



Full wwPDB EM Validation Report ⓘ

Jan 23, 2024 – 08:07 PM JST

PDB ID : 8HWD
EMDB ID : EMD-35054
Title : Cryo-EM Structure of D5 ADP form
Authors : Li, Y.N.; Zhu, J.; Guo, Y.Y.; Yan, R.H.
Deposited on : 2022-12-29
Resolution : 3.30 Å (reported)

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : **FAILED**
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

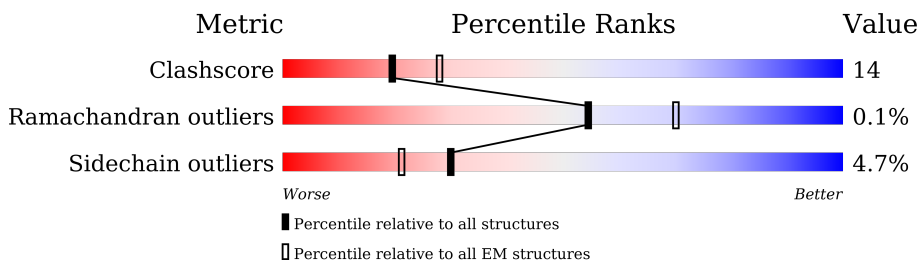
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.30 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)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	785	
1	B	785	
1	C	785	
1	D	785	
1	E	785	
1	F	785	

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
2	ADP	D	1001	-	-	X	-

2 Entry composition [i](#)

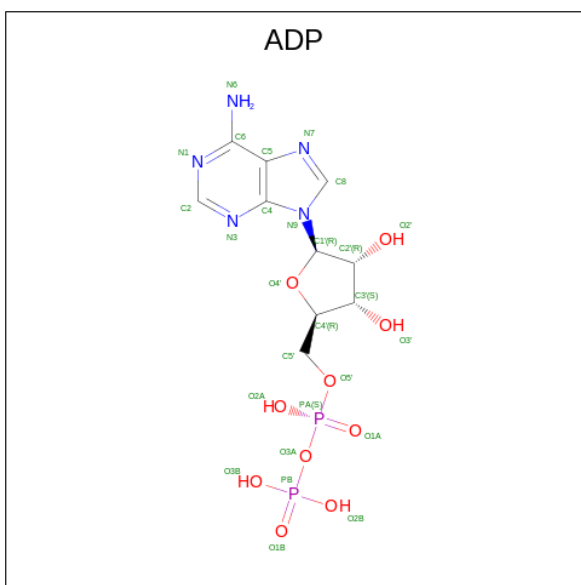
There are 2 unique types of molecules in this entry. The entry contains 15029 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Primase D5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	308	Total 2505	C 1603	N 427	O 461	S 14	0	0
1	F	258	Total 2092	C 1338	N 354	O 388	S 12	0	0
1	D	299	Total 2427	C 1548	N 412	O 455	S 12	0	0
1	E	247	Total 2012	C 1293	N 335	O 373	S 11	0	0
1	C	344	Total 2786	C 1772	N 478	O 522	S 14	0	0
1	B	378	Total 3045	C 1939	N 518	O 572	S 16	0	0

- Molecule 2 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).

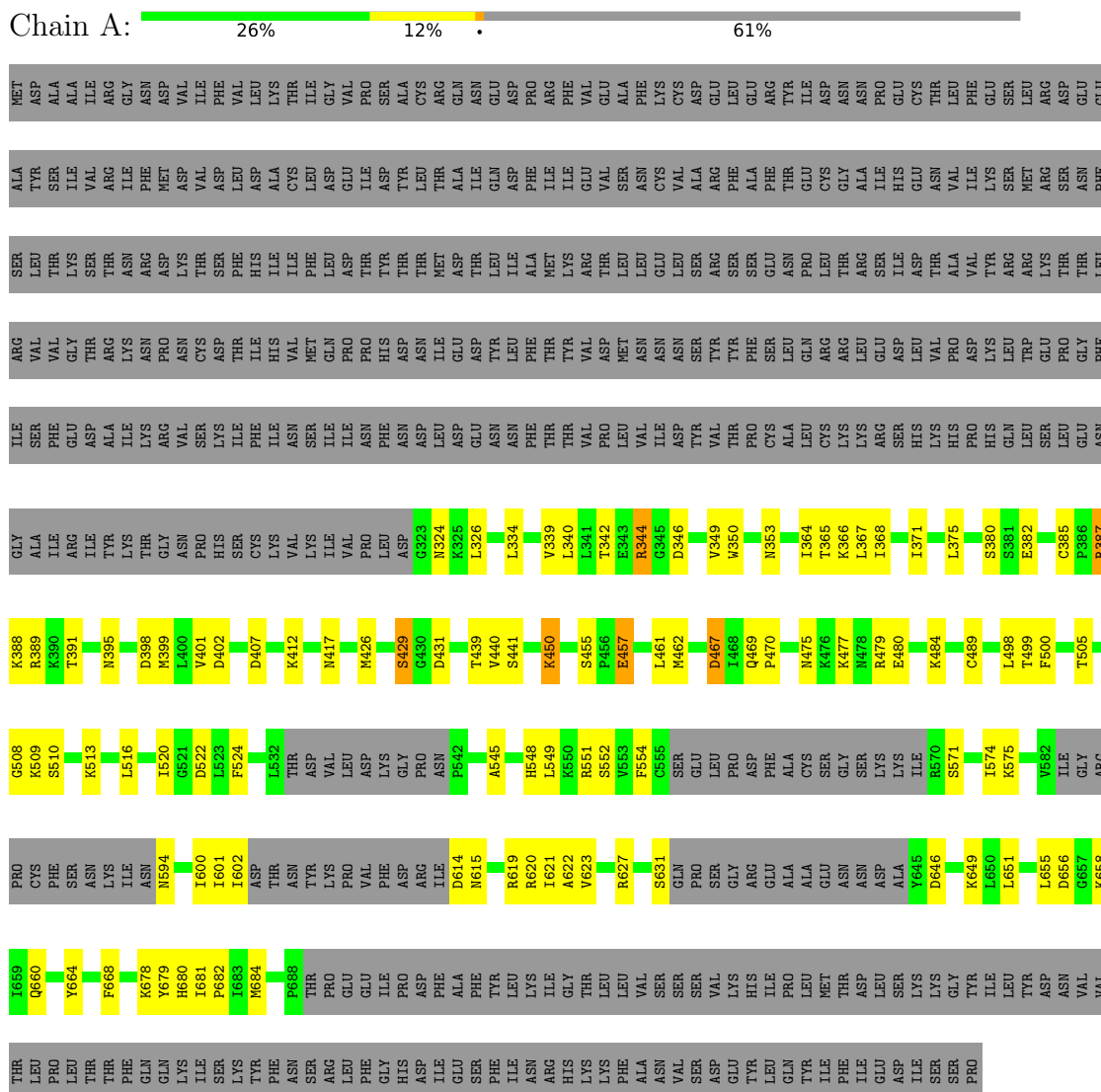


Mol	Chain	Residues	Atoms					AltConf
2	A	1	Total	C	N	O	P	0
			27	10	5	10	2	
2	F	1	Total	C	N	O	P	0
			27	10	5	10	2	
2	D	1	Total	C	N	O	P	0
			27	10	5	10	2	
2	E	1	Total	C	N	O	P	0
			27	10	5	10	2	
2	C	1	Total	C	N	O	P	0
			27	10	5	10	2	
2	B	1	Total	C	N	O	P	0
			27	10	5	10	2	

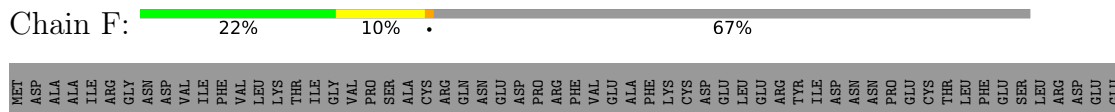
3 Residue-property plots

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. 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. 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: Primase D5



