



# Full wwPDB X-ray Structure Validation Report

Oct 11, 2021 – 01:28 PM EDT

PDB ID : 2OPQ  
Title : Crystal Structure of L100I Mutant HIV-1 Reverse Transcriptase in Complex with GW420867X.  
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Deposited on : 2007-01-30  
Resolution : 2.80 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.

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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)  
Xtrriage (Phenix) : 1.13  
EDS : 2.23.2  
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) : 2.23.2

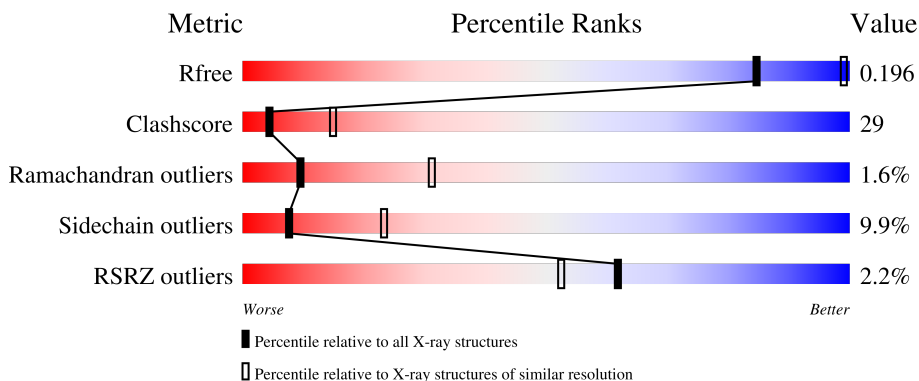
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.80 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	3140 (2.80-2.80)
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RSRZ outliers	127900	3078 (2.80-2.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	534	
2	B	424	

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 7605 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 Reverse transcriptase/ribonuclease H.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	516	4238	2748	699	783	8	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	100	ILE	LEU	engineered mutation	UNP P04585
A	280	CSD	CYS	modified residue	UNP P04585

- Molecule 2 is a protein called p51 RT.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	400	3317	2162	547	601	7	0	0	0

There is a discrepancy between the modelled and reference sequences:

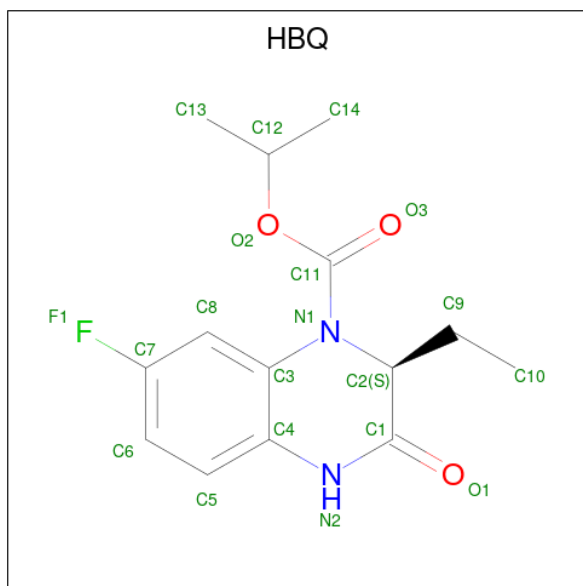
Chain	Residue	Modelled	Actual	Comment	Reference
B	100	ILE	LEU	engineered mutation	UNP P04585

- Molecule 3 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



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

- Molecule 4 is ISOPROPYL (2S)-2-ETHYL-7-FLUORO-3-OXO-3,4-DIHYDROQUINOXALINE-1(2H)-CARBOXYLATE (three-letter code: HBQ) (formula:  $C_{14}H_{17}FN_2O_3$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	F	N	O		
4	A	1	20	14	1	2	3	0	0

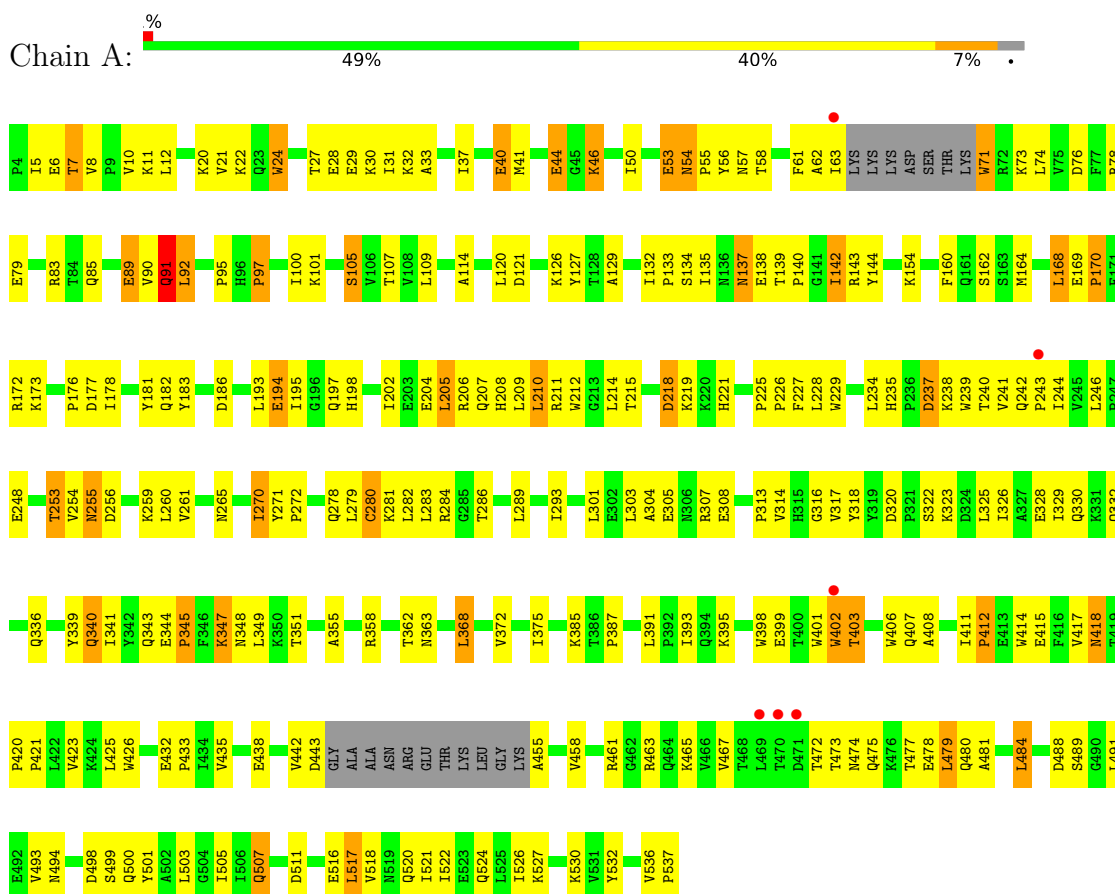
- Molecule 5 is water.

