



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 20, 2023 – 12:23 PM EST

PDB ID : 2HRE  
Title : Structure of human ferrochelatase variant E343K with protoporphyrin IX bound  
Authors : Medlock, A.; Swartz, L.; Dailey, T.A.; Dailey, H.A.; Lanzilotta, W.N.  
Deposited on : 2006-07-20  
Resolution : 2.50 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](mailto: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>.

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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  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

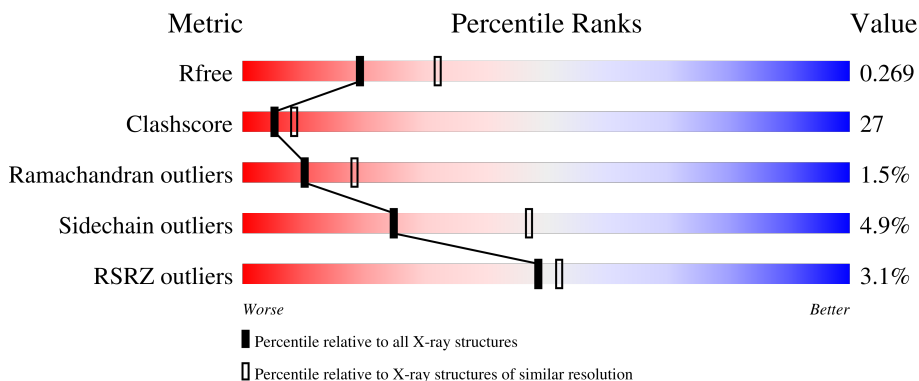
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.50 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))
$R_{free}$	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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  $\geq 3$ , 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	359	
1	B	359	
1	C	359	
1	D	359	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	FES	B	502	-	-	X	-

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 12228 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.

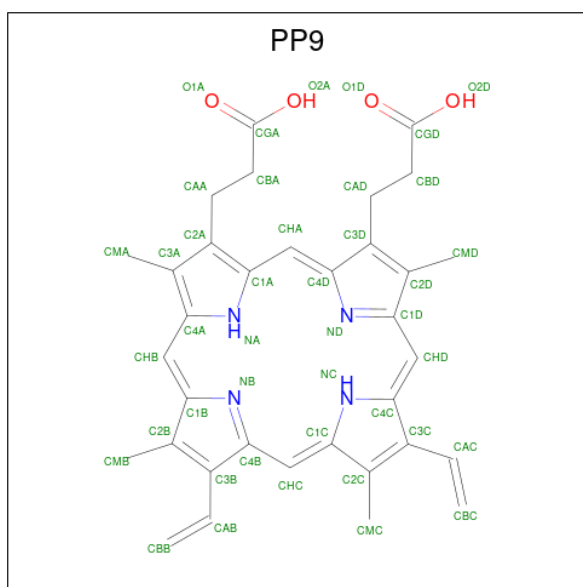
- Molecule 1 is a protein called Ferrochelatase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	359	2891	1842	504	527	18	0	0	0
1	B	359	2891	1842	504	527	18	0	0	0
1	C	359	2891	1842	504	527	18	0	0	0
1	D	359	2891	1842	504	527	18	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

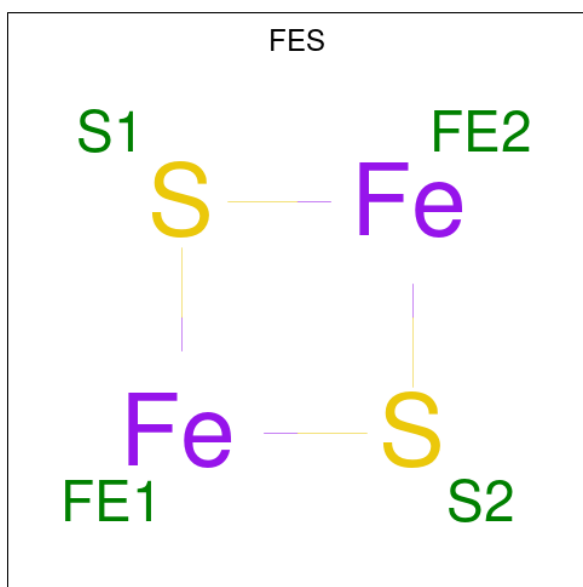
Chain	Residue	Modelled	Actual	Comment	Reference
A	343	LYS	GLU	engineered mutation	UNP P22830
B	343	LYS	GLU	engineered mutation	UNP P22830
C	343	LYS	GLU	engineered mutation	UNP P22830
D	343	LYS	GLU	engineered mutation	UNP P22830

- Molecule 2 is PROTOPORPHYRIN IX (three-letter code: PP9) (formula: C<sub>34</sub>H<sub>34</sub>N<sub>4</sub>O<sub>4</sub>).



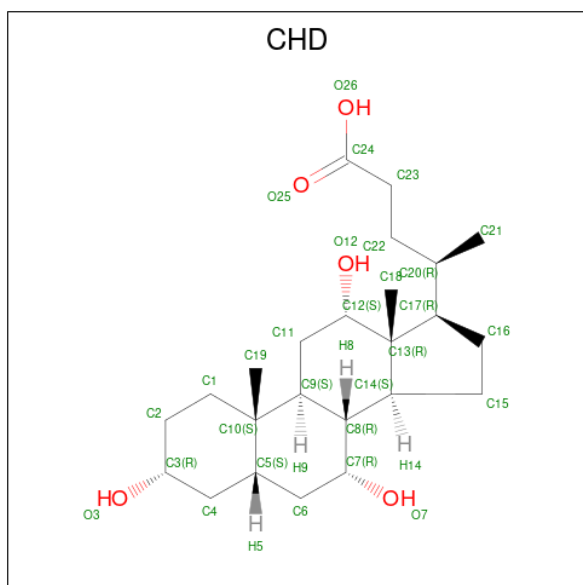
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			42	34	4	4		
2	B	1	Total	C	N	O	0	0
			42	34	4	4		
2	B	1	Total	C	N	O	0	0
			42	34	4	4		
2	C	1	Total	C	N	O	0	0
			42	34	4	4		
2	D	1	Total	C	N	O	0	0
			42	34	4	4		
2	D	1	Total	C	N	O	0	0
			42	34	4	4		

- Molecule 3 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe<sub>2</sub>S<sub>2</sub>).



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

- Molecule 4 is CHOLIC ACID (three-letter code: CHD) (formula:  $C_{24}H_{40}O_5$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	B	1	Total	C	O	0	0
			29	24	5		
4	D	1	Total	C	O	0	0
			29	24	5		

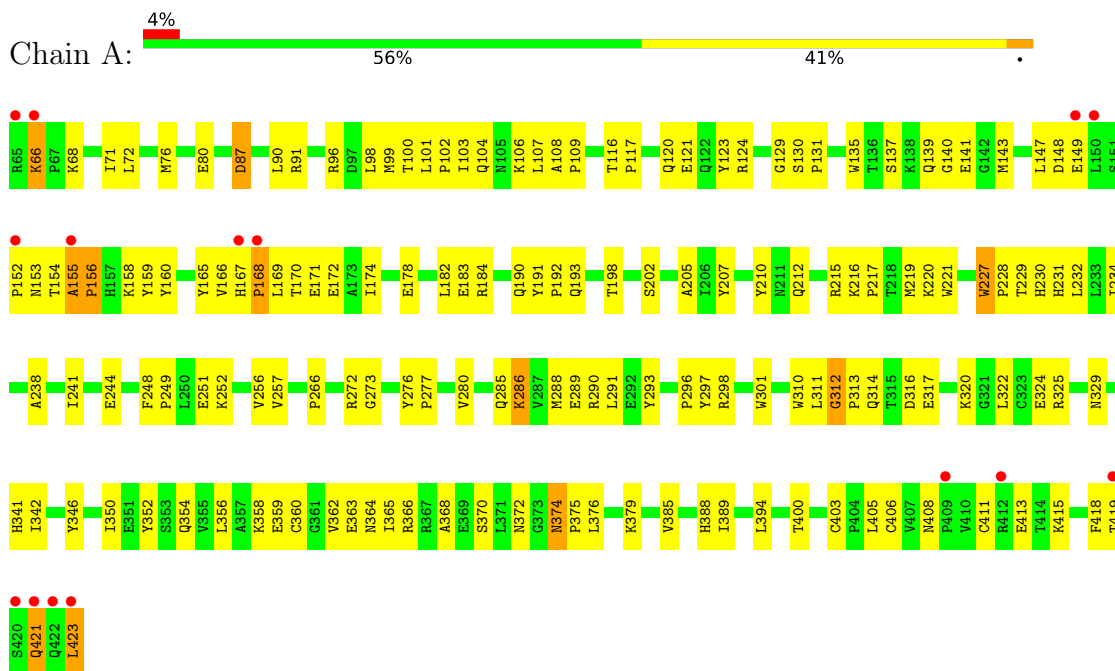
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	120	Total	O	0	0
			120	120		
5	B	99	Total	O	0	0
			99	99		
5	C	91	Total	O	0	0
			91	91		
5	D	28	Total	O	0	0
			28	28		

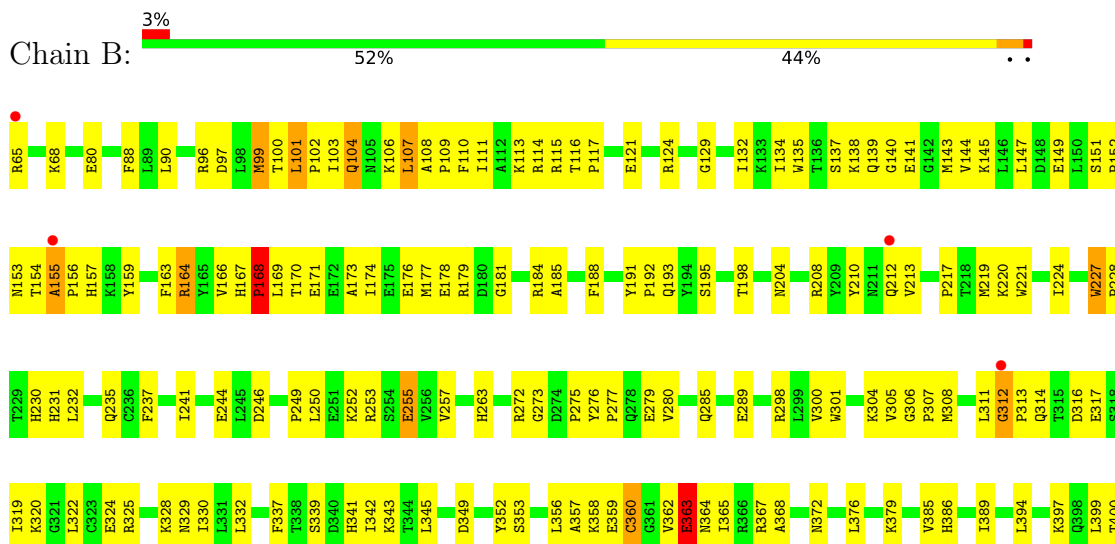
### 3 Residue-property plots

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.

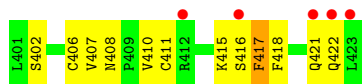
#### • Molecule 1: Ferrochelatase



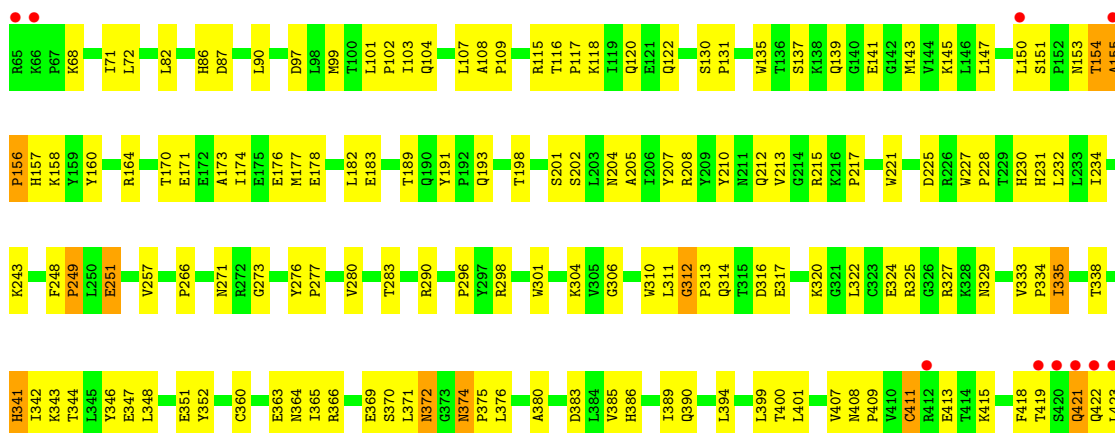
#### • Molecule 1: Ferrochelatase



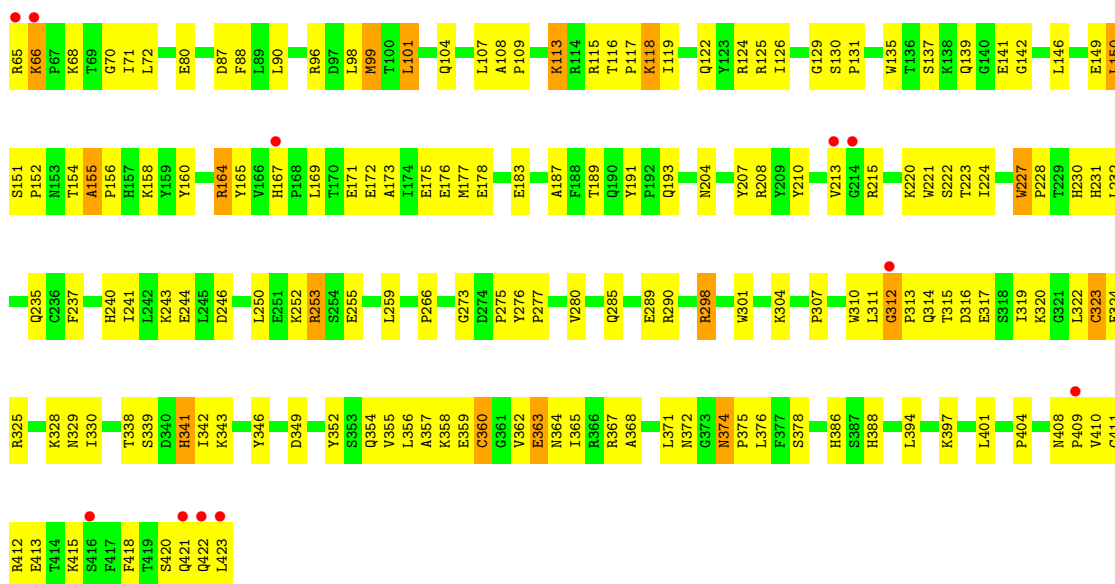




● Molecule 1: Ferrochelatase



● Molecule 1: Ferrochelatase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	61.95Å 88.39Å 93.25Å 102.41° 109.34° 105.58°	Depositor
Resolution (Å)	43.66 – 2.50 43.66 – 2.50	Depositor EDS
% Data completeness (in resolution range)	91.7 (43.66-2.50) 91.7 (43.66-2.50)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	0.08	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.68 (at 2.51Å)	Xtrriage
Refinement program	CNS 1.0	Depositor
R, $R_{free}$	0.216 , 0.279 0.207 , 0.269	Depositor DCC
$R_{free}$ test set	2869 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	23.1	Xtrriage
Anisotropy	0.387	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 53.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	12228	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	31.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.16% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: FES, PP9, CHD

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	0.48	0/2961	0.72	0/4010
1	B	0.47	1/2961 (0.0%)	0.82	5/4010 (0.1%)
1	C	0.49	1/2961 (0.0%)	0.70	0/4010
1	D	0.46	0/2961	0.72	0/4010
All	All	0.48	2/11844 (0.0%)	0.74	5/16040 (0.0%)

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	D	0	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	255	GLU	CD-OE1	-5.31	1.19	1.25
1	C	171	GLU	CD-OE1	-5.22	1.20	1.25

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	167	HIS	C-N-CD	-20.58	75.33	120.60
1	B	167	HIS	C-N-CA	13.72	179.62	122.00
1	B	168	PRO	N-CA-C	-6.42	95.40	112.10
1	B	224	ILE	N-CA-C	-5.62	95.83	111.00
1	B	168	PRO	CA-N-CD	-5.06	104.41	111.50

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	346	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	2891	0	2904	150	0
1	B	2891	0	2904	174	0
1	C	2891	0	2904	156	0
1	D	2891	0	2905	165	0
2	A	42	0	32	5	0
2	B	84	0	64	11	0
2	C	42	0	32	5	0
2	D	84	0	64	10	0
3	A	4	0	0	0	0
3	B	4	0	0	2	0
3	C	4	0	0	0	0
3	D	4	0	0	0	0
4	B	29	0	39	4	0
4	D	29	0	39	1	0
5	A	120	0	0	5	0
5	B	99	0	0	13	0
5	C	91	0	0	3	0
5	D	28	0	0	0	0
All	All	12228	0	11887	632	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 27.

