



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 4, 2025 – 12:09 PM JST

PDB ID : 9KFL / pdb_00009kfl
Title : KRAS G12V and peptide complex
Authors : Ha, M.S.; Jang, S.B.; Han, C.W.
Deposited on : 2024-11-06
Resolution : 3.45 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 2.0
EDS : 3.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.46

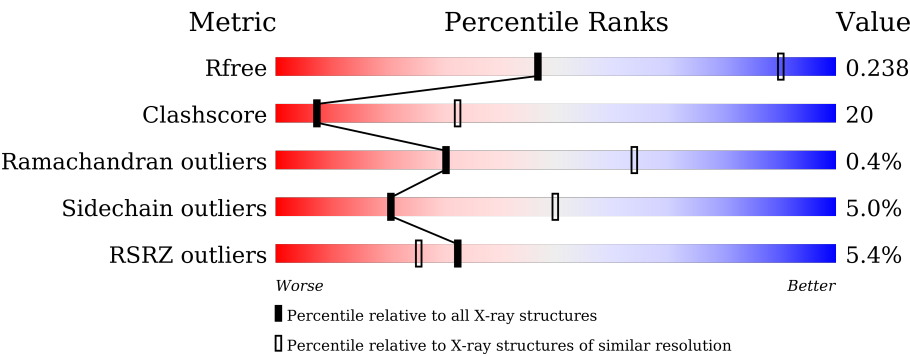
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.45 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.



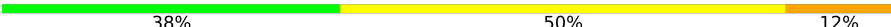
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	1597 (3.52-3.40)
Clashscore	180529	1041 (3.50-3.42)
Ramachandran outliers	177936	1026 (3.50-3.42)
Sidechain outliers	177891	1027 (3.50-3.42)
RSRZ outliers	164620	1596 (3.52-3.40)

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

Mol	Chain	Length	Quality of chain
1	A	168	<div><div>4%</div><div><div></div><div></div><div></div><div></div></div><div>71%25%..</div></div>
1	D	168	<div><div>7%</div><div><div></div><div></div><div></div><div></div></div><div>74%25%.</div></div>
1	E	168	<div><div>3%</div><div><div></div><div></div><div></div><div></div></div><div>68%28%..</div></div>
1	H	168	<div><div>7%</div><div><div></div><div></div><div></div><div></div></div><div>74%24%..</div></div>
1	K	168	<div><div>8%</div><div><div></div><div></div><div></div><div></div></div><div>72%24%.</div></div>
2	P	8	<div><div></div><div><div></div><div></div><div></div><div></div></div><div>25%38%25%12%</div></div>

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Mol	Chain	Length	Quality of chain
2	Y	8	

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
4	GDP	A	1002	-	-	X	-
4	GDP	D	1002	-	-	X	-
4	GDP	K	1002	-	-	X	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 6932 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 Isoform 2B of GTPase KRas.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	168	Total	C	N	O	S	0	0	0
			1337	840	227	263	7			
1	D	168	Total	C	N	O	S	0	0	0
			1337	840	227	263	7			
1	E	168	Total	C	N	O	S	0	0	0
			1337	840	227	263	7			
1	H	168	Total	C	N	O	S	0	0	0
			1337	840	227	263	7			
1	K	168	Total	C	N	O	S	0	0	0
			1337	840	227	263	7			

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	12	VAL	GLY	engineered mutation	UNP P01116
D	12	VAL	GLY	engineered mutation	UNP P01116
E	12	VAL	GLY	engineered mutation	UNP P01116
H	12	VAL	GLY	engineered mutation	UNP P01116
K	12	VAL	GLY	engineered mutation	UNP P01116

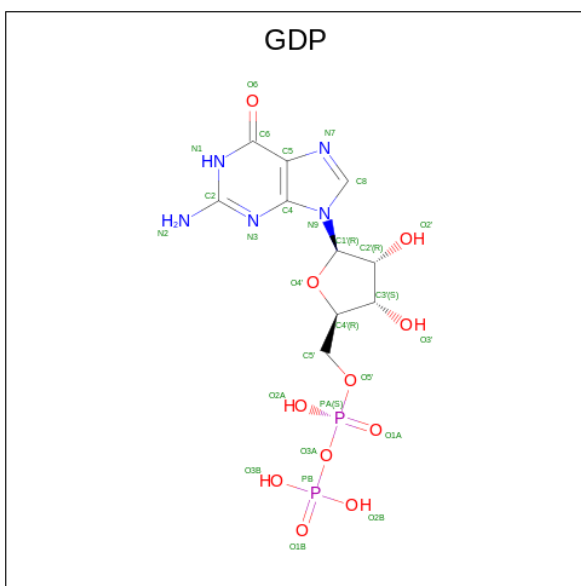
- Molecule 2 is a protein called TIG3 peptide.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	P	8	Total	C	N	O	S	0	0	0
			51	29	8	12	2			
2	Y	8	Total	C	N	O	S	0	0	0
			51	29	8	12	2			

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Mg 1 1	0	0
3	D	1	Total Mg 1 1	0	0
3	E	1	Total Mg 1 1	0	0
3	H	1	Total Mg 1 1	0	0
3	K	1	Total Mg 1 1	0	0

- Molecule 4 is GUANOSINE-5'-DIPHOSPHATE (CCD ID: GDP) (formula: $\text{C}_{10}\text{H}_{15}\text{N}_5\text{O}_{11}\text{P}_2$) (labeled as "Ligand of Interest" by depositor).

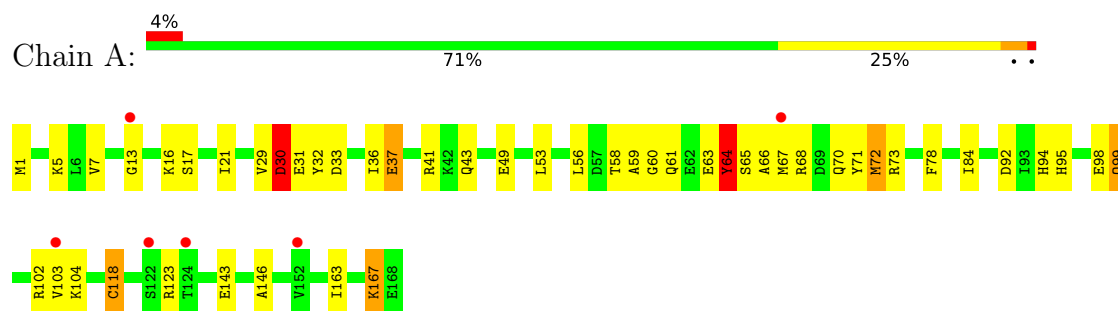


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total 28	C 10	N 5	O 11	P 2	0	0
4	D	1	Total 28	C 10	N 5	O 11	P 2	0	0
4	E	1	Total 28	C 10	N 5	O 11	P 2	0	0
4	H	1	Total 28	C 10	N 5	O 11	P 2	0	0
4	K	1	Total 28	C 10	N 5	O 11	P 2	0	0

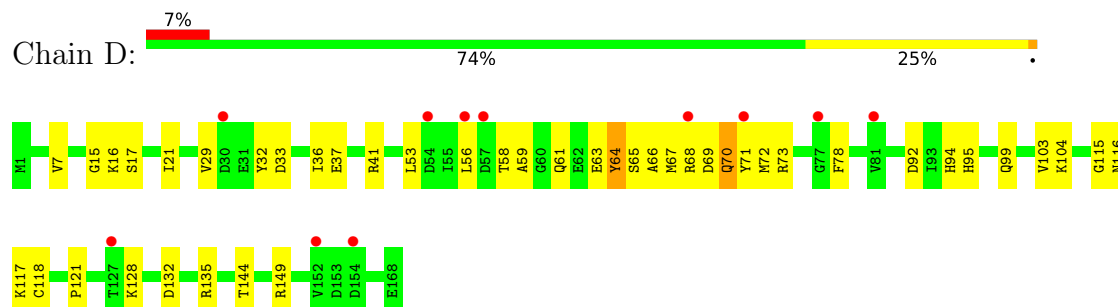
3 Residue-property plots

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.

