Full wwPDB EM Validation Report ⓘ

Mar 17, 2025 – 04:14 PM EDT

PDB ID	:	9E2Z
EMDB ID	:	EMD-47473
Title	:	Cryo-EM structure of human CMG helicase stalled at G4-containing DNA template
Authors	:	Allwein, B.; Batra, S.; Remus, D.; Hite, R.
Deposited on	:	2024-10-23
Resolution	:	2.60 Å(reported)
Based on initial model	:	.

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:

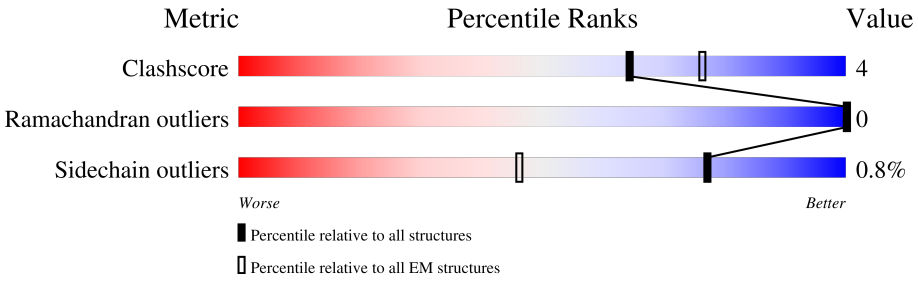
EMDB validation analysis	:	0.0.1.dev117
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.41.4

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 2.60 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	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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 <=5%

Mol	Chain	Length	Quality of chain
1	2	904	62% 7% 32%
2	3	853	70% 5% 25%
3	4	883	61% 8% 31%
4	5	734	78% 7% 15%
5	6	821	68% 7% 25%
6	7	719	68% 10% 21%
7	A	196	94% 6% •
8	B	222	75% 5% 21%
9	C	216	87% • 9%

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Mol	Chain	Length	Quality of chain
10	D	223	83% 8% 9%
11	E	566	86% 9% 6%
12	F	40	10% 68% 22%
13	G	13	23% 62% 15%

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
17	ZN	7	1003	-	-	X	-

2 Entry composition (i)

There are 19 unique types of molecules in this entry. The entry contains 81491 atoms, of which 40474 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 DNA replication licensing factor MCM2.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
1	2	616	9714	3062	4849	866	911	26	0	0

- Molecule 2 is a protein called Isoform 2 of DNA replication licensing factor MCM3.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
2	3	639	10064	3138	5047	884	969	26	0	0

- Molecule 3 is a protein called DNA replication licensing factor MCM4.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
3	4	607	9711	3055	4864	855	911	26	0	0

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
4	-19	MET	-	initiating methionine	UNP P33991
4	-18	HIS	-	expression tag	UNP P33991
4	-17	HIS	-	expression tag	UNP P33991
4	-16	HIS	-	expression tag	UNP P33991
4	-15	HIS	-	expression tag	UNP P33991
4	-14	HIS	-	expression tag	UNP P33991
4	-13	HIS	-	expression tag	UNP P33991
4	-12	HIS	-	expression tag	UNP P33991
4	-11	HIS	-	expression tag	UNP P33991
4	-10	GLU	-	expression tag	UNP P33991
4	-9	ASN	-	expression tag	UNP P33991
4	-8	LEU	-	expression tag	UNP P33991
4	-7	TYR	-	expression tag	UNP P33991
4	-6	PHE	-	expression tag	UNP P33991
4	-5	GLN	-	expression tag	UNP P33991

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Chain	Residue	Modelled	Actual	Comment	Reference
4	-4	GLY	-	expression tag	UNP P33991
4	-3	SER	-	expression tag	UNP P33991
4	-2	SER	-	expression tag	UNP P33991
4	-1	ALA	-	expression tag	UNP P33991
4	0	THR	-	expression tag	UNP P33991

- Molecule 4 is a protein called DNA replication licensing factor MCM5.

Mol	Chain	Residues	Atoms						AltConf	Trace
4	5	624	Total	C	H	N	O	S	0	0
			9825	3055	4938	875	922	35		

- Molecule 5 is a protein called DNA replication licensing factor MCM6.

Mol	Chain	Residues	Atoms						AltConf	Trace
5	6	617	Total	C	H	N	O	S	0	0
			9881	3100	4949	875	931	26		

- Molecule 6 is a protein called DNA replication licensing factor MCM7.

Mol	Chain	Residues	Atoms						AltConf	Trace
6	7	565	Total	C	H	N	O	S	0	0
			9030	2830	4531	794	847	28		

- Molecule 7 is a protein called DNA replication complex GINS protein PSF1.

Mol	Chain	Residues	Atoms						AltConf	Trace
7	A	195	Total	C	H	N	O	S	0	0
			3193	1011	1589	289	293	11		

- Molecule 8 is a protein called DNA replication complex GINS protein PSF2.

Mol	Chain	Residues	Atoms						AltConf	Trace
8	B	176	Total	C	H	N	O	S	0	0
			2883	916	1452	242	264	9		

There are 37 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	186	GLU	-	expression tag	UNP Q9Y248
B	187	ASN	-	expression tag	UNP Q9Y248

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Chain	Residue	Modelled	Actual	Comment	Reference
B	188	LEU	-	expression tag	UNP Q9Y248
B	189	TYR	-	expression tag	UNP Q9Y248
B	190	PHE	-	expression tag	UNP Q9Y248
B	191	GLN	-	expression tag	UNP Q9Y248
B	192	GLY	-	expression tag	UNP Q9Y248
B	193	SER	-	expression tag	UNP Q9Y248
B	194	ALA	-	expression tag	UNP Q9Y248
B	195	TRP	-	expression tag	UNP Q9Y248
B	196	SER	-	expression tag	UNP Q9Y248
B	197	HIS	-	expression tag	UNP Q9Y248
B	198	PRO	-	expression tag	UNP Q9Y248
B	199	GLN	-	expression tag	UNP Q9Y248
B	200	PHE	-	expression tag	UNP Q9Y248
B	201	GLU	-	expression tag	UNP Q9Y248
B	202	LYS	-	expression tag	UNP Q9Y248
B	203	GLY	-	expression tag	UNP Q9Y248
B	204	GLY	-	expression tag	UNP Q9Y248
B	205	GLY	-	expression tag	UNP Q9Y248
B	206	SER	-	expression tag	UNP Q9Y248
B	207	GLY	-	expression tag	UNP Q9Y248
B	208	GLY	-	expression tag	UNP Q9Y248
B	209	GLY	-	expression tag	UNP Q9Y248
B	210	SER	-	expression tag	UNP Q9Y248
B	211	GLY	-	expression tag	UNP Q9Y248
B	212	GLY	-	expression tag	UNP Q9Y248
B	213	SER	-	expression tag	UNP Q9Y248
B	214	ALA	-	expression tag	UNP Q9Y248
B	215	TRP	-	expression tag	UNP Q9Y248
B	216	SER	-	expression tag	UNP Q9Y248
B	217	HIS	-	expression tag	UNP Q9Y248
B	218	PRO	-	expression tag	UNP Q9Y248
B	219	GLN	-	expression tag	UNP Q9Y248
B	220	PHE	-	expression tag	UNP Q9Y248
B	221	GLU	-	expression tag	UNP Q9Y248
B	222	LYS	-	expression tag	UNP Q9Y248

- Molecule 9 is a protein called DNA replication complex GINS protein PSF3.

Mol	Chain	Residues	Atoms						AltConf	Trace
9	C	196	Total	C	H	N	O	S	0	0
			3106	998	1534	275	293	6		

- Molecule 10 is a protein called DNA replication complex GINS protein SLD5.

Mol	Chain	Residues	Atoms						AltConf	Trace
10	D	204	Total	C	H	N	O	S	0	0
			3389	1070	1704	291	314	10		

- Molecule 11 is a protein called Cell division control protein 45 homolog.

Mol	Chain	Residues	Atoms						AltConf	Trace
11	E	533	Total	C	H	N	O	S	0	0
			8607	2760	4268	744	804	31		

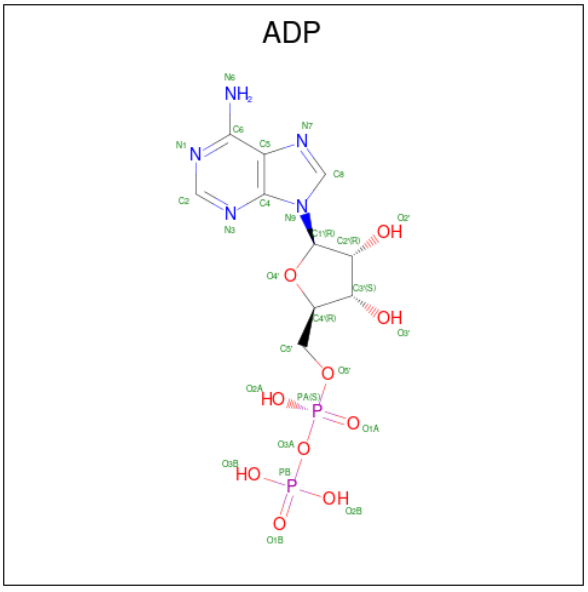
- Molecule 12 is a DNA chain called Leading strand DNA template.

Mol	Chain	Residues	Atoms						AltConf	Trace
12	F	40	Total	C	H	N	O	P	0	0
			1292	397	453	155	247	40		

- Molecule 13 is a DNA chain called Lagging strand DNA template.

Mol	Chain	Residues	Atoms						AltConf	Trace
13	G	13	Total	C	H	N	O	P	0	0
			413	127	146	53	74	13		

- Molecule 14 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).

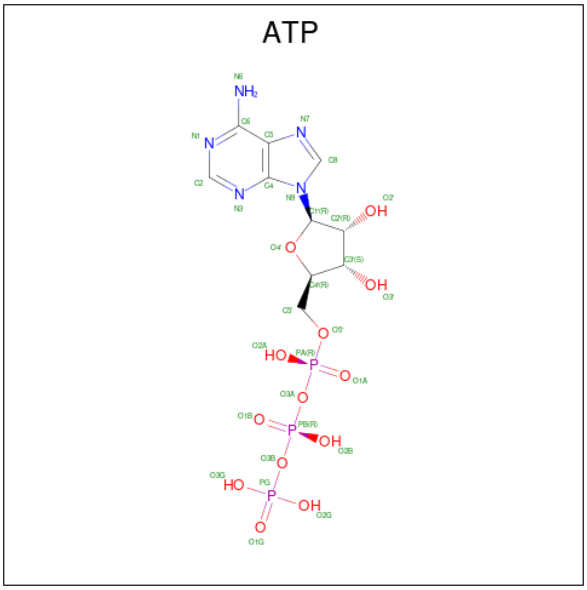


Mol	Chain	Residues	Atoms						AltConf
14	2	1	Total	C	H	N	O	P	0
			39	10	12	5	10	2	

- Molecule 15 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	AltConf
15	2	1	Total Mg 1 1	0
15	3	1	Total Mg 1 1	0
15	4	1	Total Mg 1 1	0
15	5	1	Total Mg 1 1	0
15	6	1	Total Mg 1 1	0
15	7	1	Total Mg 1 1	0

- Molecule 16 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	AltConf
16	3	1	Total C H N O P 43 10 12 5 13 3	0
16	4	1	Total C H N O P 43 10 12 5 13 3	0
16	5	1	Total C H N O P 43 10 12 5 13 3	0
16	6	1	Total C H N O P 43 10 12 5 13 3	0

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Mol	Chain	Residues	Atoms						AltConf
16	7	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	

- Molecule 17 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
17	4	1	Total	Zn	0
			1	1	
17	5	1	Total	Zn	0
			1	1	
17	6	1	Total	Zn	0
			1	1	
17	7	1	Total	Zn	0
			1	1	

- Molecule 18 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		AltConf
18	F	2	Total	K	0
			2	2	

- Molecule 19 is water.