All (632) 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:D:155:ALA:HB1	1:D:156:PRO:CD	1.66	1.24
1:D:155:ALA:HB1	1:D:156:PRO:HD3	1.08	1.07
1:D:311:LEU:HD12	1:D:312:GLY:H	1.22	1.05

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:155:ALA:CB	1:D:156:PRO:CD	2.37	1.02
1:B:155:ALA:HB1	1:B:156:PRO:CD	1.93	0.99
1:B:272:ARG:HE	1:B:406:CYS:HA	1.24	0.98
1:D:221:TRP:H	1:D:421:GLN:HE21	1.00	0.97
1:B:311:LEU:HD12	1:B:312:GLY:H	1.29	0.97
1:C:155:ALA:HB1	1:C:156:PRO:HD2	1.49	0.95
1:C:221:TRP:H	1:C:421:GLN:NE2	1.62	0.95
1:D:68:LYS:HG3	1:D:183:GLU:HG3	1.46	0.94
1:C:155:ALA:HB1	1:C:156:PRO:CD	1.99	0.93
1:D:167:HIS:O	1:D:169:LEU:N	2.00	0.93
1:A:221:TRP:H	1:A:421:GLN:HE21	1.18	0.92
1:B:68:LYS:HD3	1:B:155:ALA:HB3	1.49	0.92
1:D:113:LYS:HE3	1:D:113:LYS:HA	1.50	0.91
1:B:272:ARG:NH2	1:B:407:VAL:H	1.69	0.90
1:A:311:LEU:HD12	1:A:312:GLY:H	1.37	0.88
1:C:311:LEU:HD12	1:C:312:GLY:H	1.39	0.88
1:D:221:TRP:N	1:D:421:GLN:HE21	1.72	0.86
1:D:221:TRP:H	1:D:421:GLN:NE2	1.71	0.86
1:A:313:PRO:HG2	1:B:273:GLY:HA2	1.59	0.84
1:A:221:TRP:H	1:A:421:GLN:NE2	1.76	0.83
1:A:155:ALA:HB1	1:A:156:PRO:CD	2.06	0.83
1:C:154:THR:HG21	1:C:389:ILE:HD13	1.60	0.81
1:D:311:LEU:CD1	1:D:312:GLY:H	1.94	0.81
1:D:135:TRP:O	1:D:139:GLN:HG3	1.81	0.80
1:D:320:LYS:O	1:D:324:GLU:HG3	1.80	0.80
1:C:342:ILE:HG22	2:C:605:PP9:HBD2	1.63	0.80
1:C:108:ALA:HB3	1:C:109:PRO:HD3	1.62	0.79
1:B:155:ALA:HB1	1:B:156:PRO:HD3	1.65	0.79
1:D:235:GLN:HG3	1:D:290:ARG:NH1	2.00	0.77
1:B:68:LYS:HD3	1:B:155:ALA:CB	2.16	0.76
1:C:313:PRO:HG2	1:D:273:GLY:HA2	1.68	0.76
1:A:320:LYS:O	1:A:324:GLU:HG3	1.85	0.75
1:A:103:ILE:HB	1:A:106:LYS:HZ3	1.51	0.74
1:C:231:HIS:CE1	1:C:232:LEU:HG	2.21	0.74
1:A:155:ALA:HB1	1:A:156:PRO:HD2	1.68	0.74
1:A:108:ALA:HB3	1:A:109:PRO:HD3	1.70	0.74
1:C:151:SER:HB2	1:C:386:HIS:CD2	2.23	0.74
1:A:154:THR:HG21	1:A:389:ILE:HD13	1.69	0.73
1:B:276:TYR:HB3	1:B:277:PRO:HD3	1.70	0.73
1:C:137:SER:O	1:C:141:GLU:HG3	1.88	0.73
1:A:229:THR:HB	1:A:286:LYS:HE3	1.69	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:272:ARG:NE	1:B:406:CYS:HA	2.01	0.72
1:A:273:GLY:HA2	1:B:313:PRO:HG2	1.71	0.72
1:B:208:ARG:NH2	1:B:410:VAL:HG21	2.04	0.72
1:D:208:ARG:HH21	1:D:410:VAL:HG21	1.55	0.71
1:B:208:ARG:HH21	1:B:410:VAL:HG21	1.56	0.71
1:D:204:ASN:HB3	1:D:208:ARG:NH1	2.05	0.71
1:C:135:TRP:O	1:C:139:GLN:HG3	1.91	0.71
1:B:228:PRO:HG2	1:B:279:GLU:CG	2.20	0.71
1:D:220:LYS:HA	1:D:421:GLN:NE2	2.06	0.71
1:D:155:ALA:CB	1:D:156:PRO:HD3	1.99	0.70
1:A:103:ILE:HB	1:A:106:LYS:NZ	2.06	0.70
1:B:272:ARG:CZ	3:B:502:FES:S1	2.80	0.70
1:A:276:TYR:HB3	1:A:277:PRO:HD3	1.73	0.70
1:B:155:ALA:CB	1:B:156:PRO:CD	2.70	0.70
1:B:400:THR:HA	1:B:415:LYS:HD2	1.74	0.70
1:B:227:TRP:N	1:B:228:PRO:HD3	2.07	0.69
1:B:328:LYS:O	1:B:362:VAL:HG22	1.92	0.69
1:B:155:ALA:HB1	1:B:156:PRO:HD2	1.75	0.69
1:A:137:SER:O	1:A:141:GLU:HG3	1.92	0.68
1:C:90:LEU:HD11	1:C:109:PRO:HG3	1.73	0.68
1:B:235:GLN:NE2	5:B:779:HOH:O	2.25	0.68
1:C:164:ARG:NH1	1:C:201:SER:OG	2.27	0.68
1:C:170:THR:O	1:C:174:ILE:HG13	1.93	0.68
2:B:603:PP9:HBA2	4:B:701:CHD:H7	1.75	0.68
1:A:210:TYR:CZ	1:A:217:PRO:HG3	2.28	0.68
1:A:296:PRO:HG3	1:B:397:LYS:HG3	1.76	0.68
1:D:374:ASN:C	1:D:374:ASN:HD22	1.95	0.68
1:B:341:HIS:HB2	2:B:602:PP9:CGD	2.24	0.67
1:C:320:LYS:O	1:C:324:GLU:HG3	1.93	0.67
1:C:347:GLU:O	1:C:351:GLU:HB3	1.95	0.67
1:C:421:GLN:CD	1:C:422:GLN:H	1.99	0.67
1:D:329:ASN:ND2	1:D:363:GLU:HB3	2.09	0.67
1:D:374:ASN:ND2	1:D:376:LEU:H	1.92	0.67
1:C:276:TYR:HB3	1:C:277:PRO:HD3	1.77	0.66
1:A:216:LYS:HG3	1:A:217:PRO:HD2	1.78	0.66
1:B:272:ARG:NH2	1:B:407:VAL:N	2.41	0.66
1:C:374:ASN:HD22	1:C:375:PRO:N	1.94	0.66
1:C:135:TRP:CZ3	1:C:372:ASN:HB3	2.30	0.66
1:C:341:HIS:HB2	2:C:605:PP9:CGD	2.27	0.65
1:D:316:ASP:OD2	1:D:317:GLU:N	2.30	0.65
1:D:328:LYS:HB3	1:D:363:GLU:H	1.61	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:307:PRO:HG3	4:B:701:CHD:H12	1.76	0.65
1:A:169:LEU:HB2	1:A:172:GLU:HG3	1.78	0.65
1:D:240:HIS:HA	1:D:243:LYS:HD2	1.79	0.64
1:C:407:VAL:O	1:C:409:PRO:HD3	1.98	0.64
1:C:101:LEU:HB3	1:C:104:GLN:HG2	1.79	0.64
1:A:135:TRP:O	1:A:139:GLN:HG3	1.98	0.64
1:A:313:PRO:HG2	1:B:273:GLY:CA	2.26	0.63
1:B:272:ARG:NH2	1:B:406:CYS:SG	2.70	0.63
1:B:329:ASN:HD21	1:B:363:GLU:HG2	1.63	0.63
1:D:253:ARG:NH1	1:D:253:ARG:HG3	2.13	0.63
1:A:325:ARG:HG3	1:A:325:ARG:HH11	1.62	0.63
1:B:217:PRO:HG2	1:B:417:PHE:CE1	2.33	0.63
1:C:68:LYS:HD3	1:C:155:ALA:HB3	1.80	0.63
1:C:155:ALA:CB	1:C:156:PRO:CD	2.76	0.63
1:D:311:LEU:CG	1:D:312:GLY:N	2.62	0.62
1:B:108:ALA:HB3	1:B:109:PRO:HD3	1.82	0.62
1:B:257:VAL:HG21	1:B:322:LEU:HD13	1.81	0.62
1:C:102:PRO:O	1:C:107:LEU:HD12	1.99	0.62
1:A:266:PRO:HD3	2:A:601:PP9:HAB	1.82	0.62
1:B:308:MET:HB2	5:B:763:HOH:O	1.98	0.62
1:D:137:SER:O	1:D:141:GLU:HG3	1.99	0.62
1:D:352:TYR:HA	1:D:356:LEU:HB3	1.81	0.62
1:D:90:LEU:HD11	1:D:109:PRO:HG3	1.80	0.62
1:D:207:TYR:CZ	1:D:413:GLU:HB3	2.35	0.62
1:B:231:HIS:NE2	5:B:779:HOH:O	2.28	0.62
1:C:227:TRP:N	1:C:228:PRO:HD3	2.14	0.62
1:D:204:ASN:HB3	1:D:208:ARG:HH12	1.64	0.62
1:D:213:VAL:HG13	1:D:215:ARG:H	1.65	0.62
1:D:285:GLN:HE21	1:D:289:GLU:CD	2.03	0.62
1:C:215:ARG:CB	1:C:215:ARG:HH11	2.13	0.61
1:C:374:ASN:ND2	1:C:376:LEU:H	1.98	0.61
1:D:374:ASN:HD22	1:D:375:PRO:N	1.98	0.61
1:A:252:LYS:HD3	1:A:329:ASN:HD21	1.65	0.61
1:A:311:LEU:O	1:A:312:GLY:O	2.18	0.61
1:C:273:GLY:HA2	1:D:313:PRO:HG2	1.81	0.61
1:C:221:TRP:H	1:C:421:GLN:HE22	1.48	0.61
1:D:193:GLN:HG2	1:D:280:VAL:HA	1.83	0.61
1:D:311:LEU:HD12	1:D:312:GLY:N	2.05	0.61
1:B:357:ALA:HB1	1:B:362:VAL:CG1	2.29	0.61
1:A:135:TRP:CZ3	1:A:372:ASN:HB3	2.36	0.61
1:D:252:LYS:O	1:D:255:GLU:HB3	1.99	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:311:LEU:HG	1:D:312:GLY:N	2.16	0.61
1:B:232:LEU:HD22	1:B:376:LEU:HD11	1.83	0.61
1:D:160:TYR:HE2	1:D:176:GLU:HG2	1.66	0.61
1:C:325:ARG:HH11	1:C:325:ARG:HG3	1.65	0.61
1:D:66:LYS:HE3	1:D:66:LYS:H	1.66	0.61
1:C:215:ARG:NH1	1:C:215:ARG:HB2	2.15	0.61
1:C:386:HIS:CE1	1:C:390:GLN:OE1	2.54	0.61
1:C:400:THR:HA	1:C:415:LYS:HD2	1.83	0.61
1:D:253:ARG:HG3	1:D:253:ARG:HH11	1.66	0.61
1:A:311:LEU:HD12	1:A:312:GLY:N	2.13	0.60
1:A:220:LYS:HD2	1:A:423:LEU:HB3	1.83	0.60
1:B:367:ARG:HG2	1:B:368:ALA:O	2.01	0.60
1:C:68:LYS:HG3	1:C:183:GLU:OE1	2.01	0.60
1:D:227:TRP:N	1:D:228:PRO:HD3	2.15	0.60
1:B:115:ARG:HH21	2:B:602:PP9:CGA	2.14	0.60
1:B:246:ASP:HA	1:B:253:ARG:NH1	2.15	0.60
1:B:311:LEU:HD12	1:B:312:GLY:N	2.08	0.60
1:B:320:LYS:O	1:B:324:GLU:HG3	2.01	0.60
1:A:68:LYS:HG3	1:A:183:GLU:OE2	2.01	0.60
1:B:272:ARG:HH21	1:B:407:VAL:N	1.99	0.60
1:D:115:ARG:HH21	2:D:606:PP9:CGA	2.15	0.60
1:D:167:HIS:C	1:D:169:LEU:N	2.55	0.60
1:A:101:LEU:HB3	1:A:104:GLN:HG2	1.84	0.60
1:B:408:ASN:HB3	1:B:411:CYS:SG	2.41	0.59
1:C:266:PRO:HD3	2:C:605:PP9:HAB	1.84	0.59
1:B:185:ALA:O	1:B:221:TRP:HA	2.02	0.59
1:A:123:TYR:CE1	1:A:342:ILE:HD12	2.38	0.59
1:D:220:LYS:HA	1:D:421:GLN:HE21	1.66	0.59
1:B:272:ARG:HH21	1:B:407:VAL:H	1.51	0.59
1:D:164:ARG:HG3	1:D:165:TYR:CE2	2.37	0.59
1:C:72:LEU:HD12	1:C:160:TYR:O	2.02	0.59
1:C:232:LEU:HD22	1:C:376:LEU:HD11	1.84	0.59
1:A:154:THR:HG22	5:A:640:HOH:O	2.01	0.59
1:B:65:ARG:HD3	1:B:156:PRO:HG2	1.85	0.59
1:C:213:VAL:HG11	1:C:215:ARG:CZ	2.32	0.59
1:D:191:TYR:CD2	2:D:606:PP9:HAC	2.37	0.59
1:D:307:PRO:HG3	4:D:702:CHD:H183	1.84	0.59
1:B:96:ARG:HG3	1:B:100:THR:HG22	1.85	0.59
1:C:374:ASN:HD22	1:C:374:ASN:C	2.03	0.59
1:A:124:ARG:HD2	1:C:215:ARG:HG2	1.85	0.58
1:B:113:LYS:NZ	5:B:757:HOH:O	2.36	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:408:ASN:HB3	1:A:411:CYS:SG	2.43	0.58
1:B:99:MET:HB3	2:B:602:PP9:CBB	2.34	0.58
1:B:394:LEU:HB3	1:B:418:PHE:O	2.03	0.58
1:B:352:TYR:HA	1:B:356:LEU:HB3	1.84	0.58
1:D:167:HIS:O	1:D:172:GLU:OE1	2.21	0.58
1:B:140:GLY:O	1:B:144:VAL:HG23	2.03	0.58
1:D:311:LEU:O	1:D:312:GLY:O	2.21	0.58
1:D:155:ALA:HB1	1:D:156:PRO:HD2	1.77	0.58
1:D:113:LYS:HE3	1:D:113:LYS:CA	2.27	0.58
1:A:68:LYS:HE3	1:A:183:GLU:OE2	2.04	0.57
1:A:215:ARG:CB	1:A:215:ARG:HH11	2.17	0.57
1:D:222:SER:OG	1:D:388:HIS:HE1	1.87	0.57
1:C:298:ARG:NH1	1:D:275:PRO:HG3	2.19	0.57
1:A:374:ASN:C	1:A:374:ASN:HD22	2.06	0.57
1:B:192:PRO:HG3	1:B:227:TRP:CH2	2.39	0.57
1:C:230:HIS:CD2	1:C:232:LEU:HB2	2.39	0.57
1:A:116:THR:HB	1:A:117:PRO:HD3	1.85	0.57
1:D:155:ALA:CB	1:D:156:PRO:HD2	2.32	0.57
1:C:311:LEU:O	1:C:312:GLY:O	2.23	0.57
1:C:422:GLN:HG3	1:C:423:LEU:HD23	1.87	0.57
1:D:71:ILE:N	1:D:71:ILE:HD12	2.19	0.57
1:D:319:ILE:O	1:D:323:CYS:HB2	2.04	0.57
1:D:329:ASN:HD21	1:D:363:GLU:HB3	1.70	0.57
2:D:604:PP9:HBA1	2:D:604:PP9:HHA	1.87	0.57
1:A:374:ASN:HD22	1:A:375:PRO:N	2.02	0.57
1:A:356:LEU:HA	1:A:359:GLU:HG2	1.87	0.56
1:D:108:ALA:HB3	1:D:109:PRO:HD3	1.87	0.56
1:B:402:SER:HB3	3:B:502:FES:S2	2.45	0.56
1:C:290:ARG:HH11	1:C:290:ARG:HG2	1.68	0.56
1:D:412:ARG:HA	1:D:415:LYS:NZ	2.21	0.56
1:D:341:HIS:HB2	2:D:606:PP9:CGD	2.35	0.56
1:A:234:ILE:HD12	1:A:286:LYS:HB2	1.87	0.56
1:C:147:LEU:HD21	1:C:385:VAL:HB	1.87	0.56
1:C:207:TYR:CZ	1:C:413:GLU:HB3	2.41	0.56
1:D:122:GLN:OE1	1:D:342:ILE:HD11	2.06	0.56
1:B:195:SER:HB2	1:B:276:TYR:HB2	1.87	0.56
1:C:150:LEU:HB3	1:C:386:HIS:CD2	2.40	0.56
1:D:244:GLU:HG3	1:D:368:ALA:HA	1.88	0.56
1:A:230:HIS:CE1	1:A:232:LEU:HB2	2.41	0.56
1:C:215:ARG:NH1	5:C:635:HOH:O	2.35	0.56
1:C:394:LEU:HD21	1:C:423:LEU:O	2.05	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:66:LYS:HE3	1:A:66:LYS:H	1.70	0.55
1:A:184:ARG:HD3	1:A:220:LYS:HD3	1.88	0.55
