750	FAD	C4'-C3'-C2'	-2.28	109.78	113.57
4	B	753	NAP	C3D-C2D-C1D	2.28	105.76	101.46
3	A	752	FMN	O5'-C5'-C4'	2.26	115.40	109.36
4	A	753	NAP	C6A-C5A-N7A	-2.26	127.74	132.09
2	B	750	FAD	C1'-N10-C9A	2.24	124.99	120.63
4	B	753	NAP	C6A-C5A-N7A	-2.23	127.78	132.09
3	B	752	FMN	O3P-P-O2P	2.22	116.14	107.80
3	A	751	FMN	N3-C2-N1	-2.17	114.88	119.50
4	B	753	NAP	O2A-PA-O3	2.17	113.14	107.27
4	B	753	NAP	C6A-C5A-C4A	2.16	120.13	117.18
3	A	752	FMN	O3P-P-O2P	2.14	115.84	107.80
4	A	753	NAP	C6A-C5A-C4A	2.12	120.08	117.18
4	B	753	NAP	C2D-C3D-C4D	2.11	106.68	102.61
2	B	750	FAD	O2B-C2B-C3B	2.09	118.52	111.82
4	A	753	NAP	C4A-N9A-C8A	2.08	107.92	105.74
4	B	753	NAP	O3B-C3B-C2B	2.07	116.98	111.19
4	A	753	NAP	C2A-N1A-C6A	2.07	122.12	118.73
3	B	752	FMN	N3-C2-N1	-2.06	115.11	119.50
4	B	753	NAP	C2A-N1A-C6A	2.06	122.12	118.73
3	A	752	FMN	N3-C2-N1	-2.04	115.16	119.50
4	A	753	NAP	O2X-P2B-O2B	-2.03	97.93	105.85
2	A	750	FAD	C5'-C4'-C3'	-2.02	108.40	112.22
3	B	752	FMN	O5'-C5'-C4'	2.02	114.75	109.36
3	B	751	FMN	N3-C2-N1	-2.00	115.24	119.50

There are no chirality outliers.

All (43) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	750	FAD	C1'-C2'-C3'-C4'
2	A	750	FAD	C3'-C4'-C5'-O5'

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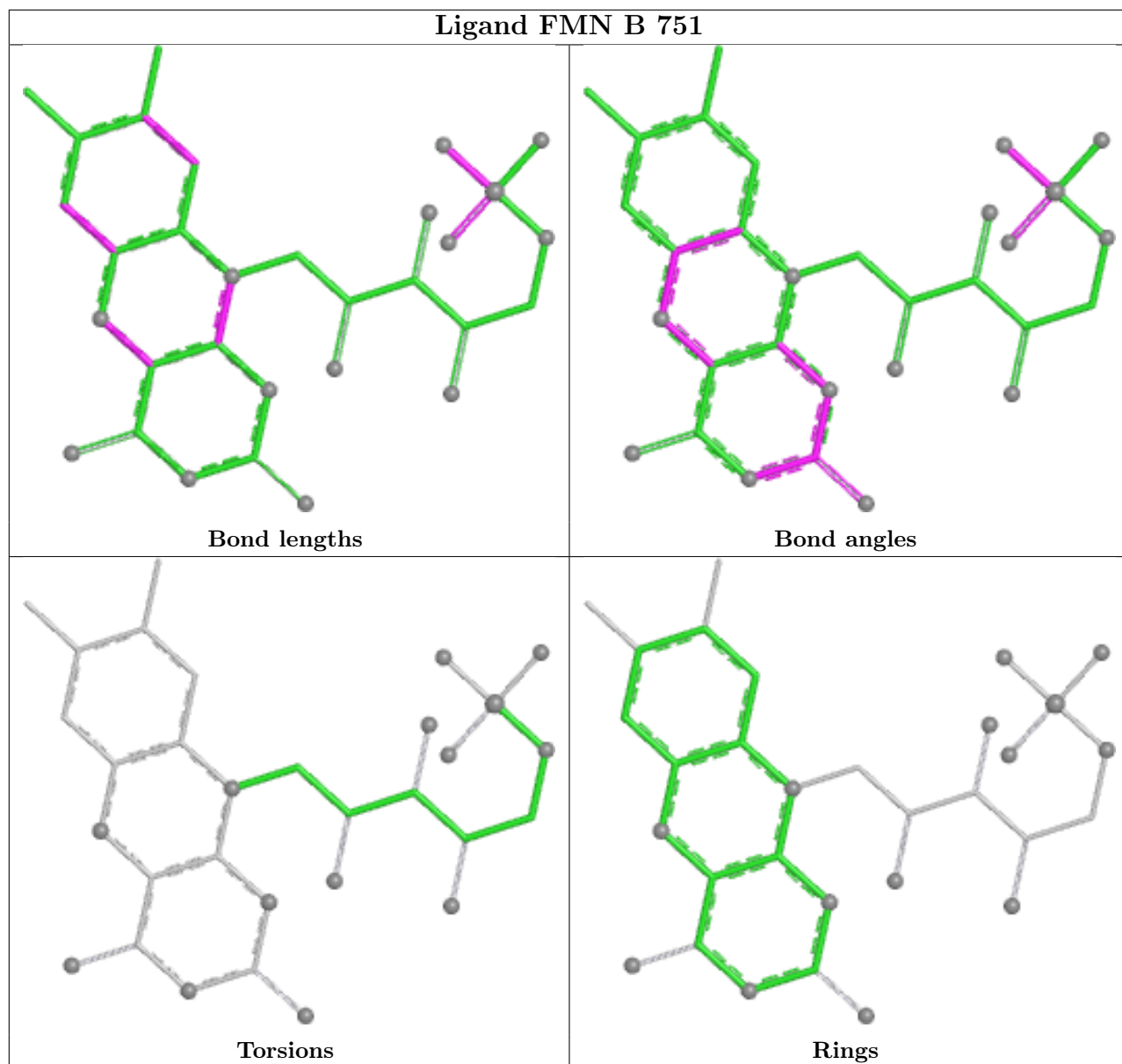
Mol	Chain	Res	Type	Atoms
2	A	750	FAD	O4'-C4'-C5'-O5'
2	B	750	FAD	C1'-C2'-C3'-C4'
2	B	750	FAD	C3'-C4'-C5'-O5'
2	B	750	FAD	O4'-C4'-C5'-O5'
3	A	752	FMN	C5'-O5'-P-O1P
3	A	752	FMN	C5'-O5'-P-O2P
3	A	752	FMN	C5'-O5'-P-O3P
4	A	753	NAP	C5B-O5B-PA-O1A
4	A	753	NAP	C5B-O5B-PA-O3
4	A	753	NAP	C2B-C1B-N9A-C8A
4	B	753	NAP	C5B-O5B-PA-O1A
4	B	753	NAP	C5B-O5B-PA-O3
4	B	753	NAP	C2B-C1B-N9A-C8A
4	B	753	NAP	C2B-C1B-N9A-C4A
4	B	753	NAP	C3D-C4D-C5D-O5D
4	A	753	NAP	C2B-C1B-N9A-C4A
2	B	750	FAD	C2B-C1B-N9A-C8A
2	A	750	FAD	O2'-C2'-C3'-O3'
2	B	750	FAD	O2'-C2'-C3'-O3'
2	B	750	FAD	C2B-C1B-N9A-C4A
2	A	750	FAD	O2'-C2'-C3'-C4'
2	B	750	FAD	O2'-C2'-C3'-C4'
3	B	752	FMN	O2'-C2'-C3'-C4'
4	A	753	NAP	O4D-C4D-C5D-O5D
4	A	753	NAP	C3D-C4D-C5D-O5D
3	B	752	FMN	O2'-C2'-C3'-O3'
2	A	750	FAD	C2B-C1B-N9A-C8A
3	B	752	FMN	C1'-C2'-C3'-O3'
3	A	752	FMN	C1'-C2'-C3'-C4'
2	A	750	FAD	P-O3P-PA-O1A
2	B	750	FAD	P-O3P-PA-O1A
4	A	753	NAP	C5B-O5B-PA-O2A
4	B	753	NAP	C5B-O5B-PA-O2A
4	B	753	NAP	O4D-C4D-C5D-O5D
2	A	750	FAD	C2B-C1B-N9A-C4A
2	A	750	FAD	C1'-C2'-C3'-O3'
2	B	750	FAD	C1'-C2'-C3'-O3'
3	A	752	FMN	C1'-C2'-C3'-O3'
3	A	752	FMN	O2'-C2'-C3'-O3'
2	A	750	FAD	O4B-C1B-N9A-C8A
2	B	750	FAD	O4B-C1B-N9A-C8A