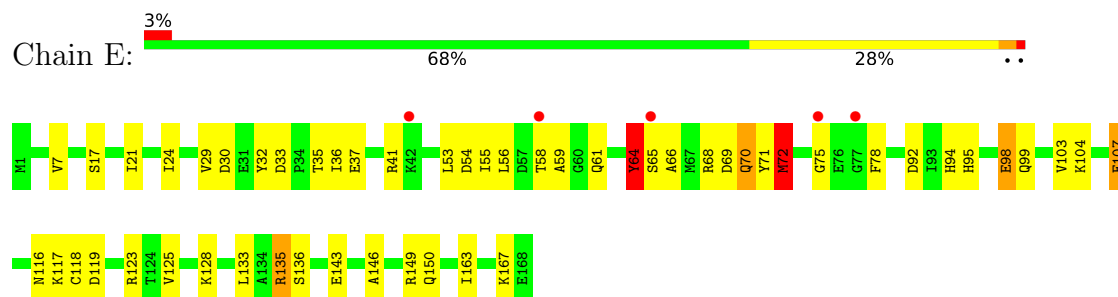
- Molecule 1: Isoform 2B of GTPase KRas



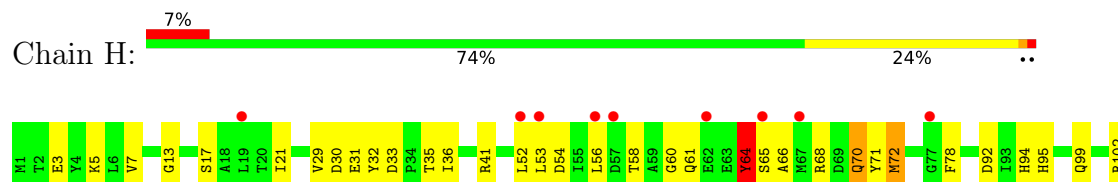
- Molecule 1: Isoform 2B of GTPase KRas

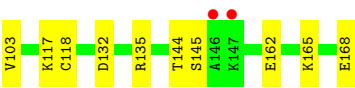


- Molecule 1: Isoform 2B of GTPase KRas

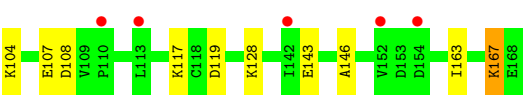
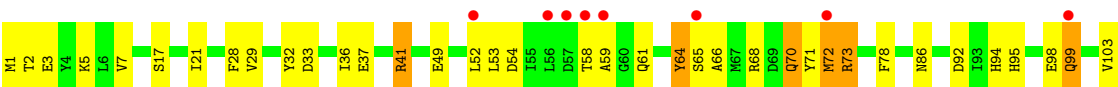


- Molecule 1: Isoform 2B of GTPase KRas

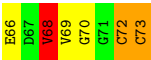
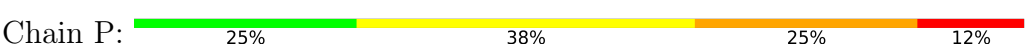




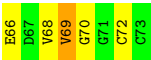
● Molecule 1: Isoform 2B of GTPase KRas



● Molecule 2: TIG3 peptide



● Molecule 2: TIG3 peptide



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	41.84Å 83.42Å 83.49Å 120.06° 90.07° 89.96°	Depositor
Resolution (Å)	29.57 – 3.45 29.57 – 3.45	Depositor EDS
% Data completeness (in resolution range)	95.5 (29.57-3.45) 98.7 (29.57-3.45)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.89 (at 3.47Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.189 , 0.233 0.198 , 0.238	Depositor DCC
R_{free} test set	697 reflections (5.41%)	wwPDB-VP
Wilson B-factor (Å ²)	54.7	Xtriage
Anisotropy	0.069	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 58.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.53$, $\langle L^2 \rangle = 0.37$	Xtriage
Estimated twinning fraction	0.025 for h,k+l,-k 0.025 for h,-l,k+l 0.088 for h,l,-k-l 0.088 for h,-k-l,k 0.052 for h,-k,-l 0.000 for -h,l,k 0.000 for -h,k,-k-l 0.000 for -h,-k-l,l 0.000 for -h,k+l,-l 0.000 for -h,-l,-k 0.000 for -h,-k,k+l	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	6932	wwPDB-VP
Average B, all atoms (Å ²)	66.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.54% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MG, GDP

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	0/1358	1.15	9/1833 (0.5%)
1	D	0.57	0/1358	1.17	2/1833 (0.1%)
1	E	0.57	0/1358	1.15	5/1833 (0.3%)
1	H	0.55	0/1358	1.17	8/1833 (0.4%)
1	K	0.52	0/1358	1.19	6/1833 (0.3%)
2	P	0.69	0/50	1.29	0/66
2	Y	0.70	0/50	1.62	1/66 (1.5%)
All	All	0.55	0/6890	1.17	31/9297 (0.3%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
2	P	0	1

There are no bond length outliers.

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	107	GLU	CB-CG-CD	6.68	123.96	112.60
1	K	143	GLU	CB-CG-CD	6.33	123.37	112.60
1	E	94	HIS	CA-CB-CG	-6.29	107.51	113.80
1	A	94	HIS	CA-CB-CG	-6.12	107.68	113.80
1	D	94	HIS	CA-CB-CG	-6.10	107.70	113.80
1	D	64	TYR	CA-CB-CG	-6.07	102.98	113.90
1	K	94	HIS	CA-CB-CG	-5.91	107.89	113.80
1	A	37	GLU	CB-CG-CD	-5.89	102.58	112.60
2	Y	69	VAL	N-CA-C	-5.76	104.71	110.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	H	94	HIS	CA-CB-CG	-5.73	108.07	113.80
1	A	64	TYR	CA-C-N	-5.63	115.23	123.00
1	A	64	TYR	C-N-CA	-5.63	115.23	123.00
1	K	99	GLN	CB-CG-CD	-5.40	103.43	112.60
1	H	60	GLY	CA-C-N	-5.39	113.71	121.42
1	H	60	GLY	C-N-CA	-5.39	113.71	121.42
1	K	86	ASN	CA-CB-CG	5.34	117.94	112.60
1	E	72	MET	CA-C-N	5.31	127.66	120.65
1	E	72	MET	C-N-CA	5.31	127.66	120.65
1	H	72	MET	CA-C-N	5.14	127.43	120.65
1	H	72	MET	C-N-CA	5.14	127.43	120.65
1	A	72	MET	CA-C-N	5.13	127.43	120.65
1	A	72	MET	C-N-CA	5.13	127.43	120.65
1	H	30	ASP	CA-CB-CG	5.13	117.73	112.60
1	A	30	ASP	CA-CB-CG	5.13	117.73	112.60
1	A	49	GLU	CB-CG-CD	5.09	121.25	112.60
1	H	64	TYR	CA-C-N	-5.06	115.59	122.93
1	H	64	TYR	C-N-CA	-5.06	115.59	122.93
1	A	99	GLN	CB-CG-CD	-5.06	104.00	112.60
1	K	72	MET	CA-C-N	5.05	127.32	120.65
1	K	72	MET	C-N-CA	5.05	127.32	120.65
1	E	64	TYR	CA-CB-CG	-5.03	104.85	113.90

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	P	68	VAL	Peptide

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	1337	0	1317	56	0
1	D	1337	0	1318	55	1
1	E	1337	0	1318	67	0
1	H	1337	0	1318	49	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	K	1337	0	1318	40	1
2	P	51	0	43	12	0
2	Y	51	0	43	8	0
3	A	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	H	1	0	0	0	0
3	K	1	0	0	0	0
4	A	28	0	12	14	0
4	D	28	0	12	10	0
4	E	28	0	12	7	0
4	H	28	0	12	5	0
4	K	28	0	12	12	0
All	All	6932	0	6735	276	1

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 20.

All (276) 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:H:61:GLN:HB2	1:H:68:ARG:NH2	1.51	1.24
4:K:1002:GDP:C8	4:K:1002:GDP:H5'	1.79	1.17
2:P:69:VAL:HB	2:P:72:CYS:HB2	1.27	1.13
4:K:1002:GDP:H5'	4:K:1002:GDP:H8	1.03	1.11
1:E:35:THR:HB	1:E:61:GLN:HG3	1.11	1.07
1:E:35:THR:CB	1:E:61:GLN:HG3	1.84	1.07
1:A:64:TYR:O	1:A:64:TYR:CD2	2.11	1.04
1:K:64:TYR:CD2	1:K:64:TYR:O	2.11	1.03
1:A:118:CYS:SG	1:A:143:GLU:HB3	1.98	1.02
1:K:17:SER:N	4:K:1002:GDP:O3B	1.94	0.99
1:K:119:ASP:CG	4:K:1002:GDP:HN21	1.74	0.94
1:H:64:TYR:O	1:H:64:TYR:CD2	2.20	0.94
1:H:61:GLN:HB2	1:H:68:ARG:HH22	1.16	0.92
1:A:16:LYS:N	4:A:1002:GDP:O3B	2.04	0.90
1:A:17:SER:HB3	1:A:32:TYR:CD1	2.06	0.90
1:E:64:TYR:CD1	1:E:64:TYR:C	2.45	0.89
1:A:99:GLN:HA	2:P:66:GLU:OE2	1.74	0.87
1:H:17:SER:HB3	1:H:32:TYR:CD1	2.09	0.87
1:D:64:TYR:CD1	1:D:64:TYR:C	2.45	0.85
1:D:64:TYR:CE1	1:D:69:ASP:CG	2.56	0.84