1:B:193:GLN:HG2	1:B:280:VAL:HA	1.87	0.55
1:B:204:ASN:HB3	1:B:208:ARG:NH1	2.20	0.55
1:D:221:TRP:O	1:D:421:GLN:HG3	2.06	0.55
1:A:98:LEU:HG	2:A:601:PP9:HBB1	1.88	0.55
1:A:374:ASN:ND2	1:A:376:LEU:H	2.04	0.55
1:C:153:ASN:C	1:C:155:ALA:H	2.10	0.55
1:C:301:TRP:O	1:C:314:GLN:HA	2.06	0.55
1:A:160:TYR:OH	1:A:182:LEU:HD11	2.06	0.55
1:A:365:ILE:O	1:A:365:ILE:HG23	2.05	0.55
1:C:408:ASN:HB3	1:C:411:CYS:SG	2.46	0.55
1:B:134:ILE:HG13	5:B:770:HOH:O	2.06	0.55
1:D:208:ARG:NH2	1:D:410:VAL:HG11	2.22	0.55
1:A:147:LEU:C	1:A:149:GLU:H	2.10	0.55
1:A:215:ARG:HB2	1:A:215:ARG:NH1	2.22	0.55
1:B:88:PHE:HD1	1:B:166:VAL:HG13	1.70	0.55
1:D:246:ASP:OD2	1:D:253:ARG:NH2	2.32	0.55
1:B:311:LEU:CD1	1:B:312:GLY:H	2.09	0.55
1:B:250:LEU:HD12	1:B:253:ARG:NH2	2.22	0.55
1:C:99:MET:O	1:C:99:MET:HG3	2.06	0.55
1:C:311:LEU:HD12	1:C:312:GLY:N	2.16	0.55
1:C:316:ASP:HB3	1:C:352:TYR:CE1	2.42	0.55
1:C:210:TYR:CE2	1:C:217:PRO:HG3	2.42	0.54
1:D:273:GLY:HA3	1:D:404:PRO:HD2	1.89	0.54
1:A:360:CYS:SG	1:A:362:VAL:HG23	2.46	0.54
1:C:207:TYR:CE1	1:C:413:GLU:HB3	2.42	0.54
1:D:99:MET:SD	1:D:101:LEU:HD13	2.47	0.54
1:D:394:LEU:HB3	1:D:418:PHE:O	2.07	0.54
1:A:316:ASP:HB3	1:A:352:TYR:CE1	2.42	0.54
1:A:238:ALA:CB	1:A:290:ARG:HD3	2.38	0.54
1:D:154:THR:O	1:D:155:ALA:O	2.25	0.54
1:A:227:TRP:N	1:A:228:PRO:HD3	2.21	0.54
1:A:285:GLN:O	1:A:289:GLU:HG3	2.08	0.54
1:C:82:LEU:HD13	1:C:120:GLN:HB3	1.88	0.54
1:C:210:TYR:CZ	1:C:217:PRO:HG3	2.42	0.54
1:C:298:ARG:HH21	1:D:401:LEU:HD23	1.71	0.54
1:A:215:ARG:CB	1:A:215:ARG:NH1	2.71	0.54
1:A:215:ARG:HH11	1:A:215:ARG:HB3	1.71	0.54
1:B:228:PRO:HG2	1:B:279:GLU:HG3	1.90	0.54
1:C:374:ASN:ND2	1:C:374:ASN:C	2.61	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:68:LYS:CD	1:C:155:ALA:HB3	2.38	0.54
1:A:210:TYR:CE1	1:A:217:PRO:HG3	2.43	0.54
1:B:246:ASP:HA	1:B:253:ARG:CZ	2.38	0.54
1:C:394:LEU:HB3	1:C:418:PHE:O	2.08	0.54
1:D:311:LEU:CD1	1:D:312:GLY:N	2.67	0.54
1:B:107:LEU:HD22	1:B:111:ILE:HG13	1.90	0.53
1:B:134:ILE:HG22	1:B:138:LYS:HE3	1.90	0.53
1:B:330:ILE:O	1:B:365:ILE:HA	2.07	0.53
1:C:422:GLN:HG3	1:C:423:LEU:CD2	2.37	0.53
1:A:248:PHE:CE1	1:A:366:ARG:HD3	2.43	0.53
1:C:419:THR:C	1:C:421:GLN:H	2.12	0.53
1:A:121:GLU:OE1	1:A:124:ARG:NE	2.38	0.53
1:B:65:ARG:HD3	1:B:156:PRO:CG	2.39	0.53
1:C:232:LEU:HB3	1:C:380:ALA:HB2	1.91	0.53
1:D:357:ALA:HB1	1:D:362:VAL:HG11	1.90	0.53
1:D:342:ILE:HG22	2:D:606:PP9:O1D	2.09	0.53
1:A:155:ALA:CB	1:A:156:PRO:CD	2.82	0.53
1:A:244:GLU:HG3	1:A:368:ALA:HA	1.89	0.53
1:C:230:HIS:CD2	1:C:232:LEU:H	2.26	0.53
1:C:249:PRO:HB3	1:C:251:GLU:OE2	2.09	0.53
1:B:147:LEU:HD21	1:B:385:VAL:HB	1.91	0.52
1:D:232:LEU:HD22	1:D:376:LEU:HD11	1.90	0.52
1:D:330:ILE:O	1:D:365:ILE:HA	2.08	0.52
1:C:158:LYS:HD3	1:C:160:TYR:OH	2.09	0.52
1:B:173:ALA:O	1:B:177:MET:HG3	2.09	0.52
1:B:210:TYR:CE2	1:B:217:PRO:HG3	2.45	0.52
1:D:135:TRP:CZ3	1:D:372:ASN:HB3	2.44	0.52
1:B:357:ALA:HB1	1:B:362:VAL:HG11	1.90	0.52
1:C:135:TRP:CE3	1:C:372:ASN:HB3	2.43	0.52
1:C:160:TYR:OH	1:C:182:LEU:HD11	2.10	0.52
1:C:248:PHE:CE1	1:C:366:ARG:HD3	2.45	0.52
1:D:173:ALA:O	1:D:177:MET:HG3	2.10	0.52
1:C:215:ARG:CB	1:C:215:ARG:NH1	2.71	0.52
1:A:288:MET:HG3	1:A:297:TYR:CD2	2.45	0.52
1:D:355:VAL:O	1:D:359:GLU:HG2	2.09	0.52
1:B:90:LEU:HD11	1:B:109:PRO:HG3	1.92	0.52
2:B:603:PP9:HBC1	4:B:701:CHD:H232	1.92	0.52
1:C:344:THR:HG22	1:C:348:LEU:HD12	1.92	0.52
1:C:418:PHE:O	1:C:421:GLN:HB2	2.10	0.52
1:D:338:THR:HA	1:D:371:LEU:HD12	1.91	0.52
1:A:68:LYS:CB	1:A:155:ALA:HB3	2.40	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:230:HIS:O	1:C:234:ILE:HG12	2.10	0.51
1:D:149:GLU:O	1:D:152:PRO:HD3	2.09	0.51
1:D:408:ASN:HB3	1:D:411:CYS:SG	2.50	0.51
1:B:170:THR:O	1:B:174:ILE:HG13	2.10	0.51
1:B:217:PRO:HG2	1:B:417:PHE:HE1	1.76	0.51
1:C:103:ILE:O	1:C:103:ILE:HG13	2.11	0.51
1:D:150:LEU:HB3	1:D:386:HIS:CE1	2.46	0.51
1:D:210:TYR:O	1:D:213:VAL:HG12	2.09	0.51
1:A:116:THR:O	1:A:120:GLN:HG3	2.11	0.51
1:B:137:SER:O	1:B:141:GLU:HG3	2.10	0.51
1:D:374:ASN:HD22	1:D:376:LEU:H	1.57	0.51
1:B:65:ARG:HH11	1:B:156:PRO:HG3	1.76	0.51
1:C:230:HIS:HD2	1:C:232:LEU:HB2	1.75	0.51
1:D:367:ARG:HG2	1:D:368:ALA:O	2.10	0.51
1:C:115:ARG:HH21	2:C:605:PP9:CGA	2.23	0.51
1:B:311:LEU:CG	1:B:312:GLY:N	2.74	0.51
1:A:96:ARG:HH12	1:A:100:THR:HG23	1.75	0.50
1:A:241:ILE:HG21	1:A:291:LEU:HD11	1.93	0.50
1:C:151:SER:HB2	1:C:386:HIS:NE2	2.25	0.50
1:D:276:TYR:HB3	1:D:277:PRO:HD3	1.92	0.50
1:A:96:ARG:NH1	1:A:100:THR:HG23	2.26	0.50
1:C:204:ASN:HB3	1:C:208:ARG:NH1	2.26	0.50
1:C:213:VAL:HG11	1:C:215:ARG:NH2	2.26	0.50
1:A:102:PRO:O	1:A:107:LEU:HD12	2.12	0.50
1:A:190:GLN:O	1:A:192:PRO:HD3	2.11	0.50
1:A:400:THR:HA	1:A:415:LYS:HD2	1.93	0.50
1:C:101:LEU:N	1:C:104:GLN:OE1	2.44	0.50
1:D:315:THR:O	1:D:319:ILE:HG13	2.11	0.50
1:D:422:GLN:O	1:D:423:LEU:HB2	2.09	0.50
1:A:244:GLU:CG	1:A:368:ALA:HA	2.42	0.50
1:B:342:ILE:HG22	2:B:602:PP9:HBD2	1.93	0.50
1:D:341:HIS:HD2	1:D:343:LYS:H	1.60	0.50
1:A:71:ILE:N	1:A:71:ILE:HD12	2.26	0.50
1:B:99:MET:HB3	2:B:602:PP9:HBB1	1.94	0.50
1:D:231:HIS:CE1	1:D:232:LEU:HG	2.46	0.50
1:A:342:ILE:HG22	2:A:601:PP9:HBD2	1.93	0.50
1:D:142:GLY:O	1:D:146:LEU:HG	2.12	0.50
1:B:134:ILE:CG2	1:B:138:LYS:HE3	2.42	0.49
1:B:353:SER:O	1:B:357:ALA:HB3	2.12	0.49
1:C:266:PRO:HG3	1:C:310:TRP:CE2	2.48	0.49
1:D:169:LEU:HB2	1:D:172:GLU:HG3	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:212:GLN:NE2	5:A:616:HOH:O	2.44	0.49
1:B:325:ARG:HG3	1:B:325:ARG:HH11	1.77	0.49
1:B:337:PHE:HB3	5:B:708:HOH:O	2.12	0.49
1:A:325:ARG:HG3	1:A:325:ARG:NH1	2.27	0.49
1:C:208:ARG:O	1:C:212:GLN:HG2	2.13	0.49
1:D:266:PRO:HD3	2:D:606:PP9:HAB	1.94	0.49
1:C:271:ASN:C	1:D:313:PRO:HG3	2.31	0.49
1:D:374:ASN:ND2	1:D:376:LEU:N	2.61	0.49
1:A:374:ASN:HD22	1:A:375:PRO:CD	2.25	0.49
1:A:252:LYS:HZ1	1:A:363:GLU:CD	2.16	0.49
1:B:135:TRP:HA	1:B:135:TRP:CE3	2.46	0.49
1:B:400:THR:HA	1:B:415:LYS:CD	2.43	0.49
1:C:273:GLY:CA	1:D:313:PRO:HG2	2.43	0.49
1:D:191:TYR:CE2	2:D:606:PP9:HAC	2.48	0.49
1:B:394:LEU:HD22	1:B:421:GLN:HB2	1.95	0.49
1:C:215:ARG:HH11	1:C:215:ARG:HB3	1.78	0.49
1:A:316:ASP:OD2	1:A:317:GLU:N	2.43	0.49
1:A:329:ASN:HA	1:A:364:ASN:O	2.13	0.49
1:B:135:TRP:CZ3	1:B:372:ASN:HB3	2.47	0.49
1:C:101:LEU:CB	1:C:104:GLN:HG2	2.42	0.49
1:B:154:THR:HG21	1:B:389:ILE:HD13	1.95	0.49
1:B:228:PRO:HG2	1:B:279:GLU:CD	2.32	0.49
1:B:272:ARG:HH21	1:B:406:CYS:CA	2.26	0.49
1:B:154:THR:HG21	1:B:389:ILE:HG21	1.94	0.49
1:B:356:LEU:O	1:B:359:GLU:HG3	2.12	0.49
1:D:66:LYS:N	1:D:66:LYS:CE	2.76	0.49
1:B:106:LYS:O	1:B:109:PRO:HD2	2.13	0.48
1:B:316:ASP:OD2	1:B:317:GLU:N	2.42	0.48
1:B:319:ILE:HD11	1:B:332:LEU:HD21	1.95	0.48
1:D:98:LEU:HD12	2:D:606:PP9:HBB1	1.94	0.48
1:B:96:ARG:CG	1:B:100:THR:HG22	2.43	0.48
1:B:149:GLU:O	1:B:152:PRO:HD3	2.12	0.48
1:A:298:ARG:NH1	1:B:275:PRO:HG3	2.28	0.48
1:B:102:PRO:O	1:B:103:ILE:C	2.51	0.48
1:B:171:GLU:OE1	1:B:171:GLU:N	2.39	0.48
1:A:210:TYR:CE2	1:A:217:PRO:HG3	2.49	0.48
1:B:145:LYS:HG3	5:B:729:HOH:O	2.12	0.48
1:C:90:LEU:CD1	1:C:109:PRO:HG3	2.42	0.48
1:C:191:TYR:CE1	1:C:198:THR:HB	2.48	0.48
1:A:341:HIS:HB2	2:A:601:PP9:CGD	2.43	0.48
1:B:230:HIS:CE1	1:B:232:LEU:HB2	2.48	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:68:LYS:HD3	1:C:155:ALA:CB	2.43	0.48
1:C:116:THR:HB	1:C:117:PRO:HD3	1.96	0.48
1:C:348:LEU:HD23	1:C:352:TYR:HD2	1.78	0.48
1:D:240:HIS:HD2	1:D:243:LYS:NZ	2.11	0.48
1:A:238:ALA:HB3	1:A:290:ARG:HD3	1.95	0.48
1:B:185:ALA:HB2	1:B:219:MET:SD	2.53	0.48
1:C:341:HIS:HB2	2:C:605:PP9:O1D	2.14	0.48
1:D:189:THR:HG22	1:D:224:ILE:O	2.14	0.48
1:C:401:LEU:O	1:D:298:ARG:NH2	2.45	0.48
1:A:272:ARG:O	1:A:272:ARG:HG3	2.13	0.48
1:A:252:LYS:NZ	1:A:363:GLU:CD	2.67	0.48
1:A:123:TYR:CZ	1:A:342:ILE:HD12	2.49	0.47
1:A:252:LYS:HD3	1:A:329:ASN:ND2	2.29	0.47
1:B:363:GLU:HB3	1:B:364:ASN:H	1.43	0.47
1:D:304:LYS:HG3	1:D:310:TRP:CG	2.48	0.47
1:B:164:ARG:NH1	5:B:717:HOH:O	2.37	0.47
1:B:328:LYS:O	1:B:363:GLU:HB2	2.13	0.47
1:D:151:SER:HB2	1:D:386:HIS:CD2	2.50	0.47
1:D:422:GLN:HG2	1:D:423:LEU:HD23	1.96	0.47
1:B:244:GLU:HG3	1:B:368:ALA:HA	1.96	0.47
1:A:154:THR:O	1:A:155:ALA:O	2.32	0.47
1:B:217:PRO:HG2	1:B:417:PHE:CZ	2.49	0.47
1:B:252:LYS:O	1:B:255:GLU:N	2.47	0.47
1:B:311:LEU:CD1	1:B:312:GLY:N	2.74	0.47
1:A:244:GLU:HG2	5:A:662:HOH:O	2.14	0.47
1:A:350:ILE:O	1:A:354:GLN:HB2	2.15	0.47
1:C:322:LEU:HD21	1:D:401:LEU:HD11	1.96	0.47
1:D:149:GLU:O	1:D:150:LEU:C	2.53	0.47
1:B:204:ASN:HB3	1:B:208:ARG:HH12	1.78	0.47
1:B:329:ASN:ND2	1:B:363:GLU:HG2	2.28	0.47
1:B:399:LEU:O	1:B:415:LYS:HD3	2.14	0.47
1:C:115:ARG:HG3	1:C:118:LYS:HE2	1.97	0.47
1:C:102:PRO:O	1:C:103:ILE:HG12	2.15	0.47
1:C:314:GLN:HG2	5:C:660:HOH:O	2.14	0.47
1:D:72:LEU:HD12	1:D:160:TYR:O	2.15	0.47
1:D:342:ILE:HG22	2:D:606:PP9:HBD2	1.96	0.47
1:A:104:GLN:HG3	5:A:650:HOH:O	2.15	0.46
1:B:328:LYS:HB3	1:B:363:GLU:H	1.79	0.46
1:C:221:TRP:N	1:C:421:GLN:NE2	2.47	0.46
1:C:325:ARG:HG3	1:C:325:ARG:NH1	2.30	0.46
1:A:289:GLU:HG2	1:A:293:TYR:OH	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:135:TRP:O	1:B:139:GLN:HG3	2.16	0.46
1:B:311:LEU:HG	1:B:312:GLY:N	2.31	0.46
1:C:68:LYS:HE3	1:C:183:GLU:OE1	2.15	0.46
1:C:193:GLN:HG2	1:C:280:VAL:HA	1.97	0.46
1:D:237:PHE:O	1:D:241:ILE:HG13	2.16	0.46
1:A:149:GLU:O	1:A:152:PRO:HD3	2.16	0.46
1:A:160:TYR:CZ	1:A:182:LEU:HD11	2.51	0.46
1:A:202:SER:O	1:A:205:ALA:HB3	2.15	0.46
1:B:228:PRO:CG	1:B:279:GLU:CG	2.92	0.46
1:C:71:ILE:HG21	1:C:143:MET:CE	2.46	0.46
1:C:322:LEU:HB3	1:C:327:ARG:HB2	1.97	0.46