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
5	A	12	Total 12	O 12	0	0
5	B	13	Total 13	O 13	0	0

### 3 Residue-property plots

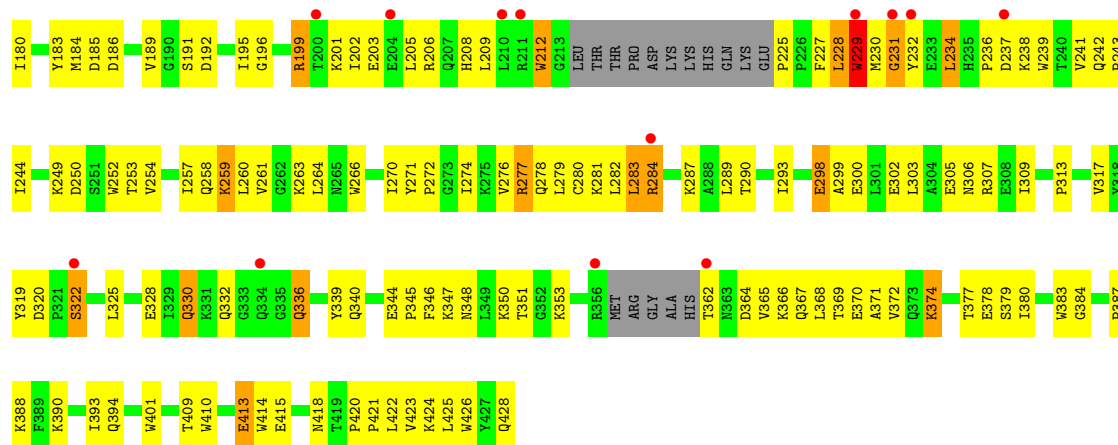
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Reverse transcriptase/ribonuclease H



- Molecule 2: p51 RT





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	138.40Å 114.90Å 64.90Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.78 – 2.80 29.78 – 2.80	Depositor EDS
% Data completeness (in resolution range)	98.9 (29.78-2.80) 98.9 (29.78-2.80)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.42 (at 2.80Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, $R_{free}$	0.210 , 0.273 0.194 , 0.196	Depositor DCC
$R_{free}$ test set	1250 reflections (4.82%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	61.0	Xtrriage
Anisotropy	0.089	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 75.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	7605	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	61.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.43% 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: CSD, PO4, HBQ

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	0.53	0/4343	0.71	1/5907 (0.0%)
2	B	0.52	0/3411	0.74	3/4630 (0.1%)
All	All	0.52	0/7754	0.73	4/10537 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	231	GLY	N-CA-C	-7.43	94.53	113.10
2	B	229	TRP	CA-CB-CG	-6.01	102.29	113.70
2	B	229	TRP	N-CA-C	-5.27	96.78	111.00
1	A	248	GLU	N-CA-C	-5.09	97.26	111.00

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4238	0	4261	244	0
2	B	3317	0	3343	207	0
3	A	5	0	0	0	0
4	A	20	0	17	1	0
5	A	12	0	0	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	B	13	0	0	1	0
All	All	7605	0	7621	437	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 29.