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:17:SER:HB3	1:E:32:TYR:CD1	2.12	0.83
1:K:17:SER:HB3	1:K:32:TYR:CD1	2.14	0.83
1:A:99:GLN:O	1:A:103:VAL:HG23	1.78	0.82
1:E:149:ARG:HB3	1:H:31:GLU:HG2	1.61	0.82
1:D:64:TYR:HE1	1:D:65:SER:O	1.64	0.81
1:D:64:TYR:CE1	1:D:65:SER:O	2.34	0.81
1:D:17:SER:HB3	1:D:32:TYR:CD1	2.17	0.80
1:K:17:SER:HB2	4:K:1002:GDP:O1A	1.81	0.79
1:K:99:GLN:O	1:K:103:VAL:HG23	1.83	0.79
2:Y:69:VAL:HG23	2:Y:70:GLY:H	1.45	0.79
1:H:99:GLN:O	1:H:103:VAL:HG23	1.83	0.79
1:K:146:ALA:N	4:K:1002:GDP:O6	2.13	0.78
1:E:35:THR:HG22	1:E:61:GLN:OE1	1.82	0.78
1:E:99:GLN:O	1:E:103:VAL:HG23	1.86	0.76
1:H:118:CYS:SG	1:H:144:THR:C	2.69	0.76
1:A:61:GLN:HB2	1:A:68:ARG:NH2	2.01	0.76
1:E:146:ALA:N	4:E:1002:GDP:O6	2.15	0.76
1:E:64:TYR:CE1	1:E:65:SER:O	2.39	0.76
1:H:21:ILE:HG21	1:H:29:VAL:CG2	2.16	0.75
1:K:70:GLN:OE1	1:K:70:GLN:HA	1.87	0.75
1:E:64:TYR:CE1	1:E:69:ASP:CG	2.65	0.75
1:H:118:CYS:SG	1:H:145:SER:HB2	2.27	0.74
2:P:68:VAL:O	2:P:68:VAL:CG1	2.34	0.74
1:D:16:LYS:HB2	4:D:1002:GDP:O3B	1.88	0.74
1:D:116:ASN:ND2	4:D:1002:GDP:N7	2.36	0.73
1:E:35:THR:HA	1:E:61:GLN:CG	2.19	0.72
1:A:63:GLU:O	1:A:68:ARG:NH1	2.22	0.72
1:E:37:GLU:OE2	1:E:68:ARG:HG3	1.90	0.72
1:H:72:MET:HB3	1:H:103:VAL:HG11	1.70	0.72
1:A:98:GLU:HA	1:A:98:GLU:OE2	1.88	0.71
1:H:3:GLU:HG2	1:H:52:LEU:HB2	1.73	0.71
1:K:119:ASP:OD2	4:K:1002:GDP:N2	2.23	0.71
1:A:64:TYR:CD2	1:A:64:TYR:C	2.69	0.71
1:H:61:GLN:HB2	1:H:68:ARG:HH21	1.52	0.70
1:E:70:GLN:HA	1:E:70:GLN:OE1	1.91	0.70
1:D:99:GLN:O	1:D:103:VAL:HG23	1.92	0.70
1:E:56:LEU:HD22	1:E:71:TYR:CB	2.22	0.69
1:A:17:SER:CB	1:A:32:TYR:CD1	2.75	0.69
1:D:16:LYS:NZ	4:D:1002:GDP:O1B	2.25	0.69
1:E:64:TYR:HE1	1:E:65:SER:O	1.75	0.69
1:A:146:ALA:N	4:A:1002:GDP:O6	2.25	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:102:ARG:HB2	2:P:66:GLU:OE2	1.93	0.69
1:H:21:ILE:HD13	1:H:29:VAL:HG21	1.73	0.69
1:K:21:ILE:HD13	1:K:29:VAL:HG21	1.74	0.69
1:D:117:LYS:HA	4:D:1002:GDP:C6	2.27	0.68
1:H:17:SER:CB	1:H:32:TYR:CD1	2.76	0.68
1:E:64:TYR:CZ	1:E:69:ASP:OD2	2.45	0.68
1:D:66:ALA:O	1:D:70:GLN:NE2	2.26	0.67
1:E:35:THR:HG22	1:E:61:GLN:CD	2.18	0.67
1:H:70:GLN:HA	1:H:70:GLN:OE1	1.95	0.67
1:K:17:SER:CB	1:K:32:TYR:CD1	2.78	0.67
1:H:21:ILE:HG21	1:H:29:VAL:HG21	1.78	0.66
1:D:64:TYR:CZ	1:D:69:ASP:OD2	2.48	0.66
1:D:117:LYS:HA	4:D:1002:GDP:O6	1.94	0.66
1:A:21:ILE:HG21	1:A:29:VAL:CG2	2.26	0.66
1:D:64:TYR:CD1	1:D:65:SER:N	2.63	0.66
1:E:17:SER:CB	1:E:32:TYR:CD1	2.78	0.65
1:K:70:GLN:OE1	1:K:70:GLN:CA	2.44	0.65
1:D:117:LYS:HG2	4:D:1002:GDP:C5	2.31	0.65
1:E:117:LYS:HA	4:E:1002:GDP:N1	2.11	0.65
2:P:72:CYS:O	2:P:73:CYS:O	2.14	0.65
1:D:64:TYR:CE1	1:D:65:SER:C	2.75	0.65
1:E:35:THR:CA	1:E:61:GLN:CG	2.75	0.65
1:A:16:LYS:HZ3	4:A:1002:GDP:PB	2.20	0.64
1:E:35:THR:CA	1:E:61:GLN:HG3	2.27	0.64
1:A:61:GLN:HB2	1:A:68:ARG:HH22	1.61	0.64
1:D:21:ILE:HD13	1:D:29:VAL:HG21	1.80	0.64
1:E:64:TYR:CD1	1:E:65:SER:N	2.65	0.64
1:K:98:GLU:HA	1:K:98:GLU:OE2	1.96	0.64
1:K:117:LYS:HA	4:K:1002:GDP:N1	2.11	0.64
1:H:70:GLN:OE1	1:H:70:GLN:CA	2.46	0.64
1:D:17:SER:CB	1:D:32:TYR:CD1	2.81	0.63
1:H:118:CYS:SG	1:H:144:THR:O	2.57	0.63
1:H:61:GLN:CB	1:H:68:ARG:NH2	2.46	0.63
1:D:67:MET:HG3	1:D:71:TYR:HE1	1.63	0.63
1:K:64:TYR:CD2	1:K:64:TYR:C	2.77	0.63
1:D:64:TYR:OH	1:D:66:ALA:HA	1.98	0.63
1:E:56:LEU:HD22	1:E:71:TYR:HB2	1.81	0.62
1:E:70:GLN:OE1	1:E:70:GLN:CA	2.47	0.62
1:H:64:TYR:CD2	1:H:64:TYR:C	2.78	0.62
1:H:54:ASP:OD1	1:H:71:TYR:OH	2.15	0.62
1:E:149:ARG:HB3	1:H:31:GLU:CG	2.30	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:35:THR:CB	1:E:61:GLN:CG	2.70	0.61
1:K:21:ILE:HG21	1:K:29:VAL:CG2	2.31	0.61
2:P:68:VAL:O	2:P:68:VAL:HG13	2.01	0.61
1:A:17:SER:N	4:A:1002:GDP:O1A	2.34	0.60
1:A:64:TYR:O	1:A:64:TYR:HD2	1.78	0.60
1:D:21:ILE:HG21	1:D:29:VAL:CG2	2.31	0.60
1:H:13:GLY:HA2	4:H:1002:GDP:O3A	2.01	0.60
1:D:56:LEU:HD22	1:D:71:TYR:CB	2.31	0.60
1:A:30:ASP:HA	4:A:1002:GDP:O2'	2.02	0.59
1:A:21:ILE:HD13	1:A:29:VAL:HG21	1.85	0.59
1:K:163:ILE:HG22	1:K:167:LYS:HD3	1.85	0.59
1:E:58:THR:HG21	1:E:72:MET:HE1	1.85	0.59
2:P:69:VAL:HB	2:P:72:CYS:CB	2.18	0.58
2:Y:69:VAL:HG23	2:Y:70:GLY:N	2.16	0.58
1:K:119:ASP:OD1	4:K:1002:GDP:N2	2.33	0.58
1:K:66:ALA:O	1:K:70:GLN:NE2	2.36	0.58
2:P:69:VAL:CB	2:P:72:CYS:HB2	2.19	0.57
1:A:58:THR:HG21	1:A:72:MET:HE1	1.86	0.57
1:D:118:CYS:SG	1:D:144:THR:O	2.59	0.57
1:H:117:LYS:HA	4:H:1002:GDP:O6	2.04	0.57
1:E:64:TYR:CE1	1:E:65:SER:C	2.83	0.57
1:K:64:TYR:O	1:K:64:TYR:CG	2.54	0.57
2:Y:69:VAL:O	2:Y:72:CYS:HB2	2.03	0.57
1:E:118:CYS:SG	1:E:143:GLU:HB3	2.45	0.56
1:A:59:ALA:O	1:A:61:GLN:N	2.39	0.56
2:Y:69:VAL:CG2	2:Y:70:GLY:H	2.18	0.56
1:A:163:ILE:HG22	1:A:167:LYS:HD3	1.87	0.55
1:A:70:GLN:OE1	1:A:73:ARG:NH2	2.36	0.55
1:D:33:ASP:HB3	1:D:36:ILE:HD12	1.89	0.55
2:Y:66:GLU:C	2:Y:70:GLY:HA2	2.32	0.55
1:D:64:TYR:CE1	1:D:69:ASP:OD2	2.61	0.54
1:D:17:SER:CB	1:D:32:TYR:HD1	2.21	0.54
1:E:21:ILE:HG21	1:E:29:VAL:CG2	2.39	0.53
1:E:117:LYS:HA	4:E:1002:GDP:HN1	1.73	0.53
1:A:13:GLY:N	4:A:1002:GDP:O1B	2.41	0.53
1:E:119:ASP:OD1	4:E:1002:GDP:N2	2.36	0.53
1:H:17:SER:CB	1:H:32:TYR:HD1	2.19	0.53
1:A:21:ILE:HG21	1:A:29:VAL:HG21	1.91	0.53
1:K:33:ASP:HB3	1:K:36:ILE:HD12	1.91	0.53
1:K:70:GLN:CD	1:K:70:GLN:N	2.67	0.53
1:H:56:LEU:HD22	1:H:71:TYR:CG	2.44	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:150:GLN:HA	1:H:31:GLU:HB3	1.92	0.52
1:E:54:ASP:OD1	1:E:71:TYR:OH	2.25	0.52
1:A:118:CYS:HG	1:A:143:GLU:HB3	1.74	0.52
1:A:17:SER:CB	1:A:32:TYR:HD1	2.19	0.52
1:D:67:MET:O	1:D:71:TYR:HD1	1.93	0.52