1:A:90:LEU:HD11	1:A:109:PRO:HG3	1.97	0.46
1:B:141:GLU:HG2	1:B:159:TYR:HE2	1.80	0.46
1:B:88:PHE:CD1	1:B:166:VAL:HG13	2.50	0.46
1:B:365:ILE:HG23	1:B:365:ILE:O	2.15	0.46
1:A:227:TRP:N	1:A:227:TRP:CD1	2.84	0.46
1:B:417:PHE:CG	1:B:417:PHE:O	2.69	0.46
1:D:160:TYR:CE2	1:D:176:GLU:HG2	2.48	0.46
1:D:360:CYS:O	1:D:360:CYS:SG	2.73	0.46
1:A:266:PRO:HG3	1:A:310:TRP:CZ2	2.51	0.46
1:B:400:THR:CA	1:B:415:LYS:HD2	2.45	0.46
1:A:370:SER:HB2	1:A:372:ASN:ND2	2.31	0.45
1:B:357:ALA:HB1	1:B:362:VAL:HG12	1.97	0.45
1:D:118:LYS:HG3	1:D:119:ILE:N	2.31	0.45
1:A:135:TRP:CE3	1:A:372:ASN:HB3	2.52	0.45
1:A:257:VAL:HG11	1:A:322:LEU:HD13	1.97	0.45
2:B:603:PP9:HBD2	2:B:603:PP9:HHA	1.99	0.45
1:B:208:ARG:O	1:B:212:GLN:HG3	2.16	0.45
1:C:399:LEU:O	1:C:415:LYS:HD3	2.17	0.45
1:D:116:THR:HB	1:D:117:PRO:HD3	1.98	0.45
1:D:171:GLU:O	1:D:175:GLU:HG3	2.16	0.45
1:A:385:VAL:O	1:A:388:HIS:HB3	2.17	0.45
1:B:153:ASN:C	1:B:155:ALA:H	2.20	0.45
1:B:263:HIS:CD2	1:B:343:LYS:HE3	2.51	0.45
1:B:308:MET:HE3	5:B:742:HOH:O	2.16	0.45
1:C:342:ILE:HG23	1:C:343:LYS:N	2.31	0.45
1:C:348:LEU:HD23	1:C:352:TYR:CD2	2.52	0.45
1:D:304:LYS:HG3	1:D:310:TRP:CD1	2.52	0.45
1:C:189:THR:HG21	1:C:225:ASP:O	2.15	0.45
1:C:277:PRO:HD2	5:C:652:HOH:O	2.17	0.45
2:B:602:PP9:CBB	2:B:602:PP9:HMB1	2.47	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:163:PHE:O	1:B:169:LEU:HA	2.17	0.45
1:D:357:ALA:HB1	1:D:362:VAL:CG1	2.46	0.45
1:D:374:ASN:C	1:D:374:ASN:ND2	2.68	0.45
1:B:184:ARG:NH2	5:B:774:HOH:O	2.39	0.45
1:C:122:GLN:HG2	1:C:346:TYR:CE2	2.52	0.45
1:D:301:TRP:CD1	1:D:312:GLY:HA3	2.52	0.45
1:D:329:ASN:HA	1:D:364:ASN:O	2.17	0.45
1:A:68:LYS:HB2	1:A:155:ALA:HB3	1.99	0.44
1:A:346:TYR:CD1	1:A:350:ILE:HD12	2.52	0.44
1:D:66:LYS:H	1:D:66:LYS:CE	2.28	0.44
1:B:244:GLU:HG2	5:B:739:HOH:O	2.17	0.44
1:C:304:LYS:HE2	1:C:306:GLY:O	2.17	0.44
1:D:207:TYR:CE1	1:D:413:GLU:HB3	2.53	0.44
1:A:106:LYS:HZ3	1:A:106:LYS:HB2	1.83	0.44
1:A:356:LEU:HA	1:A:359:GLU:CG	2.47	0.44
1:B:385:VAL:O	1:B:389:ILE:HG13	2.18	0.44
1:C:97:ASP:OD1	1:C:408:ASN:ND2	2.51	0.44
1:A:101:LEU:CB	1:A:104:GLN:HG2	2.48	0.44
1:A:231:HIS:CE1	1:A:232:LEU:HG	2.53	0.44
1:B:113:LYS:HD2	1:B:113:LYS:HA	1.81	0.44
1:B:311:LEU:O	1:B:312:GLY:O	2.35	0.44
1:C:232:LEU:CD2	1:C:376:LEU:HD11	2.48	0.44
1:C:338:THR:HA	1:C:371:LEU:HD12	1.99	0.44
1:A:352:TYR:HA	1:A:356:LEU:HB3	2.00	0.44
1:B:101:LEU:O	1:B:104:GLN:HG2	2.18	0.44
1:B:121:GLU:HA	1:B:121:GLU:OE1	2.18	0.44
1:C:116:THR:O	1:C:120:GLN:HG3	2.17	0.44
1:A:72:LEU:HD12	1:A:160:TYR:O	2.17	0.44
1:A:216:LYS:CG	1:A:217:PRO:HD2	2.47	0.44
1:A:301:TRP:O	1:A:314:GLN:HA	2.18	0.44
1:B:80:GLU:O	1:B:129:GLY:HA3	2.18	0.44
1:B:308:MET:HG3	2:B:603:PP9:CBB	2.47	0.44
1:D:96:ARG:O	1:D:96:ARG:HG2	2.16	0.44
1:D:320:LYS:HE2	1:D:324:GLU:OE2	2.18	0.44
1:B:151:SER:O	1:B:154:THR:OG1	2.35	0.43
1:A:166:VAL:O	1:A:166:VAL:HG23	2.18	0.43
1:B:191:TYR:CZ	1:B:198:THR:HB	2.54	0.43
1:C:173:ALA:O	1:C:177:MET:HG3	2.17	0.43
1:D:250:LEU:HA	1:D:253:ARG:HB2	2.01	0.43
1:D:394:LEU:HD13	1:D:418:PHE:O	2.18	0.43
1:A:141:GLU:HG2	1:A:159:TYR:CE2	2.54	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:164:ARG:HA	1:C:164:ARG:HD2	1.67	0.43
1:A:140:GLY:O	1:A:143:MET:HB3	2.18	0.43
1:A:153:ASN:C	1:A:155:ALA:H	2.21	0.43
1:A:220:LYS:HE3	1:A:423:LEU:O	2.19	0.43
1:C:86:HIS:HA	1:C:116:THR:OG1	2.18	0.43
1:C:108:ALA:HB3	1:C:109:PRO:CD	2.40	0.43
1:D:208:ARG:CZ	1:D:410:VAL:HG11	2.49	0.43
1:D:314:GLN:HB2	1:D:317:GLU:HG3	2.00	0.43
1:D:422:GLN:HG2	1:D:423:LEU:CD2	2.48	0.43
1:A:193:GLN:HG2	1:A:280:VAL:HA	2.01	0.43
1:A:365:ILE:O	1:A:365:ILE:CG2	2.66	0.43
1:A:394:LEU:HB3	1:A:418:PHE:O	2.18	0.43
1:B:184:ARG:NH1	1:B:220:LYS:NZ	2.67	0.43
1:B:301:TRP:O	1:B:314:GLN:HA	2.18	0.43
1:D:408:ASN:OD1	1:D:410:VAL:HB	2.19	0.43
1:C:232:LEU:HD23	1:C:232:LEU:HA	1.87	0.43
1:D:220:LYS:CA	1:D:421:GLN:HE21	2.31	0.43
1:D:230:HIS:CE1	1:D:232:LEU:HB2	2.53	0.43
1:D:298:ARG:HA	1:D:298:ARG:HD3	1.89	0.43
1:C:311:LEU:CD1	1:C:312:GLY:H	2.19	0.43
1:D:124:ARG:HH11	1:D:124:ARG:HG2	1.84	0.43
1:D:126:ILE:O	1:D:126:ILE:HG13	2.19	0.43
1:D:204:ASN:CB	1:D:208:ARG:HH12	2.30	0.43
1:A:220:LYS:HE3	1:A:423:LEU:C	2.39	0.43
1:B:68:LYS:CD	1:B:155:ALA:HB3	2.33	0.43
1:B:116:THR:HB	1:B:117:PRO:HD3	2.00	0.43
1:B:285:GLN:HE21	1:B:289:GLU:CD	2.22	0.43
1:D:88:PHE:CE1	1:D:165:TYR:HB2	2.54	0.43
1:D:131:PRO:HD2	1:D:341:HIS:HA	2.01	0.43
1:A:76:MET:HG3	1:A:165:TYR:CD1	2.53	0.43
2:A:601:PP9:CGA	2:A:601:PP9:HMA3	2.49	0.43
1:B:416:SER:C	1:B:418:PHE:H	2.21	0.43
1:D:301:TRP:O	1:D:314:GLN:HA	2.18	0.43
1:C:322:LEU:CD2	1:D:401:LEU:HD11	2.49	0.42
1:A:311:LEU:CD1	1:A:312:GLY:N	2.82	0.42
1:C:130:SER:HA	1:C:131:PRO:HD3	1.83	0.42
1:C:296:PRO:HD3	1:D:397:LYS:HD2	2.01	0.42
1:D:354:GLN:O	1:D:358:LYS:HB2	2.19	0.42
1:B:252:LYS:HZ1	1:B:363:GLU:CD	2.22	0.42
1:B:285:GLN:O	1:B:289:GLU:HG3	2.19	0.42
1:B:379:LYS:HD2	1:B:379:LYS:HA	1.88	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:283:THR:HG22	1:C:335:ILE:HD11	2.01	0.42
1:C:333:VAL:HA	1:C:334:PRO:HD3	1.88	0.42
1:A:130:SER:HA	1:A:131:PRO:HD3	1.80	0.42
1:A:230:HIS:O	1:A:234:ILE:HG12	2.19	0.42
1:B:97:ASP:OD1	1:B:408:ASN:ND2	2.52	0.42
1:B:99:MET:HE2	1:B:99:MET:HB2	1.92	0.42
1:B:110:PHE:CE1	1:B:114:ARG:NH1	2.87	0.42
1:B:220:LYS:HE3	1:B:422:GLN:O	2.19	0.42
1:C:141:GLU:O	1:C:145:LYS:HG3	2.19	0.42
1:C:313:PRO:CG	1:D:273:GLY:HA2	2.44	0.42
1:A:80:GLU:O	1:A:129:GLY:HA3	2.20	0.42
1:A:158:LYS:HA	5:A:697:HOH:O	2.19	0.42
1:A:311:LEU:CD1	1:A:312:GLY:H	2.21	0.42
1:C:365:ILE:HG23	1:C:365:ILE:O	2.18	0.42
1:D:65:ARG:HA	1:D:66:LYS:HE2	2.00	0.42
1:D:193:GLN:HG2	1:D:280:VAL:CG2	2.49	0.42
1:D:259:LEU:HD11	1:D:322:LEU:HD12	2.01	0.42
1:A:68:LYS:HE3	1:A:183:GLU:CD	2.40	0.42
1:A:68:LYS:CD	1:A:155:ALA:HB3	2.50	0.42
1:A:171:GLU:OE1	1:A:171:GLU:N	2.52	0.42
1:B:237:PHE:O	1:B:241:ILE:HG13	2.19	0.42
1:C:154:THR:HG1	1:C:157:HIS:CE1	2.37	0.42
1:D:70:GLY:C	1:D:71:ILE:HD12	2.40	0.42
1:A:229:THR:HA	1:A:234:ILE:HD11	2.01	0.42
1:A:256:VAL:HA	1:A:329:ASN:O	2.20	0.42
1:B:154:THR:HG1	1:B:157:HIS:CE1	2.36	0.42
1:B:227:TRP:N	1:B:228:PRO:CD	2.81	0.42
1:B:304:LYS:HE2	1:B:306:GLY:O	2.20	0.42
1:D:125:ARG:HG3	1:D:125:ARG:HH11	1.84	0.42
1:D:193:GLN:HG2	1:D:280:VAL:HG22	2.01	0.42
1:C:314:GLN:HB2	1:C:317:GLU:HG3	2.01	0.42
1:A:191:TYR:CE1	1:A:198:THR:HB	2.55	0.42
1:C:419:THR:C	1:C:421:GLN:N	2.74	0.41
1:A:207:TYR:CZ	1:A:413:GLU:HB3	2.54	0.41
1:A:362:VAL:HG11	1:A:365:ILE:HB	2.01	0.41
1:B:307:PRO:HG3	4:B:701:CHD:H183	2.02	0.41
1:C:266:PRO:HG3	1:C:310:TRP:CZ2	2.55	0.41
1:D:222:SER:CB	1:D:388:HIS:HE1	2.33	0.41
1:A:403:CYS:HB2	1:A:406:CYS:HB2	2.02	0.41
1:D:70:GLY:HA2	1:D:158:LYS:O	2.20	0.41
1:D:358:LYS:HB2	1:D:358:LYS:HE3	1.92	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:143:MET:HB3	1:B:143:MET:HE2	1.91	0.41
1:C:102:PRO:O	1:C:103:ILE:CG1	2.68	0.41
1:B:121:GLU:O	1:B:124:ARG:HB3	2.20	0.41
1:B:345:LEU:O	1:B:349:ASP:HB2	2.20	0.41
1:C:210:TYR:CE2	1:C:217:PRO:HA	2.55	0.41
1:C:243:LYS:NZ	1:C:369:GLU:OE2	2.53	0.41
1:D:80:GLU:O	1:D:129:GLY:HA3	2.21	0.41
1:B:337:PHE:HB2	5:B:749:HOH:O	2.20	0.41
1:A:87:ASP:HB3	1:A:91:ARG:NH2	2.35	0.41
1:B:88:PHE:HD1	1:B:166:VAL:CG1	2.33	0.41
1:B:244:GLU:CG	1:B:368:ALA:HA	2.50	0.41
1:B:276:TYR:HB3	1:B:277:PRO:CD	2.47	0.41
1:B:306:GLY:HA2	1:B:307:PRO:HD3	1.88	0.41
2:B:602:PP9:HMC1	2:B:602:PP9:CBC	2.51	0.41
1:C:301:TRP:CD1	1:C:301:TRP:N	2.88	0.41
1:D:149:GLU:O	1:D:151:SER:N	2.53	0.41
1:A:170:THR:O	1:A:174:ILE:HG13	2.21	0.41
1:A:415:LYS:O	1:A:419:THR:HG23	2.21	0.41
1:B:151:SER:HB2	1:B:386:HIS:CD2	2.55	0.41
1:B:360:CYS:SG	1:B:362:VAL:HB	2.61	0.41
1:C:370:SER:HB2	1:C:372:ASN:ND2	2.36	0.41
1:D:142:GLY:HA3	1:D:378:SER:OG	2.21	0.41
1:A:167:HIS:HA	1:A:169:LEU:HG	2.03	0.41
1:A:374:ASN:C	1:A:374:ASN:ND2	2.73	0.41
1:C:122:GLN:HG2	1:C:346:TYR:CZ	2.56	0.41
1:C:164:ARG:NH1	1:C:201:SER:O	2.54	0.41
1:C:230:HIS:HD2	1:C:232:LEU:H	1.68	0.41
1:C:329:ASN:HA	1:C:364:ASN:O	2.21	0.41
1:C:418:PHE:C	1:C:421:GLN:HB2	2.41	0.41
1:D:310:TRP:CH2	2:D:606:PP9:HAB	2.56	0.41
1:A:191:TYR:CZ	1:A:198:THR:HB	2.57	0.40
1:A:232:LEU:CD1	1:A:379:LYS:HG3	2.51	0.40
1:B:210:TYR:CD2	1:B:217:PRO:HG3	2.56	0.40
1:C:385:VAL:O	1:C:389:ILE:HG13	2.21	0.40
1:D:130:SER:HA	1:D:131:PRO:HD3	1.69	0.40
1:D:349:ASP:O	1:D:354:GLN:HG3	2.20	0.40
1:A:290:ARG:HH11	1:A:290:ARG:HG2	1.86	0.40
1:C:202:SER:O	1:C:205:ALA:HB3	2.21	0.40
1:C:232:LEU:HD22	1:C:376:LEU:CD1	2.49	0.40
1:C:374:ASN:HD22	1:C:375:PRO:CD	2.35	0.40
1:A:405:LEU:HD11	1:B:317:GLU:HB3	2.02	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:113:LYS:HE3	5:B:765:HOH:O	2.20	0.40
1:B:301:TRP:CD1	1:B:301:TRP:N	2.88	0.40
1:A:68:LYS:HG3	1:A:183:GLU:CD	2.41	0.40
1:A:273:GLY:CA	1:B:313:PRO:HG2	2.45	0.40
1:A:311:LEU:CG	1:A:312:GLY:N	2.85	0.40
1:B:179:ARG:C	1:B:181:GLY:H	2.24	0.40
1:C:273:GLY:N	1:D:313:PRO:HG2	2.36	0.40
1:C:399:LEU:C	1:C:401:LEU:H	2.24	0.40
1:D:285:GLN:O	1:D:289:GLU:HG3	2.21	0.40
1:D:325:ARG:HH11	1:D:325:ARG:HG3	1.86	0.40
1:B:298:ARG:HA	1:B:298:ARG:HD3	1.82	0.40
1:B:300:VAL:HG12	1:B:313:PRO:HB2	2.02	0.40
1:C:371:LEU:O	1:C:372:ASN:C	2.60	0.40
1:D:187:ALA:HB3	1:D:223:THR:HB	2.04	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	357/359 (99%)	331 (93%)	22 (6%)	4 (1%)	14	26
1	B	357/359 (99%)	313 (88%)	37 (10%)	7 (2%)	7	12
1	C	357/359 (99%)	325 (91%)	26 (7%)	6 (2%)	9	16
1	D	357/359 (99%)	326 (91%)	26 (7%)	5 (1%)	11	20
All	All	1428/1436 (99%)	1295 (91%)	111 (8%)	22 (2%)	10	18