- Molecule 1: Primase D5



GLY	K390	T507	I601	HIS	TYR
ALA	T391	G508	I602	ILE	LEU
ILE	V392	K509	K607	PRO	GLN
ARG	E393	S510	R612	LEU	TYR
ILE		T511	I613	MET	ILE
TYR	R397	K517	D614	THR	PHE
LYS	D398		M615	ASP	ILE
THR		D522	A616	LEU	GLU
GLY	V401	L523	A622	SER	ASP
ASN	D402	F524	V623	LYS	ILE
PRO	S403	Q529	V624	LYS	SER
HIS	V404	T530	R625	GLY	SER
SER	E405	I531	H629	TYR	PRO
CYS	T406	L532	A639	ILE	
LYS	D407	T533	Y645	LEU	
VAL		D534	D646	THR	
LYS	K412	V536	K647	LEU	
ILE	M417	L536	V648	PRO	
VAL		P542	L651	THR	
PRO	G430	F543	D652	THR	
LEU	S441	I544	L655	PHE	
LEU	K445	M547	D656	GLN	
ASP	F446	H548	L657	GLN	
G323	D447	R551	D657	LYS	
	E460	F554	K658	ILE	
L326	I464	C555	L671	SER	
	P470	C563	L672	LYS	
S338	L471	K567	W675	SER	
D346	D473	K568	Y679	ARG	
H347	M478	I569		LEU	
I348	R479	I574		LEU	
K349	E483	K575		PHE	
W350	K484	K576		GLY	
N352	S359	L577		GLY	
I351	T485	T578		HIS	
N353	L490	E579		ASP	
S354	C491	P580		ASP	
K356	T494	C581		ILE	
F357	K495	V582		GLU	
N358	G496	R585		PHE	
S359	C497	P586		PHE	
E360	L498	S589		ILE	
E361	T499	N593		ASN	
P362	F500	M594		ARG	
L363	F501	R595		HIS	
T365	F502	R596		LYS	
I367	G503	H597		LYS	
I368	E504			THR	
L369	T506			LYS	
	A506			LEU	
				LEU	
				LEU	
				VAL	
				SER	
				SER	
				SER	
				VAL	
				SER	
				SER	
				VAL	
				ASP	
				VAL	
				LYS	

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	621428	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor

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: ADP

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	0.25	0/2550	0.50	0/3430
1	B	0.26	0/3108	0.52	0/4198
1	C	0.26	0/2839	0.52	0/3828
1	D	0.33	0/2472	0.55	0/3328
1	E	0.24	0/2050	0.48	0/2757
1	F	0.26	0/2129	0.50	0/2863
All	All	0.27	0/15148	0.51	0/20404

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2505	0	2541	72	0
1	B	3045	0	3055	83	0
1	C	2786	0	2803	64	0
1	D	2427	0	2438	114	0
1	E	2012	0	2038	45	0
1	F	2092	0	2125	64	0
2	A	27	0	12	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	27	0	12	5	0
2	C	27	0	12	1	0
2	D	27	0	12	13	0
2	E	27	0	12	4	0
2	F	27	0	12	1	0
All	All	15029	0	15072	422	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 14.