All (437) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:230:MET:HG3	2:B:231:GLY:H	1.12	1.10
2:B:362:THR:HG22	2:B:367:GLN:HE21	1.20	1.03
2:B:104:LYS:HB2	2:B:192:ASP:HA	1.38	1.02
2:B:330:GLN:HE22	2:B:340:GLN:HE22	0.96	0.95
1:A:286:THR:HG22	1:A:293:ILE:HD11	1.48	0.95
1:A:517:LEU:HA	1:A:520:GLN:HE21	1.35	0.91
1:A:142:ILE:HD13	1:A:142:ILE:H	1.35	0.91
1:A:33:ALA:O	1:A:37:ILE:HG12	1.71	0.90
1:A:208:HIS:O	1:A:211:ARG:HG2	1.71	0.90
2:B:195:ILE:HG12	2:B:199:ARG:HE	1.38	0.89
2:B:206:ARG:HA	2:B:209:LEU:HD12	1.55	0.88
1:A:344:GLU:HB3	1:A:347:LYS:HB2	1.56	0.86
2:B:330:GLN:NE2	2:B:340:GLN:HE22	1.76	0.83
2:B:366:LYS:O	2:B:370:GLU:HG3	1.79	0.82
2:B:60:VAL:HG12	2:B:75:VAL:HG22	1.62	0.81
2:B:175:ASN:HD21	2:B:201:LYS:NZ	1.77	0.81
1:A:54:ASN:HD22	1:A:143:ARG:NH2	1.79	0.81
2:B:330:GLN:HE22	2:B:340:GLN:NE2	1.78	0.81
1:A:332:GLN:O	1:A:332:GLN:HG2	1.79	0.80
1:A:474:ASN:O	1:A:477:THR:HG22	1.83	0.78
2:B:230:MET:HG3	2:B:231:GLY:N	1.95	0.78
1:A:253:THR:HG22	1:A:256:ASP:H	1.48	0.78
1:A:27:THR:HG22	1:A:29:GLU:H	1.49	0.77
1:A:101:LYS:HD2	1:A:101:LYS:N	1.99	0.77
1:A:210:LEU:HD22	1:A:214:LEU:O	1.84	0.77
1:A:8:VAL:HG13	2:B:53:GLU:HG3	1.68	0.76
2:B:97:PRO:HG2	2:B:100:ILE:HD11	1.67	0.76
2:B:66:LYS:HG2	2:B:230:MET:HA	1.67	0.76
2:B:97:PRO:CG	2:B:100:ILE:HD11	2.14	0.76
2:B:422:LEU:HA	2:B:425:LEU:HD13	1.67	0.75
1:A:503:LEU:O	1:A:507:GLN:HB2	1.87	0.74
1:A:442:VAL:HB	1:A:481:ALA:HB1	1.69	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:362:THR:CG2	2:B:367:GLN:HG3	2.18	0.74
1:A:344:GLU:HB3	1:A:347:LYS:CB	2.18	0.73
1:A:347:LYS:HE2	1:A:347:LYS:HA	1.69	0.73
2:B:13:LYS:HB2	2:B:16:MET:HG3	1.69	0.73
2:B:16:MET:CE	2:B:83:ARG:HA	2.18	0.73
2:B:229:TRP:HA	2:B:229:TRP:CE3	2.22	0.73
2:B:151:GLN:HB3	2:B:185:ASP:OD1	1.89	0.72
2:B:362:THR:CG2	2:B:367:GLN:HE21	1.99	0.72
2:B:13:LYS:HD2	2:B:16:MET:HE2	1.72	0.72
1:A:71:TRP:CD1	1:A:71:TRP:N	2.58	0.71
1:A:517:LEU:HA	1:A:520:GLN:NE2	2.05	0.71
2:B:270:ILE:O	2:B:272:PRO:HD3	1.89	0.71
2:B:348:ASN:HD22	2:B:351:THR:CG2	2.04	0.71
2:B:97:PRO:O	2:B:100:ILE:HG12	1.91	0.70
1:A:24:TRP:HZ2	1:A:61:PHE:HD2	1.36	0.70
1:A:395:LYS:HD3	1:A:414:TRP:CZ2	2.27	0.70
2:B:103:LYS:NZ	2:B:191:SER:HA	2.07	0.70
1:A:142:ILE:HD13	1:A:142:ILE:N	2.06	0.69
2:B:72:ARG:HH21	2:B:409:THR:HB	1.57	0.69
2:B:252:TRP:CZ3	2:B:260:LEU:HD22	2.28	0.68
1:A:61:PHE:HE1	1:A:63:ILE:HD11	1.59	0.68
2:B:16:MET:HE3	2:B:83:ARG:HA	1.75	0.68
2:B:40:GLU:OE2	2:B:43:LYS:HD2	1.94	0.68
1:A:522:ILE:O	1:A:526:ILE:HG13	1.94	0.67
2:B:353:LYS:NZ	2:B:428:GLN:HG3	2.09	0.67
2:B:374:LYS:O	2:B:377:THR:HG22	1.94	0.67
1:A:28:GLU:OE1	1:A:135:ILE:HG23	1.94	0.67
1:A:90:VAL:HG23	5:A:1001:HOH:O	1.94	0.67
1:A:225:PRO:HA	1:A:226:PRO:C	2.15	0.67
2:B:208:HIS:CE1	2:B:212:TRP:HZ3	2.13	0.67
1:A:239:TRP:NE1	1:A:316:GLY:HA3	2.09	0.66
1:A:61:PHE:CE1	1:A:74:LEU:HD23	2.30	0.66
1:A:28:GLU:O	1:A:32:LYS:HG3	1.96	0.66
1:A:347:LYS:HA	1:A:347:LYS:CE	2.26	0.66
1:A:246:LEU:HD12	1:A:307:ARG:HB3	1.75	0.66
2:B:237:ASP:OD1	2:B:238:LYS:HG2	1.94	0.66
1:A:406:TRP:CH2	2:B:418:ASN:HA	2.31	0.66
2:B:174:GLN:C	2:B:176:PRO:HD3	2.16	0.66
1:A:105:SER:HB2	1:A:198:HIS:CE1	2.30	0.65
1:A:301:LEU:O	1:A:305:GLU:HG3	1.95	0.65
1:A:473:THR:HG22	1:A:475:GLN:H	1.61	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:261:VAL:HG13	2:B:276:VAL:HG11	1.77	0.65
1:A:202:ILE:O	1:A:206:ARG:HG3	1.97	0.65
2:B:175:ASN:HD21	2:B:201:LYS:HZ2	1.44	0.65
1:A:408:ALA:HB1	2:B:364:ASP:HB3	1.77	0.64
2:B:254:VAL:O	2:B:258:GLN:HG3	1.98	0.64
2:B:379:SER:OG	2:B:387:PRO:HG3	1.98	0.64
2:B:104:LYS:HD2	2:B:192:ASP:O	1.97	0.64
2:B:332:GLN:HA	2:B:424:LYS:HE2	1.79	0.64
2:B:344:GLU:HB2	2:B:347:LYS:HG3	1.80	0.64
1:A:226:PRO:HG3	1:A:235:HIS:CE1	2.33	0.63
2:B:230:MET:C	2:B:232:TYR:H	2.01	0.63
2:B:101:LYS:O	2:B:236:PRO:HB2	1.98	0.63
1:A:197:GLN:HA	1:A:197:GLN:NE2	2.14	0.63
1:A:344:GLU:HG2	1:A:347:LYS:HG3	1.81	0.62
2:B:234:LEU:N	2:B:234:LEU:HD12	2.14	0.62
1:A:255:ASN:HD22	1:A:259:LYS:HE3	1.64	0.62
1:A:244:ILE:O	1:A:244:ILE:HG23	2.00	0.62
2:B:27:THR:OG1	2:B:30:LYS:HG2	1.98	0.62
2:B:106:VAL:HA	2:B:189:VAL:O	2.00	0.62
1:A:194:GLU:CD	1:A:194:GLU:H	2.03	0.62
2:B:175:ASN:HD21	2:B:201:LYS:CE	2.12	0.62
1:A:24:TRP:CZ2	1:A:61:PHE:HD2	2.17	0.62
1:A:61:PHE:CE1	1:A:63:ILE:HD11	2.35	0.62
1:A:218:ASP:HB3	1:A:221:HIS:ND1	2.15	0.62
1:A:12:LEU:HD11	1:A:127:TYR:CE1	2.35	0.61
1:A:197:GLN:HA	1:A:197:GLN:HE21	1.65	0.61
1:A:28:GLU:OE1	1:A:135:ILE:HA	2.00	0.61
2:B:30:LYS:HG3	5:B:1017:HOH:O	1.99	0.61
2:B:97:PRO:C	2:B:99:GLY:H	2.04	0.61
2:B:239:TRP:CZ3	2:B:378:GLU:HG3	2.35	0.61
1:A:455:ALA:HB3	1:A:467:VAL:O	2.00	0.61
1:A:54:ASN:HD22	1:A:143:ARG:HH21	1.49	0.61
1:A:340:GLN:HB3	1:A:351:THR:HG22	1.83	0.61
1:A:177:ASP:O	1:A:178:ILE:HD13	2.01	0.60
2:B:178:ILE:HG22	2:B:179:VAL:N	2.16	0.60
2:B:348:ASN:HD22	2:B:351:THR:HG22	1.67	0.59