All (22) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	155	ALA

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Mol	Chain	Res	Type
1	A	168	PRO
1	A	312	GLY
1	B	155	ALA
1	B	168	PRO
1	B	312	GLY
1	B	363	GLU
1	C	155	ALA
1	C	312	GLY
1	D	155	ALA
1	D	312	GLY
1	D	150	LEU
1	A	148	ASP
1	B	358	LYS
1	C	154	THR
1	C	372	ASN
1	C	341	HIS
1	D	341	HIS
1	B	417	PHE
1	B	132	ILE
1	D	420	SER
1	C	335	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	324/324 (100%)	309 (95%)	15 (5%)	27	50
1	B	324/324 (100%)	308 (95%)	16 (5%)	25	47
1	C	324/324 (100%)	311 (96%)	13 (4%)	31	56
1	D	324/324 (100%)	305 (94%)	19 (6%)	19	37
All	All	1296/1296 (100%)	1233 (95%)	63 (5%)	25	47

All (63) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	66	LYS
1	A	87	ASP
1	A	99	MET
1	A	156	PRO
1	A	168	PRO
1	A	178	GLU
1	A	219	MET
1	A	227	TRP
1	A	249	PRO
1	A	251	GLU
1	A	286	LYS
1	A	358	LYS
1	A	374	ASN
1	A	421	GLN
1	A	423	LEU
1	B	99	MET
1	B	101	LEU
1	B	104	GLN
1	B	107	LEU
1	B	164	ARG
1	B	168	PRO
1	B	176	GLU
1	B	178	GLU
1	B	188	PHE
1	B	213	VAL
1	B	227	TRP
1	B	249	PRO
1	B	305	VAL
1	B	339	SER
1	B	360	CYS
1	B	363	GLU
1	C	87	ASP
1	C	156	PRO
1	C	176	GLU
1	C	178	GLU
1	C	249	PRO
1	C	251	GLU
1	C	257	VAL
1	C	360	CYS
1	C	363	GLU
1	C	374	ASN
1	C	383	ASP
1	C	411	CYS

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Mol	Chain	Res	Type
1	C	421	GLN
1	D	66	LYS
1	D	87	ASP
1	D	99	MET
1	D	101	LEU
1	D	104	GLN
1	D	107	LEU
1	D	113	LYS
1	D	118	LYS
1	D	164	ARG
1	D	178	GLU
1	D	227	TRP
1	D	253	ARG
1	D	298	ARG
1	D	323	CYS
1	D	339	SER
1	D	360	CYS
1	D	363	GLU
1	D	374	ASN
1	D	409	PRO

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (37) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	212	GLN
1	A	235	GLN
1	A	247	HIS
1	A	285	GLN
1	A	354	GLN
1	A	374	ASN
1	A	421	GLN
1	B	231	HIS
1	B	235	GLN
1	B	285	GLN
1	B	329	ASN
1	B	354	GLN
1	B	390	GLN
1	B	392	ASN
1	B	421	GLN
1	C	105	ASN
1	C	212	GLN
1	C	230	HIS

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Mol	Chain	Res	Type
1	C	235	GLN
1	C	240	HIS
1	C	285	GLN
1	C	329	ASN
1	C	354	GLN
1	C	364	ASN
1	C	374	ASN
1	C	421	GLN
1	D	231	HIS
1	D	240	HIS
1	D	278	GLN
1	D	285	GLN
1	D	329	ASN
1	D	341	HIS
1	D	354	GLN
1	D	364	ASN
1	D	374	ASN
1	D	388	HIS
1	D	421	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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

12 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	PP9	D	604	-	31,46,46	1.73	5 (16%)	25,68,68	1.74	2 (8%)
4	CHD	D	702	-	32,32,32	2.12	15 (46%)	51,51,51	1.93	16 (31%)
2	PP9	C	605	-	31,46,46	1.80	8 (25%)	25,68,68	2.01	4 (16%)
2	PP9	D	606	-	31,46,46	1.78	7 (22%)	25,68,68	2.10	4 (16%)
3	FES	C	503	1	0,4,4	-	-	-	-	-
3	FES	D	504	1	0,4,4	-	-	-	-	-
4	CHD	B	701	-	32,32,32	2.08	12 (37%)	51,51,51	1.91	17 (33%)
3	FES	B	502	1	0,4,4	-	-	-	-	-
2	PP9	A	601	-	31,46,46	1.78	9 (29%)	25,68,68	1.99	5 (20%)
2	PP9	B	602	-	31,46,46	1.76	10 (32%)	25,68,68	2.05	5 (20%)
3	FES	A	501	1	0,4,4	-	-	-	-	-
2	PP9	B	603	-	31,46,46	1.69	6 (19%)	25,68,68	1.68	2 (8%)

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	PP9	D	604	-	-	6/12/62/62	0/4/5/5
4	CHD	D	702	-	-	4/9/74/74	0/4/4/4
3	FES	B	502	1	-	-	0/1/1/1
2	PP9	C	605	-	-	5/12/62/62	0/4/5/5
2	PP9	D	606	-	-	3/12/62/62	0/4/5/5
3	FES	C	503	1	-	-	0/1/1/1
3	FES	D	504	1	-	-	0/1/1/1
4	CHD	B	701	-	-	3/9/74/74	0/4/4/4
2	PP9	A	601	-	-	5/12/62/62	0/4/5/5
2	PP9	B	602	-	-	1/12/62/62	0/4/5/5
3	FES	A	501	1	-	-	0/1/1/1
2	PP9	B	603	-	-	10/12/62/62	0/4/5/5

All (72) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	702	CHD	O25-C24	4.71	1.37	1.22

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	701	CHD	O25-C24	4.67	1.37	1.22
2	D	604	PP9	CBB-CAB	4.51	1.52	1.30
2	B	602	PP9	CBB-CAB	4.49	1.52	1.30
2	B	603	PP9	CBB-CAB	4.49	1.52	1.30
2	A	601	PP9	CBB-CAB	4.42	1.52	1.30
2	D	606	PP9	CBB-CAB	4.40	1.52	1.30
2	C	605	PP9	CBB-CAB	4.37	1.52	1.30
2	A	601	PP9	C3C-C2C	-4.36	1.34	1.40
2	D	606	PP9	C3C-C2C	-4.36	1.34	1.40
2	C	605	PP9	C3C-C2C	-4.30	1.34	1.40
2	B	603	PP9	C3C-C2C	-4.28	1.34	1.40
2	D	604	PP9	C3C-C2C	-4.27	1.34	1.40
4	D	702	CHD	C11-C9	3.64	1.59	1.53
2	D	604	PP9	CBC-CAC	3.57	1.53	1.29
4	B	701	CHD	C16-C17	3.56	1.61	1.54
2	A	601	PP9	CBC-CAC	3.52	1.52	1.29
2	B	603	PP9	CBC-CAC	3.48	1.52	1.29
2	B	602	PP9	CBC-CAC	3.46	1.52	1.29
2	D	606	PP9	CBC-CAC	3.46	1.52	1.29
2	C	605	PP9	CBC-CAC	3.45	1.52	1.29
4	B	701	CHD	C11-C9	3.37	1.59	1.53
4	D	702	CHD	C16-C17	3.25	1.61	1.54
2	B	602	PP9	C3C-C2C	-3.16	1.36	1.40
2	B	602	PP9	C3C-CAC	3.09	1.54	1.47
2	D	604	PP9	C3C-CAC	3.04	1.54	1.47
4	B	701	CHD	C13-C12	3.03	1.59	1.54
4	D	702	CHD	C10-C9	2.94	1.61	1.56
2	C	605	PP9	C3C-CAC	2.93	1.53	1.47
4	D	702	CHD	C18-C13	2.93	1.59	1.54
4	D	702	CHD	C6-C5	2.93	1.58	1.53
4	D	702	CHD	C13-C12	2.88	1.59	1.54
2	D	606	PP9	C3C-CAC	2.86	1.53	1.47
4	D	702	CHD	C8-C14	2.84	1.59	1.53
4	B	701	CHD	C8-C14	2.84	1.59	1.53
4	B	701	CHD	C18-C13	2.79	1.58	1.54
4	B	701	CHD	C6-C5	2.77	1.58	1.53
2	B	602	PP9	CBA-CGA	-2.73	1.44	1.50
4	B	701	CHD	C10-C9	2.73	1.61	1.56
2	D	604	PP9	CAB-C3B	2.70	1.54	1.47
2	A	601	PP9	C3C-CAC	2.61	1.53	1.47
2	B	603	PP9	C3C-CAC	2.59	1.53	1.47
2	B	603	PP9	CAB-C3B	2.57	1.54	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	601	PP9	CBA-CGA	-2.57	1.44	1.50
2	B	602	PP9	O2A-CGA	-2.44	1.22	1.30
2	A	601	PP9	O2A-CGA	-2.42	1.22	1.30
4	B	701	CHD	O7-C7	2.42	1.48	1.43
2	D	606	PP9	O2A-CGA	-2.33	1.22	1.30
2	B	602	PP9	CAB-C3B	2.33	1.53	1.47
2	C	605	PP9	CBA-CGA	-2.32	1.45	1.50
2	B	602	PP9	CMB-C2B	2.30	1.54	1.50
2	B	602	PP9	O2D-CGD	-2.30	1.23	1.30
2	C	605	PP9	O2A-CGA	-2.29	1.23	1.30
4	D	702	CHD	O12-C12	2.21	1.47	1.43
4	D	702	CHD	O26-C24	-2.20	1.23	1.30
4	B	701	CHD	O26-C24	-2.20	1.23	1.30
4	B	701	CHD	O12-C12	2.20	1.47	1.43
4	D	702	CHD	C22-C23	2.19	1.59	1.52
2	D	606	PP9	O2D-CGD	-2.18	1.23	1.30
2	C	605	PP9	O2D-CGD	-2.16	1.23	1.30
2	B	602	PP9	CMD-C2D	2.15	1.54	1.50
4	D	702	CHD	O7-C7	2.14	1.47	1.43
4	B	701	CHD	C19-C10	2.14	1.58	1.54
2	C	605	PP9	CMD-C2D	2.13	1.54	1.50
2	D	606	PP9	CMB-C2B	2.12	1.54	1.50
4	D	702	CHD	C8-C7	2.09	1.57	1.53
2	A	601	PP9	O2D-CGD	-2.07	1.23	1.30
2	A	601	PP9	CAB-C3B	2.06	1.53	1.47
2	A	601	PP9	CMD-C2D	2.05	1.53	1.50
4	D	702	CHD	C19-C10	2.02	1.57	1.54
4	D	702	CHD	C8-C9	2.02	1.57	1.53
2	B	603	PP9	O2D-CGD	-2.01	1.24	1.30

All (55) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	606	PP9	CBA-CAA-C2A	-5.98	102.52	112.60
2	C	605	PP9	CBA-CAA-C2A	-5.78	102.87	112.60
2	B	602	PP9	CBA-CAA-C2A	-5.64	103.10	112.60
2	D	606	PP9	CAA-CBA-CGA	5.49	129.14	113.76
2	B	602	PP9	CAA-CBA-CGA	5.39	128.87	113.76
2	A	601	PP9	CBA-CAA-C2A	-5.38	103.54	112.60
2	D	604	PP9	CBA-CAA-C2A	5.02	121.07	112.60
2	B	603	PP9	CBA-CAA-C2A	4.92	120.89	112.60
2	A	601	PP9	CAA-CBA-CGA	4.63	126.73	113.76