All (422) 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:655:LEU:HD22	2:D:1001:ADP:C2	1.45	1.48
1:D:655:LEU:HD22	2:D:1001:ADP:N3	1.67	1.08
1:D:655:LEU:CD2	2:D:1001:ADP:C2	2.41	1.03
1:D:655:LEU:CD2	2:D:1001:ADP:N3	2.36	0.87
1:D:507:THR:HG21	1:D:626:PHE:HB3	1.57	0.84
1:F:462:MET:SD	1:F:466:ASN:ND2	2.51	0.83
1:D:514:ARG:HB3	1:D:659:ILE:HG21	1.60	0.82
1:E:385:CYS:SG	1:E:387:ARG:NH1	2.56	0.79
1:D:671:LEU:HD21	1:D:675:TRP:CZ2	2.20	0.77
1:C:532:LEU:HD11	1:C:602:ILE:HD13	1.67	0.77
1:D:518:SER:O	1:D:665:ARG:HG3	1.85	0.76
1:D:655:LEU:HD22	2:D:1001:ADP:H2	1.43	0.75
1:D:507:THR:CG2	1:D:626:PHE:HB3	2.16	0.75
1:D:671:LEU:CG	1:D:675:TRP:CZ2	2.70	0.75
1:D:671:LEU:HD11	1:D:675:TRP:CZ2	2.24	0.72
1:D:415:PHE:HZ	1:D:669:LEU:HD21	1.55	0.72
1:C:556:SER:HA	1:C:603:ASP:HB3	1.71	0.72
1:D:395:ASN:OD1	1:C:389:ARG:NH2	2.22	0.72
1:C:338:SER:HB3	1:C:367:LEU:HD11	1.72	0.71
1:D:369:LEU:O	1:D:372:ARG:NH1	2.24	0.71
1:D:671:LEU:HG	1:D:675:TRP:CH2	2.27	0.70
1:D:671:LEU:CD2	1:D:675:TRP:CH2	2.75	0.70
1:B:536:LEU:HD12	1:B:544:ILE:HD11	1.72	0.70
1:A:545:ALA:HA	1:A:594:ASN:HD21	1.57	0.70
1:D:671:LEU:HG	1:D:675:TRP:CZ2	2.27	0.69
1:F:470:PRO:O	1:F:475:ASN:ND2	2.26	0.69
1:F:682:PRO:HB2	1:F:683:ILE:HD12	1.74	0.69
1:F:523:LEU:HD13	1:F:551:ARG:HD2	1.75	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:415:PHE:CZ	1:D:669:LEU:HD21	2.28	0.68
1:B:511:THR:HG21	2:B:1001:ADP:H2	1.58	0.68
1:A:484:LYS:HG2	1:A:680:HIS:HE2	1.59	0.68
1:D:671:LEU:HD21	1:D:675:TRP:CH2	2.29	0.68
1:F:482:TYR:O	1:F:486:LEU:HD12	1.94	0.67
1:D:671:LEU:HD11	1:D:675:TRP:CE2	2.30	0.67
1:D:636:ARG:NH2	1:D:650:LEU:HA	2.09	0.67
1:E:385:CYS:HB3	1:E:388:LYS:HB2	1.77	0.67
1:C:398:ASP:OD2	1:B:389:ARG:NH1	2.27	0.66
1:D:412:LYS:O	1:D:551:ARG:NH1	2.27	0.66
1:B:625:ARG:HD3	1:B:692:GLU:HG3	1.77	0.66
1:F:412:LYS:HE2	1:F:421:ASP:HB3	1.79	0.65
1:F:459:GLU:OE2	1:F:459:GLU:N	2.29	0.65
1:E:361:GLU:OE1	1:E:366:LYS:NZ	2.29	0.65
1:A:655:LEU:HA	1:A:658:LYS:HE2	1.78	0.65
1:D:461:LEU:HB2	1:D:664:TYR:CD1	2.32	0.65
1:D:630:PHE:CB	2:D:1001:ADP:H8	2.10	0.65
1:D:523:LEU:HD22	1:D:551:ARG:HG3	1.77	0.65
1:E:467:ASP:HB3	2:E:1001:ADP:HN62	1.62	0.64
1:A:344:ARG:NH2	1:A:594:ASN:OD1	2.31	0.64
1:A:467:ASP:HB3	2:A:1001:ADP:HN62	1.62	0.64
1:A:461:LEU:HD12	1:A:664:TYR:HB3	1.80	0.63
1:B:504:GLU:O	1:B:509:LYS:NZ	2.28	0.63
1:A:389:ARG:NH1	1:B:398:ASP:OD2	2.32	0.63
1:C:491:CYS:HG	1:C:676:TYR:HH	1.42	0.63
1:B:353:ASN:HD22	1:B:430:GLY:H	1.47	0.63
1:A:324:ASN:ND2	1:F:384:LEU:O	2.32	0.62
1:D:525:VAL:HB	1:D:553:VAL:HG23	1.81	0.62
1:D:671:LEU:CD2	1:D:675:TRP:CZ2	2.82	0.62
1:B:651:LEU:HA	2:B:1001:ADP:H8	1.63	0.62
1:F:332:ARG:HD2	1:F:375:LEU:HD23	1.82	0.62
1:E:349:VAL:HG21	1:E:363:LEU:HB2	1.80	0.62
1:A:398:ASP:OD2	1:F:389:ARG:NH1	2.32	0.61
1:F:365:THR:HG23	1:F:389:ARG:HB3	1.82	0.61
1:D:630:PHE:CG	2:D:1001:ADP:C8	2.89	0.61
1:A:385:CYS:SG	1:A:387:ARG:NE	2.74	0.61
1:D:631:SER:HB2	1:D:648:VAL:CG1	2.30	0.61
1:F:329:ILE:HG21	1:F:383:LEU:HD21	1.83	0.61
1:E:419:VAL:HG23	1:E:433:ALA:HB1	1.82	0.61
1:A:500:PHE:HE1	1:A:602:ILE:HD12	1.66	0.60
1:E:457:GLU:OE1	1:E:664:TYR:N	2.34	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:395:ASN:OD1	1:F:389:ARG:NH2	2.34	0.60
1:D:641:ASN:OD1	1:D:642:ASN:N	2.34	0.60
1:A:461:LEU:HD21	1:A:668:PHE:HD1	1.65	0.60
1:C:554:PHE:HE1	1:C:603:ASP:HB2	1.66	0.60
1:D:461:LEU:O	1:D:465:ILE:HD12	2.01	0.60
1:D:384:LEU:O	1:E:324:ASN:ND2	2.35	0.59
1:C:647:LYS:HE3	1:C:647:LYS:HA	1.84	0.59
1:B:498:LEU:HD22	1:B:574:ILE:HG13	1.84	0.59
1:B:338:SER:HB3	1:B:367:LEU:HD11	1.83	0.59
1:D:671:LEU:CD1	1:D:675:TRP:CE2	2.85	0.59
1:F:349:VAL:HG11	1:F:363:LEU:HB3	1.83	0.59
1:C:340:LEU:HD23	1:C:404:VAL:HG21	1.82	0.59
1:F:395:ASN:O	1:F:399:MET:HG3	2.02	0.59
1:B:365:THR:OG1	1:B:393:GLU:OE1	2.20	0.59
1:B:500:PHE:HB2	1:B:623:VAL:HG12	1.84	0.59
1:D:671:LEU:CD1	1:D:675:TRP:CZ2	2.86	0.59
1:E:412:LYS:O	1:E:551:ARG:NH1	2.25	0.59
1:C:612:ARG:HH21	1:B:563:CYS:HB2	1.67	0.59
1:A:505:THR:HG21	1:B:615:ASN:HB3	1.85	0.58
1:F:485:THR:HG21	1:F:499:THR:HG21	1.85	0.58
1:D:629:HIS:HB3	1:D:645:TYR:CG	2.39	0.58
1:D:632:GLN:O	1:D:636:ARG:N	2.35	0.58
1:D:461:LEU:HB2	1:D:664:TYR:HD1	1.68	0.58
1:E:352:ASN:OD1	1:E:356:LYS:NZ	2.35	0.58
1:F:364:ILE:O	1:F:368:ILE:HD12	2.02	0.58
1:C:637:GLU:N	1:C:637:GLU:OE2	2.37	0.58
1:D:671:LEU:CG	1:D:675:TRP:CH2	2.88	0.57
1:A:470:PRO:HG2	1:A:475:ASN:HD21	1.68	0.57
1:D:358:ASN:ND2	1:D:360:GLU:OE1	2.37	0.57
1:C:363:LEU:HD23	1:C:366:LYS:HD2	1.86	0.57
1:A:498:LEU:HD22	1:A:574:ILE:HG13	1.86	0.57
1:C:385:CYS:SG	1:C:387:ARG:NH1	2.77	0.57
1:C:525:VAL:HG23	1:C:553:VAL:HG13	1.86	0.57
1:F:514:ARG:HG2	1:F:660:GLN:HE22	1.69	0.57
1:D:398:ASP:OD2	1:C:389:ARG:NH1	2.38	0.57
1:C:614:ASP:OD1	1:C:614:ASP:N	2.38	0.57
1:A:365:THR:HG23	1:A:389:ARG:HB3	1.85	0.56
1:B:460:GLU:O	1:B:464:ILE:HG23	2.04	0.56
1:A:366:LYS:HD3	1:B:401:VAL:HG12	1.86	0.56
1:F:510:SER:OG	2:F:1001:ADP:O2A	2.20	0.56
1:C:421:ASP:O	1:C:425:GLY:N	2.38	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:632:GLN:HG3	1:C:651:LEU:HD13	1.87	0.56
1:D:338:SER:HB3	1:D:367:LEU:HD11	1.88	0.56
1:D:631:SER:O	1:D:651:LEU:HB2	2.06	0.56
1:D:507:THR:N	2:D:1001:ADP:O1A	2.39	0.56
1:C:508:GLY:N	2:C:1001:ADP:O1A	2.38	0.56
1:E:677:LYS:O	1:E:681:ILE:HD11	2.06	0.56
1:F:518:SER:O	1:F:665:ARG:NE	2.34	0.55
1:B:386:PRO:O	1:B:390:LYS:HG2	2.06	0.55
1:F:398:ASP:OD2	1:E:389:ARG:NH1	2.38	0.55
1:D:389:ARG:NH1	1:E:398:ASP:OD2	2.39	0.55
1:D:369:LEU:HG	1:D:372:ARG:HH12	1.71	0.55
1:E:508:GLY:N	2:E:1001:ADP:O1A	2.36	0.55
1:C:523:LEU:HB3	1:C:551:ARG:HG3	1.89	0.55
1:E:677:LYS:C	1:E:681:ILE:HD11	2.27	0.55
1:A:431:ASP:N	1:A:431:ASP:OD1	2.40	0.55
1:A:342:THR:HG23	1:A:344:ARG:H	1.72	0.55
1:B:479:ARG:O	1:B:483:GLU:HG2	2.07	0.55
1:F:363:LEU:HD13	1:F:366:LYS:HD2	1.88	0.54
1:E:510:SER:OG	2:E:1001:ADP:O1B	2.26	0.54
1:A:499:THR:HA	1:A:622:ALA:O	2.07	0.54
1:D:416:LYS:HB2	1:D:445:LYS:HD2	1.89	0.54
1:D:522:ASP:O	1:D:550:LYS:NZ	2.37	0.54
1:B:693:ILE:HB	1:B:696:PHE:HB2	1.90	0.54
1:B:393:GLU:O	1:B:397:ARG:HG3	2.08	0.54
1:B:490:LEU:HD11	1:B:672:LEU:HB3	1.89	0.54
1:E:510:SER:OG	2:E:1001:ADP:O2A	2.26	0.54
1:B:655:LEU:HD12	1:B:658:LYS:HE3	1.90	0.54
1:A:364:ILE:O	1:A:368:ILE:HG12	2.07	0.53
1:D:339:VAL:O	1:D:340:LEU:HD23	2.08	0.53
1:D:457:GLU:OE2	1:D:664:TYR:HA	2.08	0.53