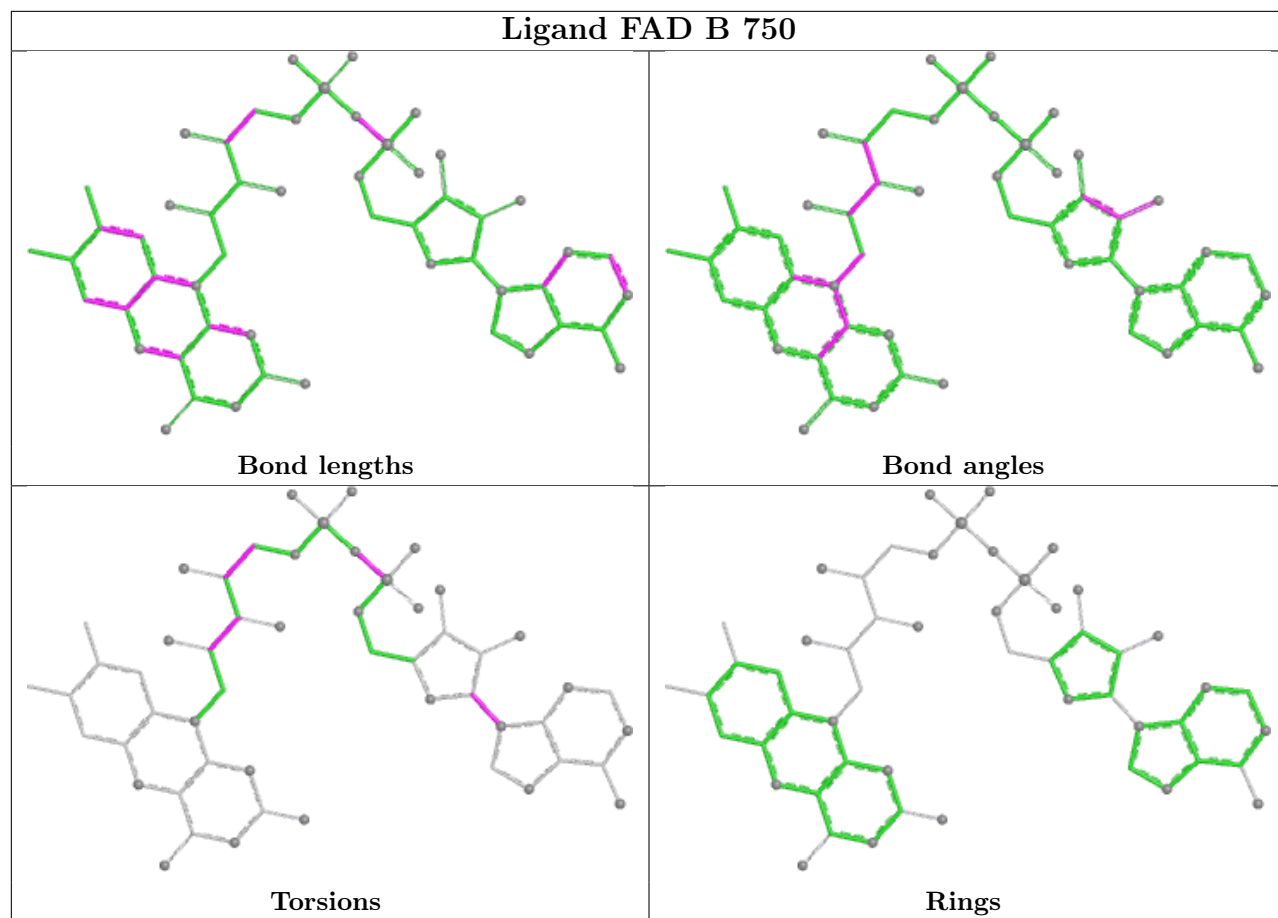
There are no ring outliers.