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	605	PP9	CAA-CBA-CGA	4.61	126.68	113.76
4	D	702	CHD	O26-C24-C23	4.39	128.15	114.03
4	D	702	CHD	C19-C10-C1	-4.20	101.50	108.26
4	D	702	CHD	C18-C13-C12	-4.17	104.82	109.07
4	B	701	CHD	O26-C24-C23	4.14	127.33	114.03
4	B	701	CHD	C19-C10-C1	-3.91	101.96	108.26
4	D	702	CHD	C17-C13-C12	3.73	121.07	117.67
4	B	701	CHD	C17-C13-C14	3.47	103.59	100.09
4	B	701	CHD	C18-C13-C12	-3.46	105.54	109.07
2	C	605	PP9	CBD-CAD-C3D	3.16	121.33	112.62
4	D	702	CHD	C17-C13-C14	3.16	103.28	100.09
4	D	702	CHD	O25-C24-C23	-3.10	113.11	123.08
2	A	601	PP9	CBD-CAD-C3D	3.09	121.14	112.62
4	B	701	CHD	C17-C13-C12	3.05	120.45	117.67
4	B	701	CHD	C6-C5-C10	-3.03	109.43	112.66
4	B	701	CHD	O25-C24-C23	-3.01	113.41	123.08
2	B	603	PP9	CAD-CBD-CGD	3.00	120.06	113.60
2	B	602	PP9	CBD-CAD-C3D	2.99	120.87	112.62
4	B	701	CHD	C11-C9-C10	-2.98	110.65	113.73
4	D	702	CHD	O12-C12-C13	-2.98	106.00	111.03
2	D	606	PP9	CBD-CAD-C3D	2.96	120.77	112.62
2	D	604	PP9	CAD-CBD-CGD	2.92	119.89	113.60
4	D	702	CHD	C11-C9-C10	-2.70	110.94	113.73
4	B	701	CHD	C9-C8-C7	-2.69	108.66	111.88
4	D	702	CHD	C1-C10-C5	2.68	111.73	107.77
4	B	701	CHD	C16-C17-C13	-2.67	100.94	103.55
4	B	701	CHD	O12-C12-C13	-2.64	106.56	111.03
4	B	701	CHD	C1-C10-C5	2.60	111.62	107.77
4	D	702	CHD	C6-C5-C10	-2.58	109.92	112.66
4	D	702	CHD	C11-C12-C13	2.56	113.88	111.24
4	B	701	CHD	C11-C12-C13	2.56	113.87	111.24
4	B	701	CHD	C6-C5-C4	2.54	114.11	111.19
4	D	702	CHD	C9-C8-C7	-2.52	108.86	111.88
2	A	601	PP9	CAA-C2A-C3A	-2.50	120.07	127.25
2	D	606	PP9	CAA-C2A-C3A	-2.49	120.08	127.25
2	B	602	PP9	CAA-C2A-C3A	-2.46	120.17	127.25
4	D	702	CHD	C6-C5-C4	2.46	114.03	111.19
2	C	605	PP9	CAA-C2A-C3A	-2.33	120.56	127.25
4	D	702	CHD	C5-C4-C3	-2.21	109.51	112.76
4	D	702	CHD	C19-C10-C9	2.20	114.21	111.18
4	B	701	CHD	C5-C4-C3	-2.14	109.61	112.76
4	B	701	CHD	C10-C9-C8	2.09	114.06	111.82

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	701	CHD	C19-C10-C9	2.08	114.04	111.18
2	B	602	PP9	CAD-C3D-C2D	-2.06	124.05	127.88
2	A	601	PP9	C1A-NA-C4A	-2.04	102.90	107.09
4	D	702	CHD	C16-C17-C13	-2.00	101.59	103.55

There are no chirality outliers.

All (37) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	601	PP9	C2B-C3B-CAB-CBB
2	A	601	PP9	C4B-C3B-CAB-CBB
2	B	603	PP9	C1A-C2A-CAA-CBA
2	B	603	PP9	C3A-C2A-CAA-CBA
2	B	603	PP9	C4D-C3D-CAD-CBD
2	C	605	PP9	C2A-CAA-CBA-CGA
2	C	605	PP9	C2B-C3B-CAB-CBB
2	C	605	PP9	C4B-C3B-CAB-CBB
2	D	604	PP9	C1A-C2A-CAA-CBA
2	D	604	PP9	C3A-C2A-CAA-CBA
2	D	606	PP9	C2B-C3B-CAB-CBB
2	D	606	PP9	C4B-C3B-CAB-CBB
4	D	702	CHD	C21-C20-C22-C23
4	B	701	CHD	C20-C22-C23-C24
4	D	702	CHD	C17-C20-C22-C23
2	A	601	PP9	C2A-CAA-CBA-CGA
2	B	602	PP9	C2A-CAA-CBA-CGA
2	D	606	PP9	C2A-CAA-CBA-CGA
2	B	603	PP9	C2B-C3B-CAB-CBB
2	B	603	PP9	C2D-C3D-CAD-CBD
2	B	603	PP9	C4B-C3B-CAB-CBB
2	B	603	PP9	CAD-CBD-CGD-O2D
4	B	701	CHD	C22-C23-C24-O26
2	D	604	PP9	CAA-CBA-CGA-O1A
2	D	604	PP9	CAA-CBA-CGA-O2A
2	B	603	PP9	CAD-CBD-CGD-O1D
4	B	701	CHD	C22-C23-C24-O25
2	A	601	PP9	CAD-CBD-CGD-O2D
4	D	702	CHD	C22-C23-C24-O25
2	A	601	PP9	CAD-CBD-CGD-O1D
2	B	603	PP9	CAA-CBA-CGA-O1A
2	D	604	PP9	CAD-CBD-CGD-O2D
2	D	604	PP9	CAD-CBD-CGD-O1D

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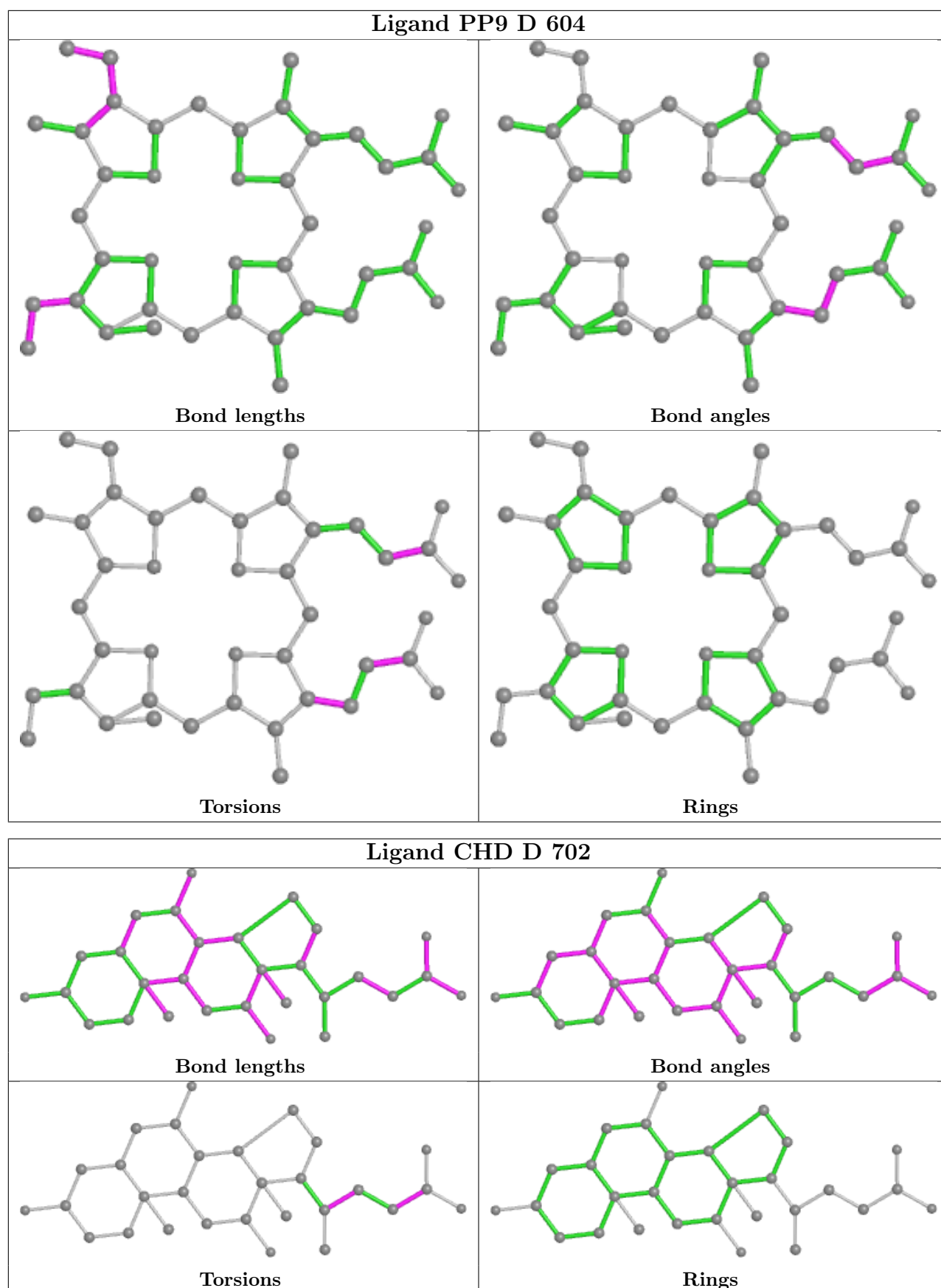
Mol	Chain	Res	Type	Atoms
2	C	605	PP9	CAA-CBA-CGA-O2A
4	D	702	CHD	C22-C23-C24-O26
2	B	603	PP9	CAA-CBA-CGA-O2A
2	C	605	PP9	CAD-CBD-CGD-O1D

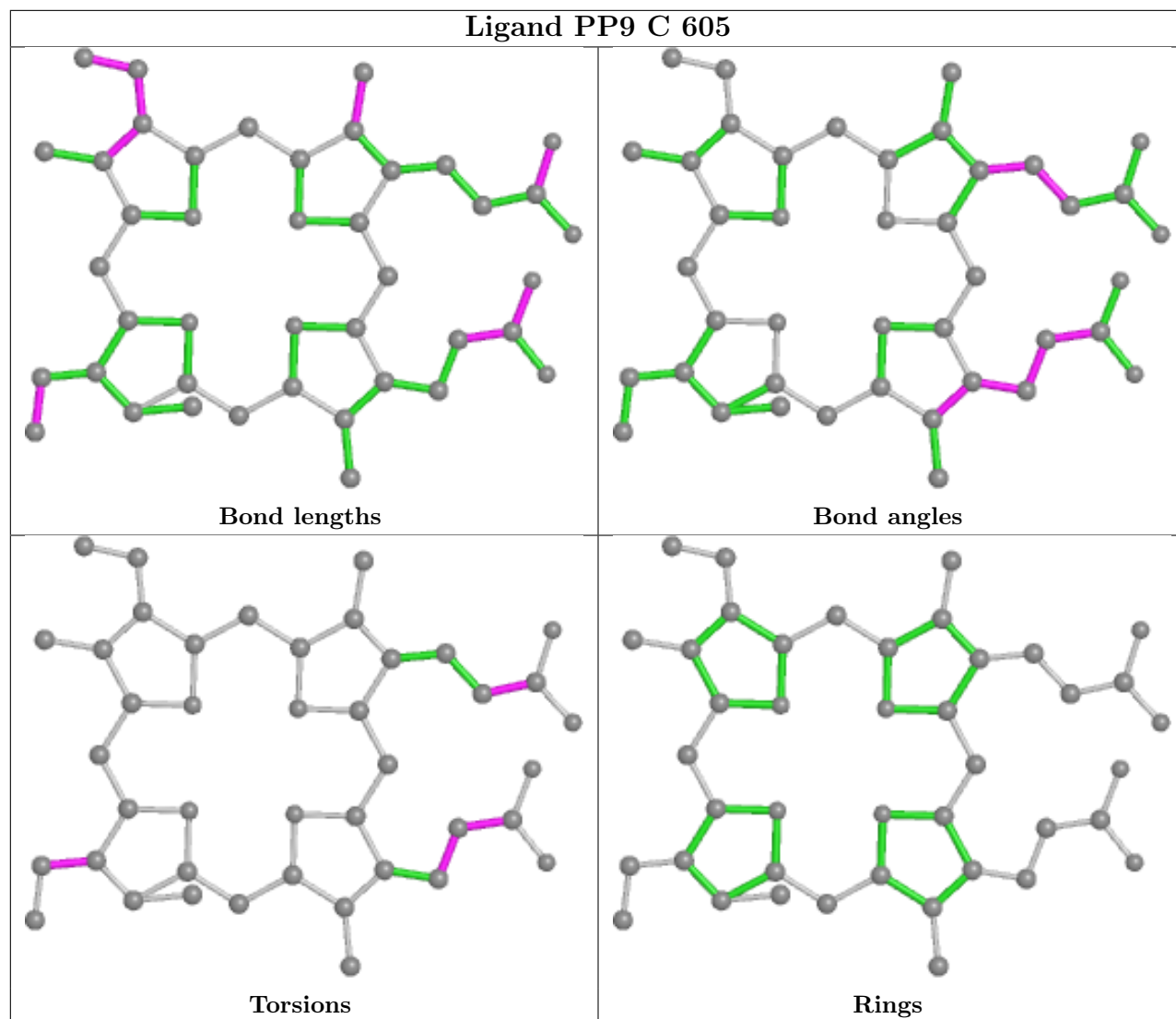
There are no ring outliers.

9 monomers are involved in 36 short contacts:

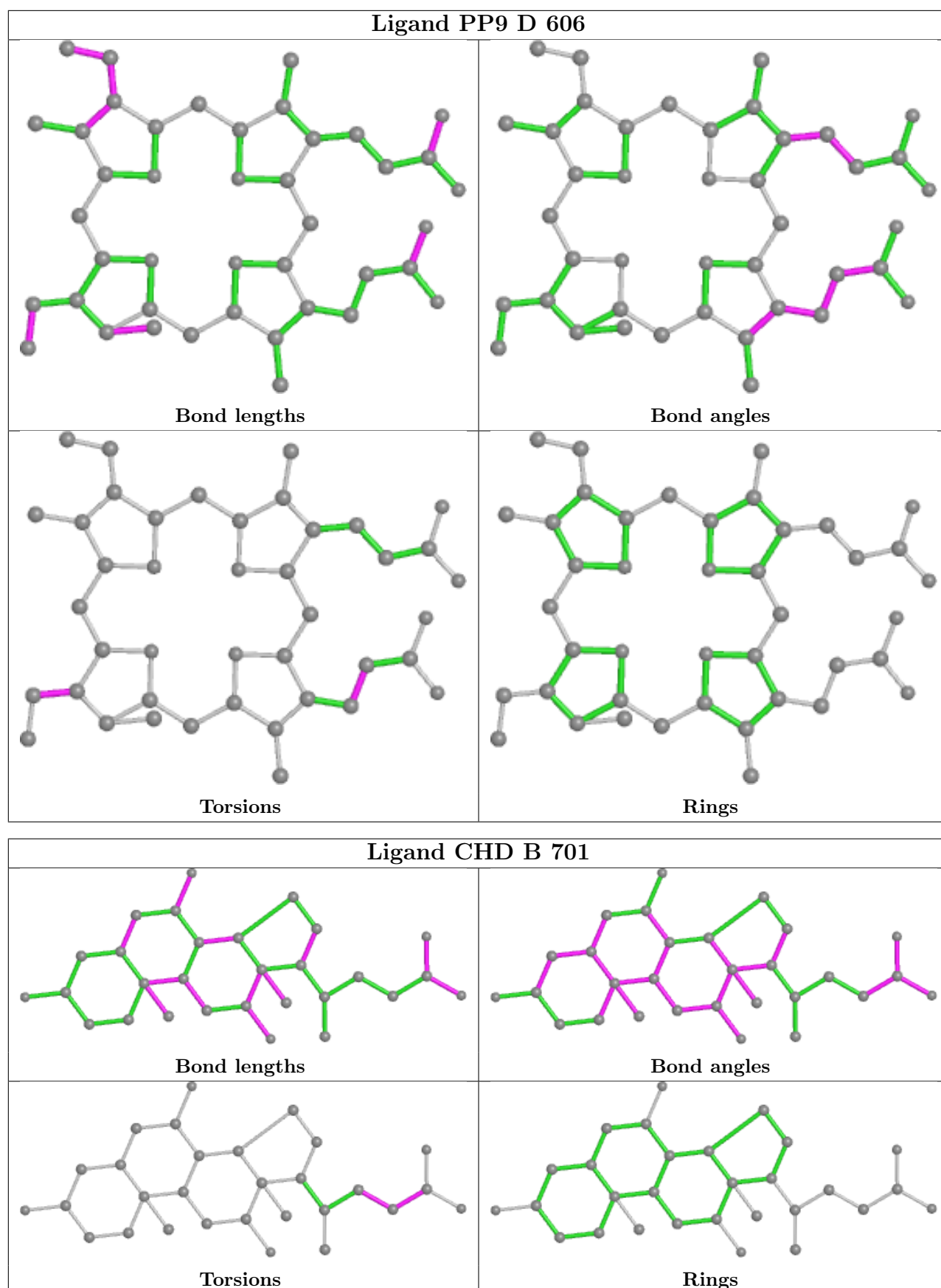
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	604	PP9	1	0
4	D	702	CHD	1	0
2	C	605	PP9	5	0
2	D	606	PP9	9	0
4	B	701	CHD	4	0
3	B	502	FES	2	0
2	A	601	PP9	5	0
2	B	602	PP9	7	0
2	B	603	PP9	4	0