1:E:33:ASP:HB3	1:E:36:ILE:HD12	1.92	0.52
1:A:102:ARG:NE	2:P:66:GLU:OE2	2.43	0.52
1:H:58:THR:HG21	1:H:72:MET:HE1	1.92	0.52
1:A:33:ASP:HB3	1:A:36:ILE:HD12	1.92	0.52
1:E:17:SER:CB	1:E:32:TYR:HD1	2.22	0.52
1:E:98:GLU:OE1	1:E:98:GLU:CA	2.58	0.52
1:H:117:LYS:HG2	4:H:1002:GDP:C6	2.44	0.51
1:D:37:GLU:OE2	1:D:68:ARG:HB2	2.10	0.51
1:H:13:GLY:N	4:H:1002:GDP:O1B	2.28	0.51
1:A:16:LYS:NZ	4:A:1002:GDP:PB	2.83	0.51
1:D:67:MET:O	1:D:71:TYR:CD1	2.64	0.51
1:D:59:ALA:O	1:D:61:GLN:NE2	2.43	0.51
1:E:64:TYR:CE1	1:E:69:ASP:OD2	2.64	0.51
1:A:16:LYS:HB2	4:A:1002:GDP:O3B	2.10	0.51
1:E:37:GLU:OE1	1:E:68:ARG:CZ	2.60	0.50
1:E:119:ASP:CG	4:E:1002:GDP:HN21	2.19	0.50
1:K:54:ASP:OD1	1:K:71:TYR:OH	2.25	0.50
1:K:64:TYR:OH	1:K:66:ALA:HB2	2.11	0.50
1:A:102:ARG:CZ	2:P:66:GLU:OE2	2.60	0.50
1:D:15:GLY:HA3	4:D:1002:GDP:C8	2.47	0.50
1:E:35:THR:HA	1:E:61:GLN:HG2	1.92	0.50
1:A:146:ALA:HB3	4:A:1002:GDP:N7	2.27	0.50
1:H:64:TYR:OH	1:H:66:ALA:HB2	2.12	0.50
1:K:37:GLU:OE2	1:K:68:ARG:HG3	2.12	0.50
1:H:33:ASP:HB3	1:H:36:ILE:HD12	1.94	0.49
2:Y:66:GLU:N	2:Y:69:VAL:HG23	2.26	0.49
1:H:35:THR:HA	1:H:61:GLN:NE2	2.28	0.49
1:E:37:GLU:OE2	1:E:68:ARG:CG	2.59	0.49
1:E:59:ALA:O	1:E:61:GLN:NE2	2.43	0.49
1:K:17:SER:CB	1:K:32:TYR:HD1	2.26	0.49
1:D:15:GLY:CA	4:D:1002:GDP:H8	2.25	0.49
1:H:70:GLN:N	1:H:70:GLN:CD	2.71	0.49
1:D:58:THR:HG21	1:D:72:MET:HE1	1.93	0.49
1:E:163:ILE:HG22	1:E:167:LYS:HD3	1.94	0.48
1:K:21:ILE:HG21	1:K:29:VAL:HG21	1.95	0.48
2:P:68:VAL:O	2:P:68:VAL:HG12	2.10	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:118:CYS:SG	1:H:145:SER:CB	3.01	0.48
1:H:56:LEU:HD22	1:H:71:TYR:CB	2.43	0.48
1:D:72:MET:HB3	1:D:103:VAL:HG11	1.95	0.47
1:E:35:THR:HA	1:E:61:GLN:CD	2.38	0.47
1:E:116:ASN:OD1	4:E:1002:GDP:O6	2.32	0.47
2:P:72:CYS:O	2:P:73:CYS:C	2.57	0.47
1:D:73:ARG:O	1:D:104:LYS:NZ	2.46	0.47
1:E:149:ARG:HB3	1:H:31:GLU:CD	2.39	0.47
1:D:41:ARG:HA	1:D:53:LEU:O	2.14	0.47
1:H:70:GLN:OE1	1:H:70:GLN:N	2.47	0.47
1:D:92:ASP:O	1:D:95:HIS:HB3	2.14	0.47
1:A:17:SER:HB2	4:A:1002:GDP:O1A	2.15	0.47
1:K:58:THR:HG21	1:K:72:MET:HE1	1.95	0.47
1:K:73:ARG:O	1:K:104:LYS:NZ	2.48	0.47
1:D:67:MET:HG3	1:D:71:TYR:CE1	2.46	0.47
1:E:21:ILE:CD1	1:E:29:VAL:HG21	2.45	0.47
1:H:41:ARG:HA	1:H:53:LEU:O	2.15	0.47
1:D:64:TYR:CZ	1:D:66:ALA:HA	2.50	0.46
1:E:98:GLU:OE1	1:E:98:GLU:N	2.49	0.46
1:D:132:ASP:OD1	1:D:135:ARG:NH2	2.48	0.46
1:A:31:GLU:OE2	1:D:149:ARG:O	2.33	0.46
1:A:33:ASP:HB3	1:A:36:ILE:CD1	2.45	0.46
1:A:41:ARG:HA	1:A:53:LEU:O	2.16	0.46
1:D:61:GLN:O	1:D:68:ARG:NH1	2.48	0.46
1:E:75:GLY:O	1:E:104:LYS:CE	2.64	0.46
1:E:37:GLU:OE1	1:E:68:ARG:NE	2.49	0.46
1:E:72:MET:HB3	1:E:103:VAL:HG11	1.95	0.46
1:E:64:TYR:OH	1:E:66:ALA:HA	2.16	0.46
1:E:41:ARG:HA	1:E:53:LEU:O	2.15	0.46
1:E:92:ASP:O	1:E:95:HIS:HB3	2.16	0.46
1:K:41:ARG:HA	1:K:53:LEU:O	2.15	0.46
1:E:70:GLN:N	1:E:70:GLN:CD	2.74	0.45
1:H:92:ASP:O	1:H:95:HIS:HB3	2.15	0.45
1:K:92:ASP:O	1:K:95:HIS:HB3	2.16	0.45
1:D:115:GLY:O	1:D:118:CYS:SG	2.74	0.45
1:D:33:ASP:HB3	1:D:36:ILE:CD1	2.46	0.45
1:E:37:GLU:CD	1:E:68:ARG:NE	2.74	0.45
1:A:16:LYS:CA	4:A:1002:GDP:O3B	2.63	0.45
1:H:117:LYS:HA	4:H:1002:GDP:C6	2.52	0.45
1:D:61:GLN:C	1:D:63:GLU:H	2.24	0.45
1:K:59:ALA:O	1:K:61:GLN:NE2	2.46	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:16:LYS:CB	4:A:1002:GDP:O3B	2.65	0.45
1:H:35:THR:HA	1:H:61:GLN:HE22	1.81	0.44
1:D:56:LEU:HD22	1:D:71:TYR:HB2	1.98	0.44
1:D:117:LYS:HG2	4:D:1002:GDP:C6	2.53	0.44
1:H:118:CYS:SG	1:H:145:SER:N	2.90	0.44
1:K:3:GLU:HG2	1:K:52:LEU:CB	2.47	0.44
1:A:92:ASP:O	1:A:95:HIS:HB3	2.17	0.44
1:D:15:GLY:HA3	4:D:1002:GDP:H8	1.81	0.44
1:A:123:ARG:NH2	1:A:143:GLU:OE1	2.45	0.44
1:K:33:ASP:HB3	1:K:36:ILE:CD1	2.48	0.44
1:A:66:ALA:O	1:A:70:GLN:HG2	2.18	0.43
1:A:73:ARG:HD2	2:Y:68:VAL:CG1	2.48	0.43
1:E:33:ASP:HB3	1:E:36:ILE:CD1	2.48	0.43
1:H:132:ASP:OD1	1:H:135:ARG:NH2	2.51	0.43
1:K:28:PHE:CZ	4:K:1002:GDP:H2'	2.54	0.43
1:A:56:LEU:HD22	1:A:71:TYR:CG	2.54	0.43
1:E:7:VAL:HB	1:E:78:PHE:CD2	2.54	0.43
1:A:17:SER:HB3	1:A:32:TYR:CE1	2.52	0.43
1:D:21:ILE:CD1	1:D:29:VAL:HG21	2.48	0.43
1:A:73:ARG:O	1:A:104:LYS:NZ	2.47	0.43
1:D:64:TYR:HD1	1:D:65:SER:N	2.15	0.43
1:K:119:ASP:OD1	4:K:1002:GDP:N1	2.52	0.42
1:K:1:MET:SD	1:K:52:LEU:HD12	2.58	0.42
1:A:37:GLU:OE1	1:A:68:ARG:NH2	2.38	0.42
1:D:64:TYR:CZ	1:D:69:ASP:CG	2.93	0.42
1:D:21:ILE:HG21	1:D:29:VAL:HG22	2.02	0.42
1:K:7:VAL:HB	1:K:78:PHE:CD2	2.55	0.42
1:H:7:VAL:HB	1:H:78:PHE:CD2	2.55	0.42
1:A:41:ARG:HB2	1:E:136:SER:O	2.20	0.42
1:H:56:LEU:HB2	1:H:71:TYR:CE2	2.55	0.42
1:A:67:MET:O	1:A:71:TYR:HD1	2.03	0.41
1:E:64:TYR:CZ	1:E:69:ASP:CG	2.98	0.41
1:E:146:ALA:HB3	4:E:1002:GDP:C5	2.55	0.41
1:D:104:LYS:HA	1:D:104:LYS:HD2	1.86	0.41
1:H:162:GLU:OE2	1:H:165:LYS:HE3	2.21	0.41
1:D:7:VAL:HB	1:D:78:PHE:CD2	2.55	0.41
1:K:70:GLN:OE1	1:K:70:GLN:N	2.54	0.41
1:A:72:MET:HB3	1:A:103:VAL:HG11	2.01	0.41
1:E:123:ARG:NH1	1:E:125:VAL:O	2.52	0.41
1:A:7:VAL:HB	1:A:78:PHE:CD2	2.56	0.41
1:D:121:PRO:HB2	1:E:133:LEU:CD1	2.51	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:56:LEU:HD22	1:E:71:TYR:HB3	2.02	0.41
1:H:3:GLU:HG2	1:H:52:LEU:CB	2.45	0.41
1:H:33:ASP:HB3	1:H:36:ILE:CD1	2.50	0.41
1:K:28:PHE:CE1	4:K:1002:GDP:H2'	2.56	0.41
1:E:24:ILE:HD11	1:E:55:ILE:HD12	2.04	0.40
1:A:43:GLN:NE2	1:E:135:ARG:HD2	2.36	0.40
1:A:73:ARG:HD2	2:Y:68:VAL:HG13	2.03	0.40
1:A:98:GLU:OE2	1:A:98:GLU:CA	2.62	0.40
4:A:1002:GDP:O3B	4:A:1002:GDP:O1A	2.40	0.40
1:A:16:LYS:NZ	4:A:1002:GDP:O1B	2.54	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:64:TYR:CE2	1:K:2:THR:N[1_654]	1.86	0.34