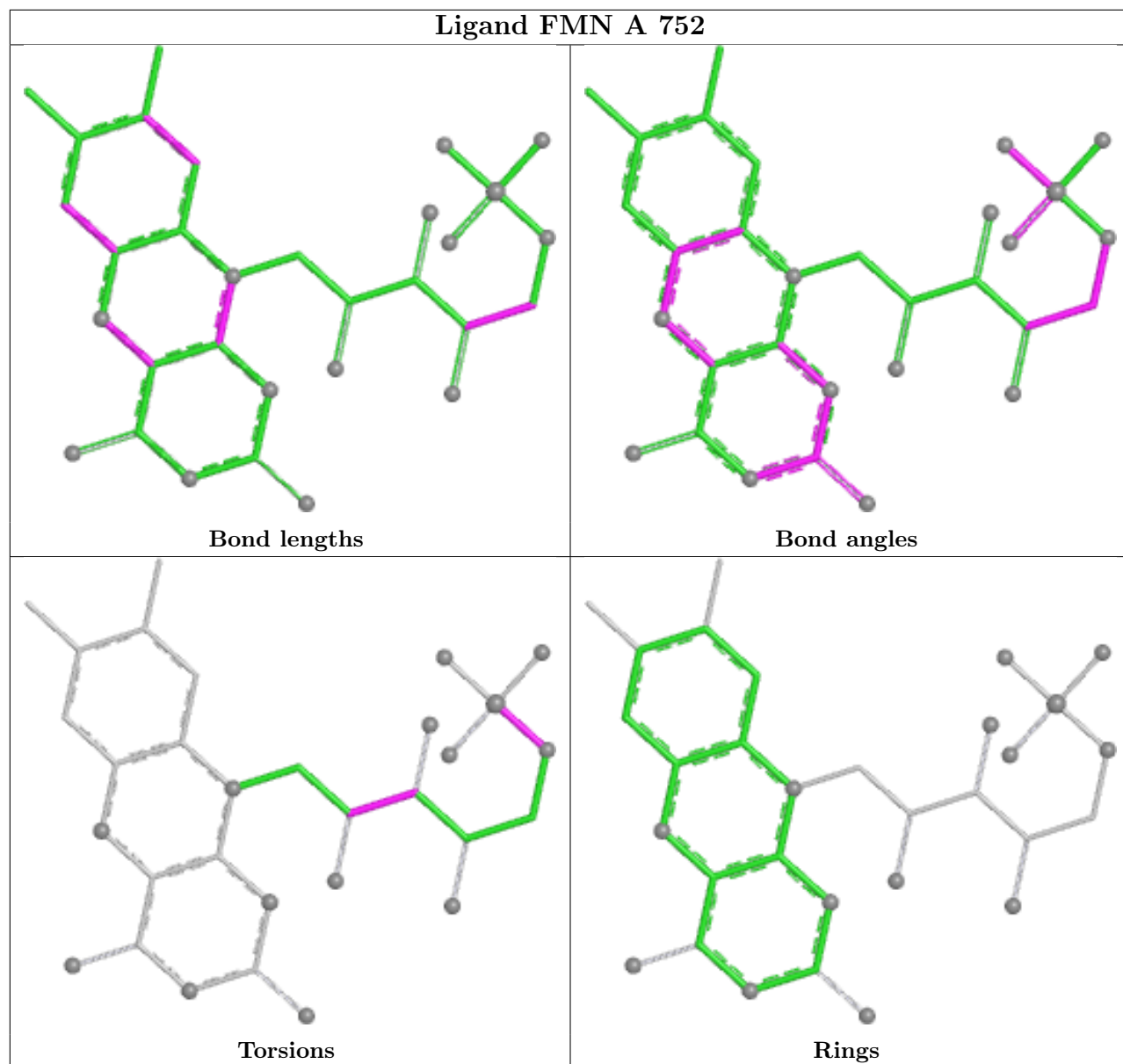
7 monomers are involved in 13 short contacts:

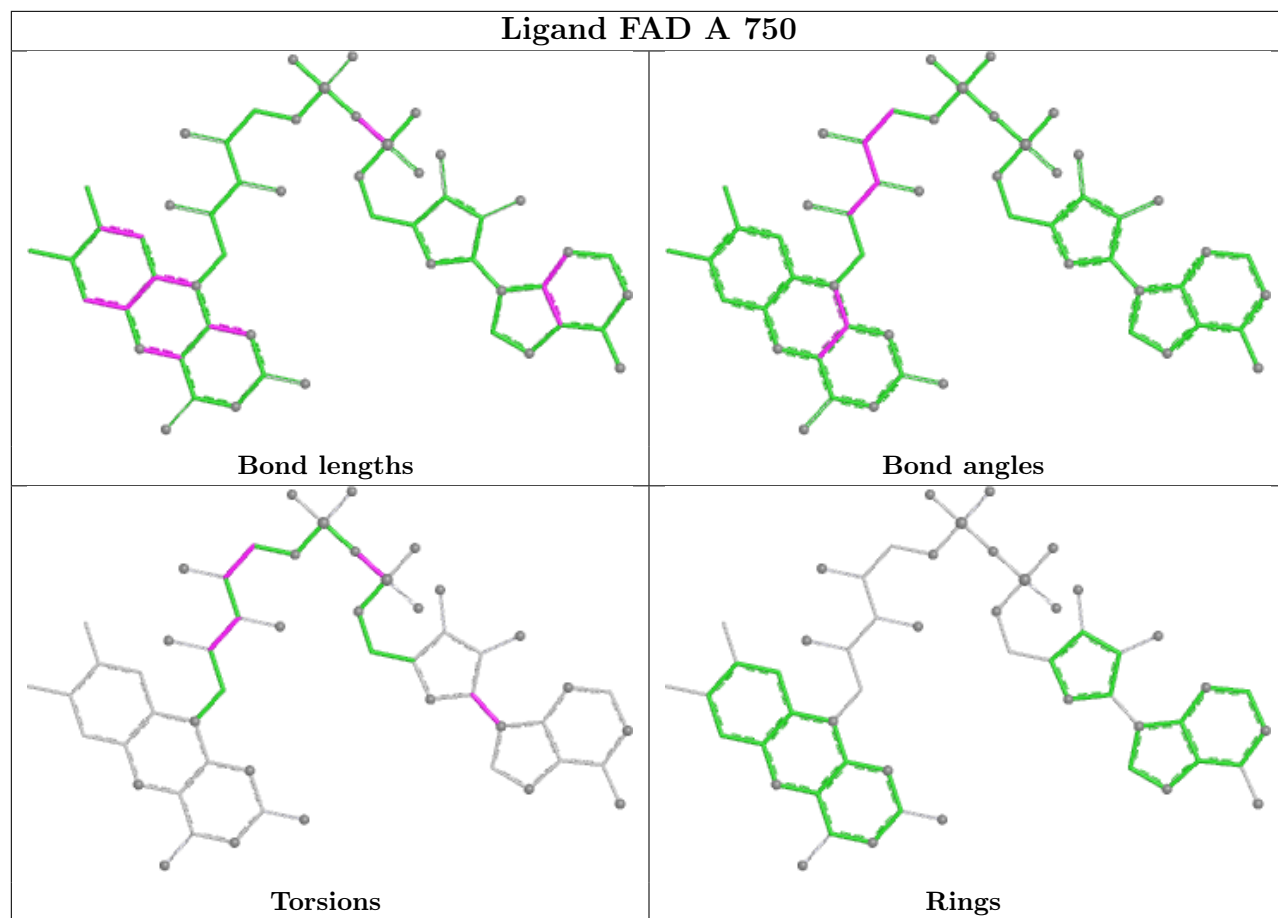
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	751	FMN	1	0
2	B	750	FAD	4	0
3	A	752	FMN	1	0
2	A	750	FAD	3	0
4	A	753	NAP	2	0
3	A	751	FMN	1	0
4	B	753	NAP	1	0