2:B:46:LYS:HE2	2:B:116:PHE:HB3	1.84	0.59
1:A:28:GLU:CD	1:A:135:ILE:HG23	2.23	0.59
2:B:362:THR:HG22	2:B:367:GLN:NE2	2.04	0.59
1:A:253:THR:HG23	1:A:289:LEU:O	2.03	0.59
2:B:253:THR:O	2:B:257:ILE:HG12	2.03	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:277:ARG:O	2:B:281:LYS:HG3	2.01	0.59
2:B:362:THR:HG21	2:B:367:GLN:HG3	1.84	0.59
1:A:208:HIS:O	1:A:212:TRP:HD1	1.85	0.59
1:A:278:GLN:NE2	1:A:278:GLN:HA	2.17	0.59
1:A:498:ASP:HA	1:A:536:VAL:O	2.03	0.59
2:B:183:TYR:CE1	2:B:184:MET:HG2	2.38	0.58
1:A:308:GLU:HA	1:A:308:GLU:OE1	2.03	0.58
1:A:368:LEU:O	1:A:372:VAL:HG23	2.03	0.58
1:A:465:LYS:HG2	1:A:484:LEU:HD11	1.86	0.58
1:A:54:ASN:ND2	1:A:143:ARG:NH2	2.49	0.58
1:A:261:VAL:O	1:A:265:ASN:OD1	2.22	0.58
1:A:54:ASN:ND2	1:A:56:TYR:H	2.02	0.58
2:B:195:ILE:HG12	2:B:199:ARG:NE	2.15	0.58
2:B:298:GLU:CD	2:B:298:GLU:H	2.07	0.58
1:A:12:LEU:HD11	1:A:127:TYR:CZ	2.39	0.57
2:B:97:PRO:HG2	2:B:100:ILE:CD1	2.34	0.57
2:B:298:GLU:OE1	2:B:298:GLU:N	2.37	0.57
1:A:137:ASN:N	1:A:137:ASN:ND2	2.51	0.56
2:B:16:MET:HE1	2:B:83:ARG:HA	1.86	0.56
1:A:50:ILE:HD12	1:A:54:ASN:CB	2.35	0.56
1:A:137:ASN:N	1:A:137:ASN:HD22	2.03	0.56
1:A:475:GLN:HB3	1:A:501:TYR:CE2	2.39	0.56
1:A:474:ASN:O	1:A:478:GLU:HG3	2.04	0.56
1:A:516:GLU:O	1:A:520:GLN:HG3	2.05	0.56
2:B:158:ALA:O	2:B:161:GLN:HB2	2.05	0.56
2:B:202:ILE:O	2:B:205:LEU:HB3	2.05	0.56
1:A:393:ILE:HB	1:A:423:VAL:HG22	1.87	0.56
2:B:135:ILE:N	2:B:135:ILE:HD12	2.20	0.56
1:A:8:VAL:CG1	2:B:53:GLU:HG3	2.33	0.56
1:A:62:ALA:C	1:A:63:ILE:HD12	2.26	0.56
2:B:142:ILE:H	2:B:142:ILE:HD12	1.71	0.56
1:A:53:GLU:O	1:A:55:PRO:HD3	2.06	0.56
1:A:219:LYS:HD3	1:A:219:LYS:O	2.05	0.56
1:A:329:ILE:HD11	1:A:375:ILE:HD12	1.88	0.56
1:A:255:ASN:ND2	1:A:259:LYS:HE3	2.21	0.55
2:B:332:GLN:HB3	2:B:428:GLN:NE2	2.21	0.55
1:A:435:VAL:HG22	2:B:290:THR:HG21	1.86	0.55
1:A:479:LEU:HB3	1:A:517:LEU:HD13	1.89	0.55
1:A:401:TRP:HB2	1:A:425:LEU:HD11	1.88	0.55
2:B:195:ILE:O	2:B:199:ARG:HD2	2.06	0.55
2:B:276:VAL:O	2:B:277:ARG:C	2.43	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:7:THR:CG2	1:A:121:ASP:HA	2.36	0.55
2:B:100:ILE:HD13	2:B:179:VAL:HG11	1.87	0.55
2:B:282:LEU:HB3	2:B:293:ILE:HG21	1.89	0.55
1:A:142:ILE:H	1:A:142:ILE:CD1	2.08	0.55
2:B:353:LYS:HZ1	2:B:428:GLN:HG3	1.71	0.55
1:A:225:PRO:HD3	1:A:227:PHE:CZ	2.42	0.55
1:A:85:GLN:C	1:A:154:LYS:HZ3	2.09	0.54
1:A:132:ILE:HB	1:A:142:ILE:HG12	1.90	0.54
1:A:253:THR:HB	1:A:256:ASP:OD2	2.07	0.54
2:B:103:LYS:HE3	2:B:179:VAL:CG2	2.37	0.54
2:B:422:LEU:HD23	2:B:425:LEU:HD22	1.88	0.54
1:A:40:GLU:OE2	1:A:44:GLU:OE1	2.23	0.54
1:A:279:LEU:HD23	1:A:282:LEU:HD11	1.88	0.54
1:A:343:GLN:HG3	1:A:349:LEU:HD11	1.90	0.54
2:B:228:LEU:O	2:B:229:TRP:HB2	2.07	0.54
1:A:76:ASP:OD2	1:A:78:ARG:HG2	2.07	0.54
2:B:97:PRO:HG2	2:B:100:ILE:CG1	2.36	0.54
1:A:79:GLU:OE2	1:A:83:ARG:NH1	2.41	0.54
1:A:418:ASN:C	1:A:418:ASN:HD22	2.09	0.54
1:A:28:GLU:OE1	1:A:135:ILE:HG12	2.07	0.54
2:B:266:TRP:CZ3	2:B:426:TRP:HB3	2.43	0.54
2:B:77:PHE:CD2	2:B:80:LEU:HD23	2.43	0.54
2:B:175:ASN:N	2:B:176:PRO:HD3	2.23	0.53
2:B:390:LYS:HE2	2:B:415:GLU:OE1	2.08	0.53
1:A:8:VAL:HG13	2:B:53:GLU:CG	2.38	0.53
1:A:358:ARG:NH2	2:B:394:GLN:HG3	2.24	0.53
2:B:169:GLU:HB3	2:B:170:PRO:HD3	1.90	0.53
2:B:420:PRO:O	2:B:423:VAL:HG12	2.09	0.53
2:B:167:ILE:HG23	2:B:212:TRP:CE3	2.44	0.53
1:A:28:GLU:OE1	1:A:28:GLU:HA	2.09	0.53
1:A:114:ALA:HB1	1:A:160:PHE:CE2	2.43	0.53
1:A:57:ASN:HA	1:A:129:ALA:O	2.08	0.53
1:A:20:LYS:HG2	1:A:55:PRO:O	2.10	0.52
1:A:91:GLN:O	1:A:91:GLN:HG2	2.08	0.52
2:B:115:TYR:HB3	2:B:149:LEU:HB2	1.90	0.52
1:A:336:GLN:OE1	1:A:355:ALA:HB2	2.09	0.52
2:B:257:ILE:HB	2:B:283:LEU:HD11	1.92	0.52
1:A:532:TYR:OH	2:B:259:LYS:HE2	2.10	0.52
2:B:60:VAL:CG1	2:B:75:VAL:HG22	2.36	0.52
2:B:5:ILE:HG23	2:B:5:ILE:O	2.09	0.52
2:B:234:LEU:HD12	2:B:234:LEU:H	1.74	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:230:MET:HB3	2:B:232:TYR:HB2	1.91	0.52
2:B:64:LYS:HG2	2:B:65:LYS:N	2.25	0.52
2:B:332:GLN:HB3	2:B:428:GLN:HE22	1.75	0.52
2:B:8:VAL:O	2:B:10:VAL:HG23	2.10	0.52
2:B:163:SER:O	2:B:167:ILE:HG13	2.10	0.52
2:B:228:LEU:HD11	2:B:409:THR:HG23	1.92	0.51
1:A:253:THR:HG23	1:A:255:ASN:H	1.76	0.51
1:A:458:VAL:HG23	1:A:458:VAL:O	2.11	0.51
2:B:160:PHE:O	2:B:160:PHE:CD1	2.64	0.51
1:A:7:THR:HG21	1:A:121:ASP:HA	1.92	0.51
1:A:417:VAL:O	1:A:417:VAL:HG13	2.09	0.51
2:B:64:LYS:HG2	2:B:65:LYS:H	1.76	0.51
1:A:328:GLU:O	1:A:339:TYR:HA	2.09	0.51
1:A:339:TYR:CD1	1:A:339:TYR:C	2.84	0.51
1:A:517:LEU:CA	1:A:520:GLN:HE21	2.17	0.51
2:B:186:ASP:OD1	2:B:228:LEU:HD12	2.11	0.51
1:A:363:ASN:HA	1:A:511:ASP:CG	2.31	0.50
1:A:406:TRP:CZ3	2:B:418:ASN:HA	2.45	0.50
1:A:61:PHE:CZ	1:A:74:LEU:HD23	2.46	0.50
2:B:13:LYS:HB2	2:B:16:MET:CE	2.41	0.50
1:A:240:THR:OG1	1:A:241:VAL:N	2.40	0.50
1:A:289:LEU:HD12	1:A:289:LEU:N	2.27	0.50
2:B:276:VAL:O	2:B:279:LEU:N	2.45	0.50
2:B:365:VAL:O	2:B:369:THR:HG23	2.12	0.50