1:D:630:PHE:CB	2:D:1001:ADP:C8	2.91	0.53
1:A:467:ASP:HB3	2:A:1001:ADP:N6	2.23	0.53
1:D:417:ASN:HB3	1:D:445:LYS:HE3	1.91	0.53
1:B:470:PRO:HB2	1:B:472:THR:HG23	1.90	0.53
1:B:533:THR:HB	1:B:567:LYS:HE3	1.91	0.52
1:B:586:PRO:HG2	1:B:589:SER:HB3	1.91	0.52
1:A:656:ASP:O	1:A:660:GLN:HG2	2.09	0.52
1:A:510:SER:HB3	2:A:1001:ADP:O2A	2.10	0.52
1:C:358:ASN:HD21	1:C:360:GLU:HB2	1.75	0.52
1:C:500:PHE:HE1	1:C:602:ILE:HD12	1.75	0.52
1:B:361:GLU:HG2	1:B:362:PRO:HD2	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:426:MET:SD	1:C:427:PHE:N	2.82	0.52
1:B:671:LEU:HG	1:B:675:TRP:CZ2	2.45	0.52
1:C:369:LEU:O	1:C:372:ARG:HB3	2.10	0.51
1:B:576:LYS:HZ1	1:B:582:VAL:HG23	1.74	0.51
1:F:460:GLU:O	1:F:464:ILE:HG22	2.11	0.51
1:A:469:GLN:O	1:A:479:ARG:NH1	2.43	0.51
1:D:497:CYS:HB3	1:D:686:LEU:HB2	1.91	0.51
1:D:504:GLU:HB3	1:D:645:TYR:HE1	1.75	0.51
1:C:364:ILE:O	1:C:368:ILE:HG12	2.11	0.51
1:C:646:ASP:HB3	1:C:647:LYS:HD2	1.91	0.51
1:C:654:GLY:O	1:C:658:LYS:HG2	2.11	0.51
1:A:412:LYS:O	1:A:551:ARG:NH1	2.37	0.51
1:A:500:PHE:HB2	1:A:623:VAL:HG22	1.92	0.51
1:B:622:ALA:HB2	1:B:688:PRO:HA	1.93	0.51
1:B:651:LEU:HA	2:B:1001:ADP:C8	2.45	0.51
1:D:625:ARG:NH2	1:D:627:ARG:HD3	2.26	0.51
1:D:631:SER:HB2	1:D:648:VAL:HG11	1.93	0.51
1:D:633:PRO:HA	1:D:636:ARG:HG2	1.92	0.51
1:E:469:GLN:HE22	1:E:479:ARG:HE	1.59	0.51
1:A:382:GLU:OE1	1:A:388:LYS:NZ	2.40	0.50
1:D:660:GLN:OE1	1:D:660:GLN:N	2.44	0.50
1:D:457:GLU:CD	1:D:664:TYR:HA	2.32	0.50
1:B:501:PHE:HE2	1:B:554:PHE:HZ	1.60	0.50
1:B:506:ALA:HB3	1:B:629:HIS:HE1	1.74	0.50
1:F:340:LEU:HD13	1:F:404:VAL:HG11	1.92	0.50
1:F:395:ASN:OD1	1:E:389:ARG:NH2	2.45	0.50
1:A:401:VAL:HG12	1:F:366:LYS:HD3	1.94	0.50
1:A:681:ILE:HG22	1:A:682:PRO:HD3	1.94	0.50
1:A:326:LEU:HD13	1:A:391:THR:HG21	1.93	0.50
1:C:553:VAL:HG23	1:C:598:ALA:HB1	1.94	0.50
1:B:629:HIS:HD2	1:B:639:ALA:HB1	1.77	0.50
1:F:417:ASN:N	1:F:417:ASN:OD1	2.45	0.50
1:D:630:PHE:HB3	2:D:1001:ADP:C8	2.47	0.50
1:E:342:THR:O	1:E:345:GLY:N	2.45	0.49
1:D:402:ASP:OD1	1:D:402:ASP:N	2.43	0.49
1:C:415:PHE:HD1	1:C:442:THR:HG1	1.59	0.49
1:F:482:TYR:CZ	1:F:486:LEU:HD11	2.47	0.49
1:C:358:ASN:ND2	1:C:360:GLU:OE1	2.46	0.49
1:B:350:TRP:H	1:B:367:LEU:HD12	1.78	0.49
1:B:502:PHE:HD1	1:B:503:GLY:N	2.10	0.49
1:B:582:VAL:HG12	1:B:594:ASN:HB2	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:334:LEU:HD11	1:F:400:LEU:HD21	1.93	0.49
1:D:461:LEU:HD23	1:D:667:ALA:HB1	1.94	0.49
1:B:412:LYS:O	1:B:551:ARG:NH1	2.31	0.49
1:C:490:LEU:O	1:C:551:ARG:NH1	2.44	0.49
1:D:495:LYS:HG3	1:D:684:MET:HE1	1.95	0.48
1:D:671:LEU:HG	1:D:675:TRP:CE2	2.47	0.48
1:D:464:ILE:HD11	1:D:655:LEU:CD1	2.43	0.48
1:D:636:ARG:HH22	1:D:650:LEU:HA	1.75	0.48
1:B:629:HIS:HB3	1:B:648:VAL:HG22	1.94	0.48
1:A:455:SER:OG	1:A:457:GLU:OE1	2.21	0.48
1:E:329:ILE:HG21	1:E:383:LEU:HD21	1.95	0.48
1:B:417:ASN:HB3	1:B:445:LYS:HG3	1.96	0.48
1:E:485:THR:HG21	1:E:499:THR:HG21	1.94	0.48
1:A:371:ILE:HG22	1:A:375:LEU:HD11	1.95	0.48
1:D:416:LYS:HE2	1:D:416:LYS:HA	1.94	0.48
1:D:450:LYS:HB3	1:D:666:PHE:CG	2.49	0.48
1:A:334:LEU:HD12	1:A:399:MET:HE3	1.96	0.47
1:A:680:HIS:ND1	1:A:684:MET:HG3	2.29	0.47
1:F:581:CYS:HG	1:F:595:ARG:N	2.11	0.47
1:C:447:ASP:HB3	1:C:666:PHE:HE2	1.79	0.47
1:F:486:LEU:HD23	1:F:516:LEU:HD12	1.96	0.47
1:B:576:LYS:NZ	1:B:582:VAL:HA	2.29	0.47
1:E:497:CYS:HB3	1:E:686:LEU:HB3	1.95	0.47
1:C:490:LEU:HD11	1:C:672:LEU:HB3	1.95	0.47
1:A:655:LEU:HD23	2:A:1001:ADP:H2'	1.97	0.47
1:F:469:GLN:O	1:F:479:ARG:NH2	2.43	0.47
1:D:377:LYS:HD2	1:D:377:LYS:HA	1.67	0.47
1:B:504:GLU:O	1:B:507:THR:OG1	2.25	0.47
1:F:402:ASP:OD1	1:F:402:ASP:N	2.43	0.47
1:B:354:SER:HB3	1:B:356:LYS:HZ2	1.80	0.47
1:B:536:LEU:HD23	1:B:536:LEU:H	1.79	0.47
1:F:519:ALA:HB2	1:F:668:PHE:HD2	1.79	0.47
1:D:489:CYS:HB3	1:D:552:SER:HB2	1.95	0.47
1:E:501:PHE:O	1:E:509:LYS:NZ	2.41	0.47
1:F:329:ILE:HD13	1:F:383:LEU:HD21	1.97	0.46
1:D:669:LEU:HD12	1:D:669:LEU:HA	1.63	0.46
1:E:423:VAL:O	1:E:677:LYS:NZ	2.30	0.46
1:B:693:ILE:HG22	1:B:696:PHE:H	1.79	0.46
1:F:364:ILE:HG22	1:F:368:ILE:HD11	1.98	0.46
1:A:499:THR:HG22	1:A:622:ALA:HB3	1.96	0.46
1:D:476:LYS:O	1:D:480:GLU:HG2	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:655:LEU:HD23	2:D:1001:ADP:N3	2.30	0.46
1:B:478:ASN:HB2	1:B:625:ARG:NH2	2.31	0.46
1:C:440:VAL:HG11	1:C:549:LEU:HB3	1.96	0.46
1:B:548:HIS:HB2	1:B:594:ASN:HB3	1.97	0.46
1:C:462:MET:O	1:C:466:ASN:ND2	2.48	0.46
1:C:661:ASN:O	1:C:661:ASN:ND2	2.44	0.46
1:B:326:LEU:HD13	1:B:391:THR:HG21	1.96	0.46
1:B:364:ILE:O	1:B:368:ILE:HG12	2.15	0.46
1:B:485:THR:HG21	1:B:499:THR:HG21	1.98	0.46
1:D:417:ASN:OD1	1:D:417:ASN:N	2.48	0.46
1:E:491:CYS:SG	1:E:684:MET:HG2	2.55	0.46
1:D:630:PHE:CG	2:D:1001:ADP:H8	2.31	0.46
1:F:509:LYS:HE2	1:F:509:LYS:HB2	1.81	0.46
1:C:546:ASN:OD1	1:C:546:ASN:N	2.44	0.46
1:F:353:ASN:HD22	1:F:430:GLY:HA2	1.80	0.45
1:B:576:LYS:HZ1	1:B:582:VAL:HA	1.80	0.45
1:E:577:LEU:HB3	1:E:600:ILE:HD13	1.98	0.45
1:D:447:ASP:HB3	1:D:450:LYS:HB2	1.96	0.45
1:C:344:ARG:HB3	1:C:346:ASP:OD2	2.17	0.45
1:C:393:GLU:OE2	1:C:397:ARG:NE	2.41	0.45
1:C:671:LEU:HD12	1:C:675:TRP:CZ2	2.52	0.45
1:B:445:LYS:HE2	1:B:445:LYS:HB2	1.71	0.45
1:D:500:PHE:HB2	1:D:623:VAL:HG22	1.97	0.45
1:D:677:LYS:HE2	1:D:677:LYS:HB2	1.87	0.45
1:E:579:GLU:O	1:E:596:ASN:ND2	2.50	0.45
1:B:530:THR:O	1:B:534:ASP:HB3	2.17	0.45
1:F:469:GLN:NE2	1:F:475:ASN:HD21	2.14	0.45
1:D:632:GLN:HG2	1:D:651:LEU:HD13	1.98	0.45
1:C:395:ASN:OD1	1:B:389:ARG:NH2	2.45	0.45
1:C:628:THR:O	1:C:628:THR:OG1	2.35	0.45
1:B:496:GLY:HA2	1:B:578:THR:HB	1.98	0.45
1:F:547:MET:H	1:F:547:MET:HG3	1.60	0.45
1:F:486:LEU:HD22	1:F:668:PHE:HZ	1.82	0.45
1:D:671:LEU:HG	1:D:675:TRP:CZ3	2.51	0.45
1:E:339:VAL:HG22	1:E:367:LEU:HD13	1.98	0.45
1:A:615:ASN:O	1:A:619:ARG:HG2	2.17	0.45
1:D:337:ASN:OD1	1:D:340:LEU:HD21	2.17	0.45
1:D:509:LYS:O	1:D:512:THR:N	2.50	0.45
1:D:515:LEU:HB3	1:D:668:PHE:CE2	2.51	0.45
1:D:340:LEU:HG	1:D:355:TRP:CH2	2.53	0.44
1:B:478:ASN:ND2	1:B:625:ARG:O	2.49	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:504:GLU:HB3	1:B:645:TYR:HE1	1.82	0.44
1:E:365:THR:HG22	1:E:389:ARG:HH11	1.83	0.44
1:B:346:ASP:OD2	1:B:359:SER:HB3	2.18	0.44
1:B:595:ARG:HD2	1:B:597:HIS:NE2	2.32	0.44
1:A:417:ASN:O	1:A:429:SER:OG	2.32	0.44
1:A:499:THR:OG1	1:A:601:ILE:HG12	2.17	0.44
1:F:347:HIS:CE1	1:F:400:LEU:HD12	2.51	0.44
1:E:468:ILE:HG23	1:E:508:GLY:HA3	1.99	0.44