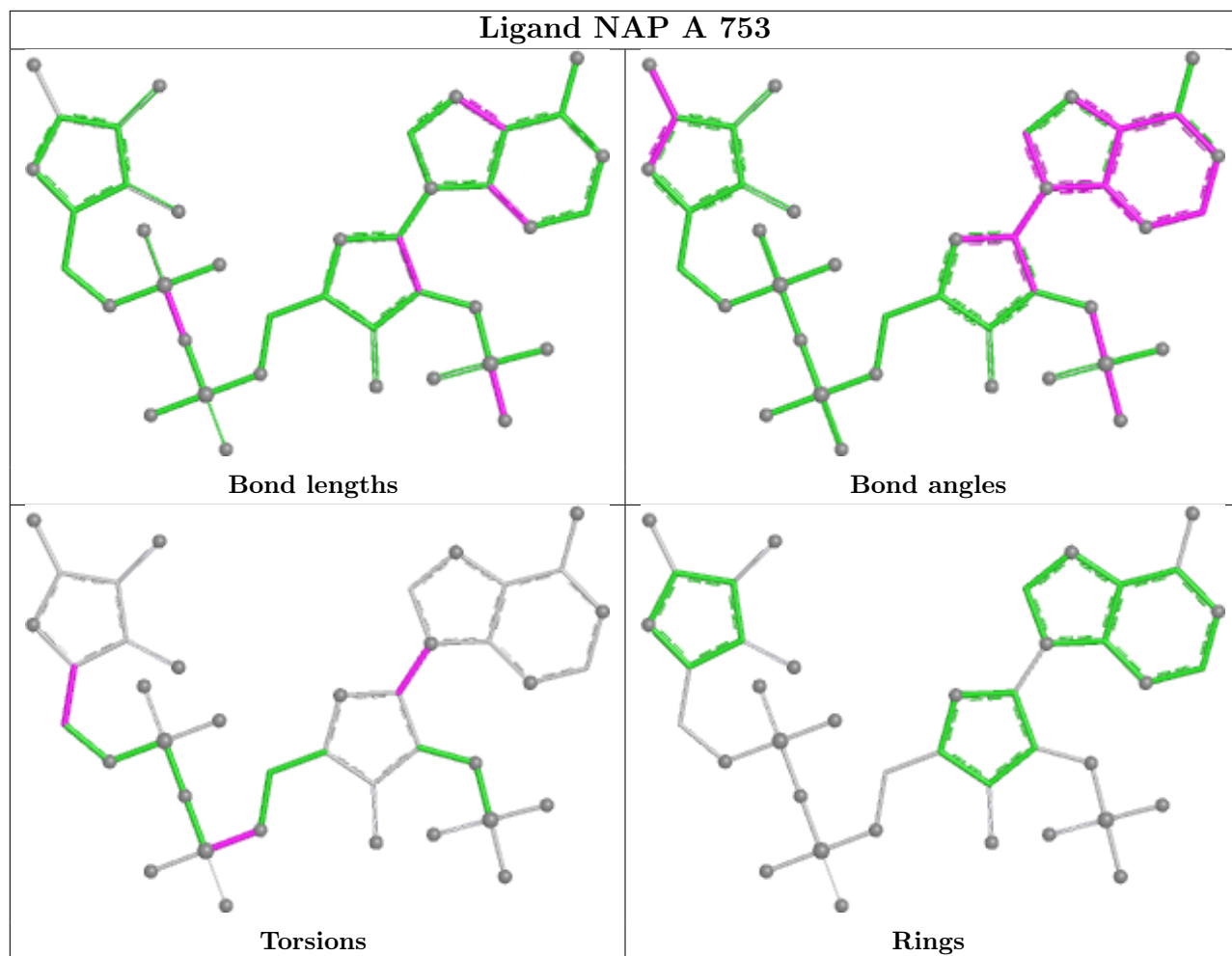
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