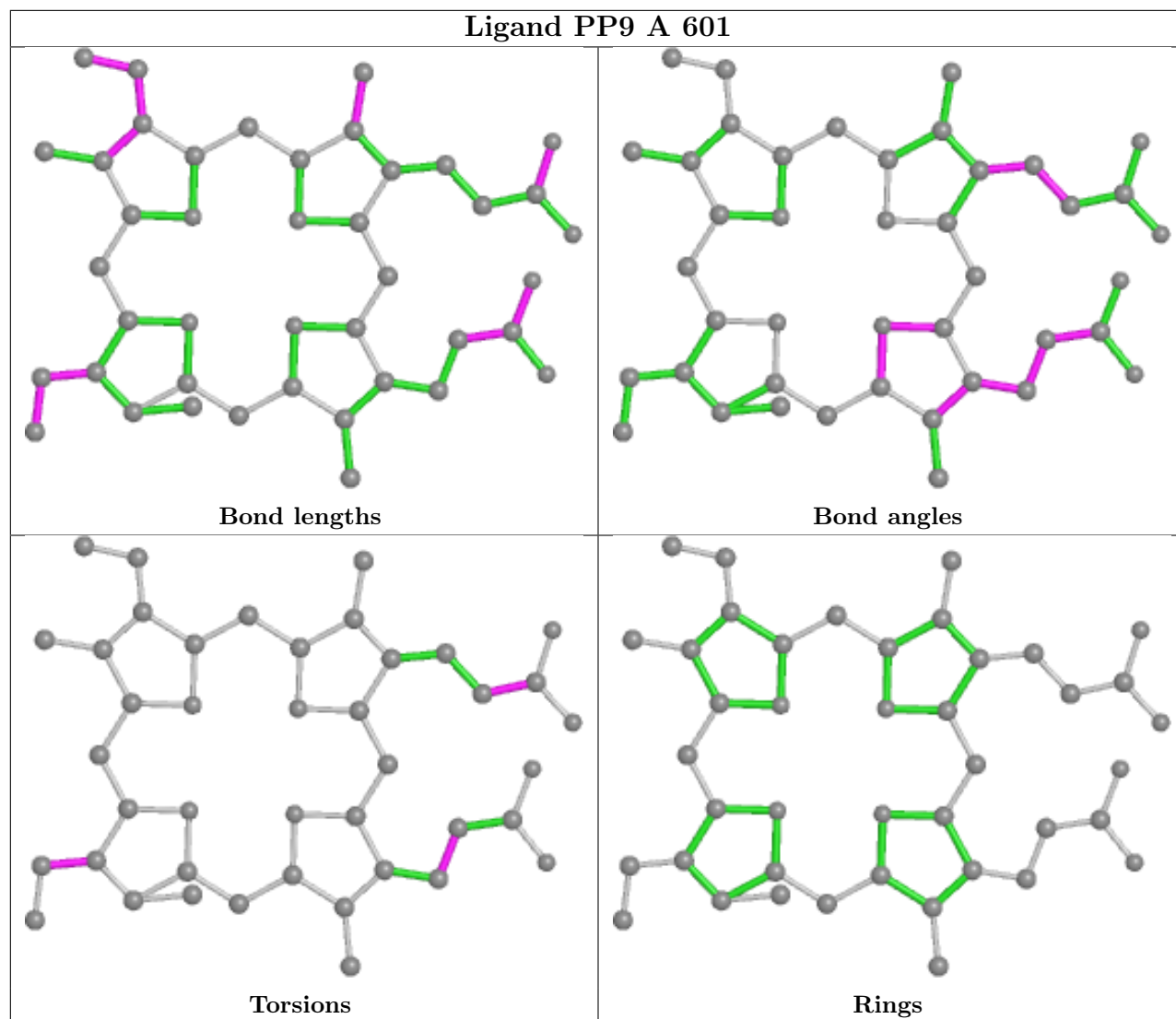
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

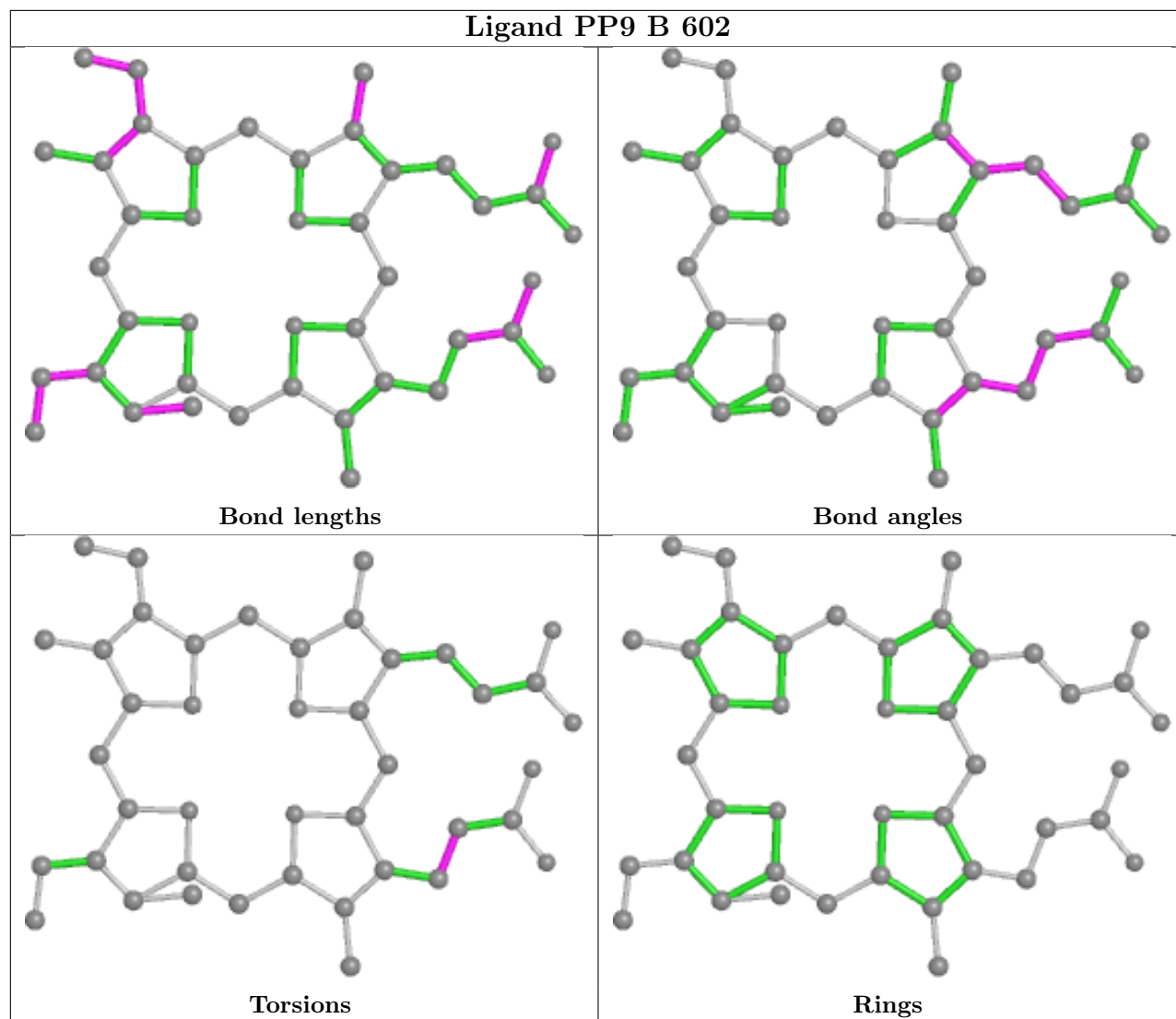


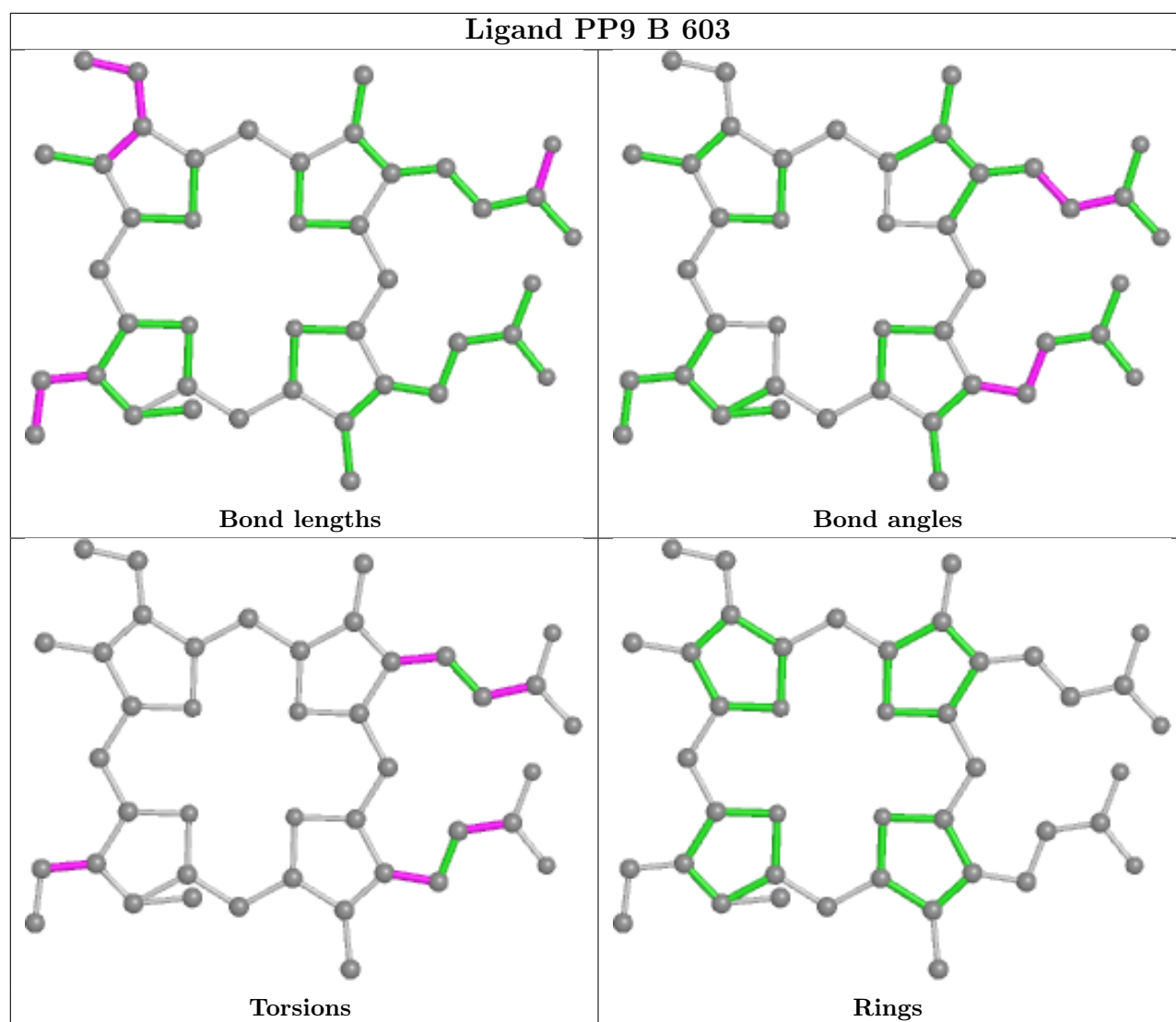












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	359/359 (100%)	0.11	15 (4%) 36 39	10, 28, 54, 90	0
1	B	359/359 (100%)	0.10	9 (2%) 57 61	7, 30, 54, 100	0
1	C	359/359 (100%)	-0.03	10 (2%) 53 56	11, 28, 57, 90	0
1	D	359/359 (100%)	0.08	11 (3%) 49 52	8, 28, 56, 92	0
All	All	1436/1436 (100%)	0.07	45 (3%) 49 52	7, 28, 56, 100	0

All (45) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	423	LEU	10.1
1	B	422	GLN	9.2
1	D	423	LEU	8.5
1	A	423	LEU	7.9
1	C	423	LEU	7.3
1	A	422	GLN	6.4
1	D	422	GLN	6.1
1	C	421	GLN	5.3
1	A	420	SER	5.0
1	A	155	ALA	4.7
1	C	422	GLN	4.5
1	D	65	ARG	4.4
1	D	421	GLN	3.9
1	D	213	VAL	3.5
1	C	420	SER	3.3
1	B	421	GLN	3.2
1	A	167	HIS	3.1
1	A	419	THR	3.1
1	A	421	GLN	3.0
1	C	150	LEU	3.0
1	A	150	LEU	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	65	ARG	2.8
1	A	412	ARG	2.8
1	D	416	SER	2.7
1	D	312	GLY	2.7
1	B	412	ARG	2.7
1	A	66	LYS	2.7
1	C	65	ARG	2.7
1	C	412	ARG	2.6
1	C	155	ALA	2.6
1	B	212	GLN	2.5
1	D	214	GLY	2.5
1	B	155	ALA	2.5
1	B	65	ARG	2.5
1	D	409	PRO	2.5
1	C	419	THR	2.3
1	C	66	LYS	2.3
1	D	167	HIS	2.3
1	A	409	PRO	2.2
1	B	312	GLY	2.2
1	B	416	SER	2.2
1	A	152	PRO	2.1
1	A	149	GLU	2.1
1	A	168	PRO	2.1
1	D	66	LYS	2.1

## 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](#)

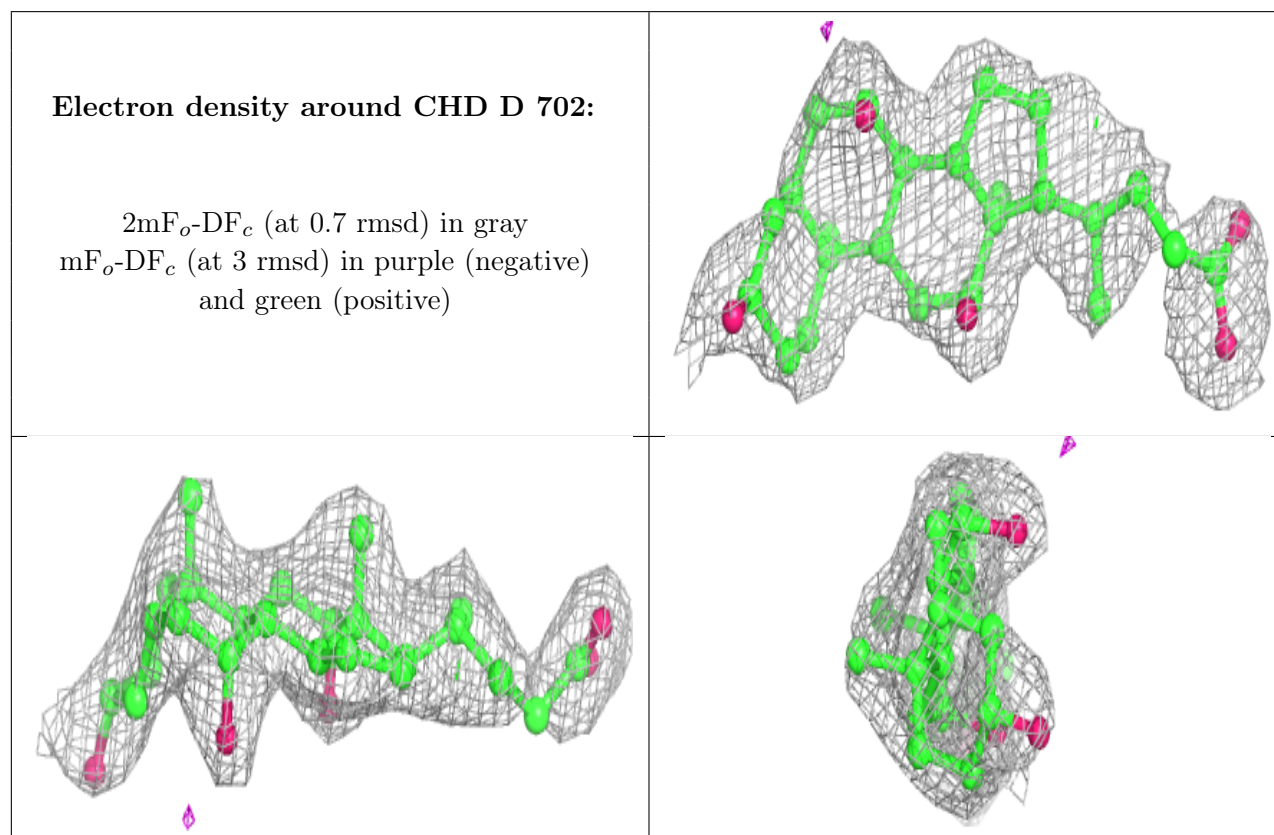
There are no monosaccharides in this entry.