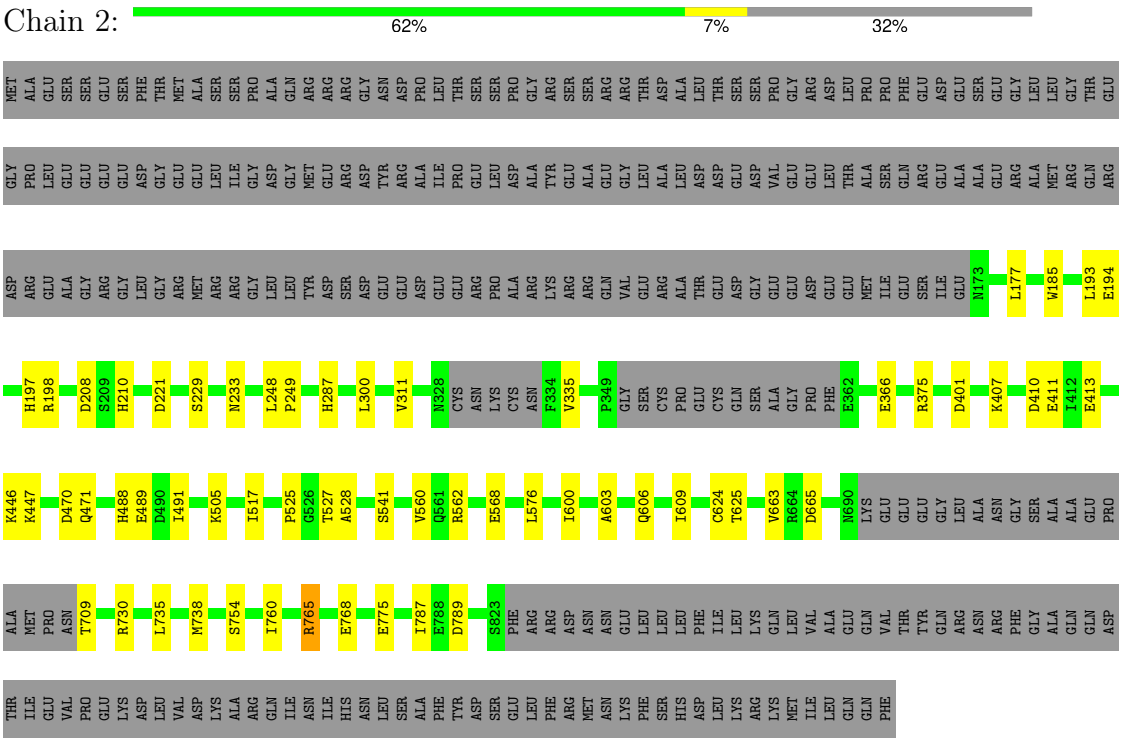
Mol	Chain	Residues	Atoms			AltConf
19	2	7	Total	H	O	0
			21	14	7	
19	3	8	Total	H	O	0
			24	16	8	
19	4	4	Total	H	O	0
			12	8	4	
19	5	8	Total	H	O	0
			24	16	8	
19	6	7	Total	H	O	0
			21	14	7	
19	7	5	Total	H	O	0
			15	10	5	

3 Residue-property plots (i)

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.

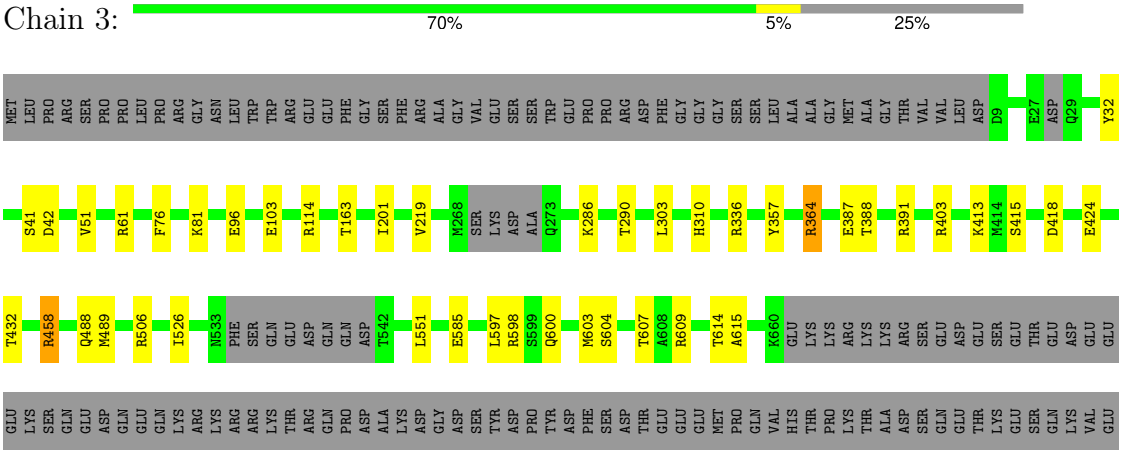
- Molecule 1: DNA replication licensing factor MCM2

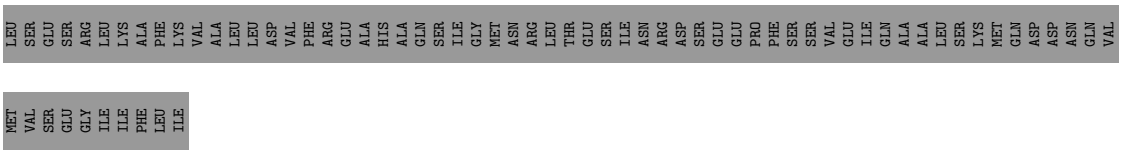
Chain 2:



- Molecule 2: Isoform 2 of DNA replication licensing factor MCM3

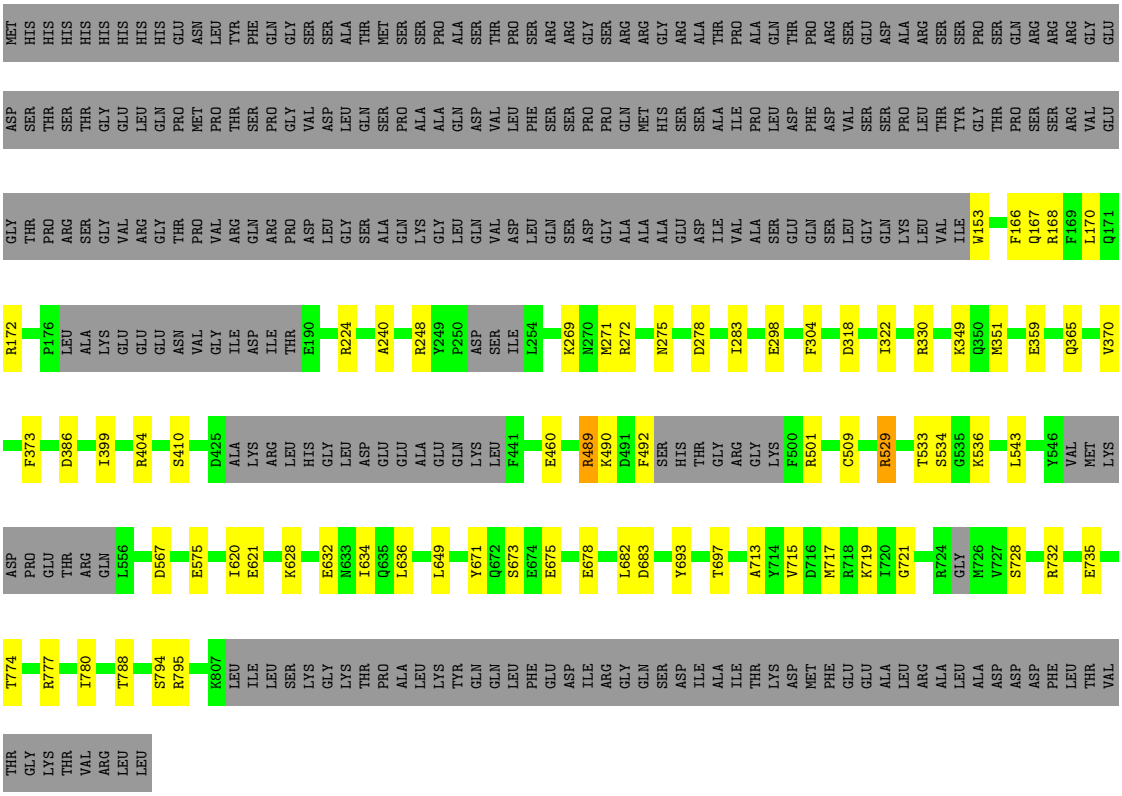
Chain 3:





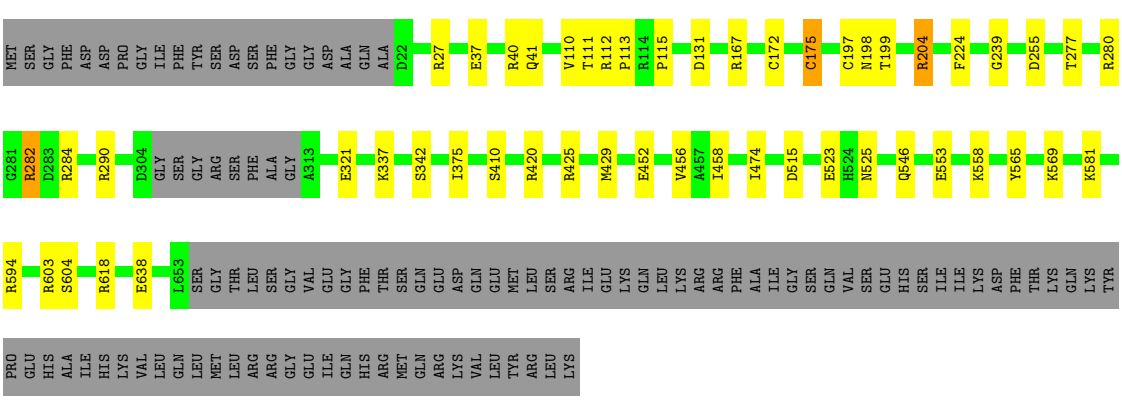
• Molecule 3: DNA replication licensing factor MCM4

Chain 4:



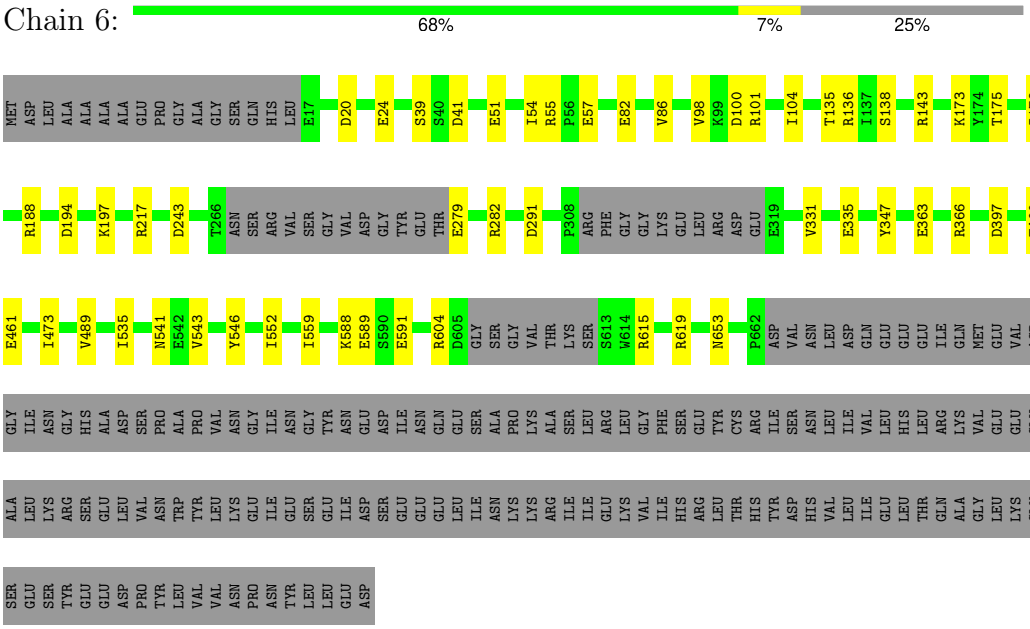
• Molecule 4: DNA replication licensing factor MCM5