1:C:417:ASN:HB3	1:C:445:LYS:HG3	1.99	0.44
1:C:585:ARG:HD2	1:B:542:PRO:HG2	1.99	0.44
1:B:532:LEU:HB3	1:B:569:ILE:HG23	1.99	0.44
1:A:450:LYS:HD2	1:A:450:LYS:HA	1.74	0.44
1:A:505:THR:HB	1:B:616:ALA:HB2	2.00	0.44
1:B:351:ILE:HG13	1:B:356:LYS:NZ	2.32	0.44
1:D:409:TYR:CD1	1:D:409:TYR:N	2.86	0.44
1:A:548:HIS:NE2	1:A:549:LEU:HG	2.33	0.44
1:F:665:ARG:HG2	1:F:666:PHE:CD1	2.52	0.44
1:D:439:THR:OG1	1:D:440:VAL:N	2.51	0.44
1:E:349:VAL:HB	1:E:367:LEU:HD12	2.00	0.44
1:A:649:LYS:HA	1:A:649:LYS:HD2	1.76	0.44
1:E:668:PHE:O	1:E:672:LEU:HD23	2.18	0.44
1:F:351:ILE:O	1:F:356:LYS:NZ	2.50	0.44
1:D:629:HIS:O	1:D:648:VAL:HA	2.17	0.44
1:D:653:GLU:H	1:D:653:GLU:HG3	1.59	0.44
1:A:385:CYS:HB3	1:A:388:LYS:HB2	1.99	0.43
1:A:656:ASP:OD1	1:A:656:ASP:N	2.50	0.43
1:B:612:ARG:NH2	1:B:614:ASP:OD2	2.51	0.43
1:A:508:GLY:N	2:A:1001:ADP:O1A	2.51	0.43
1:C:500:PHE:HD1	1:C:602:ILE:HB	1.83	0.43
1:B:348:ILE:HG22	1:B:357:PHE:HB3	2.00	0.43
1:A:554:PHE:HA	1:A:601:ILE:O	2.18	0.43
1:A:631:SER:O	1:A:651:LEU:N	2.51	0.43
1:F:411:ASP:O	1:F:412:LYS:HD3	2.19	0.43
1:F:671:LEU:HD12	1:F:675:TRP:CZ2	2.53	0.43
1:C:607:LYS:HD2	1:C:608:PRO:HD2	2.00	0.43
1:F:381:SER:HA	1:F:384:LEU:HD12	1.99	0.43
1:D:462:MET:O	1:D:466:ASN:ND2	2.51	0.43
1:D:469:GLN:OE1	1:D:626:PHE:CE2	2.72	0.43
1:D:486:LEU:HD13	1:D:668:PHE:HZ	1.82	0.43
1:C:665:ARG:HG2	1:C:666:PHE:CD1	2.54	0.43
1:F:364:ILE:O	1:F:367:LEU:N	2.48	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:463:ASN:HA	1:D:466:ASN:HD22	1.83	0.43
1:D:519:ALA:HB2	1:D:668:PHE:CD2	2.54	0.43
1:B:517:LYS:HD2	1:B:524:PHE:CD1	2.53	0.43
1:A:461:LEU:HD11	1:A:668:PHE:HB2	2.01	0.43
1:E:413:LEU:HD23	1:E:413:LEU:HA	1.84	0.43
1:E:498:LEU:HD21	1:E:577:LEU:HD12	2.00	0.43
1:A:350:TRP:CZ2	1:A:353:ASN:HA	2.54	0.43
1:A:678:LYS:HE2	1:A:678:LYS:HB2	1.81	0.43
1:D:445:LYS:HE2	1:D:445:LYS:HB3	1.78	0.43
1:E:385:CYS:HG	1:E:387:ARG:NH1	2.15	0.43
1:B:647:LYS:HB2	1:B:647:LYS:HE3	1.89	0.43
1:D:513:LYS:NZ	1:D:526:GLU:OE1	2.37	0.43
1:D:631:SER:HB2	1:D:648:VAL:HG13	1.99	0.43
1:C:469:GLN:HE22	1:C:478:ASN:HD22	1.66	0.43
1:C:484:LYS:HE2	1:C:484:LYS:HB3	1.64	0.43
1:C:663:ARG:HG2	1:C:664:TYR:CD1	2.54	0.43
1:A:399:MET:HG3	1:F:369:LEU:HD21	2.00	0.43
1:F:662:ASN:HD21	1:F:665:ARG:NH2	2.17	0.43
1:B:499:THR:HB	1:B:601:ILE:HG12	2.01	0.43
1:B:581:CYS:SG	1:B:593:ASN:HB2	2.58	0.43
1:A:627:ARG:HD2	1:A:627:ARG:HA	1.83	0.43
1:D:465:ILE:HD12	1:D:465:ILE:H	1.83	0.43
1:D:507:THR:HG21	1:D:626:PHE:CB	2.40	0.43
1:C:415:PHE:CZ	1:C:669:LEU:HD21	2.54	0.43
1:B:484:LYS:HG3	1:B:679:TYR:CD2	2.54	0.43
1:F:508:GLY:O	1:F:512:THR:HG23	2.18	0.42
1:A:439:THR:OG1	1:A:440:VAL:N	2.53	0.42
1:E:351:ILE:HG13	1:E:356:LYS:HD2	2.00	0.42
1:B:441:SER:O	1:B:522:ASP:HB3	2.19	0.42
1:A:679:TYR:HB3	1:A:680:HIS:HD2	1.83	0.42
1:B:656:ASP:N	1:B:656:ASP:OD1	2.52	0.42
1:A:499:THR:OG1	1:A:600:ILE:O	2.31	0.42
1:A:516:LEU:HD23	1:A:524:PHE:HE2	1.84	0.42
1:B:544:ILE:O	1:B:547:MET:HG3	2.19	0.42
1:D:364:ILE:O	1:D:368:ILE:HG13	2.19	0.42
1:C:549:LEU:HD23	1:C:549:LEU:HA	1.88	0.42
1:C:670:TYR:HD1	1:C:670:TYR:O	2.03	0.42
1:C:421:ASP:O	1:C:425:GLY:CA	2.67	0.42
1:F:414:PRO:HB3	1:F:438:CYS:SG	2.60	0.42
1:F:491:CYS:HG	1:F:676:TYR:HE1	1.67	0.42
1:B:405:GLU:HA	1:B:405:GLU:OE2	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:510:SER:HB3	2:B:1001:ADP:O1A	2.19	0.42
1:A:339:VAL:O	1:A:340:LEU:HD23	2.20	0.42
1:D:450:LYS:HB3	1:D:666:PHE:CB	2.50	0.42
1:C:585:ARG:HB3	1:C:592:ILE:HG22	2.01	0.42
1:F:482:TYR:CE1	1:F:486:LEU:HD11	2.55	0.42
1:D:658:LYS:HB3	1:D:663:ARG:HD3	2.01	0.42
1:A:621:ILE:HD13	1:A:621:ILE:HA	1.93	0.41
1:D:510:SER:HB3	2:D:1001:ADP:O2A	2.20	0.41
1:D:516:LEU:O	1:D:520:ILE:HG12	2.20	0.41
1:E:681:ILE:HB	1:E:682:PRO:HD3	2.02	0.41
1:A:520:ILE:HD11	1:A:524:PHE:HD2	1.85	0.41
1:F:417:ASN:HD21	1:F:446:PHE:H	1.68	0.41
1:D:351:ILE:HD12	1:E:401:VAL:HG13	2.02	0.41
1:D:625:ARG:HH21	1:D:627:ARG:HD3	1.86	0.41
1:E:472:THR:O	1:E:476:LYS:HG3	2.19	0.41
1:B:500:PHE:CD2	1:B:602:ILE:HB	2.56	0.41
1:F:336:THR:OG1	1:F:338:SER:OG	2.25	0.41
1:F:413:LEU:HD22	1:F:490:LEU:HD22	2.01	0.41
1:F:489:CYS:SG	1:F:552:SER:OG	2.76	0.41
1:E:411:ASP:OD1	1:E:411:ASP:N	2.48	0.41
1:E:469:GLN:HE22	1:E:479:ARG:NE	2.18	0.41
1:C:341:LEU:O	1:C:404:VAL:HG22	2.20	0.41
1:C:368:ILE:HG12	1:C:368:ILE:H	1.62	0.41
1:C:575:LYS:HA	1:C:575:LYS:HD3	1.73	0.41
1:C:578:THR:OG1	1:C:620:ARG:NE	2.45	0.41
1:B:567:LYS:HE3	1:B:567:LYS:HB3	1.74	0.41
1:D:470:PRO:HB2	1:D:472:THR:HG23	2.02	0.41
1:B:506:ALA:N	2:B:1001:ADP:O3B	2.43	0.41
1:B:672:LEU:HD23	1:B:675:TRP:CE3	2.55	0.41
1:D:464:ILE:HD11	1:D:655:LEU:HD13	2.01	0.41
1:A:627:ARG:NH2	1:A:646:ASP:OD1	2.54	0.41
1:A:477:LYS:O	1:A:480:GLU:HG2	2.21	0.41
1:C:507:THR:HG21	1:C:626:PHE:HB3	2.02	0.41
1:B:369:LEU:O	1:B:372:ARG:HB3	2.20	0.41
1:B:494:THR:HG21	1:B:580:PRO:HA	2.03	0.41
1:F:415:PHE:HA	1:F:442:THR:OG1	2.21	0.41
1:D:407:ASP:OD1	1:D:438:CYS:HA	2.21	0.41
1:E:486:LEU:HD23	1:E:486:LEU:HA	1.88	0.41
1:C:371:ILE:HG13	1:C:371:ILE:O	2.21	0.41
1:A:349:VAL:HG13	1:A:367:LEU:HB2	2.02	0.41
1:A:571:SER:O	1:A:575:LYS:HG2	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:481:LEU:HG	1:D:624:VAL:HG13	2.03	0.41
1:D:631:SER:O	1:D:636:ARG:NH2	2.54	0.41
1:C:349:VAL:CG2	1:C:367:LEU:HB2	2.51	0.41
1:A:509:LYS:HB2	1:A:509:LYS:HE2	1.74	0.40
1:A:513:LYS:HD2	1:A:554:PHE:CD1	2.56	0.40
1:D:674:LYS:HB3	1:D:674:LYS:HE3	1.76	0.40
1:C:575:LYS:HE3	1:C:620:ARG:HH11	1.86	0.40
1:F:669:LEU:HD12	1:F:669:LEU:HA	1.91	0.40
1:D:457:GLU:OE2	1:D:664:TYR:CD1	2.75	0.40
1:B:506:ALA:O	1:B:629:HIS:ND1	2.54	0.40
1:B:652:ASP:OD1	1:B:655:LEU:N	2.54	0.40
1:A:441:SER:O	1:A:522:ASP:HB3	2.21	0.40
1:A:489:CYS:HB3	1:A:552:SER:HB2	2.02	0.40
1:F:326:LEU:HD13	1:F:391:THR:HG21	2.03	0.40
1:F:350:TRP:CZ2	1:F:353:ASN:HA	2.56	0.40
1:F:444:PHE:CE1	1:F:665:ARG:HD3	2.56	0.40
1:F:670:TYR:O	1:F:670:TYR:HD1	2.04	0.40
1:D:393:GLU:OE2	1:D:397:ARG:NE	2.51	0.40
1:D:649:LYS:HA	1:D:649:LYS:HD2	1.91	0.40
1:E:350:TRP:CZ2	1:E:353:ASN:HA	2.55	0.40
1:A:470:PRO:HG2	1:A:475:ASN:ND2	2.33	0.40
1:E:677:LYS:HD3	1:E:677:LYS:HA	1.84	0.40
1:C:406:THR:HG22	1:C:437:THR:HG21	2.03	0.40
1:A:513:LYS:HE2	1:A:513:LYS:HB3	1.70	0.40
1:B:500:PHE:HD2	1:B:602:ILE:HB	1.86	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 PDB entries followed by that with respect to all EM entries.