5.3 Torsion angles

5.3.1 Protein backbone

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	166/168 (99%)	162 (98%)	3 (2%)	1 (1%)	22	55
1	D	166/168 (99%)	162 (98%)	4 (2%)	0	100	100
1	E	166/168 (99%)	161 (97%)	5 (3%)	0	100	100
1	H	166/168 (99%)	162 (98%)	4 (2%)	0	100	100
1	K	166/168 (99%)	163 (98%)	3 (2%)	0	100	100
2	P	6/8 (75%)	4 (67%)	0	2 (33%)	0	0
2	Y	6/8 (75%)	4 (67%)	2 (33%)	0	100	100
All	All	842/856 (98%)	818 (97%)	21 (2%)	3 (0%)	30	64

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	60	GLY
2	P	70	GLY
2	P	72	CYS

5.3.2 Protein sidechains ⓘ

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	147/149 (99%)	139 (95%)	8 (5%)	18	47
1	D	147/149 (99%)	145 (99%)	2 (1%)	62	79
1	E	147/149 (99%)	139 (95%)	8 (5%)	18	47
1	H	147/149 (99%)	141 (96%)	6 (4%)	26	56
1	K	147/149 (99%)	136 (92%)	11 (8%)	11	37
2	P	6/6 (100%)	4 (67%)	2 (33%)	0	1
2	Y	6/6 (100%)	6 (100%)	0	100	100
All	All	747/757 (99%)	710 (95%)	37 (5%)	20	50

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

Mol	Chain	Res	Type
1	A	1	MET
1	A	5	LYS
1	A	30	ASP
1	A	64	TYR
1	A	65	SER
1	A	84	ILE
1	A	118	CYS
1	A	167	LYS
1	D	70	GLN
1	D	128	LYS
1	E	30	ASP
1	E	64	TYR
1	E	70	GLN

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Mol	Chain	Res	Type
1	E	72	MET
1	E	98	GLU
1	E	107	GLU
1	E	128	LYS
1	E	135	ARG
1	H	5	LYS
1	H	64	TYR
1	H	65	SER
1	H	70	GLN
1	H	102	ARG
1	H	168	GLU
1	K	5	LYS
1	K	41	ARG
1	K	49	GLU
1	K	64	TYR
1	K	65	SER
1	K	70	GLN
1	K	73	ARG
1	K	107	GLU
1	K	108	ASP
1	K	128	LYS
1	K	167	LYS
2	P	68	VAL
2	P	73	CYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	25	GLN
1	A	26	ASN
1	D	22	GLN
1	D	25	GLN
1	D	26	ASN
1	D	99	GLN
1	E	25	GLN
1	E	26	ASN
1	E	95	HIS
1	E	116	ASN
1	H	25	GLN
1	K	22	GLN
1	K	25	GLN
1	K	26	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 10 ligands modelled in this entry, 5 are monoatomic - leaving 5 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$
4	GDP	D	1002	3	24,30,30	1.31	4 (16%)	30,47,47	1.61	6 (20%)
4	GDP	H	1002	-	24,30,30	1.23	4 (16%)	30,47,47	1.23	3 (10%)
4	GDP	E	1002	3	24,30,30	1.18	4 (16%)	30,47,47	1.67	7 (23%)
4	GDP	K	1002	3	24,30,30	1.31	3 (12%)	30,47,47	1.56	7 (23%)
4	GDP	A	1002	-	24,30,30	1.24	3 (12%)	30,47,47	1.55	8 (26%)

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	GDP	D	1002	3	-	5/12/32/32	0/3/3/3
4	GDP	H	1002	-	-	6/12/32/32	0/3/3/3
4	GDP	E	1002	3	-	0/12/32/32	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GDP	K	1002	3	-	2/12/32/32	0/3/3/3
4	GDP	A	1002	-	-	1/12/32/32	0/3/3/3

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	1002	GDP	C5-C4	3.64	1.52	1.43
4	E	1002	GDP	C6-N1	-3.03	1.33	1.37
4	H	1002	GDP	O4'-C1'	3.01	1.45	1.41
4	A	1002	GDP	C5-C4	2.82	1.50	1.43
4	K	1002	GDP	C5-C4	2.78	1.50	1.43
4	K	1002	GDP	C5-C6	2.66	1.52	1.47
4	A	1002	GDP	C2-N3	2.62	1.39	1.33
4	D	1002	GDP	C5-C6	2.62	1.52	1.47
4	H	1002	GDP	C5-C4	2.54	1.49	1.43
4	H	1002	GDP	O6-C6	2.42	1.28	1.23
4	A	1002	GDP	C5-C6	2.37	1.52	1.47
4	K	1002	GDP	O4'-C1'	2.30	1.44	1.41
4	E	1002	GDP	C5-C4	2.19	1.48	1.43
4	H	1002	GDP	C5-C6	2.19	1.51	1.47
4	D	1002	GDP	C8-N7	2.10	1.38	1.35
4	E	1002	GDP	C2-N3	2.08	1.38	1.33
4	E	1002	GDP	O4'-C1'	2.07	1.44	1.41
4	D	1002	GDP	O4'-C1'	2.02	1.43	1.41