Chain 5:



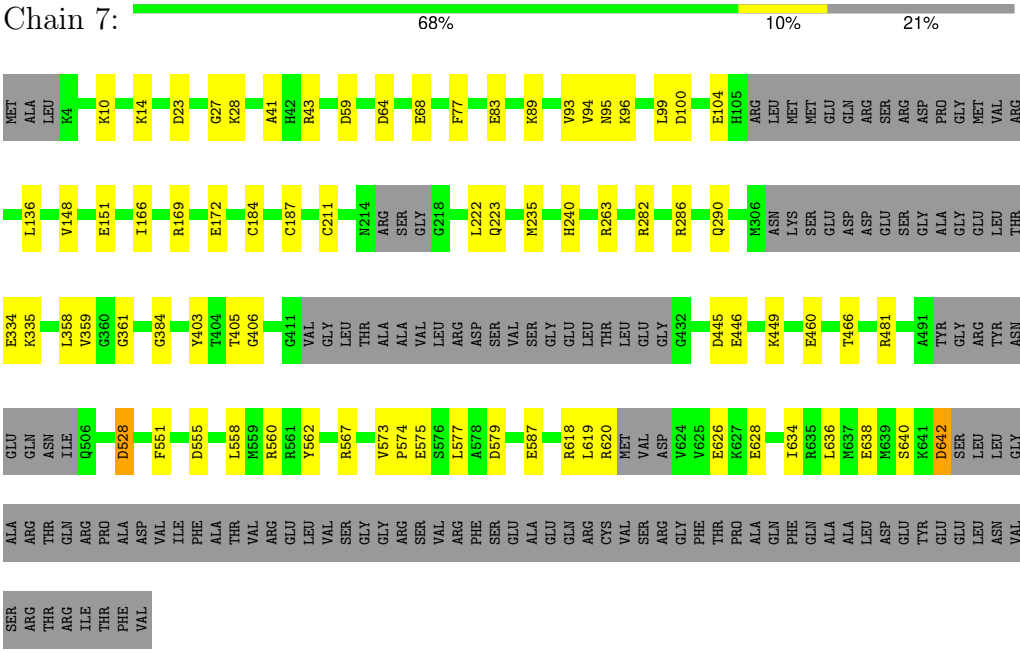
• Molecule 5: DNA replication licensing factor MCM6

Chain 6:



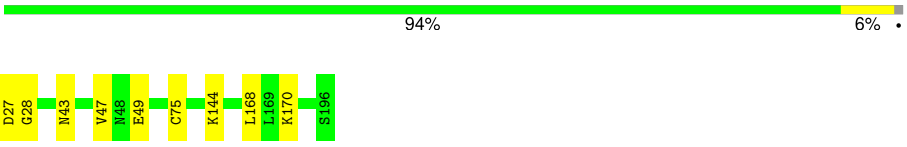
• Molecule 6: DNA replication licensing factor MCM7

Chain 7:



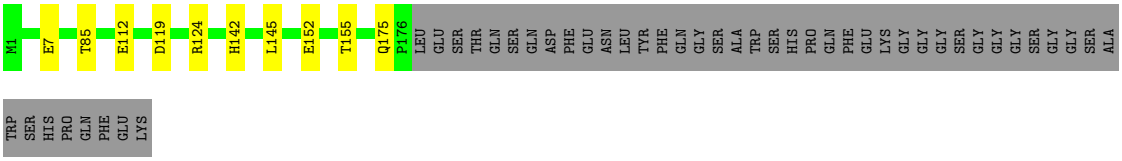
• Molecule 7: DNA replication complex GINS protein PSF1

Chain A:



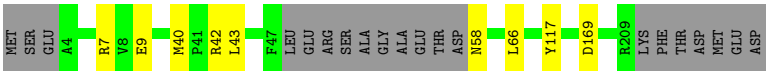
• Molecule 8: DNA replication complex GINS protein PSF2

Chain B:



• Molecule 9: DNA replication complex GINS protein PSF3

Chain C:

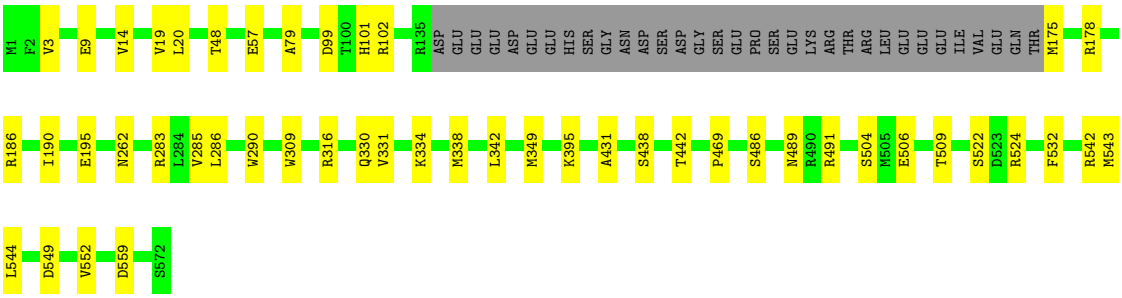


• Molecule 10: DNA replication complex GINS protein SLD5

Chain D:

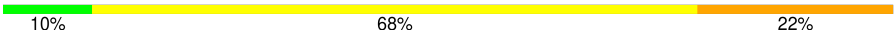
• Molecule 11: Cell division control protein 45 homolog

Chain E:



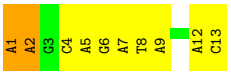
• Molecule 12: Leading strand DNA template

Chain F:



• Molecule 13: Lagging strand DNA template

Chain G:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	187345	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	66	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	29000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, ADP, MG, K, ATP

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	2	0.70	0/4954	0.74	4/6695 (0.1%)
2	3	0.57	0/5093	0.70	3/6872 (0.0%)
3	4	0.36	0/4929	0.55	1/6657 (0.0%)
4	5	0.90	1/4962 (0.0%)	0.81	8/6679 (0.1%)
5	6	0.53	0/5012	0.62	0/6763
6	7	0.42	0/4569	0.60	1/6164 (0.0%)
7	A	0.30	0/1636	0.53	0/2200
8	B	0.27	0/1462	0.47	0/1981
9	C	0.27	0/1607	0.50	0/2167
10	D	0.29	0/1717	0.51	0/2315
11	E	0.30	0/4431	0.51	0/5982
12	F	1.39	4/942 (0.4%)	2.08	58/1458 (4.0%)
13	G	1.44	4/300 (1.3%)	1.93	19/460 (4.1%)
All	All	0.59	9/41614 (0.0%)	0.73	94/56393 (0.2%)

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	2	0	1
2	3	0	5
3	4	0	5
4	5	0	8
6	7	0	3
10	D	0	1
11	E	0	1
12	F	0	7
13	G	0	2
All	All	0	33

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	5	115	PRO	N-CD	-38.31	0.94	1.47
12	F	32	DT	C5-C7	-6.72	1.46	1.50
13	G	4	DC	C5-C6	-6.64	1.29	1.34
13	G	5	DA	C6-N6	-6.27	1.28	1.33
12	F	56	DA	C6-N6	-6.08	1.29	1.33
13	G	4	DC	C4-N4	-5.68	1.28	1.33
12	F	33	DG	C2-N2	-5.21	1.29	1.34
13	G	6	DG	C2-N2	-5.18	1.29	1.34
12	F	55	DG	C2-N2	-5.17	1.29	1.34

All (94) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	5	115	PRO	N-CD-CG	15.49	126.44	103.20
12	F	54	DT	N3-C2-O2	-10.28	116.13	122.30
4	5	280	ARG	NE-CZ-NH1	9.23	124.92	120.30
6	7	286	ARG	NE-CZ-NH1	8.84	124.72	120.30
12	F	38	DG	O4'-C1'-N9	8.66	114.06	108.00
12	F	55	DG	OP1-P-OP2	-8.60	106.70	119.60
12	F	62	DT	OP1-P-O3'	8.52	123.93	105.20
12	F	37	DT	O4'-C1'-N1	8.30	113.81	108.00
12	F	55	DG	N7-C8-N9	8.13	117.16	113.10
12	F	33	DG	P-O3'-C3'	8.04	129.34	119.70
12	F	33	DG	N7-C8-N9	8.01	117.10	113.10
13	G	1	DA	N1-C6-N6	-8.00	113.80	118.60
13	G	6	DG	N7-C8-N9	7.74	116.97	113.10
13	G	13	DC	OP1-P-OP2	-7.61	108.19	119.60
12	F	42	DG	O4'-C1'-N9	7.43	113.20	108.00
12	F	56	DA	N1-C2-N3	7.39	133.00	129.30
13	G	12	DA	OP2-P-O3'	7.37	121.42	105.20
12	F	56	DA	N7-C8-N9	7.35	117.48	113.80
4	5	115	PRO	N-CA-CB	-7.28	94.56	103.30
13	G	5	DA	N7-C8-N9	7.26	117.43	113.80
12	F	53	DT	O4'-C1'-N1	7.24	113.07	108.00
12	F	34	DC	N3-C2-O2	-7.21	116.85	121.90
13	G	5	DA	N1-C2-N3	7.13	132.87	129.30
4	5	115	PRO	CB-CG-CD	-7.11	78.75	106.50
12	F	32	DT	N3-C4-O4	7.09	124.15	119.90
12	F	43	DG	O4'-C1'-N9	7.01	112.91	108.00
13	G	9	DA	OP1-P-OP2	-6.91	109.24	119.60
12	F	61	DA	OP1-P-O3'	6.90	120.38	105.20
13	G	2	DA	C5-C6-N1	6.88	121.14	117.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
12	F	29	DA	OP1-P-OP2	-6.82	109.37	119.60
13	G	1	DA	C4-C5-C6	-6.82	113.59	117.00
12	F	31	DC	OP1-P-OP2	-6.81	109.39	119.60
12	F	26	DG	OP1-P-OP2	-6.79	109.42	119.60
12	F	27	DA	OP1-P-OP2	-6.77	109.44	119.60
12	F	25	DT	OP1-P-OP2	-6.66	109.61	119.60
13	G	7	DA	OP1-P-OP2	-6.65	109.62	119.60
13	G	2	DA	N1-C6-N6	-6.60	114.64	118.60
13	G	5	DA	OP1-P-OP2	-6.59	109.72	119.60
2	3	310	HIS	N-CA-C	-6.57	93.26	111.00
12	F	54	DT	O4'-C1'-N1	6.45	112.52	108.00
12	F	45	DT	C6-C5-C7	-6.43	119.04	122.90
13	G	8	DT	OP2-P-O3'	6.42	119.33	105.20
12	F	45	DT	O4'-C1'-N1	6.42	112.49	108.00
12	F	58	DG	OP1-P-OP2	-6.35	110.08	119.60
12	F	32	DT	C2-N3-C4	6.33	131.00	127.20
4	5	290	ARG	NE-CZ-NH1	6.30	123.45	120.30
12	F	41	DT	N3-C2-O2	-6.20	118.58	122.30
12	F	57	DG	OP1-P-OP2	-6.16	110.36	119.60
12	F	35	DT	C6-C5-C7	-6.04	119.27	122.90
12	F	33	DG	OP1-P-OP2	-6.01	110.59	119.60
12	F	52	DG	N3-C2-N2	-5.98	115.71	119.90
12	F	42	DG	N3-C2-N2	-5.97	115.72	119.90
12	F	28	DT	OP2-P-O3'	5.97	118.33	105.20
12	F	49	DT	C6-C5-C7	-5.96	119.33	122.90
12	F	35	DT	O4'-C1'-N1	5.95	112.17	108.00
12	F	53	DT	C6-C5-C7	-5.93	119.34	122.90
12	F	35	DT	N3-C2-O2	-5.92	118.75	122.30
3	4	404	ARG	NE-CZ-NH1	5.91	123.25	120.30
12	F	37	DT	N3-C2-O2	-5.91	118.76	122.30
2	3	32	TYR	CB-CA-C	5.89	122.18	110.40
13	G	2	DA	C4-C5-C6	-5.88	114.06	117.00
12	F	38	DG	P-O3'-C3'	5.86	126.73	119.70
12	F	37	DT	C6-C5-C7	-5.85	119.39	122.90
12	F	55	DG	C6-N1-C2	5.84	128.61	125.10
4	5	282	ARG	NE-CZ-NH1	5.83	123.21	120.30
1	2	488	HIS	N-CA-C	-5.73	95.54	111.00
13	G	4	DC	OP1-P-O3'	5.71	117.75	105.20
12	F	33	DG	C6-N1-C2	5.69	128.51	125.10
12	F	30	DT	OP1-P-O3'	5.67	117.66	105.20
12	F	26	DG	OP1-P-O3'	5.65	117.63	105.20
13	G	6	DG	C6-N1-C2	5.63	128.48	125.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
12	F	33	DG	C8-N9-C4	-5.62	104.15	106.40
13	G	1	DA	C5-C6-N1	5.60	120.50	117.70
12	F	55	DG	C8-N9-C4	-5.59	104.17	106.40
12	F	32	DT	C5-C6-N1	5.55	127.03	123.70
2	3	391	ARG	NE-CZ-NH1	5.52	123.06	120.30
12	F	54	DT	P-O3'-C3'	5.51	126.31	119.70
12	F	48	DG	O4'-C1'-N9	5.43	111.80	108.00
12	F	54	DT	C6-C5-C7	-5.42	119.65	122.90
13	G	6	DG	OP1-P-O3'	5.37	117.01	105.20
13	G	6	DG	C8-N9-C4	-5.37	104.25	106.40
12	F	36	DT	C6-C5-C7	-5.34	119.69	122.90
1	2	375	ARG	NE-CZ-NH1	5.32	122.96	120.30
12	F	24	DG	OP1-P-O3'	5.29	116.83	105.20
12	F	52	DG	O4'-C1'-N9	5.26	111.68	108.00
12	F	25	DT	OP1-P-O3'	5.21	116.67	105.20
4	5	284	ARG	NE-CZ-NH1	5.13	122.87	120.30
12	F	49	DT	N3-C2-O2	-5.13	119.22	122.30
12	F	48	DG	C5-C6-N1	5.08	114.04	111.50
12	F	39	DG	C5-C6-N1	5.08	114.04	111.50
12	F	43	DG	N3-C2-N2	-5.08	116.34	119.90
4	5	113	PRO	N-CA-C	-5.06	98.94	112.10
1	2	446	LYS	N-CA-C	-5.05	97.35	111.00
1	2	765	ARG	NE-CZ-NH2	-5.02	117.79	120.30