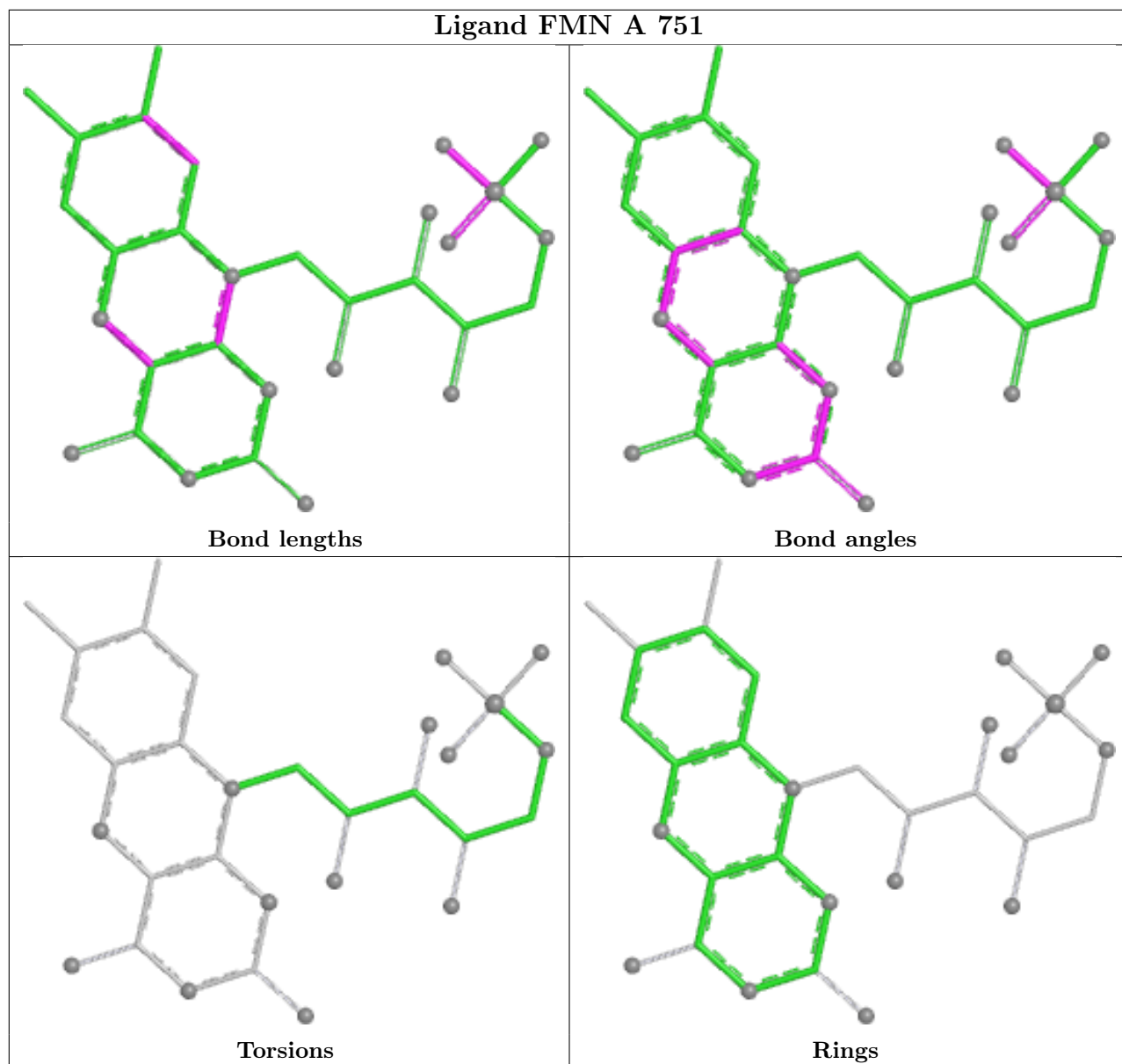


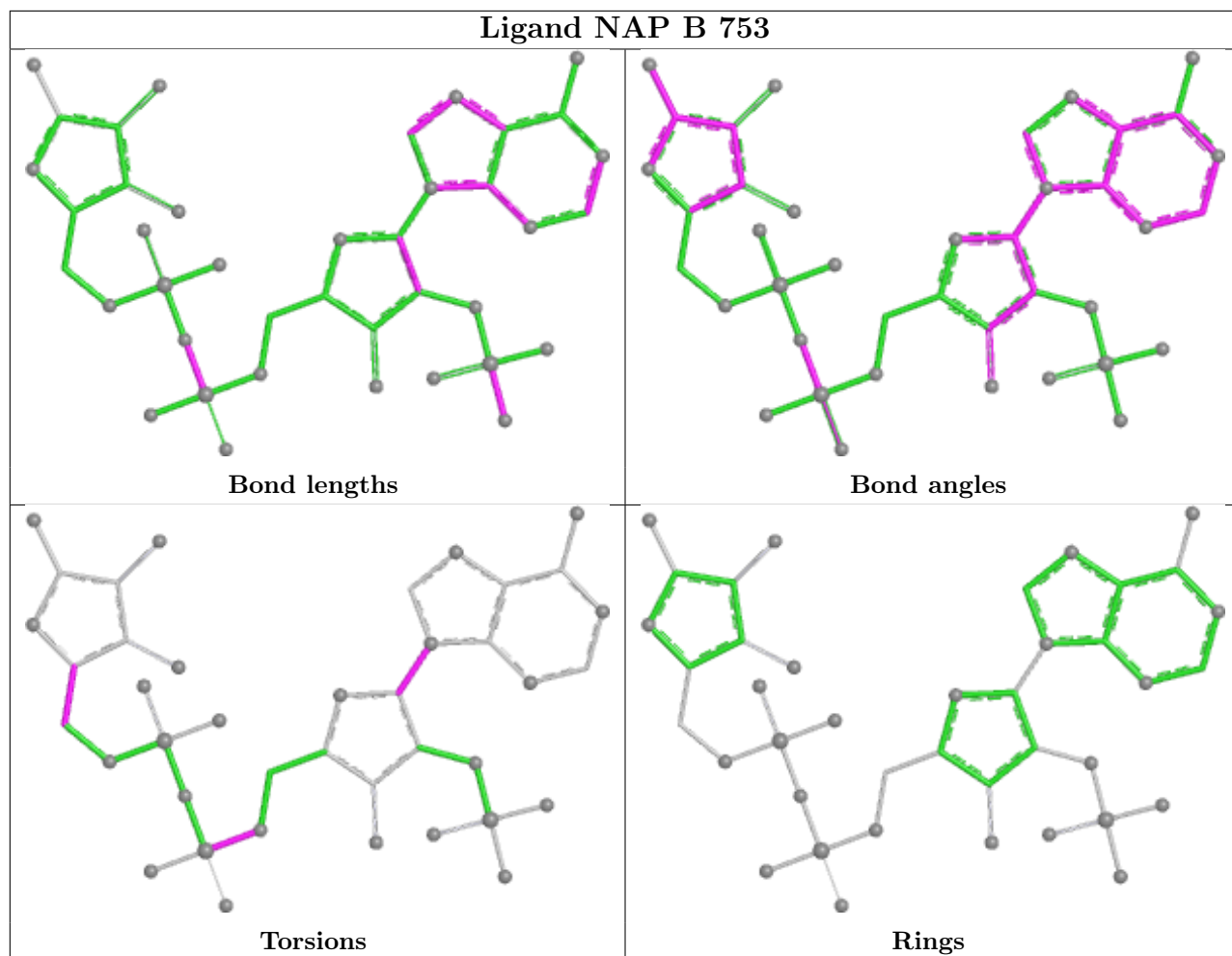


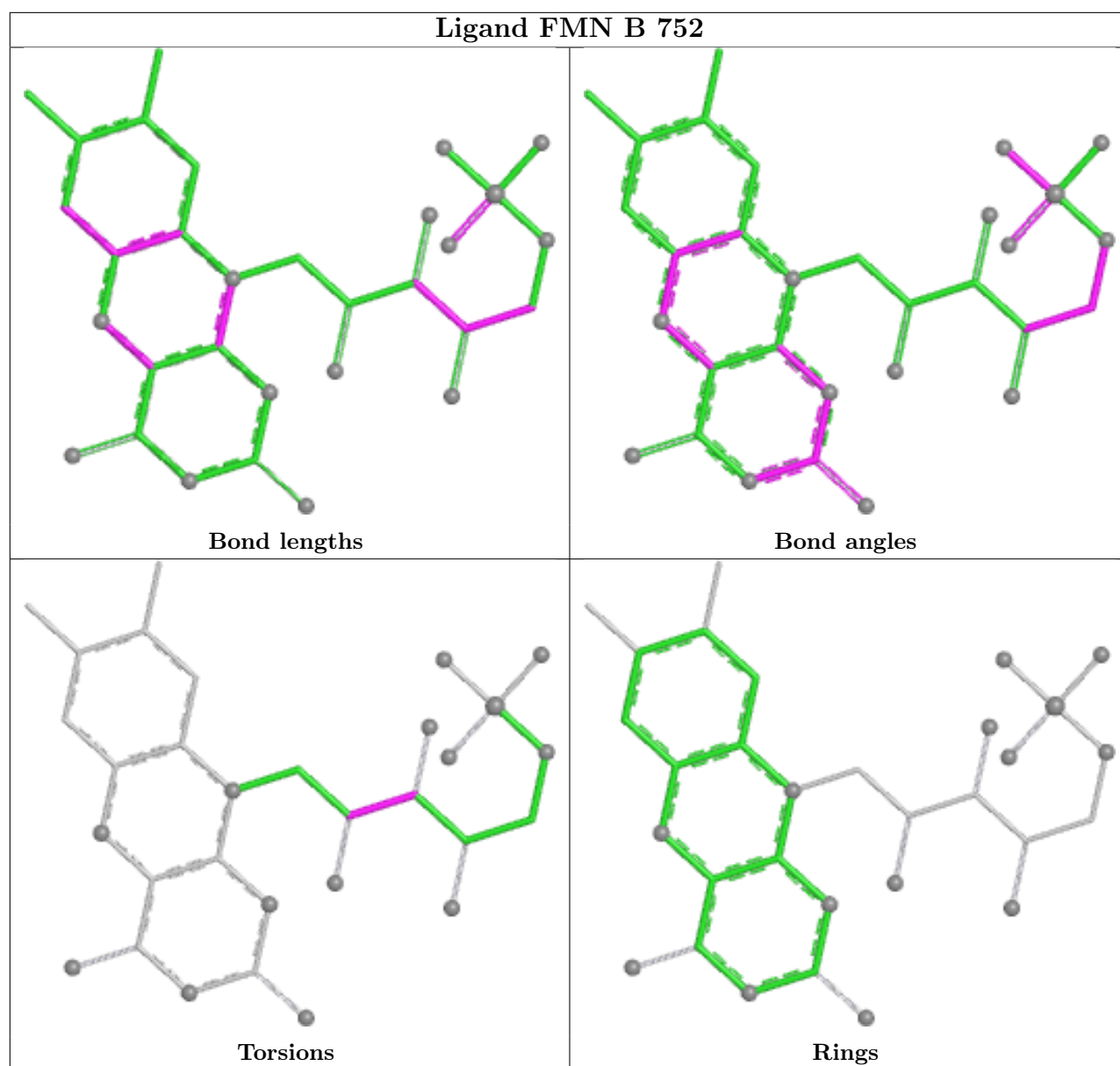












5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [\(i\)](#)

There are no chain breaks in this entry.

6 Fit of model and data [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	645/682 (94%)	-0.23	2 (0%) 90 79	27, 47, 70, 109	0
1	B	645/682 (94%)	-0.06	2 (0%) 90 79	36, 56, 78, 107	0
All	All	1290/1364 (94%)	-0.14	4 (0%) 90 79	27, 51, 76, 109	0

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	121	GLY	3.8
1	B	647	ALA	3.3
1	A	569	VAL	2.4
1	B	566	GLY	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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.

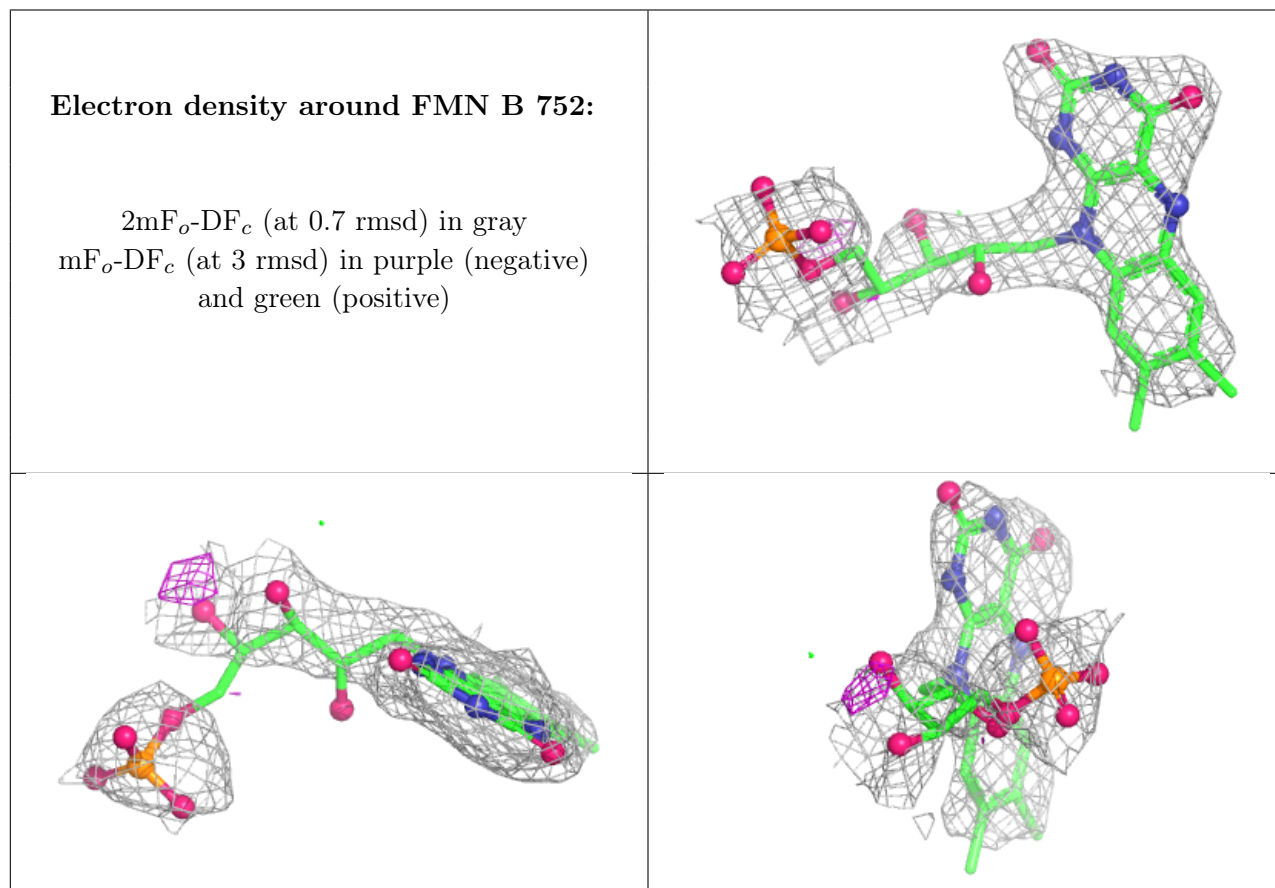