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	296/785 (38%)	275 (93%)	21 (7%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	376/785 (48%)	341 (91%)	35 (9%)	0	100	100
1	C	336/785 (43%)	309 (92%)	27 (8%)	0	100	100
1	D	289/785 (37%)	262 (91%)	26 (9%)	1 (0%)	41	71
1	E	237/785 (30%)	219 (92%)	18 (8%)	0	100	100
1	F	248/785 (32%)	221 (89%)	27 (11%)	0	100	100
All	All	1782/4710 (38%)	1627 (91%)	154 (9%)	1 (0%)	54	81

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	457	GLU

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 PDB entries followed by that with respect to all EM entries.

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	283/725 (39%)	269 (95%)	14 (5%)	25	56
1	B	343/725 (47%)	322 (94%)	21 (6%)	18	48
1	C	314/725 (43%)	301 (96%)	13 (4%)	30	61
1	D	273/725 (38%)	260 (95%)	13 (5%)	25	56
1	E	228/725 (31%)	218 (96%)	10 (4%)	28	59
1	F	237/725 (33%)	229 (97%)	8 (3%)	37	65
All	All	1678/4350 (39%)	1599 (95%)	79 (5%)	30	57

All (79) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	344	ARG
1	A	346	ASP
1	A	380	SER
1	A	387	ARG
1	A	402	ASP

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Mol	Chain	Res	Type
1	A	407	ASP
1	A	426	MET
1	A	429	SER
1	A	450	LYS
1	A	457	GLU
1	A	462	MET
1	A	467	ASP
1	A	614	ASP
1	A	620	ARG
1	F	357	PHE
1	F	361	GLU
1	F	363	LEU
1	F	402	ASP
1	F	514	ARG
1	F	547	MET
1	F	662	ASN
1	F	670	TYR
1	D	387	ARG
1	D	431	ASP
1	D	436	TYR
1	D	450	LYS
1	D	460	GLU
1	D	471	LEU
1	D	504	GLU
1	D	551	ARG
1	D	624	VAL
1	D	631	SER
1	D	651	LEU
1	D	656	ASP
1	D	668	PHE
1	E	346	ASP
1	E	357	PHE
1	E	377	LYS
1	E	381	SER
1	E	462	MET
1	E	473	ASP
1	E	502	PHE
1	E	547	MET
1	E	677	LYS
1	E	685	LYS
1	C	380	SER
1	C	414	PRO

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Mol	Chain	Res	Type
1	C	426	MET
1	C	436	TYR
1	C	471	LEU
1	C	479	ARG
1	C	554	PHE
1	C	585	ARG
1	C	605	ASN
1	C	606	TYR
1	C	645	TYR
1	C	661	ASN
1	C	670	TYR
1	B	354	SER
1	B	380	SER
1	B	402	ASP
1	B	403	SER
1	B	407	ASP
1	B	445	LYS
1	B	447	ASP
1	B	473	ASP
1	B	479	ARG
1	B	491	CYS
1	B	502	PHE
1	B	509	LYS
1	B	529	GLN
1	B	534	ASP
1	B	554	PHE
1	B	555	CYS
1	B	585	ARG
1	B	607	LYS
1	B	612	ARG
1	B	614	ASP
1	B	625	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	F	469	GLN
1	D	358	ASN
1	D	466	ASN
1	C	358	ASN
1	C	466	ASN
1	C	475	ASN

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Mol	Chain	Res	Type
1	C	573	ASN

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](#)

6 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	ADP	D	1001	-	24,29,29	0.95	1 (4%)	29,45,45	1.46	4 (13%)
2	ADP	B	1001	-	24,29,29	0.96	1 (4%)	29,45,45	1.41	4 (13%)
2	ADP	C	1001	-	24,29,29	0.95	1 (4%)	29,45,45	1.45	4 (13%)
2	ADP	F	1001	-	24,29,29	0.96	1 (4%)	29,45,45	1.46	4 (13%)
2	ADP	A	1001	-	24,29,29	0.95	1 (4%)	29,45,45	1.51	4 (13%)
2	ADP	E	1001	-	24,29,29	0.95	1 (4%)	29,45,45	1.46	4 (13%)

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	ADP	D	1001	-	-	3/12/32/32	0/3/3/3
2	ADP	B	1001	-	-	3/12/32/32	0/3/3/3
2	ADP	C	1001	-	-	3/12/32/32	0/3/3/3
2	ADP	F	1001	-	-	4/12/32/32	0/3/3/3
2	ADP	A	1001	-	-	2/12/32/32	0/3/3/3
2	ADP	E	1001	-	-	2/12/32/32	0/3/3/3