There are no chirality outliers.

All (33) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	2	765	ARG	Sidechain
2	3	114	ARG	Sidechain
2	3	336	ARG	Sidechain
2	3	364	ARG	Sidechain
2	3	458	ARG	Sidechain
2	3	598	ARG	Sidechain
3	4	248	ARG	Sidechain
3	4	330	ARG	Sidechain
3	4	489	ARG	Sidechain
3	4	501	ARG	Sidechain
3	4	529	ARG	Sidechain
4	5	112	ARG	Sidechain
4	5	167	ARG	Sidechain
4	5	204	ARG	Sidechain

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Mol	Chain	Res	Type	Group
4	5	282	ARG	Sidechain
4	5	342	SER	Mainchain
4	5	420	ARG	Sidechain
4	5	425	ARG	Sidechain
4	5	603	ARG	Sidechain
6	7	325	ARG	Sidechain
6	7	481	ARG	Sidechain
6	7	560	ARG	Sidechain
10	D	216	ARG	Sidechain
11	E	283	ARG	Sidechain
12	F	40	DG	Sidechain
12	F	43	DG	Sidechain
12	F	44	DG	Sidechain
12	F	45	DT	Sidechain
12	F	47	DG	Sidechain
12	F	52	DG	Sidechain
12	F	54	DT	Sidechain
13	G	1	DA	Sidechain
13	G	2	DA	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	2	4865	4849	4881	36	0
2	3	5017	5047	5055	40	0
3	4	4847	4864	4878	61	0
4	5	4887	4938	4954	30	0
5	6	4932	4949	4958	35	0
6	7	4499	4531	4535	66	0
7	A	1604	1589	1594	7	0
8	B	1431	1452	1456	8	0
9	C	1572	1534	1537	7	0
10	D	1685	1704	1709	11	0
11	E	4339	4268	4289	35	0
12	F	839	453	447	5	0
13	G	267	146	140	0	0
14	2	27	12	12	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
15	2	1	0	0	0	0
15	3	1	0	0	0	0
15	4	1	0	0	0	0
15	5	1	0	0	0	0
15	6	1	0	0	0	0
15	7	1	0	0	0	0
16	3	31	12	12	1	0
16	4	31	12	12	0	0
16	5	31	12	12	2	0
16	6	31	12	12	3	0
16	7	31	12	12	0	0
17	4	1	0	0	0	0
17	5	1	0	0	0	0
17	6	1	0	0	0	0
17	7	1	0	0	2	0
18	F	2	0	0	0	0
19	2	7	14	0	0	0
19	3	8	16	0	1	0
19	4	4	8	0	1	0
19	5	8	16	0	2	0
19	6	7	14	0	1	0
19	7	5	10	0	3	0
All	All	41017	40474	40505	317	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 4.

All (317) 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)
2:3:600:GLN:CG	2:3:603:MET:HB3	1.65	1.25
6:7:187:CYS:SG	17:7:1003:ZN:ZN	1.34	1.15
3:4:269:LYS:HZ2	3:4:283:ILE:CG2	1.62	1.10
11:E:14:VAL:HG13	11:E:19:VAL:HG11	1.32	1.10
2:3:600:GLN:HG3	2:3:603:MET:HB3	1.36	1.05
11:E:14:VAL:CG1	11:E:19:VAL:HG11	1.86	1.04
6:7:335:LYS:HE2	6:7:551:PHE:CD2	1.94	1.00
4:5:172:CYS:SG	4:5:175:CYS:SG	2.60	0.99
3:4:732:ARG:NH2	19:4:1101:HOH:O	1.95	0.99
2:3:364:ARG:HH11	2:3:403:ARG:HB2	1.26	0.98
2:3:600:GLN:HG2	2:3:603:MET:HB3	1.42	0.98