1:A:56:TYR:O	1:A:143:ARG:NH2	2.37	0.49
2:B:230:MET:C	2:B:232:TYR:N	2.65	0.49
1:A:205:LEU:HD22	1:A:209:LEU:HG	1.94	0.49
1:A:282:LEU:O	1:A:293:ILE:HD13	2.12	0.49
1:A:347:LYS:HE2	1:A:347:LYS:CA	2.41	0.49
1:A:181:TYR:CE1	1:A:183:TYR:HB2	2.47	0.49
1:A:320:ASP:OD1	1:A:322:SER:OG	2.29	0.49
1:A:286:THR:HG22	1:A:293:ILE:CD1	2.33	0.49
2:B:263:LYS:HE3	2:B:426:TRP:O	2.13	0.49
1:A:31:ILE:HD11	1:A:133:PRO:HB2	1.95	0.49
1:A:393:ILE:HB	1:A:423:VAL:CG2	2.43	0.49
2:B:328:GLU:O	2:B:339:TYR:HA	2.12	0.49
1:A:317:VAL:HG12	1:A:318:TYR:N	2.27	0.49
2:B:303:LEU:HD21	2:B:307:ARG:HH21	1.78	0.48
2:B:252:TRP:HB3	2:B:257:ILE:HD11	1.95	0.48
1:A:134:SER:HB2	1:A:139:THR:O	2.14	0.48
2:B:241:VAL:HG11	2:B:313:PRO:HG3	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:271:TYR:O	2:B:274:ILE:HG12	2.14	0.48
1:A:193:LEU:HD13	1:A:197:GLN:HG3	1.95	0.48
2:B:97:PRO:C	2:B:99:GLY:N	2.63	0.48
2:B:100:ILE:CD1	2:B:179:VAL:CG1	2.92	0.48
2:B:227:PHE:HB3	2:B:230:MET:O	2.13	0.48
1:A:79:GLU:HG3	1:A:83:ARG:HD2	1.95	0.48
1:A:169:GLU:O	1:A:172:ARG:HB2	2.14	0.48
2:B:24:TRP:CG	2:B:25:PRO:HD2	2.48	0.48
2:B:345:PRO:C	2:B:347:LYS:H	2.17	0.48
1:A:226:PRO:HA	1:A:234:LEU:O	2.14	0.48
1:A:282:LEU:HB3	1:A:293:ILE:HG21	1.95	0.47
2:B:260:LEU:O	2:B:264:LEU:HG	2.14	0.47
1:A:97:PRO:O	1:A:100:ILE:HG12	2.14	0.47
1:A:169:GLU:N	1:A:170:PRO:HD2	2.29	0.47
1:A:283:LEU:O	1:A:286:THR:HG23	2.13	0.47
1:A:340:GLN:HA	1:A:351:THR:HA	1.96	0.47
1:A:24:TRP:HE1	1:A:61:PHE:HB3	1.80	0.47
1:A:10:VAL:HG12	1:A:11:LYS:N	2.30	0.47
1:A:41:MET:SD	1:A:73:LYS:HE2	2.55	0.47
1:A:79:GLU:O	1:A:83:ARG:HG3	2.15	0.47
2:B:100:ILE:CD1	2:B:179:VAL:HG11	2.43	0.47
1:A:208:HIS:O	1:A:212:TRP:CD1	2.67	0.47
1:A:489:SER:OG	1:A:493:VAL:HG21	2.15	0.47
2:B:266:TRP:CE3	2:B:426:TRP:HB3	2.49	0.47
2:B:299:ALA:O	2:B:302:GLU:HB3	2.14	0.47
1:A:420:PRO:HA	1:A:421:PRO:C	2.35	0.47
2:B:305:GLU:O	2:B:309:ILE:HG13	2.15	0.47
1:A:28:GLU:CG	1:A:135:ILE:HG23	2.46	0.47
2:B:274:ILE:HA	2:B:306:ASN:OD1	2.14	0.47
1:A:206:ARG:HH12	1:A:218:ASP:HA	1.81	0.46
1:A:289:LEU:N	1:A:289:LEU:CD1	2.77	0.46
1:A:344:GLU:CB	1:A:347:LYS:HB2	2.38	0.46
2:B:228:LEU:HD23	2:B:228:LEU:HA	1.57	0.46
2:B:24:TRP:CD1	2:B:25:PRO:HD2	2.51	0.46
2:B:270:ILE:HG12	2:B:346:PHE:HB3	1.98	0.46
1:A:58:THR:CG2	1:A:76:ASP:O	2.64	0.46
2:B:180:ILE:HD12	2:B:189:VAL:HG22	1.98	0.46
2:B:421:PRO:O	2:B:425:LEU:HD13	2.16	0.46
1:A:363:ASN:HA	1:A:511:ASP:OD1	2.15	0.46
2:B:362:THR:HG21	2:B:367:GLN:CG	2.46	0.46
1:A:465:LYS:HZ3	1:A:484:LEU:HD21	1.80	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:284:ARG:O	2:B:287:LYS:HE2	2.15	0.46
1:A:91:GLN:HE22	1:A:183:TYR:HE2	1.64	0.46
1:A:281:LYS:HE3	1:A:284:ARG:CZ	2.46	0.46
2:B:116:PHE:CZ	2:B:151:GLN:HG3	2.50	0.46
2:B:242:GLN:NE2	2:B:243:PRO:O	2.45	0.46
1:A:226:PRO:HG3	1:A:235:HIS:HE1	1.79	0.46
2:B:13:LYS:HB2	2:B:16:MET:HE3	1.97	0.46
2:B:23:GLN:OE1	2:B:59:PRO:HA	2.16	0.46
1:A:101:LYS:N	1:A:101:LYS:CD	2.74	0.46
1:A:330:GLN:NE2	1:A:340:GLN:OE1	2.44	0.46
2:B:103:LYS:HA	2:B:103:LYS:HD2	1.70	0.46
2:B:340:GLN:HB3	2:B:348:ASN:ND2	2.31	0.46
1:A:27:THR:HG22	1:A:29:GLU:N	2.26	0.46
1:A:501:TYR:CE1	1:A:505:ILE:HD11	2.51	0.46
1:A:472:THR:OG1	1:A:473:THR:N	2.49	0.45
2:B:65:LYS:HG3	2:B:70:LYS:O	2.15	0.45
1:A:129:ALA:HA	1:A:144:TYR:O	2.17	0.45
1:A:279:LEU:HA	1:A:282:LEU:CD1	2.47	0.45
1:A:399:GLU:O	1:A:402:TRP:HB3	2.15	0.45
2:B:353:LYS:NZ	2:B:428:GLN:CG	2.79	0.45
1:A:27:THR:CG2	1:A:29:GLU:HB3	2.47	0.45
1:A:63:ILE:HD12	1:A:63:ILE:N	2.31	0.45
1:A:95:PRO:O	1:A:229:TRP:HH2	1.98	0.45
1:A:107:THR:HG21	1:A:202:ILE:HD12	1.97	0.45
2:B:175:ASN:ND2	2:B:201:LYS:HD2	2.32	0.45
1:A:239:TRP:CD1	1:A:316:GLY:C	2.90	0.45
1:A:255:ASN:O	1:A:259:LYS:HG3	2.16	0.45
2:B:183:TYR:CE1	2:B:184:MET:CG	2.99	0.45
1:A:95:PRO:HB3	2:B:136:ASN:O	2.16	0.45
1:A:100:ILE:HD11	1:A:318:TYR:CE1	2.51	0.45
1:A:120:LEU:O	1:A:121:ASP:C	2.54	0.45
1:A:204:GLU:O	1:A:207:GLN:HB2	2.16	0.45
1:A:438:GLU:HB2	1:A:461:ARG:NH1	2.31	0.45
2:B:51:GLY:HA3	2:B:53:GLU:OE2	2.17	0.45
2:B:161:GLN:HE21	2:B:161:GLN:HB3	1.46	0.45
1:A:391:LEU:C	1:A:417:VAL:HG12	2.38	0.45
1:A:463:ARG:NH2	1:A:488:ASP:O	2.50	0.45
1:A:40:GLU:OE2	1:A:40:GLU:CA	2.64	0.44
1:A:433:PRO:HA	1:A:532:TYR:CG	2.53	0.44
2:B:350:LYS:HG2	2:B:351:THR:N	2.32	0.44
1:A:500:GLN:O	1:A:503:LEU:HB3	2.16	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:74:LEU:HD12	1:A:74:LEU:HA	1.74	0.44
1:A:465:LYS:NZ	1:A:484:LEU:HD21	2.33	0.44
1:A:518:VAL:O	1:A:522:ILE:HG13	2.16	0.44
2:B:57:ASN:HD22	2:B:143:ARG:NH1	2.14	0.44
2:B:78:ARG:HD2	2:B:413:GLU:OE1	2.17	0.44
1:A:173:LYS:O	1:A:176:PRO:HD3	2.17	0.44
1:A:206:ARG:NH1	1:A:218:ASP:HA	2.33	0.44
1:A:344:GLU:O	1:A:347:LYS:HB2	2.16	0.44
2:B:50:ILE:CG2	2:B:145:GLN:HB3	2.48	0.44
2:B:203:GLU:OE1	2:B:206:ARG:HD3	2.18	0.44
2:B:103:LYS:HE3	2:B:179:VAL:HG21	2.00	0.44