## 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, 95<sup>th</sup> 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.

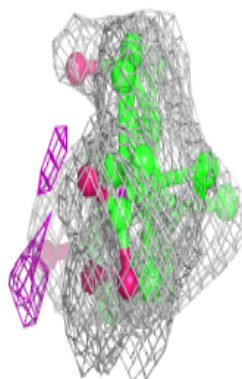
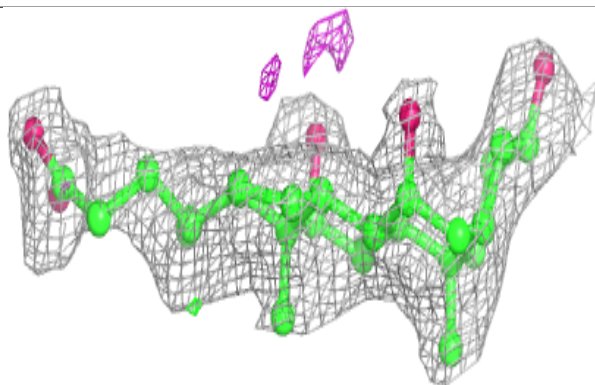
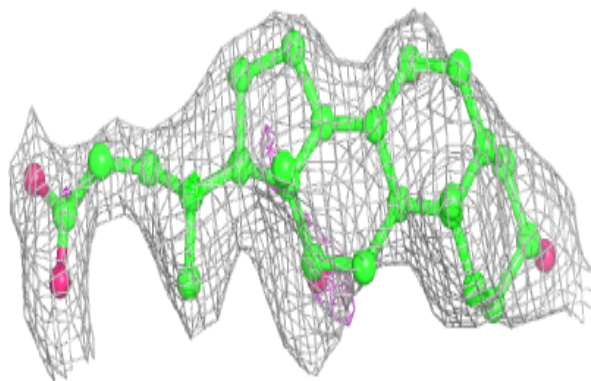
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	CHD	D	702	29/29	0.82	0.22	40,42,47,47	0
4	CHD	B	701	29/29	0.84	0.24	39,42,48,49	0
2	PP9	D	604	42/42	0.86	0.24	36,46,56,60	0
2	PP9	B	603	42/42	0.89	0.24	41,48,55,57	0
2	PP9	B	602	42/42	0.91	0.15	14,17,24,26	0
2	PP9	A	601	42/42	0.92	0.16	11,15,27,30	0
2	PP9	D	606	42/42	0.93	0.17	9,17,24,26	0
2	PP9	C	605	42/42	0.94	0.16	19,22,24,25	0
3	FES	D	504	4/4	0.94	0.07	49,50,50,50	0
3	FES	A	501	4/4	0.95	0.06	52,52,53,53	0
3	FES	C	503	4/4	0.97	0.05	46,47,47,47	0
3	FES	B	502	4/4	0.98	0.05	49,49,51,51	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 CHD B 701:**

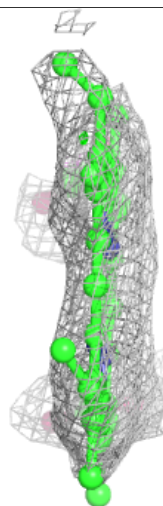
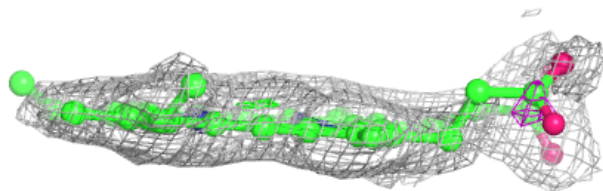
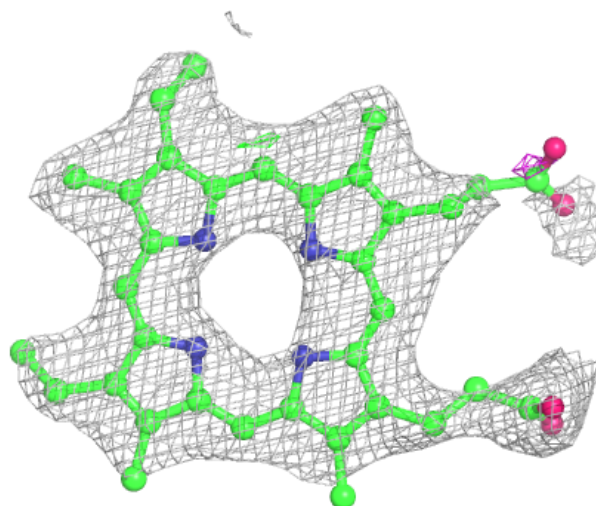
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





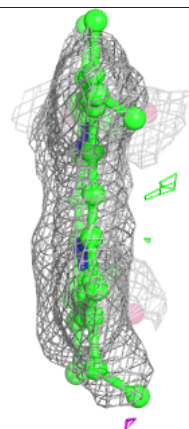
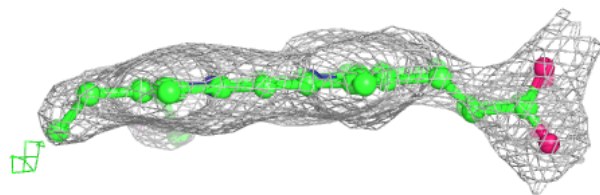
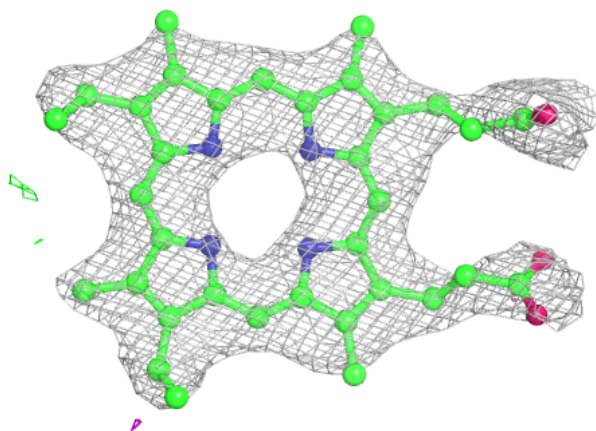
**Electron density around PP9 D 604:**

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



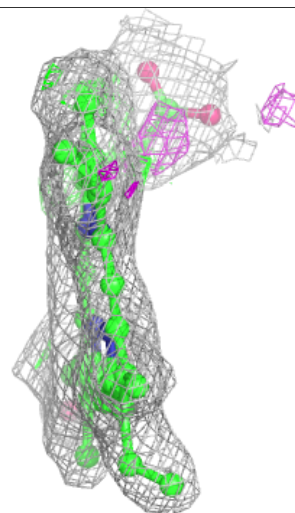
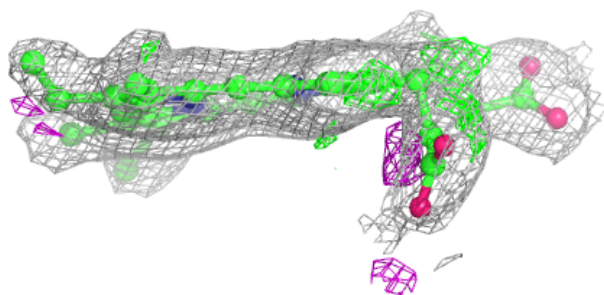
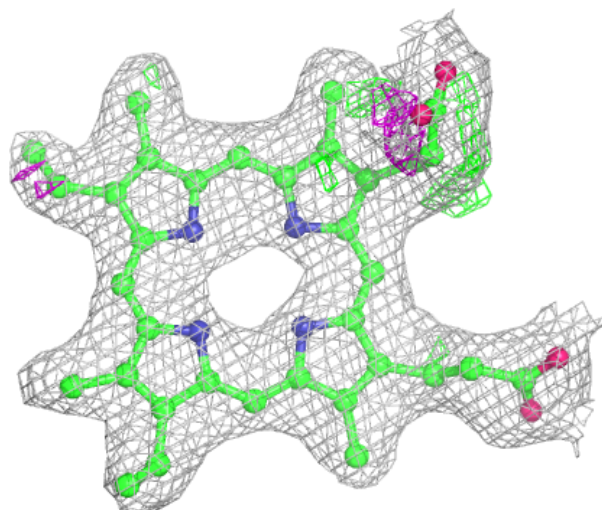
**Electron density around PP9 B 603:**

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



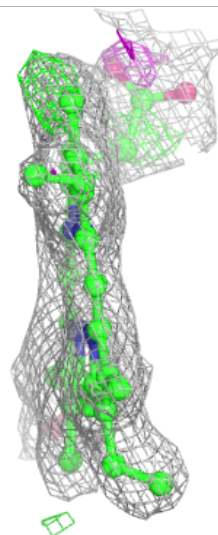
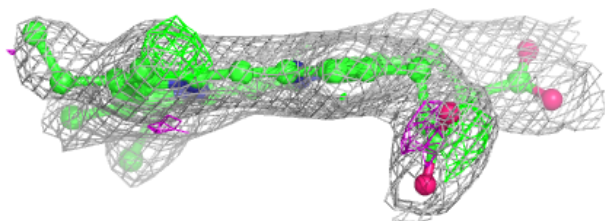
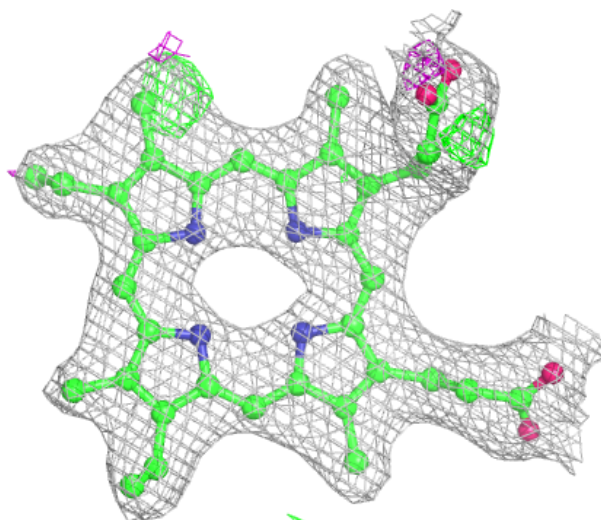
**Electron density around PP9 B 602:**

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



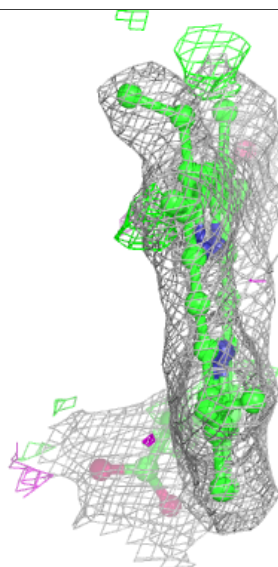
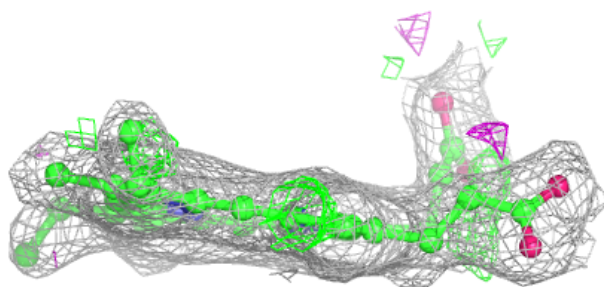
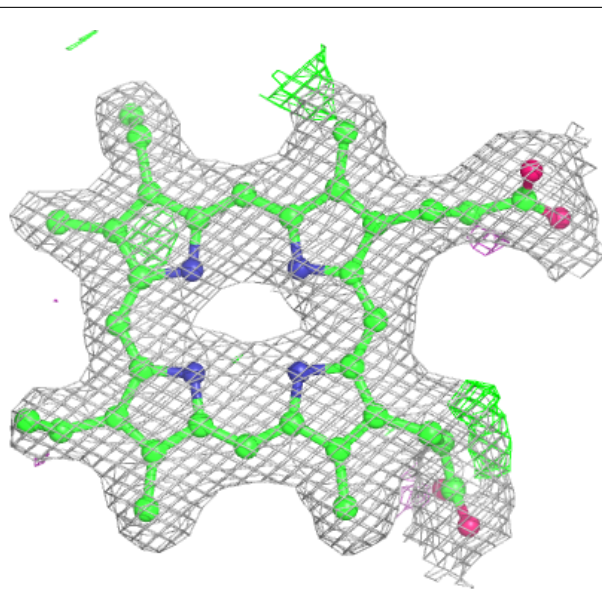
**Electron density around PP9 A 601:**

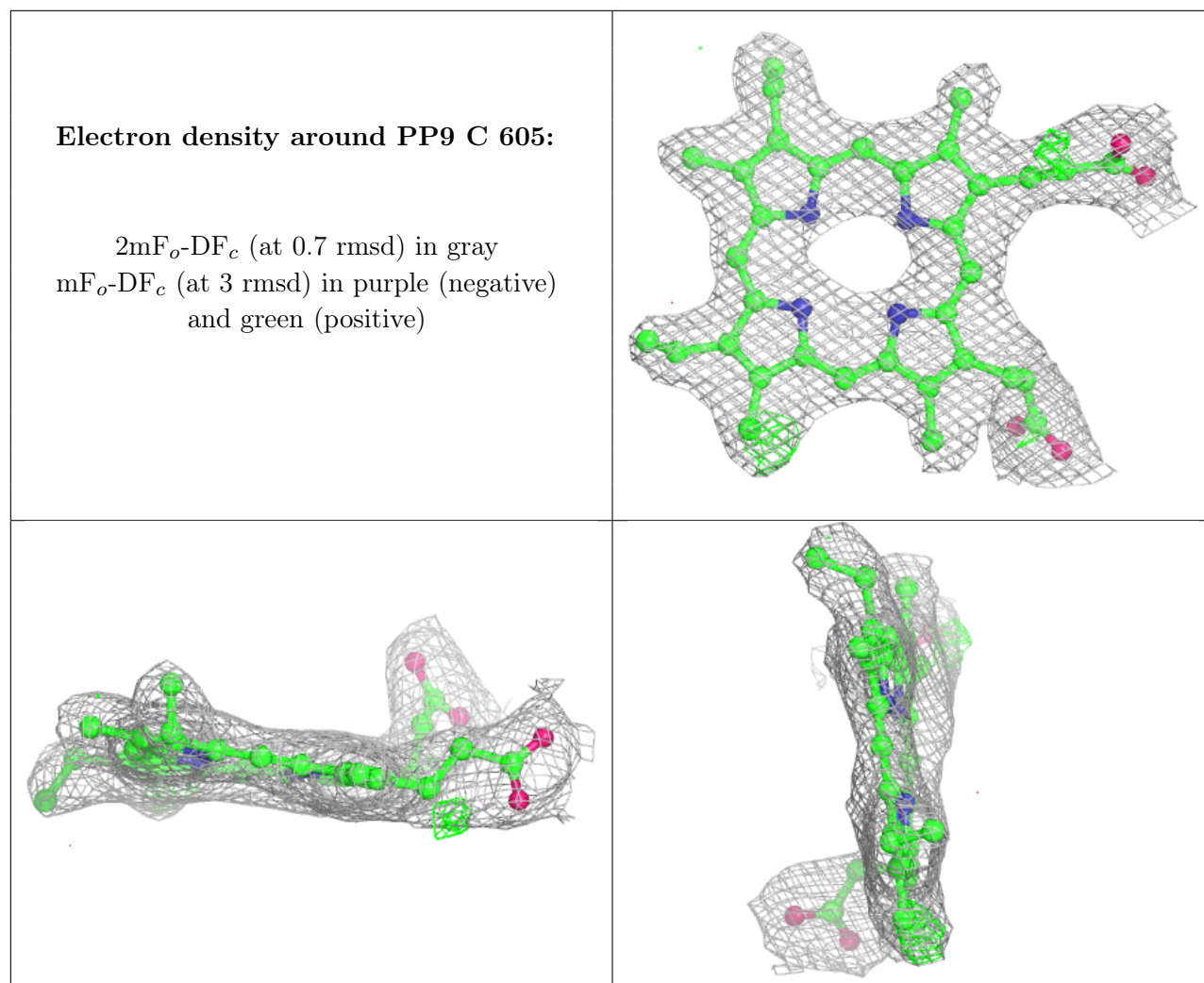
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around PP9 D 606:**

$2mF_o-DF_c$  (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.