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:7:187:CYS:HG	17:7:1003:ZN:ZN	0.80	0.96
11:E:14:VAL:HG13	11:E:19:VAL:CG1	1.97	0.95
3:4:269:LYS:NZ	3:4:283:ILE:HG21	1.83	0.93
6:7:96:LYS:NZ	6:7:104:GLU:OE2	2.00	0.93
3:4:269:LYS:HZ2	3:4:283:ILE:HG21	1.34	0.91
6:7:446:GLU:OE1	19:7:1101:HOH:O	1.89	0.90
3:4:269:LYS:NZ	3:4:283:ILE:CG2	2.35	0.90
2:3:600:GLN:CG	2:3:603:MET:CB	2.49	0.89
2:3:364:ARG:HH11	2:3:403:ARG:CB	1.84	0.89
3:4:673:SER:OG	3:4:675:GLU:OE1	1.89	0.88
6:7:446:GLU:OE2	19:7:1102:HOH:O	1.90	0.88
11:E:506:GLU:N	11:E:506:GLU:OE1	2.07	0.88
1:2:229:SER:OG	1:2:401:ASP:OD2	1.91	0.87
8:B:152:GLU:O	8:B:155:THR:HG22	1.73	0.86
4:5:321:GLU:OE2	4:5:558:LYS:NZ	2.08	0.86
6:7:43:ARG:NH1	6:7:100:ASP:OD2	2.07	0.86
6:7:335:LYS:HE2	6:7:551:PHE:CG	2.10	0.86
5:6:588:LYS:NZ	5:6:591:GLU:OE1	2.08	0.86
6:7:14:LYS:NZ	6:7:83:GLU:OE1	2.09	0.85
6:7:282:ARG:CZ	6:7:290:GLN:HB2	2.06	0.84
1:2:366:GLU:OE1	1:2:366:GLU:N	2.10	0.84
6:7:449:LYS:HE3	19:7:1101:HOH:O	1.77	0.84
11:E:330:GLN:O	11:E:338:MET:HE2	1.78	0.83
16:5:1001:ATP:O1A	19:5:1101:HOH:O	1.97	0.82
6:7:282:ARG:HD3	6:7:290:GLN:OE1	1.77	0.82
3:4:671:TYR:OH	6:7:573:VAL:O	1.99	0.80
6:7:77:PHE:HB3	6:7:136:LEU:HD11	1.62	0.80
5:6:589:GLU:OE1	5:6:589:GLU:N	2.14	0.79
8:B:85:THR:O	8:B:124:ARG:NH2	2.15	0.79
7:A:18:GLU:N	7:A:18:GLU:OE1	2.16	0.79
2:3:600:GLN:HG2	2:3:603:MET:CB	2.14	0.77
6:7:77:PHE:HB3	6:7:136:LEU:CD1	2.13	0.77
6:7:620:ARG:NE	6:7:628:GLU:OE2	2.17	0.77
14:2:1001:ADP:O2A	5:6:619:ARG:NH2	2.17	0.77
6:7:184:CYS:SG	6:7:187:CYS:SG	2.83	0.76
5:6:100:ASP:OD1	5:6:101:ARG:N	2.19	0.75
11:E:330:GLN:O	11:E:338:MET:CE	2.33	0.75
6:7:41:ALA:HB1	6:7:89:LYS:HG2	1.69	0.75
2:3:489:MET:SD	4:5:594:ARG:HB2	2.27	0.74
11:E:101:HIS:NE2	11:E:549:ASP:OD1	2.20	0.74
2:3:364:ARG:NH1	2:3:403:ARG:HB2	2.02	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:6:138:SER:OG	5:6:243:ASP:OD1	2.06	0.73
6:7:358:LEU:O	6:7:567:ARG:NH1	2.21	0.73
5:6:282:ARG:HG2	5:6:291:ASP:OD1	1.88	0.72
6:7:334:GLU:N	6:7:334:GLU:OE1	2.19	0.72
2:3:286:LYS:O	2:3:290:THR:HG23	1.90	0.72
6:7:282:ARG:NH1	6:7:290:GLN:HB2	2.04	0.72
2:3:364:ARG:NH1	2:3:403:ARG:CB	2.54	0.71
3:4:620:ILE:HD12	3:4:621:GLU:N	2.05	0.71
2:3:600:GLN:HG2	2:3:603:MET:CE	2.21	0.70
5:6:604:ARG:NH2	5:6:653:ASN:OD1	2.23	0.70
3:4:359:GLU:N	3:4:359:GLU:OE1	2.24	0.70
11:E:175:MET:HG2	11:E:178:ARG:NH2	2.06	0.70
6:7:282:ARG:CZ	6:7:290:GLN:CB	2.70	0.69
16:3:1001:ATP:O1A	19:3:1101:HOH:O	2.10	0.69
3:4:269:LYS:HZ2	3:4:283:ILE:HG22	1.54	0.69
11:E:99:ASP:O	11:E:102:ARG:NH2	2.26	0.69
5:6:173:LYS:O	5:6:175:THR:HG23	1.93	0.68
2:3:600:GLN:HG2	2:3:603:MET:HE3	1.77	0.67
1:2:505:LYS:NZ	1:2:775:GLU:OE2	2.28	0.67
3:4:735:GLU:OE2	16:6:1001:ATP:O3'	2.09	0.67
6:7:558:LEU:HD13	6:7:558:LEU:O	1.94	0.67
2:3:458:ARG:NH2	4:5:604:SER:O	2.28	0.66
7:A:27:ASP:OD1	7:A:28:GLY:N	2.29	0.66
1:2:193:LEU:O	1:2:197:HIS:CD2	2.49	0.66
1:2:413:GLU:CD	1:2:447:LYS:HB2	2.17	0.65
9:C:40:MET:HE2	9:C:43:LEU:HD12	1.79	0.64
3:4:460:GLU:OE1	3:4:460:GLU:N	2.27	0.64
6:7:59:ASP:OD1	6:7:59:ASP:O	2.15	0.64
6:7:620:ARG:NH2	6:7:626:GLU:OE1	2.31	0.64
1:2:233:ASN:OD1	1:2:287:HIS:ND1	2.30	0.64
6:7:41:ALA:HB1	6:7:89:LYS:CG	2.28	0.63
3:4:529:ARG:CD	3:4:567:ASP:O	2.45	0.63
4:5:452:GLU:O	4:5:456:VAL:HG23	1.99	0.63
5:6:535:ILE:HD12	5:6:535:ILE:O	1.99	0.62
6:7:282:ARG:NH2	6:7:290:GLN:OE1	2.32	0.62
9:C:40:MET:CE	9:C:43:LEU:HD12	2.29	0.62
9:C:117:TYR:CD2	9:C:169:ASP:OD2	2.52	0.62
1:2:562:ARG:NH2	1:2:568:GLU:OE2	2.32	0.61
6:7:282:ARG:NE	6:7:290:GLN:HB2	2.15	0.61
4:5:618:ARG:NH2	19:5:1102:HOH:O	2.12	0.61
3:4:269:LYS:CE	3:4:283:ILE:HG22	2.30	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:6:541:ASN:OD1	5:6:543:VAL:N	2.32	0.61
4:5:110:VAL:HG23	4:5:111:THR:HG23	1.83	0.61
11:E:522:SER:OG	11:E:524:ARG:NH1	2.35	0.60
6:7:359:VAL:HG11	6:7:619:LEU:HD12	1.84	0.60
6:7:282:ARG:NH1	6:7:290:GLN:CB	2.66	0.59
2:3:415:SER:OG	2:3:418:ASP:OD2	2.16	0.59
1:2:560:VAL:N	12:F:59:DC:OP1	2.30	0.59
9:C:9:GLU:OE1	9:C:9:GLU:N	2.30	0.58
6:7:148:VAL:HG22	6:7:151:GLU:OE2	2.04	0.58
8:B:175:GLN:HB2	10:D:226:THR:HG21	1.85	0.58
6:7:172:GLU:OE1	6:7:172:GLU:N	2.24	0.58
3:4:529:ARG:HD3	3:4:567:ASP:O	2.03	0.58
1:2:413:GLU:HG3	1:2:447:LYS:HB2	1.85	0.57
3:4:529:ARG:HD2	3:4:567:ASP:O	2.04	0.57
4:5:175:CYS:SG	4:5:199:THR:HG21	2.45	0.57
4:5:410:SER:OG	12:F:58:DG:OP1	2.17	0.57
6:7:359:VAL:O	6:7:618:ARG:NH2	2.37	0.57
4:5:255:ASP:OD1	4:5:255:ASP:O	2.23	0.56
5:6:54:ILE:HD12	5:6:55:ARG:N	2.20	0.56
6:7:335:LYS:HE2	6:7:551:PHE:CE2	2.40	0.56
6:7:528:ASP:N	6:7:528:ASP:OD1	2.37	0.56
2:3:201:ILE:HD12	2:3:219:VAL:HG21	1.87	0.56
10:D:59:LEU:HD11	10:D:67:ARG:HD2	1.87	0.56
5:6:552:ILE:HD11	16:6:1001:ATP:H1'	1.87	0.56
8:B:112:GLU:N	8:B:112:GLU:OE1	2.33	0.56
3:4:509:CYS:SG	3:4:649:LEU:HD12	2.45	0.56
3:4:693:TYR:O	3:4:697:THR:HG22	2.05	0.56
11:E:14:VAL:HG11	11:E:19:VAL:HG11	1.80	0.56
11:E:330:GLN:C	11:E:338:MET:HE1	2.26	0.56
3:4:634:ILE:HD13	3:4:636:LEU:HD12	1.88	0.55
3:4:365:GLN:N	3:4:365:GLN:OE1	2.39	0.55
2:3:614:THR:HG22	2:3:615:ALA:N	2.21	0.55
4:5:375:ILE:HA	4:5:515:ASP:OD2	2.07	0.55
3:4:269:LYS:CE	3:4:283:ILE:CG2	2.85	0.55
5:6:54:ILE:HG22	5:6:104:ILE:CD1	2.37	0.55
11:E:489:ASN:OD1	11:E:491:ARG:N	2.39	0.54
2:3:81:LYS:NZ	2:3:96:GLU:O	2.40	0.54
3:4:529:ARG:O	3:4:529:ARG:HG2	2.06	0.54
3:4:620:ILE:HD12	3:4:621:GLU:H	1.72	0.54
1:2:491:ILE:HD11	1:2:663:VAL:HG22	1.90	0.54
2:3:387:GLU:O	2:3:388:THR:OG1	2.22	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:4:304:PHE:CZ	3:4:322:ILE:HD11	2.42	0.54
3:4:732:ARG:NH2	16:6:1001:ATP:O2G	2.40	0.54
4:5:131:ASP:O	11:E:334:LYS:NZ	2.36	0.54
1:2:208:ASP:OD1	1:2:210:HIS:N	2.41	0.54
11:E:57:GLU:OE1	11:E:57:GLU:N	2.36	0.54
3:4:275:ASN:OD1	6:7:263:ARG:NH2	2.40	0.53
1:2:413:GLU:CG	1:2:447:LYS:HB2	2.38	0.53
2:3:413:LYS:HG2	4:5:456:VAL:CG1	2.39	0.53
1:2:470:ASP:OD1	1:2:471:GLN:N	2.41	0.53
3:4:536:LYS:HE3	3:4:575:GLU:HG2	1.91	0.53
2:3:364:ARG:NH1	2:3:403:ARG:HB3	2.24	0.53
3:4:269:LYS:HZ1	3:4:278:ASP:CG	2.11	0.53
2:3:600:GLN:OE1	2:3:603:MET:HA	2.09	0.52
4:5:37:GLU:OE1	4:5:41:GLN:NE2	2.43	0.52
6:7:558:LEU:HD11	6:7:562:TYR:CZ	2.43	0.52
1:2:193:LEU:HD12	1:2:197:HIS:NE2	2.25	0.52
3:4:269:LYS:HE3	3:4:283:ILE:HG22	1.91	0.52
1:2:194:GLU:OE1	1:2:198:ARG:NH1	2.42	0.52
6:7:10:LYS:NZ	6:7:83:GLU:OE2	2.32	0.52
6:7:634:ILE:O	6:7:638:GLU:HG2	2.10	0.52
1:2:525:PRO:HB3	19:6:1107:HOH:O	2.10	0.52
5:6:51:GLU:OE1	5:6:51:GLU:HA	2.09	0.52
6:7:77:PHE:HB3	6:7:136:LEU:HD13	1.90	0.52
7:A:144:LYS:NZ	8:B:7:GLU:OE2	2.43	0.52
11:E:442:THR:O	11:E:442:THR:HG22	2.09	0.51
3:4:721:GLY:N	3:4:728:SER:OG	2.40	0.51
6:7:169:ARG:HG3	6:7:169:ARG:HH11	1.75	0.51
2:3:413:LYS:CG	4:5:456:VAL:HG11	2.41	0.51
4:5:337:LYS:HG2	4:5:553:GLU:OE2	2.09	0.51
3:4:715:VAL:O	3:4:719:LYS:HG3	2.10	0.51
3:4:533:THR:HG21	3:4:543:LEU:HD21	1.92	0.51
4:5:581:LYS:NZ	4:5:638:GLU:OE1	2.37	0.51
10:D:101:GLU:OE1	10:D:104:ARG:NH2	2.44	0.51
2:3:364:ARG:NH1	2:3:403:ARG:O	2.44	0.50
1:2:517:ILE:O	1:2:625:THR:HG23	2.10	0.50
1:2:787:ILE:HD12	1:2:789:ASP:OD2	2.11	0.50
2:3:424:GLU:OE2	2:3:432:THR:HG23	2.12	0.50
6:7:187:CYS:SG	6:7:211:CYS:SG	3.09	0.50
11:E:504:SER:OG	11:E:509:THR:OG1	2.26	0.50
11:E:331:VAL:HA	11:E:338:MET:CE	2.41	0.50
6:7:359:VAL:HG11	6:7:619:LEU:CD1	2.42	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:6:444:ILE:HD11	5:6:489:VAL:HG11	1.94	0.49
6:7:222:LEU:HD13	6:7:223:GLN:N	2.27	0.49