1:A:178:ILE:HD11	1:A:193:LEU:HD11	1.99	0.44
1:A:210:LEU:CD2	1:A:215:THR:HA	2.47	0.44
1:A:477:THR:CG2	1:A:478:GLU:N	2.80	0.44
1:A:517:LEU:HD22	1:A:521:ILE:HD11	2.00	0.44
1:A:398:TRP:CE2	1:A:411:ILE:HD12	2.53	0.44
2:B:135:ILE:N	2:B:135:ILE:CD1	2.81	0.44
1:A:41:MET:HG2	1:A:46:LYS:HZ1	1.83	0.44
1:A:255:ASN:OD1	1:A:289:LEU:HB3	2.18	0.44
2:B:206:ARG:O	2:B:209:LEU:HB2	2.17	0.44
1:A:139:THR:HA	1:A:140:PRO:HD3	1.83	0.43
1:A:218:ASP:CB	1:A:221:HIS:ND1	2.79	0.43
2:B:169:GLU:O	2:B:172:ARG:HB3	2.18	0.43
1:A:325:LEU:HB3	1:A:387:PRO:HB3	2.00	0.43
1:A:407:GLN:HG2	2:B:393:ILE:HA	1.99	0.43
2:B:50:ILE:HG23	2:B:145:GLN:HB3	2.00	0.43
2:B:203:GLU:OE1	2:B:203:GLU:HA	2.18	0.43
1:A:89:GLU:OE1	1:A:92:LEU:N	2.52	0.43
1:A:40:GLU:OE2	1:A:40:GLU:HA	2.19	0.43
1:A:271:TYR:CE1	1:A:314:VAL:HG22	2.52	0.43
1:A:348:ASN:ND2	1:A:351:THR:CG2	2.82	0.43
1:A:478:GLU:HB3	1:A:499:SER:HB2	2.00	0.43
1:A:8:VAL:O	1:A:121:ASP:HB2	2.18	0.43
1:A:270:ILE:O	1:A:272:PRO:HD3	2.18	0.43
1:A:426:TRP:CD1	1:A:426:TRP:N	2.86	0.43
1:A:503:LEU:HD11	1:A:507:GLN:NE2	2.34	0.43
2:B:336:GLN:HE21	2:B:336:GLN:HB2	1.59	0.43
1:A:134:SER:HB3	1:A:139:THR:HB	2.00	0.43
1:A:242:GLN:HB2	1:A:243:PRO:HD2	2.00	0.43
1:A:271:TYR:OH	1:A:313:PRO:HA	2.19	0.43
2:B:178:ILE:CG2	2:B:179:VAL:N	2.80	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:234:LEU:HB3	2:B:239:TRP:HZ2	1.83	0.43
2:B:377:THR:HG23	2:B:378:GLU:N	2.33	0.43
2:B:418:ASN:O	2:B:420:PRO:HD3	2.19	0.43
1:A:20:LYS:HE2	1:A:55:PRO:HB2	2.01	0.43
1:A:164:MET:HG3	1:A:168:LEU:HD22	2.01	0.43
2:B:103:LYS:HZ3	2:B:191:SER:HA	1.83	0.43
1:A:170:PRO:O	1:A:173:LYS:N	2.52	0.43
1:A:27:THR:O	1:A:30:LYS:N	2.52	0.43
2:B:72:ARG:HG3	2:B:72:ARG:HH11	1.82	0.43
1:A:31:ILE:HD13	1:A:133:PRO:O	2.19	0.43
1:A:235:HIS:O	4:A:999:HBQ:H6	2.18	0.42
2:B:365:VAL:HG11	2:B:401:TRP:HB2	1.99	0.42
1:A:105:SER:HB2	1:A:198:HIS:ND1	2.34	0.42
1:A:516:GLU:O	1:A:517:LEU:C	2.57	0.42
2:B:100:ILE:HD13	2:B:100:ILE:N	2.35	0.42
2:B:169:GLU:CB	2:B:170:PRO:HD3	2.49	0.42
2:B:169:GLU:CG	2:B:173:LYS:NZ	2.81	0.42
1:A:50:ILE:HD12	1:A:54:ASN:HB3	2.01	0.42
1:A:320:ASP:CG	1:A:322:SER:HG	2.21	0.42
2:B:234:LEU:N	2:B:234:LEU:CD1	2.81	0.42
2:B:244:ILE:HD13	2:B:266:TRP:CZ3	2.55	0.42
1:A:237:ASP:OD1	1:A:238:LYS:HG2	2.19	0.42
2:B:377:THR:CG2	2:B:378:GLU:N	2.82	0.42
1:A:253:THR:O	1:A:254:VAL:C	2.58	0.42
1:A:411:ILE:O	1:A:412:PRO:O	2.37	0.42
1:A:253:THR:O	1:A:256:ASP:N	2.53	0.42
1:A:402:TRP:HE1	2:B:364:ASP:CG	2.23	0.42
1:A:536:VAL:HA	1:A:537:PRO:HD3	1.85	0.42
2:B:58:THR:HG23	2:B:76:ASP:O	2.19	0.42
1:A:168:LEU:O	1:A:169:GLU:C	2.58	0.42
1:A:279:LEU:O	1:A:280:CSD:C	2.67	0.42
2:B:348:ASN:ND2	2:B:351:THR:HG22	2.33	0.42
1:A:432:GLU:OE2	1:A:433:PRO:HD2	2.20	0.42
2:B:423:VAL:HG13	2:B:424:LYS:N	2.35	0.42
1:A:246:LEU:HD13	1:A:303:LEU:CD1	2.50	0.41
1:A:325:LEU:O	1:A:326:ILE:HD13	2.20	0.41
2:B:261:VAL:HG22	2:B:276:VAL:HG13	2.02	0.41
1:A:142:ILE:N	1:A:142:ILE:CD1	2.76	0.41
1:A:326:ILE:O	1:A:341:ILE:HA	2.20	0.41
1:A:398:TRP:CZ2	1:A:411:ILE:HD12	2.56	0.41
2:B:173:LYS:O	2:B:176:PRO:HD3	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:195:ILE:CG2	2:B:196:GLY:N	2.84	0.41
2:B:234:LEU:H	2:B:234:LEU:CD1	2.32	0.41
2:B:270:ILE:O	2:B:272:PRO:CD	2.63	0.41
2:B:320:ASP:OD1	2:B:322:SER:OG	2.36	0.41
1:A:134:SER:OG	1:A:140:PRO:C	2.59	0.41
1:A:281:LYS:O	1:A:284:ARG:HG3	2.21	0.41
2:B:115:TYR:C	2:B:117:SER:H	2.24	0.41
2:B:239:TRP:CE3	2:B:378:GLU:HG3	2.55	0.41
1:A:304:ALA:HA	1:A:307:ARG:HG2	2.01	0.41
2:B:169:GLU:CG	2:B:173:LYS:HZ1	2.33	0.41
2:B:249:LYS:HB3	2:B:249:LYS:HE2	1.74	0.41
2:B:300:GLU:OE1	2:B:300:GLU:HA	2.21	0.41
1:A:162:SER:HB2	2:B:52:PRO:HG3	2.02	0.41
1:A:210:LEU:HD21	1:A:215:THR:HA	2.02	0.41
2:B:136:ASN:HB3	2:B:138:GLU:OE2	2.21	0.41
2:B:325:LEU:HD21	2:B:383:TRP:CE3	2.55	0.41
1:A:239:TRP:O	1:A:316:GLY:N	2.41	0.41
1:A:246:LEU:HD22	1:A:260:LEU:HD11	2.03	0.41
1:A:278:GLN:NE2	1:A:278:GLN:CA	2.80	0.41
1:A:521:ILE:O	1:A:524:GLN:HB2	2.20	0.41
2:B:236:PRO:HA	2:B:239:TRP:CD2	2.56	0.41
2:B:241:VAL:O	2:B:241:VAL:HG13	2.21	0.41
1:A:463:ARG:NH1	5:A:1013:HOH:O	2.54	0.41
2:B:421:PRO:O	2:B:425:LEU:CD1	2.69	0.41
2:B:252:TRP:CH2	2:B:260:LEU:HD22	2.56	0.40
1:A:228:LEU:HD23	1:A:228:LEU:HA	1.93	0.40
1:A:494:ASN:HB3	2:B:289:LEU:HD22	2.03	0.40
2:B:40:GLU:OE1	2:B:44:GLU:OE2	2.40	0.40
1:A:530:LYS:HA	5:A:1010:HOH:O	2.21	0.40
2:B:99:GLY:O	2:B:103:LYS:HG2	2.22	0.40
2:B:274:ILE:HG23	2:B:306:ASN:OD1	2.22	0.40
2:B:278:GLN:CD	2:B:298:GLU:HB3	2.42	0.40
2:B:241:VAL:O	2:B:243:PRO:HD3	2.22	0.40
2:B:380:ILE:O	2:B:384:GLY:N	2.52	0.40
2:B:261:VAL:HG22	2:B:276:VAL:CG1	2.51	0.40
2:B:371:ALA:O	2:B:372:VAL:C	2.57	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	509/534 (95%)	462 (91%)	38 (8%)	9 (2%)	8	28
2	B	392/424 (92%)	347 (88%)	40 (10%)	5 (1%)	12	36
All	All	901/958 (94%)	809 (90%)	78 (9%)	14 (2%)	9	31