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	SO4	A	762	5/5	0.57	0.11	163,163,163,163	0

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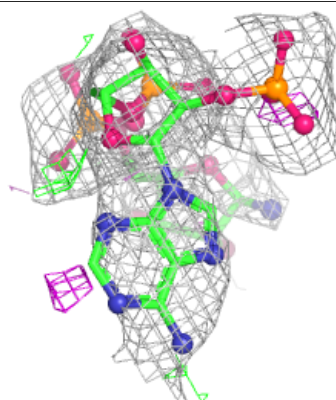
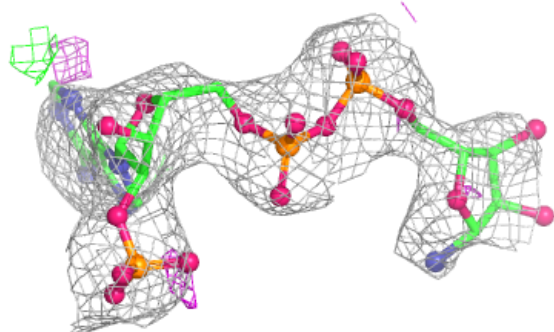
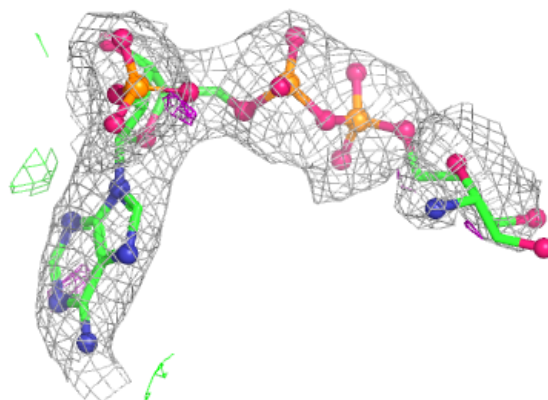
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	FMN	B	752	31/31	0.84	0.16	91,96,120,120	0
4	NAP	B	753	40/48	0.88	0.13	78,84,99,100	0
3	FMN	A	752	31/31	0.88	0.15	81,88,124,125	0
5	SO4	A	761	5/5	0.91	0.19	99,99,100,100	0
3	FMN	B	751	31/31	0.93	0.09	47,55,56,58	0
2	FAD	B	750	53/53	0.95	0.09	39,50,56,56	0
5	SO4	A	760	5/5	0.95	0.08	71,72,72,74	0
4	NAP	A	753	40/48	0.96	0.08	36,43,71,72	0
2	FAD	A	750	53/53	0.97	0.07	23,32,37,41	0
3	FMN	A	751	31/31	0.97	0.07	30,43,46,47	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.