3:4:529:ARG:NH2	5:6:217:ARG:HE	2.09	0.49
11:E:186:ARG:O	11:E:190:ILE:HD12	2.12	0.49
9:C:117:TYR:CE2	9:C:169:ASP:OD2	2.66	0.49
5:6:182:ASN:OD1	5:6:184:VAL:N	2.45	0.49
3:4:224:ARG:HG2	3:4:224:ARG:HH11	1.77	0.49
7:A:43:ASN:O	7:A:47:VAL:HG23	2.13	0.49
1:2:407:LYS:NZ	4:5:239:GLY:HA3	2.27	0.48
10:D:145:VAL:HG12	10:D:160:LEU:HD11	1.96	0.48
6:7:43:ARG:HD3	6:7:93:VAL:HG21	1.96	0.48
7:A:6:ALA:HB1	7:A:75:CYS:CB	2.43	0.48
7:A:168:LEU:HD21	7:A:170:LYS:HD2	1.96	0.48
3:4:788:THR:OG1	3:4:795:ARG:NH2	2.46	0.48
6:7:99:LEU:HD12	6:7:99:LEU:O	2.13	0.48
10:D:82:LEU:O	10:D:134:ARG:NH2	2.47	0.48
3:4:269:LYS:NZ	3:4:283:ILE:HG22	2.18	0.47
11:E:330:GLN:O	11:E:338:MET:HE1	2.14	0.47
11:E:522:SER:OG	11:E:524:ARG:HD2	2.14	0.47
6:7:555:ASP:N	6:7:555:ASP:OD1	2.39	0.47
5:6:363:GLU:OE2	5:6:366:ARG:NH1	2.48	0.47
1:2:407:LYS:HG2	1:2:410:ASP:OD2	2.15	0.47
1:2:177:LEU:HD23	1:2:185:TRP:HB2	1.96	0.47
1:2:665:ASP:O	5:6:615:ARG:NH1	2.47	0.47
2:3:614:THR:HG21	6:7:384:GLY:HA3	1.97	0.47
6:7:282:ARG:HD3	6:7:290:GLN:CD	2.35	0.47
1:2:311:VAL:HG22	1:2:411:GLU:OE2	2.15	0.47
3:4:304:PHE:CE2	3:4:322:ILE:HD11	2.49	0.46
3:4:492:PHE:CD2	5:6:559:ILE:HG23	2.49	0.46
12:F:24:DG:H2"	12:F:25:DT:H71	1.97	0.46
1:2:413:GLU:CD	1:2:447:LYS:CB	2.83	0.46
3:4:671:TYR:CD2	6:7:575:GLU:OE2	2.69	0.46
3:4:693:TYR:CZ	3:4:697:THR:HG21	2.50	0.46
3:4:271:MET:HE3	3:4:370:VAL:HG23	1.96	0.46
2:3:604:SER:HB2	2:3:607:THR:HB	1.98	0.46
3:4:269:LYS:NZ	3:4:278:ASP:CG	2.69	0.46
3:4:272:ARG:O	6:7:263:ARG:NH1	2.48	0.46
6:7:282:ARG:CD	6:7:290:GLN:OE1	2.57	0.46
8:B:175:GLN:CB	10:D:226:THR:HG21	2.44	0.46
3:4:322:ILE:HG22	5:6:282:ARG:O	2.16	0.46
5:6:54:ILE:HG22	5:6:104:ILE:HD11	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:4:628:LYS:HB3	3:4:632:GLU:HG3	1.98	0.46
3:4:168:ARG:HG2	3:4:172:ARG:HD2	1.98	0.45
1:2:576:LEU:HD11	1:2:600:ILE:HG22	1.98	0.45
5:6:82:GLU:O	5:6:86:VAL:HG22	2.16	0.45
11:E:3:VAL:HG13	11:E:9:GLU:HB2	1.99	0.45
11:E:349:MET:CE	11:E:349:MET:HA	2.47	0.45
6:7:361:GLY:O	6:7:618:ARG:NH2	2.49	0.45
6:7:405:THR:HG22	6:7:406:GLY:N	2.32	0.45
11:E:469:PRO:HB3	11:E:552:VAL:HG11	1.98	0.45
1:2:735:LEU:HD11	1:2:738:MET:HE3	1.98	0.45
3:4:269:LYS:NZ	3:4:278:ASP:HB3	2.31	0.45
2:3:413:LYS:HG3	4:5:456:VAL:HG11	1.99	0.45
2:3:600:GLN:CD	2:3:603:MET:CB	2.85	0.45
2:3:303:LEU:O	2:3:357:TYR:CZ	2.70	0.45
10:D:63:GLU:O	10:D:67:ARG:HG3	2.16	0.45
1:2:489:GLU:OE2	1:2:709:THR:HB	2.17	0.45
2:3:597:LEU:O	2:3:609:ARG:NH2	2.50	0.45
10:D:178:TYR:CE1	10:D:182:VAL:HG21	2.52	0.45
4:5:197:CYS:SG	4:5:198:ASN:N	2.91	0.44
2:3:506:ARG:NH2	2:3:551:LEU:HD21	2.32	0.44
10:D:80:GLU:O	10:D:137:LYS:NZ	2.43	0.44
11:E:20:LEU:HD22	11:E:48:THR:HB	1.99	0.44
8:B:145:LEU:O	10:D:241:GLN:HB2	2.18	0.44
11:E:101:HIS:CD2	11:E:549:ASP:OD1	2.70	0.44
5:6:57:GLU:OE1	5:6:57:GLU:N	2.45	0.43
6:7:642:ASP:OD1	6:7:642:ASP:N	2.51	0.43
7:A:49:GLU:OE1	9:C:42:ARG:NH2	2.50	0.43
4:5:546:GLN:OE1	11:E:431:ALA:HB2	2.18	0.43
5:6:397:ASP:O	5:6:400:THR:HG23	2.18	0.43
3:4:298:GLU:OE2	3:4:349:LYS:HE3	2.19	0.43
2:3:163:THR:HG22	2:3:163:THR:O	2.18	0.43
1:2:576:LEU:HD22	1:2:624:CYS:SG	2.58	0.43
5:6:39:SER:OG	5:6:41:ASP:OD1	2.28	0.43
5:6:135:THR:HG22	5:6:136:ARG:N	2.32	0.43
11:E:309:TRP:HZ2	11:E:486:SER:HB2	1.83	0.43
5:6:194:ASP:OD2	5:6:197:LYS:HB2	2.19	0.43
4:5:565:TYR:CE1	4:5:569:LYS:HE3	2.54	0.43
6:7:64:ASP:O	6:7:68:GLU:HG2	2.18	0.43
12:F:26:DG:H2"	12:F:27:DA:C8	2.53	0.43
2:3:51:VAL:HG22	2:3:103:GLU:O	2.18	0.43
3:4:509:CYS:SG	3:4:649:LEU:CD1	3.06	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:4:678:GLU:O	3:4:682:LEU:HD23	2.18	0.43
9:C:9:GLU:H	9:C:9:GLU:CD	2.18	0.43
11:E:542:ARG:NH2	11:E:559:ASP:OD2	2.51	0.43
2:3:614:THR:HG22	2:3:615:ALA:H	1.83	0.43
1:2:754:SER:OG	1:2:760:ILE:O	2.35	0.43
3:4:777:ARG:NH2	3:4:794:SER:OG	2.51	0.43
6:7:282:ARG:CZ	6:7:290:GLN:OE1	2.67	0.43
4:5:565:TYR:O	4:5:569:LYS:HG2	2.19	0.42
2:3:526:ILE:O	2:3:526:ILE:HG23	2.19	0.42
5:6:461:GLU:OE1	5:6:461:GLU:HA	2.19	0.42
11:E:285:VAL:HG12	11:E:286:LEU:HG	2.01	0.42
6:7:579:ASP:OD1	6:7:579:ASP:N	2.51	0.42
3:4:166:PHE:O	3:4:170:LEU:HD13	2.19	0.42
3:4:318:ASP:OD1	3:4:318:ASP:C	2.58	0.42
3:4:713:ALA:O	3:4:717:MET:HG3	2.19	0.42
5:6:57:GLU:H	5:6:57:GLU:CD	2.21	0.42
12:F:59:DC:H2"	12:F:60:DA:C8	2.54	0.42
4:5:458:ILE:O	4:5:458:ILE:HG22	2.18	0.42
11:E:195:GLU:CG	11:E:195:GLU:O	2.67	0.42
5:6:98:VAL:O	5:6:98:VAL:HG12	2.20	0.42
6:7:166:ILE:HD11	6:7:240:HIS:ND1	2.35	0.42
2:3:41:SER:OG	2:3:42:ASP:OD1	2.38	0.42
3:4:351:MET:HG3	3:4:373:PHE:CE1	2.55	0.42
4:5:429:MET:CE	4:5:474:ILE:HG21	2.50	0.42
5:6:20:ASP:O	5:6:24:GLU:HG2	2.20	0.42
2:3:585:GLU:CD	2:3:585:GLU:H	2.23	0.41
4:5:523:GLU:OE2	4:5:525:ASN:HB2	2.20	0.41
6:7:574:PRO:HD2	6:7:577:LEU:HD12	2.02	0.41
1:2:300:LEU:C	1:2:300:LEU:HD12	2.41	0.41
3:4:269:LYS:NZ	3:4:278:ASP:OD1	2.48	0.41
6:7:94:VAL:HG23	6:7:95:ASN:N	2.36	0.41
2:3:604:SER:HB2	2:3:607:THR:CB	2.51	0.41
3:4:533:THR:HG21	3:4:543:LEU:CD2	2.50	0.41
6:7:460:GLU:OE2	6:7:466:THR:O	2.37	0.41
11:E:532:PHE:HB3	11:E:543:MET:HE2	2.03	0.41
4:5:337:LYS:HE2	4:5:553:GLU:OE2	2.21	0.41
6:7:27:GLY:O	6:7:28:LYS:HB2	2.21	0.41
11:E:79:ALA:HB2	11:E:99:ASP:HB3	2.02	0.41
3:4:774:THR:HG22	3:4:780:ILE:HG12	2.02	0.41
5:6:331:VAL:O	5:6:335:GLU:HG3	2.20	0.41
10:D:142:PHE:CG	10:D:143:PRO:HD3	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:E:543:MET:HG2	11:E:544:LEU:N	2.36	0.41
1:2:335:VAL:O	1:2:335:VAL:HG13	2.21	0.41
1:2:603:ALA:HB2	1:2:609:ILE:HD11	2.03	0.41
3:4:166:PHE:CE2	3:4:170:LEU:HD11	2.55	0.41
5:6:179:ILE:HG22	5:6:188:ARG:NE	2.36	0.41
3:4:167:GLN:HG3	3:4:240:ALA:HB1	2.03	0.41
6:7:23:ASP:OD1	6:7:28:LYS:HA	2.20	0.41
6:7:636:LEU:O	6:7:640:SER:OG	2.39	0.41
1:2:730:ARG:HG3	1:2:730:ARG:HH11	1.86	0.40
2:3:413:LYS:HG2	4:5:456:VAL:HG11	2.01	0.40
5:6:400:THR:O	5:6:401:ALA:HB3	2.21	0.40
6:7:403:TYR:OH	6:7:445:ASP:OD2	2.32	0.40
1:2:248:LEU:HB3	1:2:249:PRO:HD3	2.04	0.40
1:2:768:GLU:OE1	16:5:1001:ATP:O3'	2.36	0.40
3:4:349:LYS:HE2	3:4:373:PHE:CD1	2.56	0.40
4:5:40:ARG:NH2	8:B:119:ASP:OD2	2.50	0.40
11:E:342:LEU:N	11:E:342:LEU:HD12	2.36	0.40
1:2:527:THR:O	1:2:528:ALA:HB3	2.21	0.40
4:5:27:ARG:HG3	4:5:27:ARG:HH11	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	2	608/904 (67%)	596 (98%)	12 (2%)	0	100	100
2	3	631/853 (74%)	617 (98%)	14 (2%)	0	100	100
3	4	593/883 (67%)	586 (99%)	7 (1%)	0	100	100
4	5	620/734 (84%)	611 (98%)	9 (2%)	0	100	100
5	6	609/821 (74%)	595 (98%)	14 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
6	7	551/719 (77%)	546 (99%)	5 (1%)	0	100	100
7	A	193/196 (98%)	188 (97%)	5 (3%)	0	100	100
8	B	174/222 (78%)	172 (99%)	2 (1%)	0	100	100
9	C	192/216 (89%)	187 (97%)	5 (3%)	0	100	100
10	D	202/223 (91%)	199 (98%)	3 (2%)	0	100	100
11	E	529/566 (94%)	519 (98%)	10 (2%)	0	100	100
All	All	4902/6337 (77%)	4816 (98%)	86 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	2	537/781 (69%)	534 (99%)	3 (1%)	84	94
2	3	552/742 (74%)	549 (100%)	3 (0%)	86	95
3	4	538/771 (70%)	530 (98%)	8 (2%)	60	81
4	5	532/625 (85%)	528 (99%)	4 (1%)	79	91
5	6	550/724 (76%)	545 (99%)	5 (1%)	75	90
6	7	490/619 (79%)	485 (99%)	5 (1%)	73	88
7	A	173/174 (99%)	173 (100%)	0	100	100
8	B	160/195 (82%)	159 (99%)	1 (1%)	84	94
9	C	169/186 (91%)	166 (98%)	3 (2%)	54	77
10	D	189/205 (92%)	189 (100%)	0	100	100
11	E	486/517 (94%)	481 (99%)	5 (1%)	73	88
All	All	4376/5539 (79%)	4339 (99%)	37 (1%)	77	91