All (14) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	403	THR
1	A	412	PRO
2	B	250	ASP
2	B	277	ARG
1	A	402	TRP
2	B	116	PHE
1	A	91	GLN
1	A	170	PRO
1	A	270	ILE
2	B	170	PRO
1	A	92	LEU
1	A	345	PRO
2	B	229	TRP
1	A	195	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	465/479 (97%)	416 (90%)	49 (10%)	7	20
2	B	365/386 (95%)	332 (91%)	33 (9%)	9	28
All	All	830/865 (96%)	748 (90%)	82 (10%)	8	23

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

Mol	Chain	Res	Type
1	A	5	ILE
1	A	6	GLU
1	A	7	THR
1	A	21	VAL
1	A	22	LYS
1	A	24	TRP
1	A	40	GLU
1	A	44	GLU
1	A	46	LYS
1	A	53	GLU
1	A	54	ASN
1	A	71	TRP
1	A	89	GLU
1	A	91	GLN
1	A	97	PRO
1	A	105	SER
1	A	109	LEU
1	A	126	LYS
1	A	137	ASN
1	A	138	GLU
1	A	142	ILE
1	A	168	LEU
1	A	182	GLN
1	A	186	ASP
1	A	194	GLU
1	A	205	LEU
1	A	210	LEU
1	A	218	ASP
1	A	237	ASP
1	A	253	THR
1	A	255	ASN
1	A	323	LYS
1	A	340	GLN
1	A	345	PRO
1	A	347	LYS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	362	THR
1	A	368	LEU
1	A	385	LYS
1	A	403	THR
1	A	415	GLU
1	A	418	ASN
1	A	443	ASP
1	A	479	LEU
1	A	480	GLN
1	A	484	LEU
1	A	491	LEU
1	A	507	GLN
1	A	517	LEU
1	A	527	LYS
2	B	16	MET
2	B	34	LEU
2	B	53	GLU
2	B	55	PRO
2	B	60	VAL
2	B	86	ASP
2	B	103	LYS
2	B	107	THR
2	B	122	GLU
2	B	161	GLN
2	B	163	SER
2	B	179	VAL
2	B	199	ARG
2	B	212	TRP
2	B	225	PRO
2	B	228	LEU
2	B	234	LEU
2	B	259	LYS
2	B	280	CYS
2	B	283	LEU
2	B	284	ARG
2	B	298	GLU
2	B	317	VAL
2	B	319	TYR
2	B	322	SER
2	B	330	GLN
2	B	336	GLN
2	B	368	LEU

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Mol	Chain	Res	Type
2	B	374	LYS
2	B	388	LYS
2	B	410	TRP
2	B	413	GLU
2	B	414	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (26) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	54	ASN
1	A	91	GLN
1	A	136	ASN
1	A	137	ASN
1	A	197	GLN
1	A	235	HIS
1	A	278	GLN
1	A	407	GLN
1	A	418	ASN
1	A	475	GLN
1	A	480	GLN
1	A	500	GLN
1	A	509	GLN
1	A	520	GLN
2	B	57	ASN
2	B	137	ASN
2	B	147	ASN
2	B	161	GLN
2	B	175	ASN
2	B	255	ASN
2	B	278	GLN
2	B	330	GLN
2	B	336	GLN
2	B	348	ASN
2	B	367	GLN
2	B	428	GLN

### 5.3.3 RNA

There are no RNA molecules in this entry.



## 5.4 Non-standard residues in protein, DNA, RNA chains

1 non-standard protein/DNA/RNA residue is 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
1	CSD	A	280	1	3,7,8	1.03	0	1,8,10	11.47	1 (100%)

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
1	CSD	A	280	1	-	2/2/6/8	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	280	CSD	OD1-SG-CB	11.47	127.36	105.54

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	280	CSD	N-CA-CB-SG
1	A	280	CSD	CA-CB-SG-OD1

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	280	CSD	1	0

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

2 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
4	HBQ	A	999	-	21,21,21	2.05	7 (33%)	28,30,30	1.06	1 (3%)
3	PO4	A	1301	-	4,4,4	1.72	0	6,6,6	0.46	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '–' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	HBQ	A	999	-	-	0/10/26/26	0/2/2/2

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	999	HBQ	C11-N1	4.84	1.44	1.37
4	A	999	HBQ	O3-C11	4.07	1.27	1.21
4	A	999	HBQ	C3-N1	3.04	1.47	1.42
4	A	999	HBQ	C1-N2	2.87	1.38	1.34
4	A	999	HBQ	C6-C5	2.55	1.43	1.38
4	A	999	HBQ	C2-N1	2.42	1.50	1.47
4	A	999	HBQ	C4-C3	2.15	1.43	1.40

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	999	HBQ	O2-C12-C13	-2.29	101.07	107.14

There are no chirality outliers.