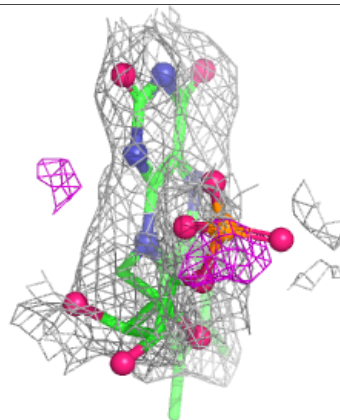
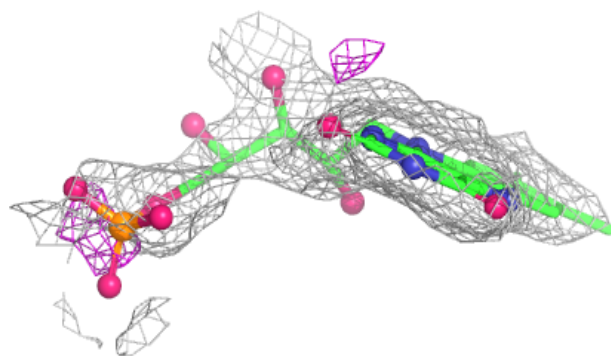
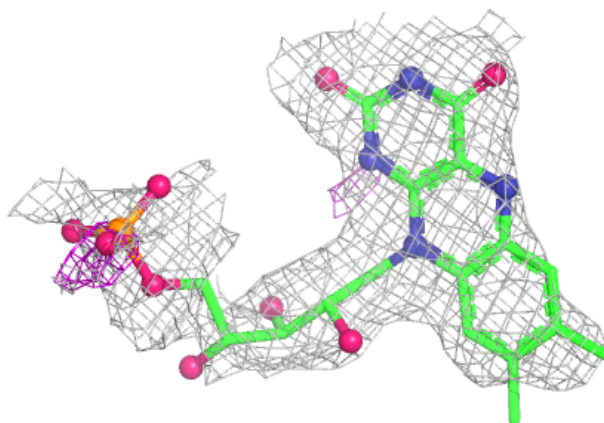


Electron density around NAP B 753:

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

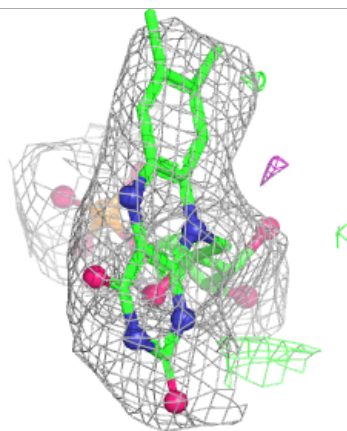
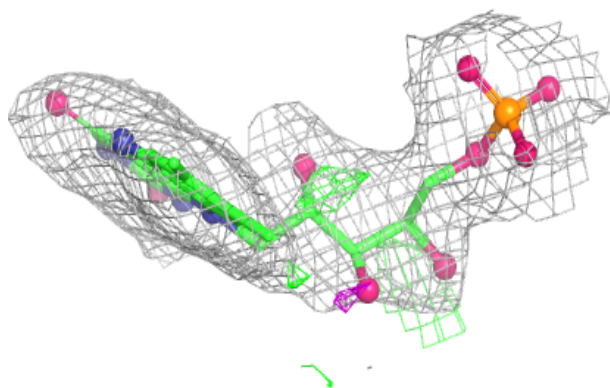
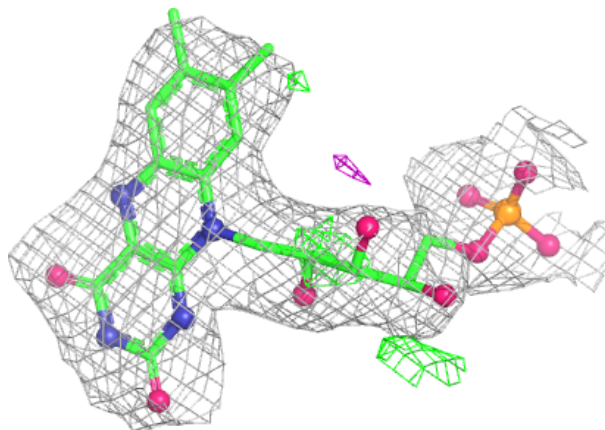
**Electron density around FMN A 752:**

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



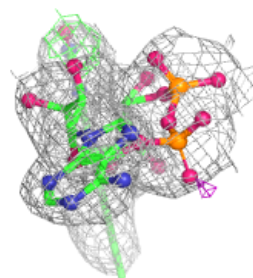
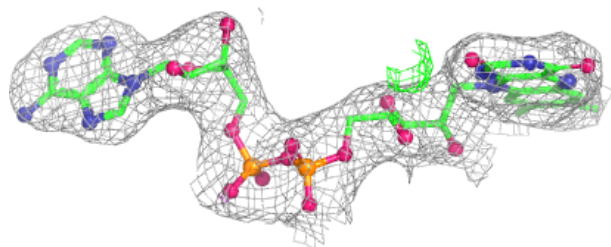
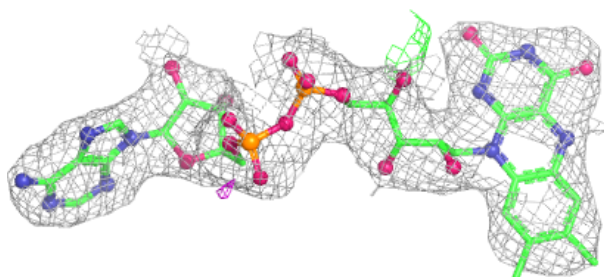
Electron density around FMN B 751:

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

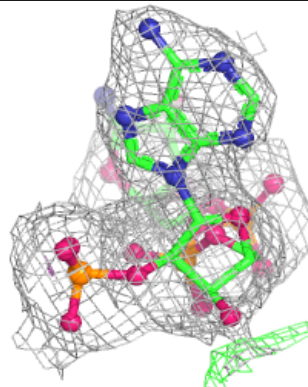
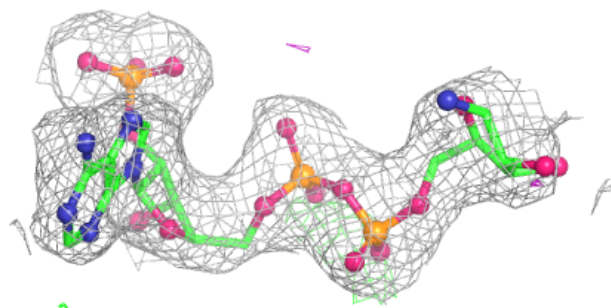
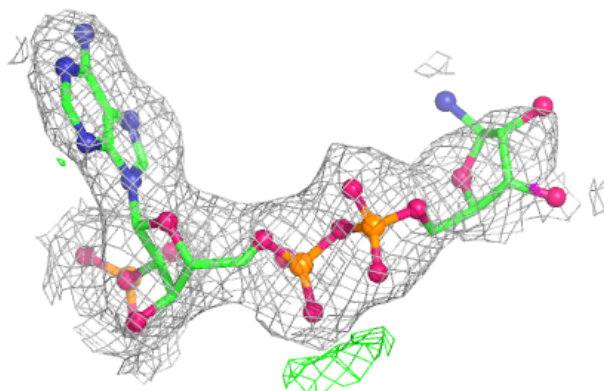


Electron density around FAD B 750:

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

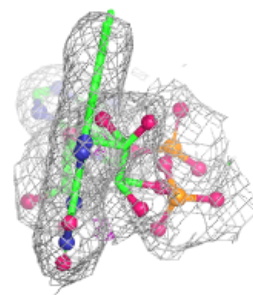
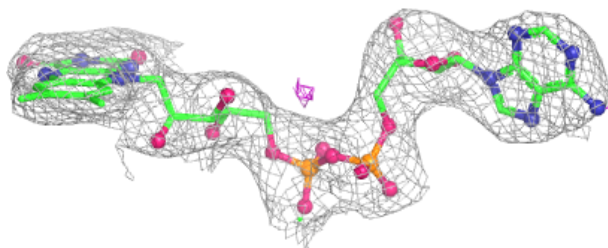
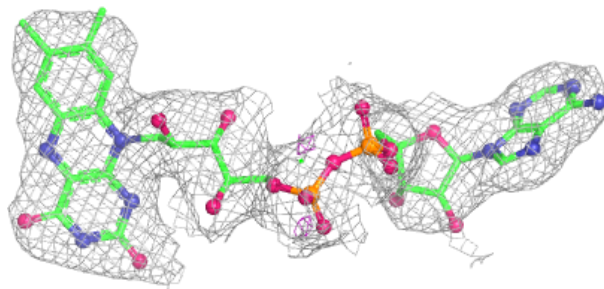
**Electron density around NAP A 753:**

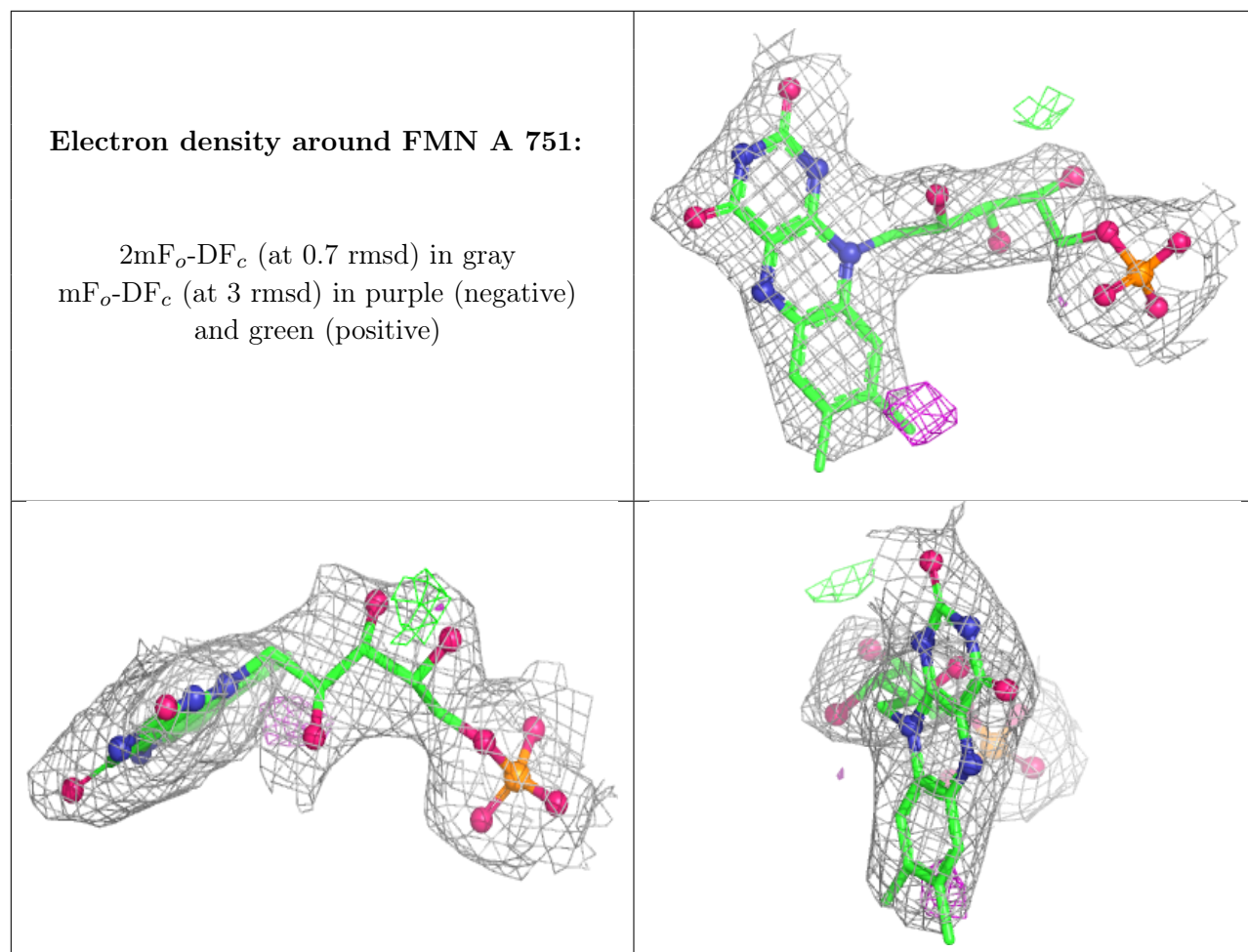
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around FAD A 750:

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





6.5 Other polymers [i](#)

There are no such residues in this entry.