All (37) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	2	221	ASP
1	2	541	SER
1	2	606	GLN
2	3	61	ARG
2	3	76	PHE
2	3	488	GLN
3	4	153	TRP
3	4	386	ASP
3	4	399	ILE
3	4	410	SER
3	4	489	ARG
3	4	490	LYS
3	4	534	SER
3	4	683	ASP
4	5	175	CYS
4	5	204	ARG
4	5	224	PHE
4	5	277	THR
5	6	143	ARG
5	6	279	GLU
5	6	347	TYR
5	6	473	ILE
5	6	546	TYR
6	7	235	MET
6	7	325	ARG
6	7	528	ASP
6	7	587	GLU
6	7	642	ASP
8	B	142	HIS
9	C	7	ARG
9	C	58	ASN
9	C	66	LEU
11	E	262	ASN
11	E	290	TRP
11	E	316	ARG
11	E	395	LYS
11	E	438	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
2	3	453	ASN
6	7	270	HIS

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 18 ligands modelled in this entry, 12 are monoatomic - leaving 6 for Mogul analysis.

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	$\#\|Z\| > 2$
14	ADP	2	1001	15	24,29,29	0.88	0	29,45,45	1.21	2 (6%)
16	ATP	5	1001	15	28,33,33	0.79	0	34,52,52	0.91	1 (2%)
16	ATP	4	1001	15	28,33,33	0.75	0	34,52,52	0.93	1 (2%)
16	ATP	3	1001	15	28,33,33	0.75	0	34,52,52	0.92	1 (2%)
16	ATP	7	1001	15	28,33,33	0.73	0	34,52,52	0.90	2 (5%)
16	ATP	6	1001	15	28,33,33	0.83	0	34,52,52	0.92	1 (2%)

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
14	ADP	2	1001	15	-	2/12/32/32	0/3/3/3
16	ATP	5	1001	15	-	1/18/38/38	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
16	ATP	4	1001	15	-	6/18/38/38	0/3/3/3
16	ATP	3	1001	15	-	2/18/38/38	0/3/3/3
16	ATP	7	1001	15	-	2/18/38/38	0/3/3/3
16	ATP	6	1001	15	-	8/18/38/38	0/3/3/3

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
14	2	1001	ADP	N3-C2-N1	-4.07	123.14	128.67
14	2	1001	ADP	C4-C5-N7	-2.59	106.60	109.34
16	3	1001	ATP	C5-C6-N6	2.41	123.99	120.31
16	5	1001	ATP	C5-C6-N6	2.39	123.95	120.31
16	6	1001	ATP	C5-C6-N6	2.34	123.88	120.31
16	7	1001	ATP	C5-C6-N6	2.33	123.87	120.31
16	4	1001	ATP	C5-C6-N6	2.29	123.80	120.31
16	7	1001	ATP	O2'-C2'-C3'	-2.02	105.34	111.82

There are no chirality outliers.

All (21) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
14	2	1001	ADP	C5'-O5'-PA-O3A
16	4	1001	ATP	C5'-O5'-PA-O1A
16	4	1001	ATP	C5'-O5'-PA-O2A
16	4	1001	ATP	C5'-O5'-PA-O3A
16	6	1001	ATP	C5'-O5'-PA-O1A
16	6	1001	ATP	C5'-O5'-PA-O2A
16	6	1001	ATP	C5'-O5'-PA-O3A
16	4	1001	ATP	C3'-C4'-C5'-O5'
16	4	1001	ATP	O4'-C4'-C5'-O5'
16	6	1001	ATP	C3'-C4'-C5'-O5'
16	6	1001	ATP	O4'-C4'-C5'-O5'
16	6	1001	ATP	PG-O3B-PB-O1B
16	3	1001	ATP	PA-O3A-PB-O2B
16	7	1001	ATP	PA-O3A-PB-O2B
14	2	1001	ADP	C5'-O5'-PA-O1A
16	6	1001	ATP	PG-O3B-PB-O2B
16	6	1001	ATP	PA-O3A-PB-O2B
16	3	1001	ATP	PA-O3A-PB-O1B

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Mol	Chain	Res	Type	Atoms
16	4	1001	ATP	PA-O3A-PB-O2B
16	5	1001	ATP	PA-O3A-PB-O2B
16	7	1001	ATP	PA-O3A-PB-O1B

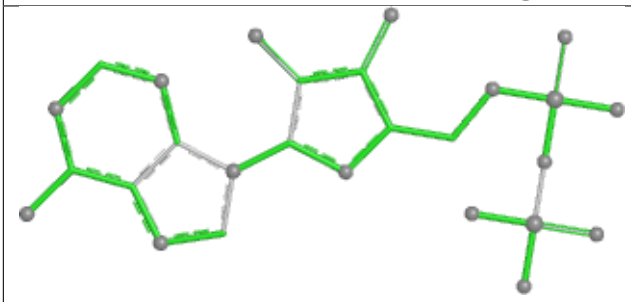
There are no ring outliers.

4 monomers are involved in 7 short contacts:

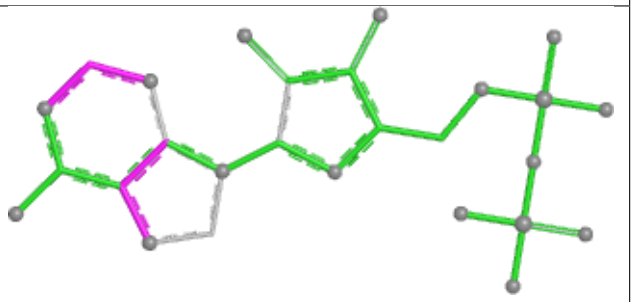
Mol	Chain	Res	Type	Clashes	Symm-Clashes
14	2	1001	ADP	1	0
16	5	1001	ATP	2	0
16	3	1001	ATP	1	0
16	6	1001	ATP	3	0