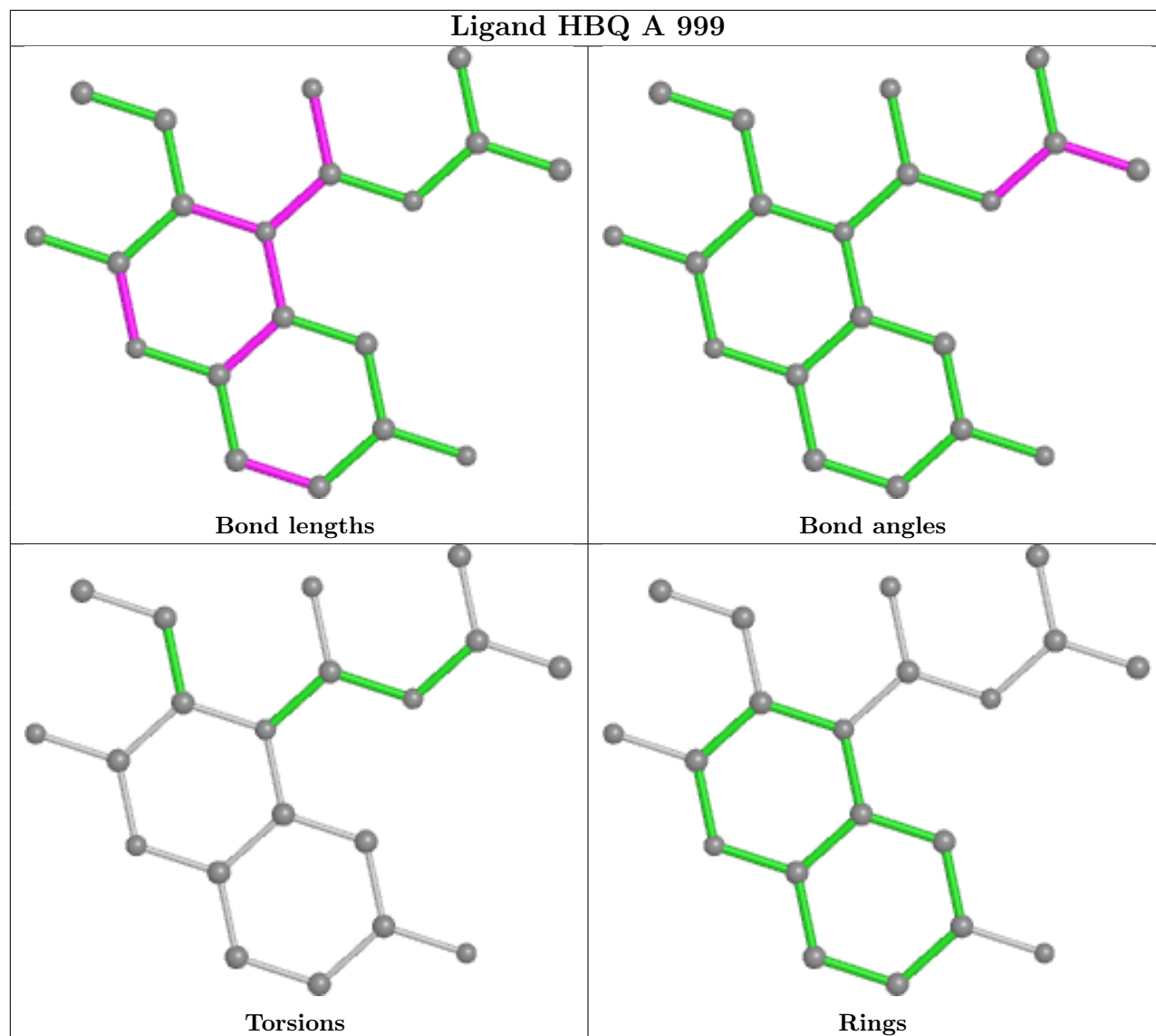
There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	999	HBQ	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, 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	515/534 (96%)	-0.35	6 (1%) 79 73	27, 56, 97, 122	0
2	B	400/424 (94%)	-0.14	14 (3%) 44 34	24, 56, 106, 132	0
All	All	915/958 (95%)	-0.26	20 (2%) 62 52	24, 56, 101, 132	0

All (20) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	231	GLY	4.6
1	A	470	THR	4.3
1	A	469	LEU	4.2
2	B	232	TYR	3.3
2	B	229	TRP	3.0
1	A	243	PRO	2.9
2	B	210	LEU	2.7
1	A	63	ILE	2.7
2	B	67	ASP	2.6
2	B	211	ARG	2.6
2	B	204	GLU	2.5
2	B	362	THR	2.4
2	B	237	ASP	2.4
2	B	200	THR	2.3
1	A	402	TRP	2.2
1	A	471	ASP	2.2
2	B	284	ARG	2.2
2	B	334	GLN	2.2
2	B	356	ARG	2.2
2	B	322	SER	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [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(Å <sup>2</sup> )	Q<0.9
1	CSD	A	280	8/9	0.97	0.14	45,52,74,74	0

## 6.3 Carbohydrates [i](#)

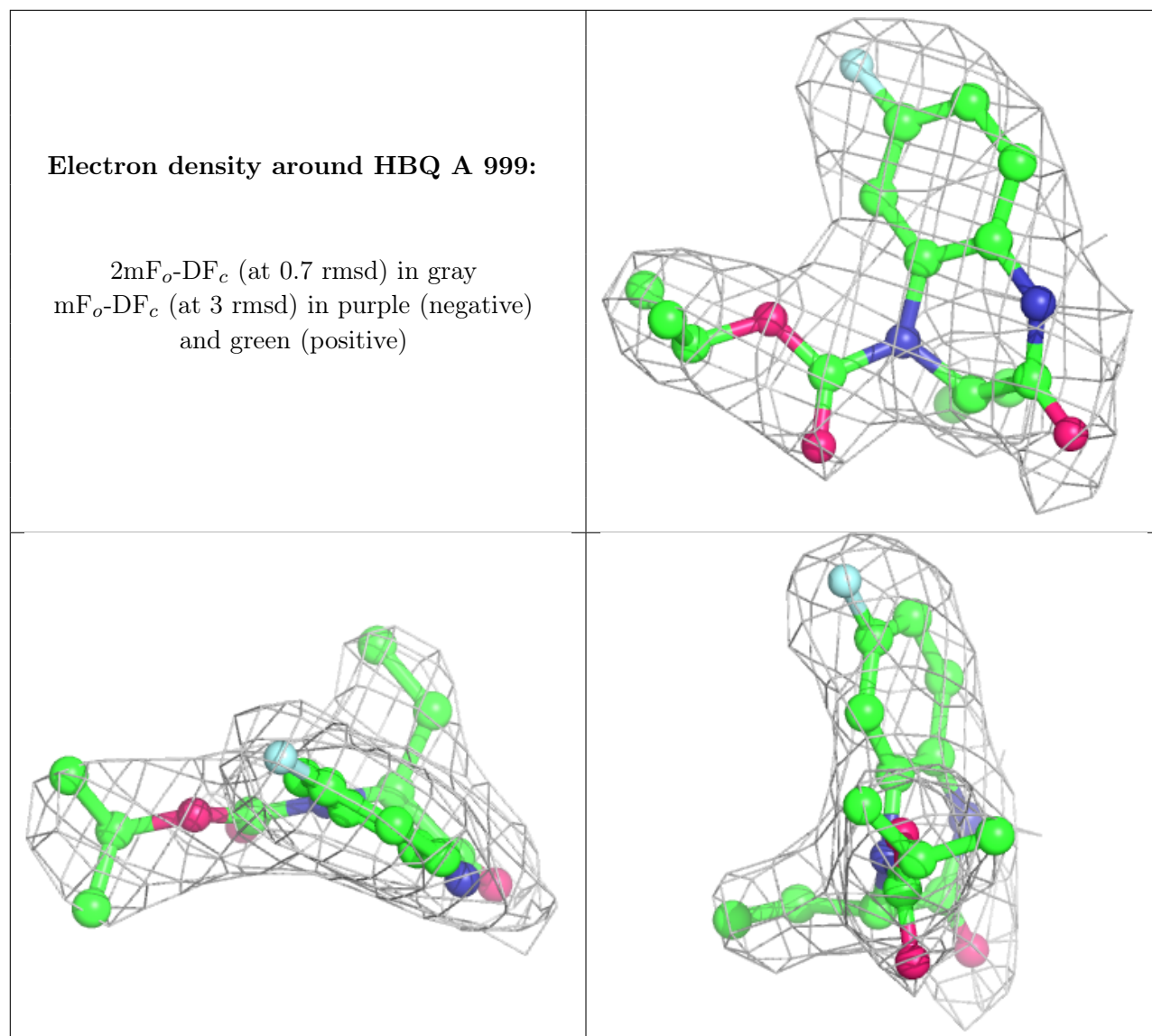
There are no monosaccharides in this entry.

## 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(Å <sup>2</sup> )	Q<0.9
3	PO4	A	1301	5/5	0.94	0.24	123,127,131,133	0
4	HBQ	A	999	20/20	0.98	0.19	25,36,48,55	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.



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

There are no such residues in this entry.