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	1002	GDP	C5-C6-N1	3.75	120.58	113.95
4	E	1002	GDP	PA-O3A-PB	-3.52	120.76	132.83
4	D	1002	GDP	N2-C2-N3	-3.35	113.22	119.74
4	A	1002	GDP	C8-N7-C5	3.11	108.92	102.99
4	E	1002	GDP	O6-C6-N1	-3.05	117.05	120.65
4	H	1002	GDP	O3B-PB-O2B	3.04	119.24	107.64
4	K	1002	GDP	C3'-C2'-C1'	2.97	105.45	100.98
4	H	1002	GDP	O4'-C1'-C2'	-2.96	102.59	106.93
4	E	1002	GDP	C3'-C2'-C1'	2.96	105.43	100.98
4	K	1002	GDP	C5-C6-N1	2.93	119.12	113.95
4	A	1002	GDP	O5'-C5'-C4'	2.82	118.70	108.99
4	D	1002	GDP	C2'-C3'-C4'	2.74	107.96	102.64
4	E	1002	GDP	C2-N1-C6	-2.63	120.25	125.10
4	A	1002	GDP	PA-O3A-PB	-2.63	123.81	132.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	1002	GDP	O3A-PB-O1B	-2.62	96.65	111.19
4	K	1002	GDP	O2B-PB-O3A	2.54	113.14	104.64
4	H	1002	GDP	C8-N7-C5	2.52	107.80	102.99
4	A	1002	GDP	O2A-PA-O1A	2.41	124.17	112.24
4	E	1002	GDP	C8-N7-C5	2.38	107.52	102.99
4	K	1002	GDP	O4'-C1'-C2'	-2.36	103.48	106.93
4	E	1002	GDP	C2'-C3'-C4'	2.34	107.19	102.64
4	K	1002	GDP	C2-N1-C6	-2.33	120.80	125.10
4	D	1002	GDP	PA-O3A-PB	-2.30	124.93	132.83
4	A	1002	GDP	O3'-C3'-C4'	-2.24	104.57	111.05
4	A	1002	GDP	O4'-C4'-C5'	2.20	116.61	109.37
4	D	1002	GDP	N2-C2-N1	2.17	121.33	116.71
4	K	1002	GDP	O5'-C5'-C4'	2.16	116.42	108.99
4	K	1002	GDP	O6-C6-N1	-2.14	118.12	120.65
4	D	1002	GDP	O2A-PA-O1A	2.14	122.81	112.24
4	A	1002	GDP	C3'-C2'-C1'	2.10	104.14	100.98
4	A	1002	GDP	O4'-C1'-C2'	-2.10	103.86	106.93

There are no chirality outliers.

All (14) torsion outliers are listed below:

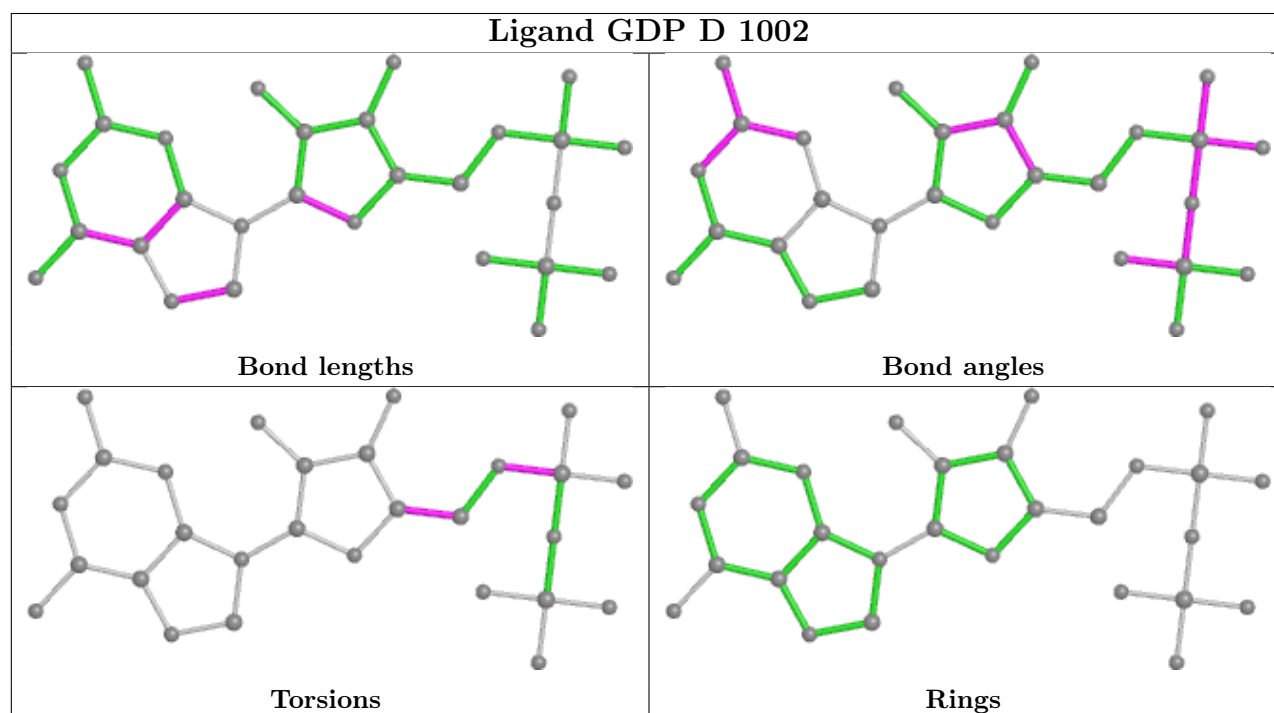
Mol	Chain	Res	Type	Atoms
4	D	1002	GDP	C5'-O5'-PA-O1A
4	D	1002	GDP	C5'-O5'-PA-O2A
4	D	1002	GDP	O4'-C4'-C5'-O5'
4	D	1002	GDP	C3'-C4'-C5'-O5'
4	H	1002	GDP	C5'-O5'-PA-O3A
4	H	1002	GDP	O4'-C4'-C5'-O5'
4	H	1002	GDP	C3'-C4'-C5'-O5'
4	K	1002	GDP	O4'-C4'-C5'-O5'
4	K	1002	GDP	C4'-C5'-O5'-PA
4	H	1002	GDP	C4'-C5'-O5'-PA
4	H	1002	GDP	C5'-O5'-PA-O1A
4	A	1002	GDP	PA-O3A-PB-O1B
4	D	1002	GDP	C5'-O5'-PA-O3A
4	H	1002	GDP	PB-O3A-PA-O1A