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

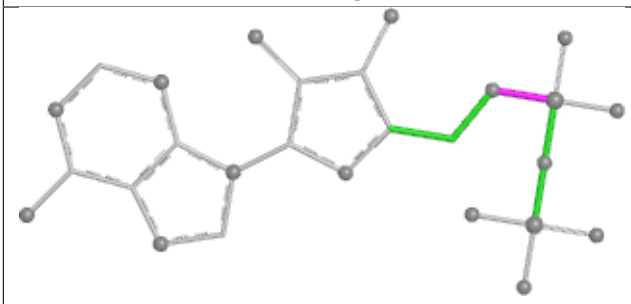
Ligand ADP 2 1001



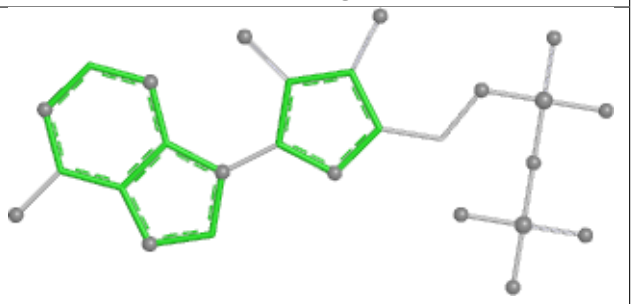
Bond lengths



Bond angles

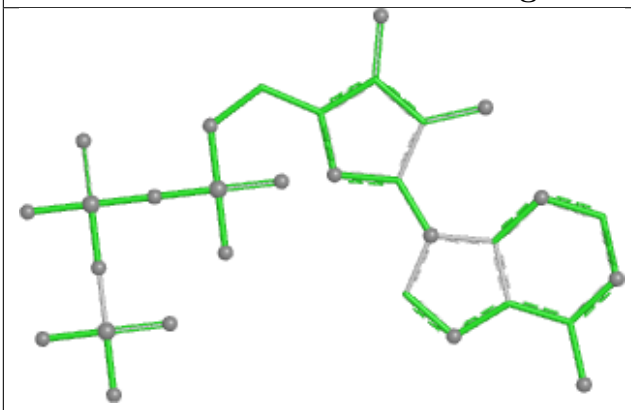


Torsions

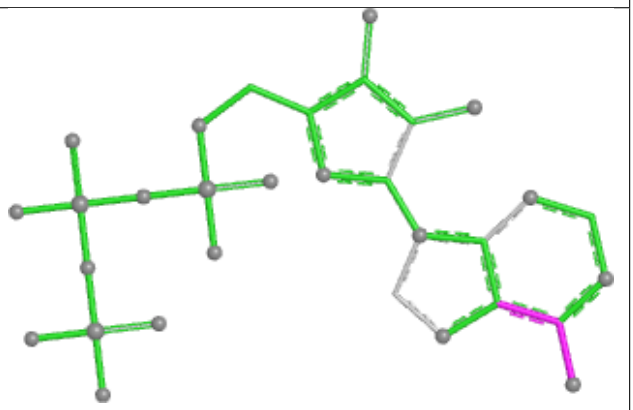


Rings

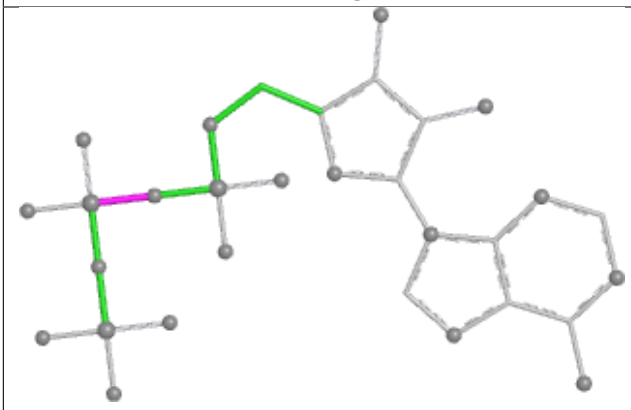
Ligand ATP 5 1001



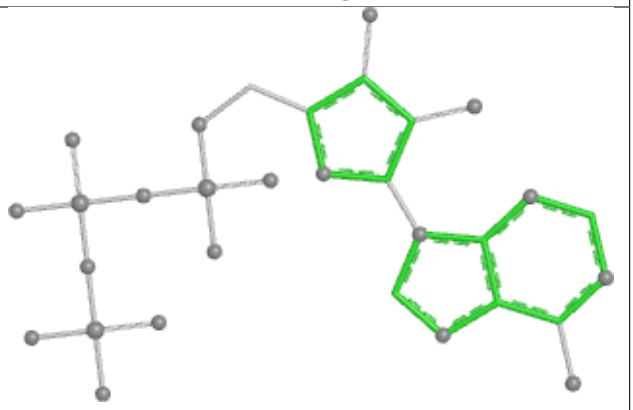
Bond lengths



Bond angles

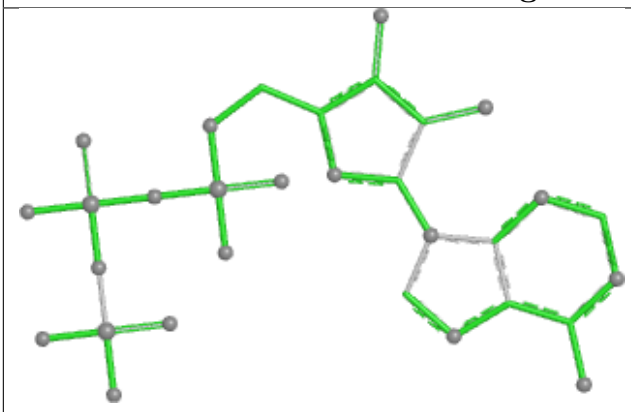


Torsions

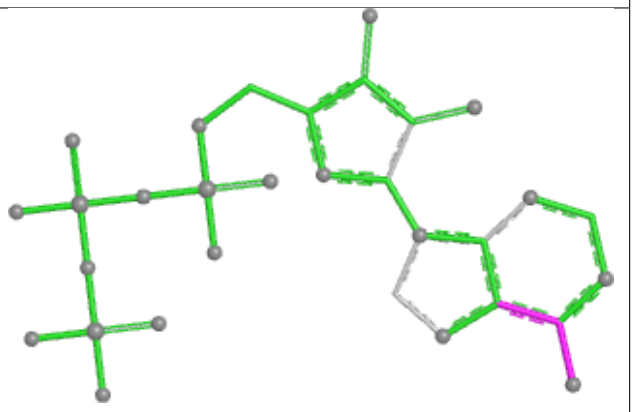


Rings

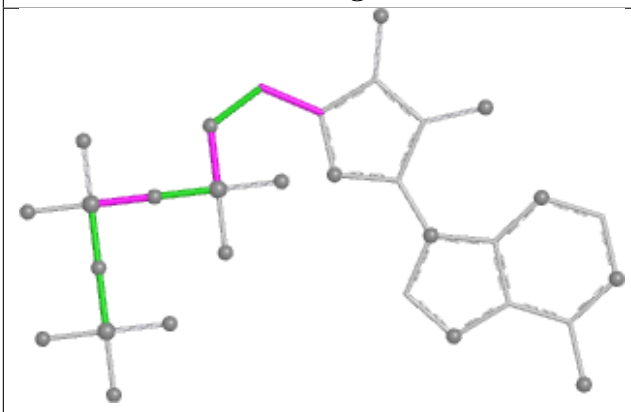
Ligand ATP 4 1001



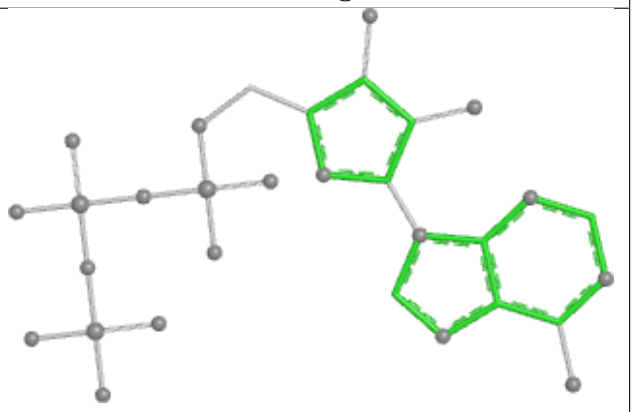
Bond lengths



Bond angles

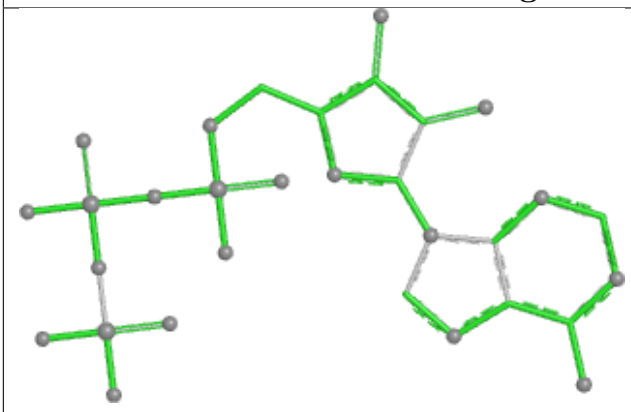


Torsions

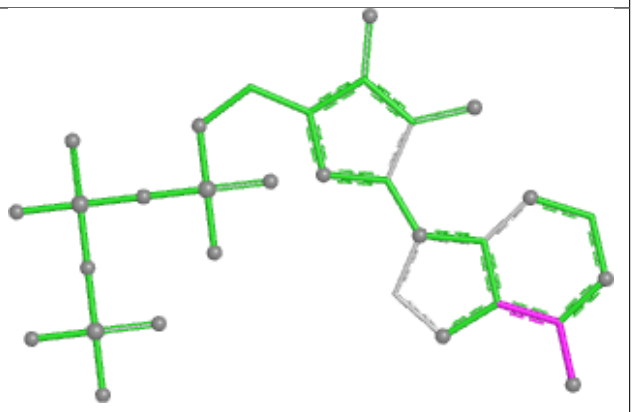


Rings

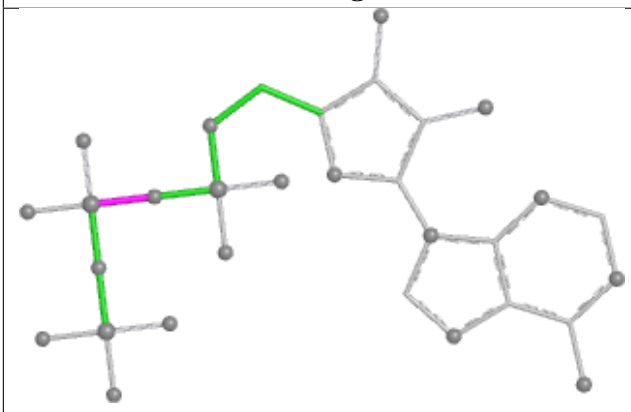
Ligand ATP 3 1001



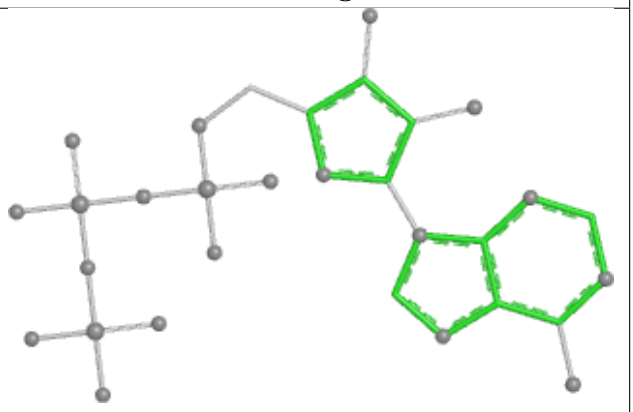
Bond lengths



Bond angles

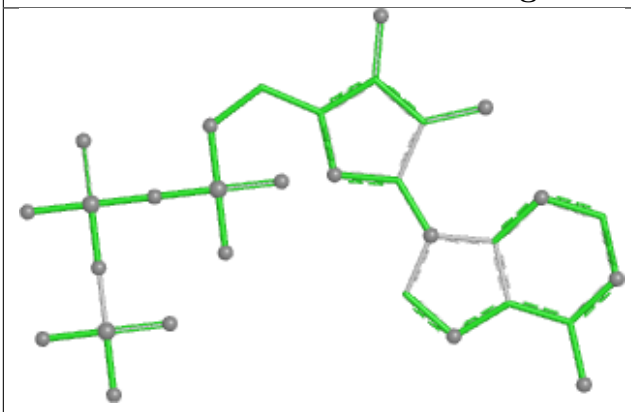


Torsions

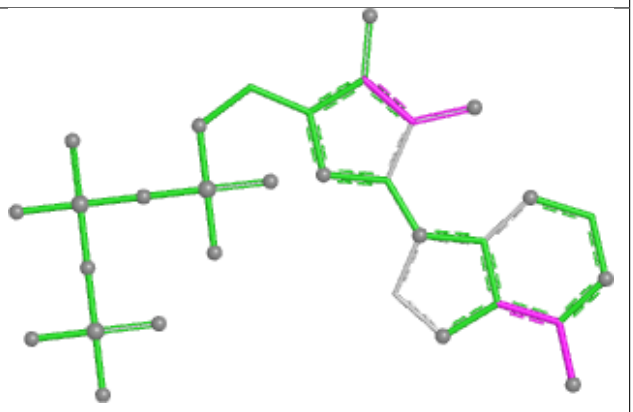


Rings

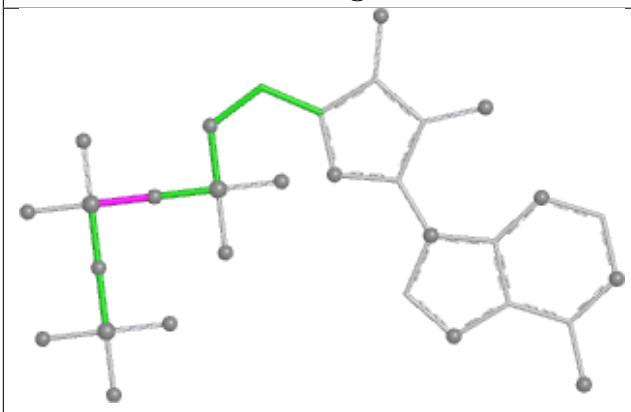
Ligand ATP 7 1001



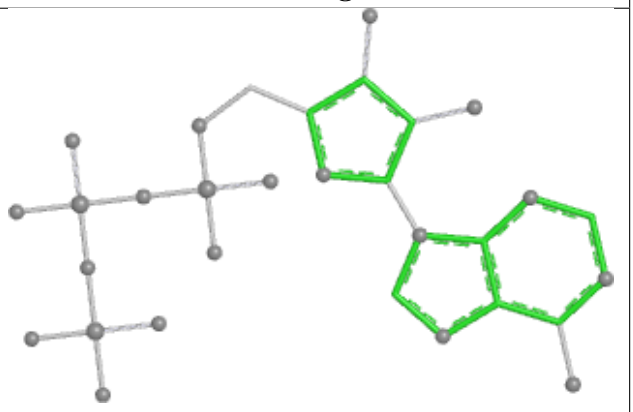
Bond lengths



Bond angles

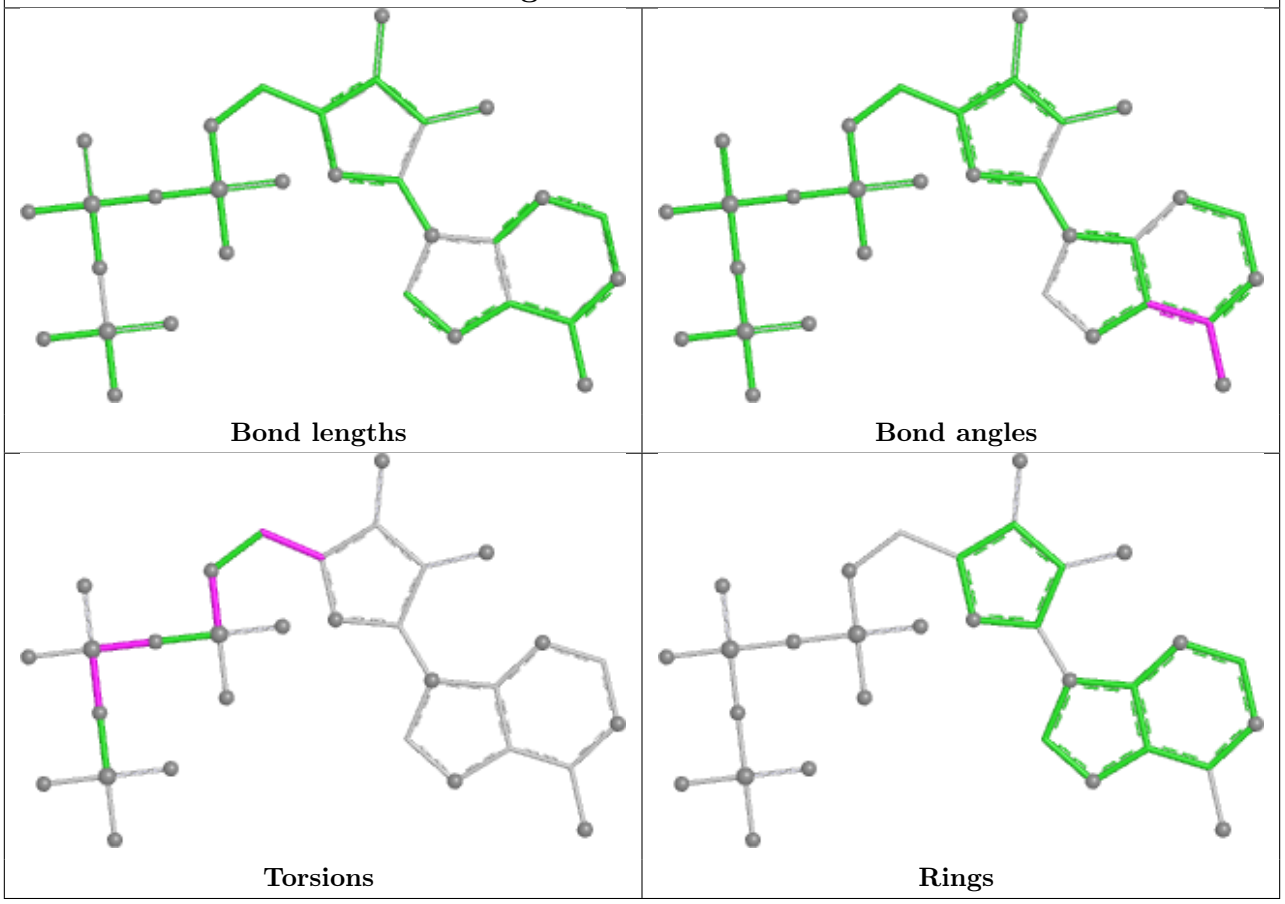


Torsions



Rings

Ligand ATP 6 1001



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 Map visualisation

This section contains visualisations of the EMDB entry EMD-47473. These allow visual inspection of the internal detail of the map and identification of artifacts.

No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

This section was not generated.

6.2 Central slices

This section was not generated.

6.3 Largest variance slices

This section was not generated.

6.4 Orthogonal standard-deviation projections (False-color)

This section was not generated.

6.5 Orthogonal surface views

This section was not generated.

6.6 Mask visualisation

This section was not generated. No masks/segmentation were deposited.

7 Map analysis

This section contains the results of statistical analysis of the map.

7.1 Map-value distribution

This section was not generated.

7.2 Volume estimate versus contour level

This section was not generated.

7.3 Rotationally averaged power spectrum

This section was not generated. The rotationally averaged power spectrum had issues being displayed.

8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit

This section was not generated.