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1001	ADP	C5-C4	2.53	1.47	1.40
2	F	1001	ADP	C5-C4	2.50	1.47	1.40
2	D	1001	ADP	C5-C4	2.47	1.47	1.40
2	E	1001	ADP	C5-C4	2.46	1.47	1.40
2	C	1001	ADP	C5-C4	2.46	1.47	1.40
2	A	1001	ADP	C5-C4	2.40	1.47	1.40

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1001	ADP	PA-O3A-PB	-3.88	119.51	132.83
2	A	1001	ADP	PA-O3A-PB	-3.88	119.51	132.83
2	F	1001	ADP	PA-O3A-PB	-3.57	120.58	132.83
2	D	1001	ADP	PA-O3A-PB	-3.41	121.12	132.83
2	C	1001	ADP	C3'-C2'-C1'	3.40	106.10	100.98
2	D	1001	ADP	C3'-C2'-C1'	3.38	106.07	100.98
2	E	1001	ADP	C3'-C2'-C1'	3.34	106.01	100.98
2	A	1001	ADP	C3'-C2'-C1'	3.30	105.95	100.98
2	F	1001	ADP	N3-C2-N1	-3.27	123.57	128.68
2	C	1001	ADP	PA-O3A-PB	-3.26	121.65	132.83
2	E	1001	ADP	N3-C2-N1	-3.25	123.60	128.68
2	E	1001	ADP	PA-O3A-PB	-3.25	121.68	132.83
2	A	1001	ADP	N3-C2-N1	-3.21	123.65	128.68
2	D	1001	ADP	N3-C2-N1	-3.20	123.67	128.68
2	F	1001	ADP	C3'-C2'-C1'	3.15	105.73	100.98
2	C	1001	ADP	N3-C2-N1	-3.10	123.83	128.68
2	B	1001	ADP	N3-C2-N1	-2.80	124.30	128.68
2	E	1001	ADP	C4-C5-N7	-2.68	106.61	109.40
2	C	1001	ADP	C4-C5-N7	-2.63	106.66	109.40
2	F	1001	ADP	C4-C5-N7	-2.62	106.67	109.40
2	D	1001	ADP	C4-C5-N7	-2.57	106.72	109.40
2	B	1001	ADP	C4-C5-N7	-2.47	106.83	109.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1001	ADP	C4-C5-N7	-2.37	106.93	109.40
2	B	1001	ADP	C3'-C2'-C1'	2.36	104.53	100.98

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1001	ADP	C5'-O5'-PA-O1A
2	A	1001	ADP	C5'-O5'-PA-O3A
2	D	1001	ADP	C5'-O5'-PA-O2A
2	D	1001	ADP	C5'-O5'-PA-O3A
2	E	1001	ADP	PB-O3A-PA-O5'
2	C	1001	ADP	C5'-O5'-PA-O2A
2	C	1001	ADP	C5'-O5'-PA-O3A
2	B	1001	ADP	C5'-O5'-PA-O1A
2	B	1001	ADP	C5'-O5'-PA-O2A
2	B	1001	ADP	C5'-O5'-PA-O3A
2	F	1001	ADP	O4'-C4'-C5'-O5'
2	F	1001	ADP	C3'-C4'-C5'-O5'
2	F	1001	ADP	C5'-O5'-PA-O3A
2	F	1001	ADP	C5'-O5'-PA-O2A
2	D	1001	ADP	O4'-C4'-C5'-O5'
2	E	1001	ADP	O4'-C4'-C5'-O5'
2	C	1001	ADP	O4'-C4'-C5'-O5'

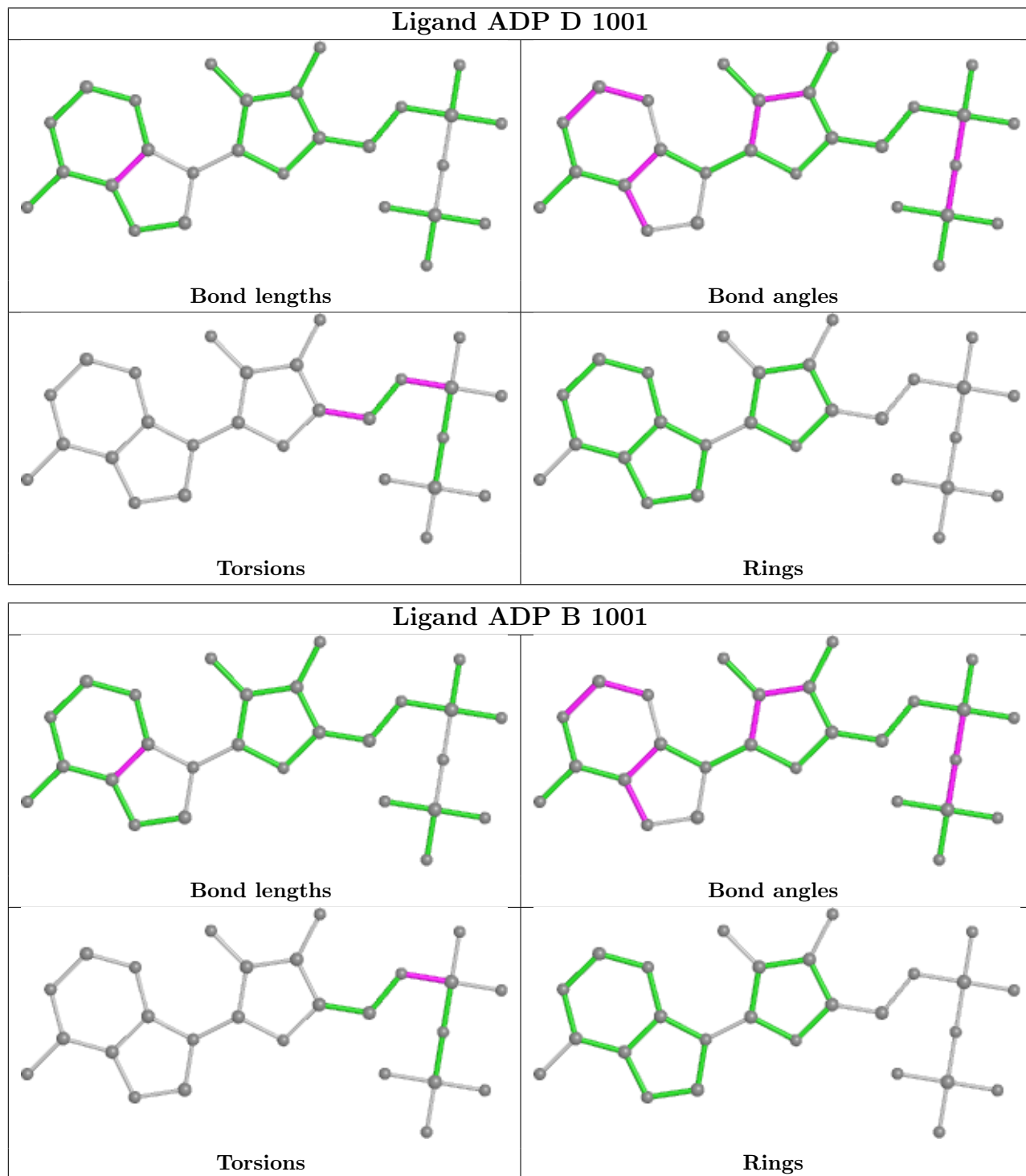
There are no ring outliers.