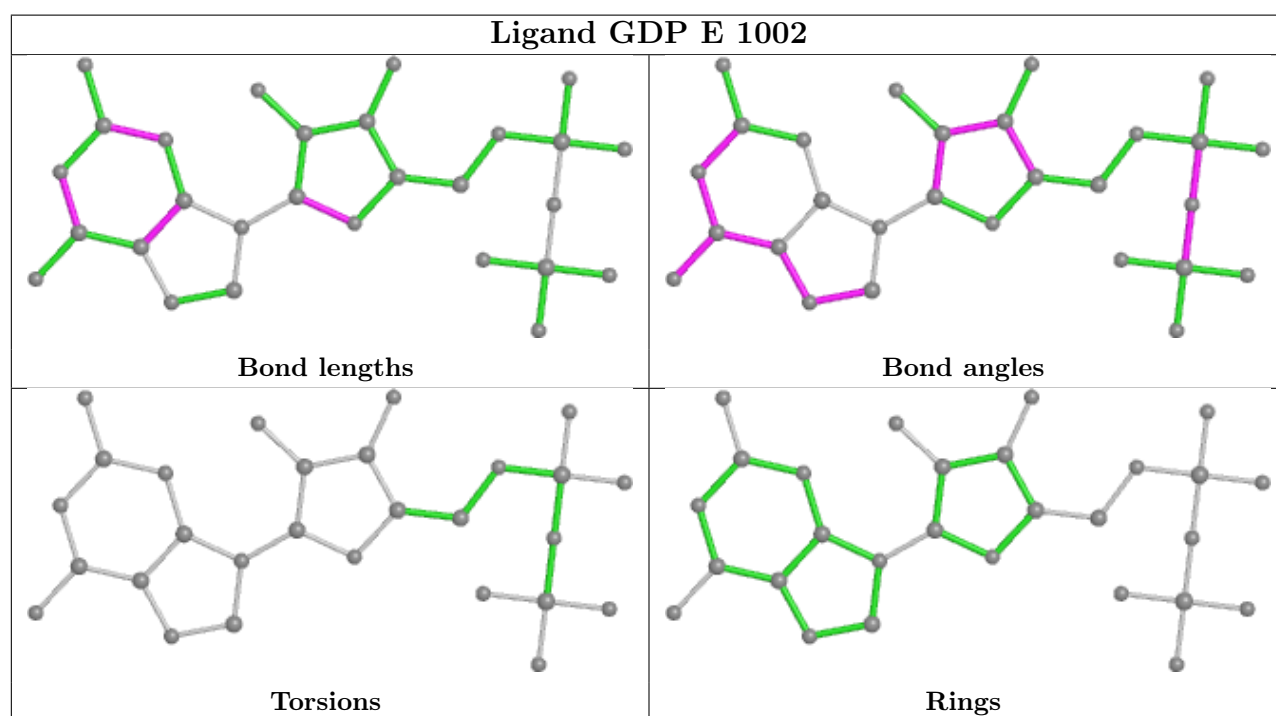
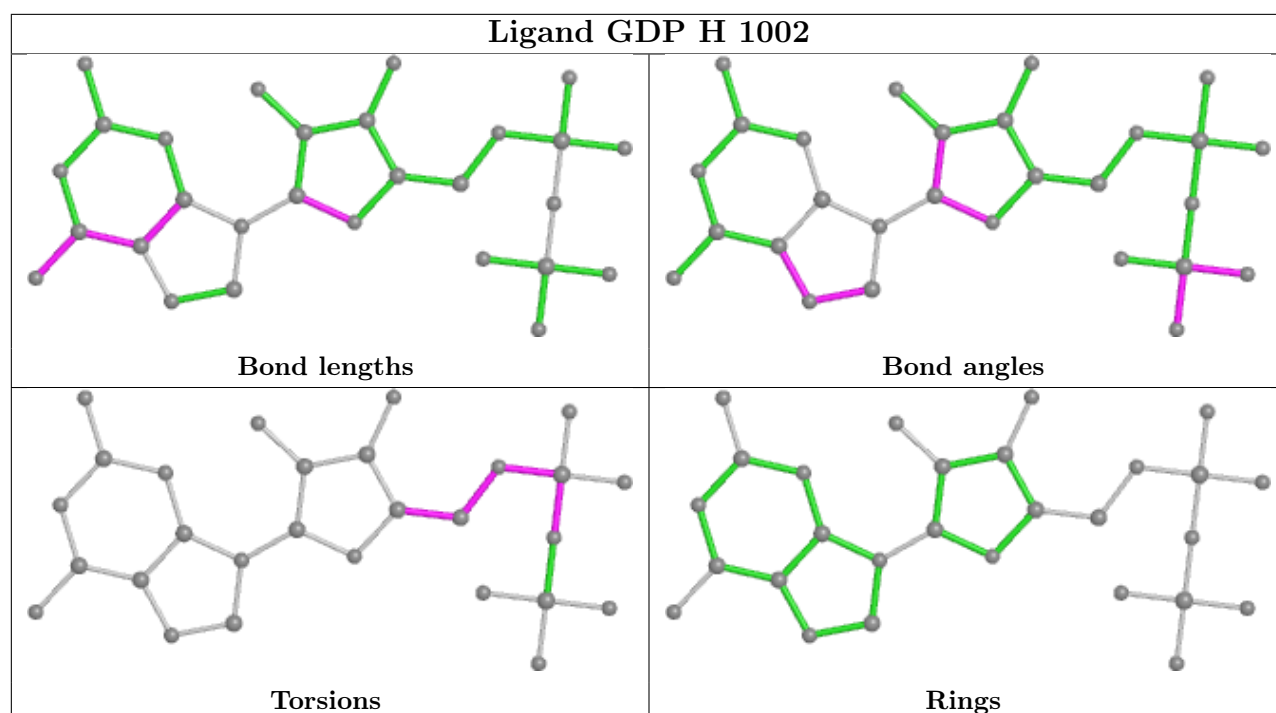
There are no ring outliers.

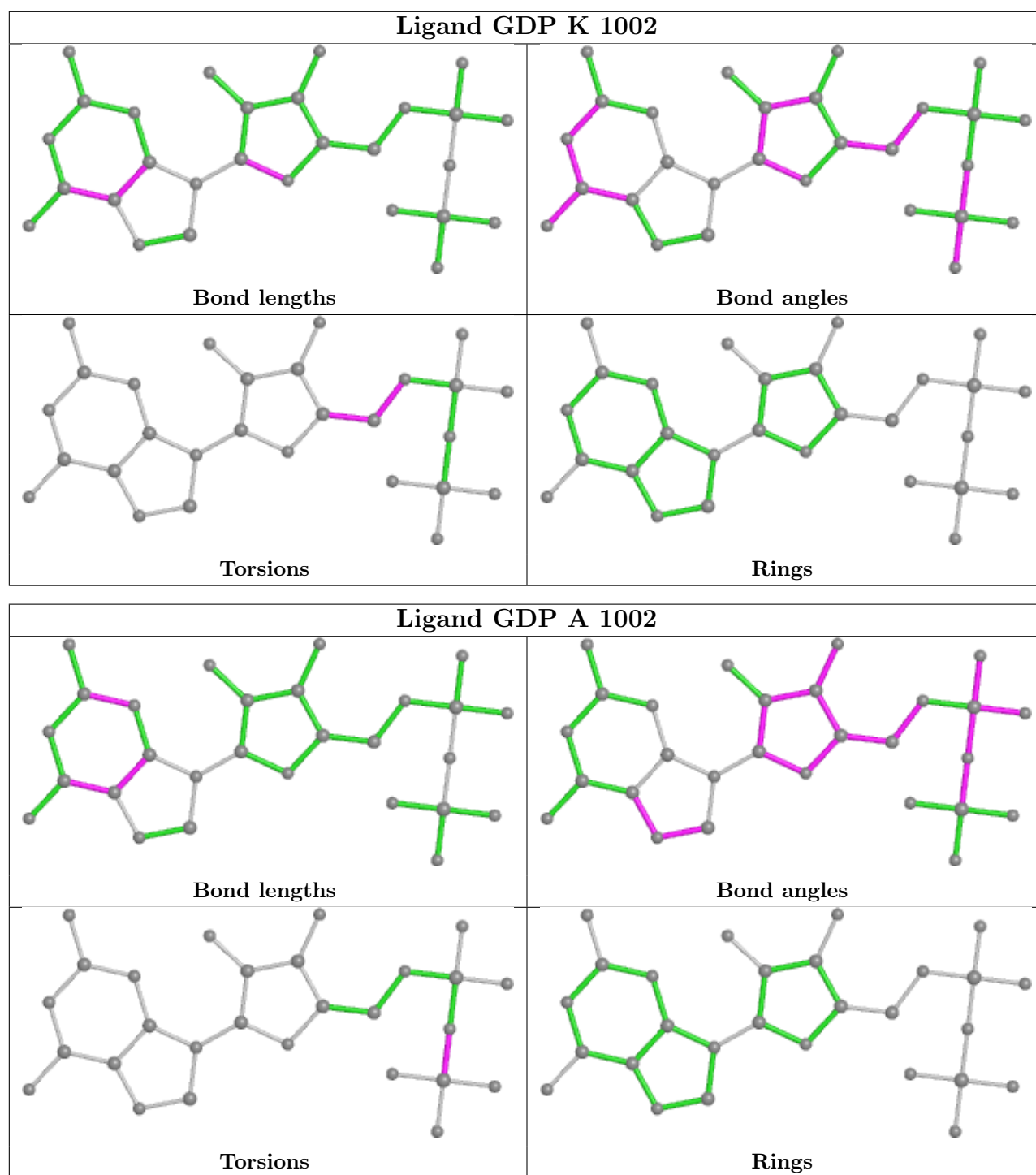
5 monomers are involved in 48 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	1002	GDP	10	0
4	H	1002	GDP	5	0
4	E	1002	GDP	7	0
4	K	1002	GDP	12	0
4	A	1002	GDP	14	0

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







5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å ²)	Q<0.9
1	A	168/168 (100%)	0.37	6 (3%)	46	34	23, 62, 128, 225	0
1	D	168/168 (100%)	0.30	11 (6%)	26	22	15, 50, 135, 288	0
1	E	168/168 (100%)	0.34	5 (2%)	52	39	17, 52, 107, 453	0
1	H	168/168 (100%)	0.40	11 (6%)	26	22	29, 66, 120, 240	0
1	K	168/168 (100%)	0.47	13 (7%)	21	18	21, 63, 135, 216	0
2	P	8/8 (100%)	-1.15	0	100	100	11, 12, 14, 15	0
2	Y	8/8 (100%)	-0.63	0	100	100	22, 25, 30, 32	0
All	All	856/856 (100%)	0.35	46 (5%)	32	25	11, 57, 132, 453	0

All (46) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	58	THR	5.2
1	H	146	ALA	4.6
1	K	52	LEU	4.1
1	H	77	GLY	3.9
1	H	19	LEU	3.5
1	H	147	LYS	3.4
1	H	67	MET	3.4
1	D	54	ASP	3.4
1	D	56	LEU	3.3
1	K	142	ILE	3.3
1	H	52	LEU	3.2
1	K	57	ASP	3.2
1	K	154	ASP	3.1
1	K	72	MET	3.1
1	K	65	SER	3.1
1	K	113	LEU	3.1
1	D	77	GLY	3.0