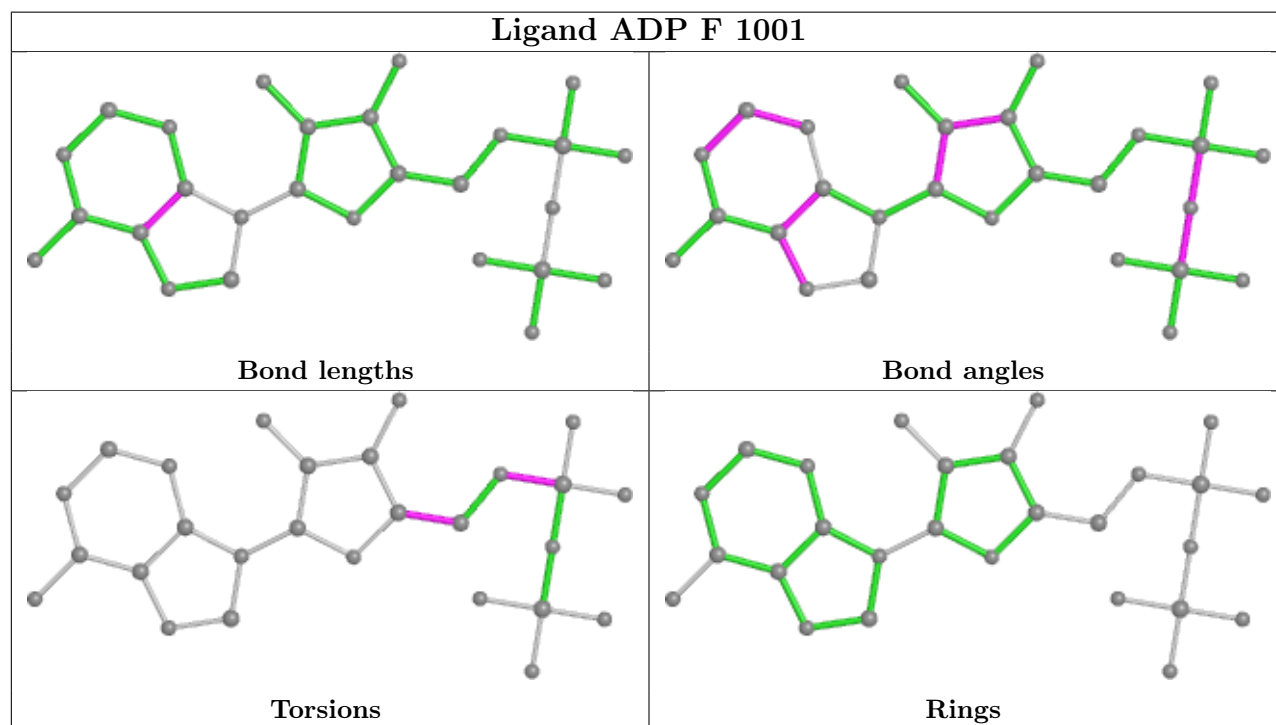
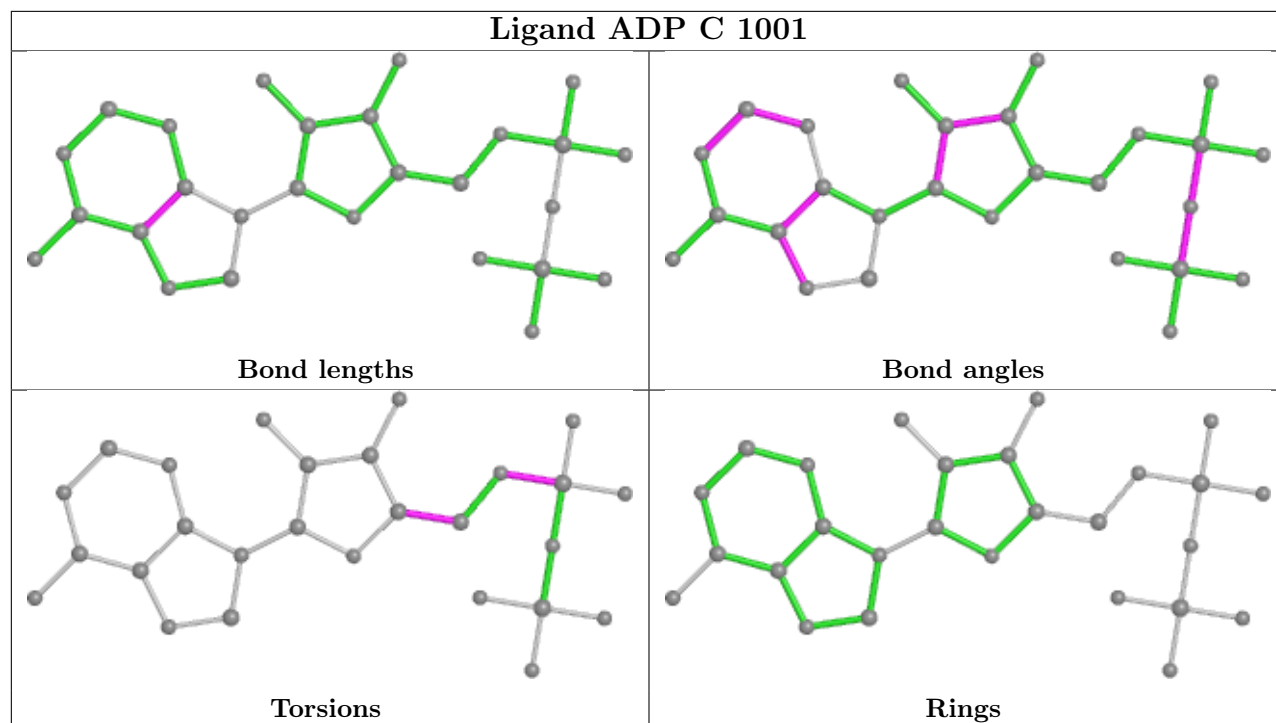
6 monomers are involved in 29 short contacts:

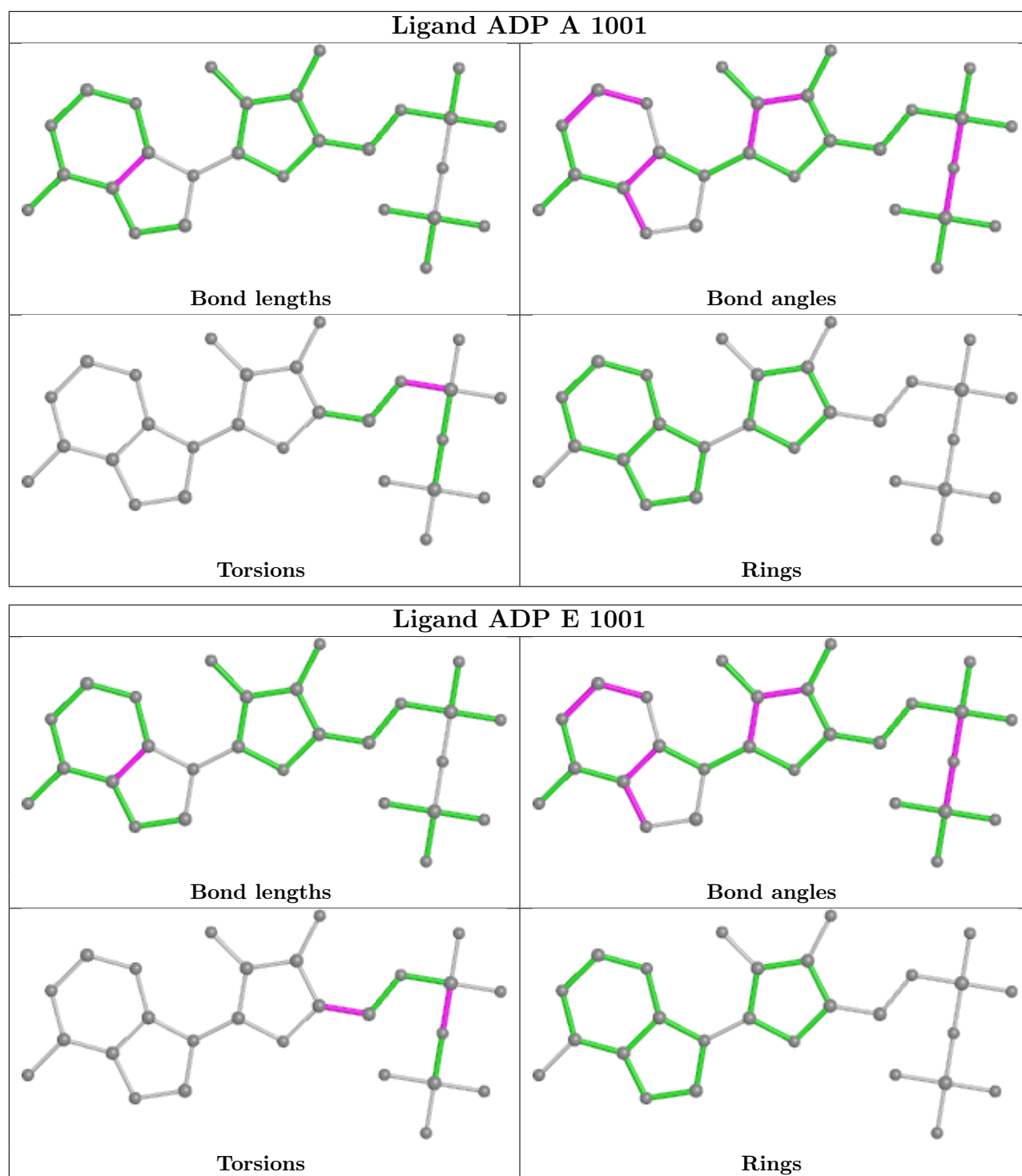
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	1001	ADP	13	0
2	B	1001	ADP	5	0
2	C	1001	ADP	1	0
2	F	1001	ADP	1	0
2	A	1001	ADP	5	0
2	E	1001	ADP	4	0

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

There are no chain breaks in this entry.