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Mol	Chain	Res	Type	RSRZ
1	D	68	ARG	2.9
1	H	53	LEU	2.9
1	A	122	SER	2.9
1	D	71	TYR	2.9
1	E	77	GLY	2.8
1	K	56	LEU	2.7
1	E	65	SER	2.7
1	A	103	VAL	2.7
1	D	154	ASP	2.7
1	A	67	MET	2.6
1	K	99	GLN	2.6
1	H	57	ASP	2.6
1	K	58	THR	2.5
1	K	152	VAL	2.5
1	E	42	LYS	2.4
1	E	75	GLY	2.4
1	A	124	THR	2.4
1	D	152	VAL	2.4
1	A	152	VAL	2.3
1	D	57	ASP	2.3
1	H	62	GLU	2.2
1	A	13	GLY	2.2
1	K	110	PRO	2.2
1	D	127	THR	2.2
1	K	59	ALA	2.1
1	D	30	ASP	2.1
1	H	56	LEU	2.1
1	D	81	VAL	2.0
1	H	65	SER	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

6.3 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands

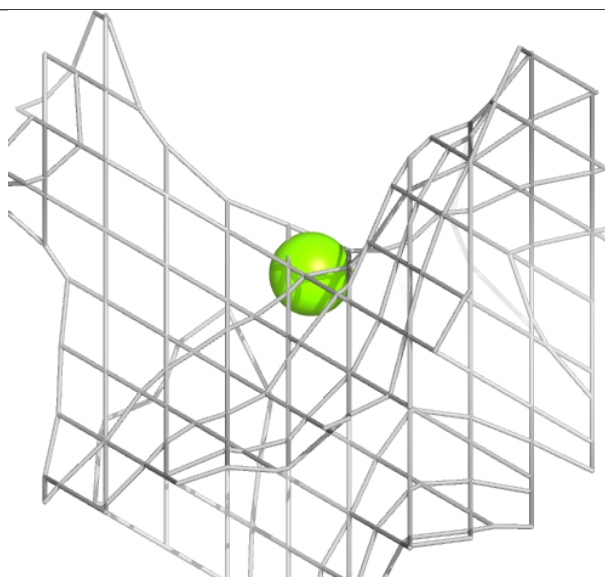
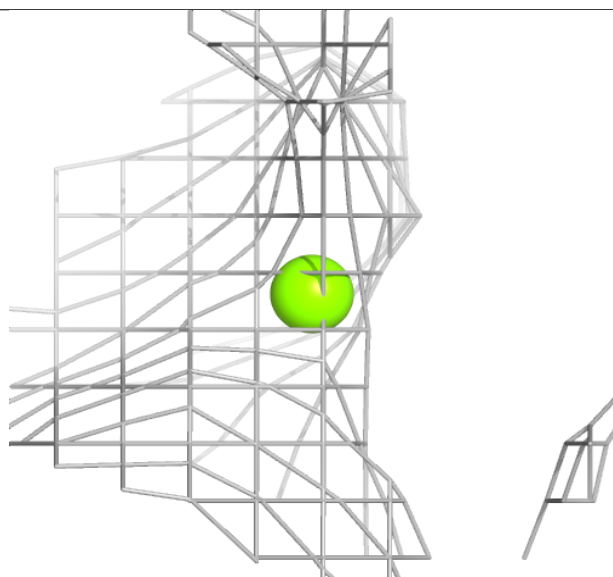
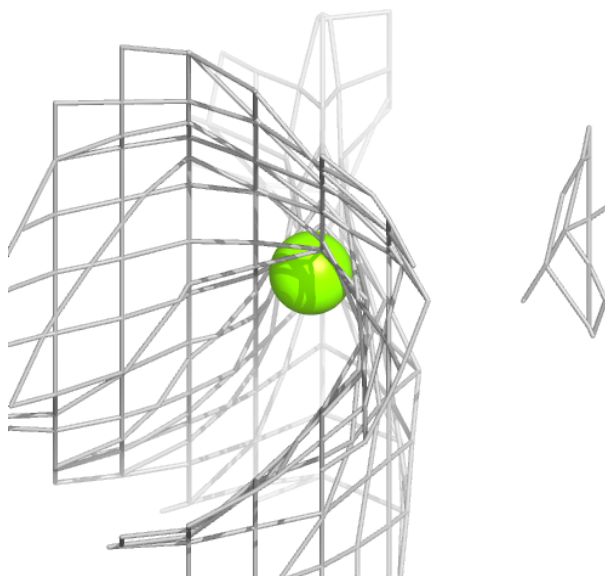
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	MG	H	1001	1/1	0.95	0.06	39,39,39,39	0
4	GDP	H	1002	28/28	0.95	0.10	30,51,78,82	0
4	GDP	D	1002	28/28	0.97	0.07	9,11,12,12	0
4	GDP	E	1002	28/28	0.97	0.09	20,53,108,115	0
4	GDP	A	1002	28/28	0.97	0.08	15,24,32,32	0
4	GDP	K	1002	28/28	0.97	0.06	14,22,28,29	0
3	MG	K	1001	1/1	0.98	0.07	0,0,0,0	0
3	MG	E	1001	1/1	0.98	0.05	0,0,0,0	0
3	MG	A	1001	1/1	0.99	0.03	0,0,0,0	0
3	MG	D	1001	1/1	0.99	0.05	0,0,0,0	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

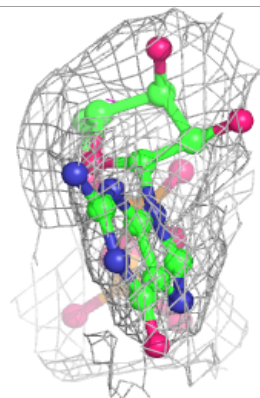
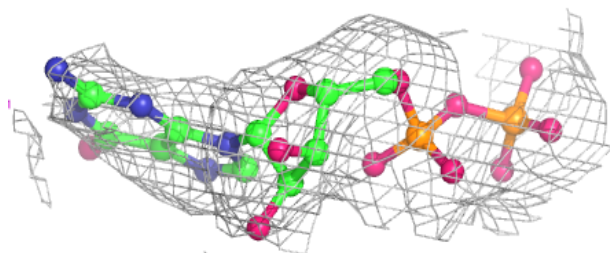
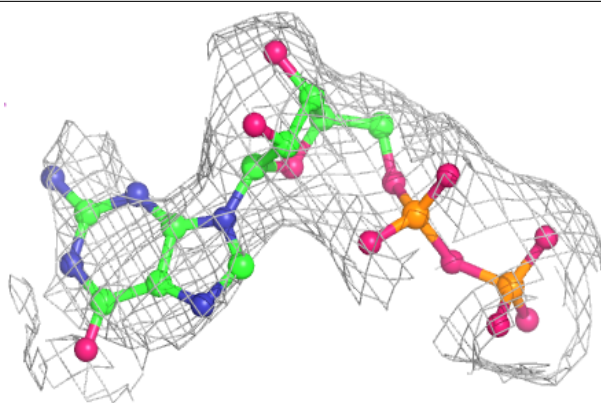
Electron density around MG H 1001:

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

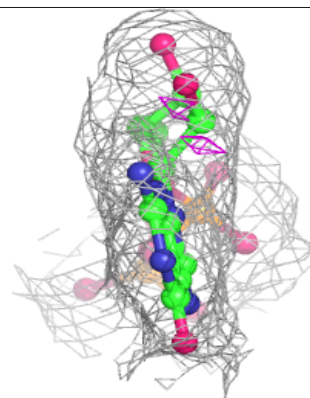
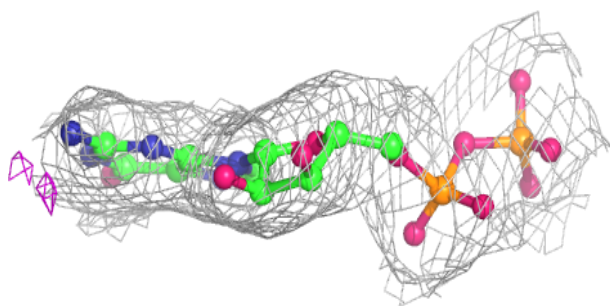
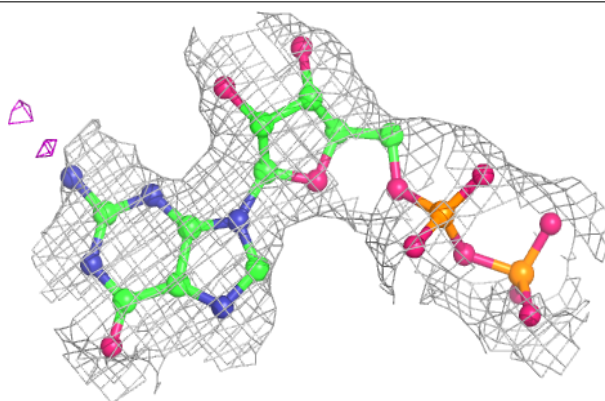


Electron density around GDP H 1002:

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

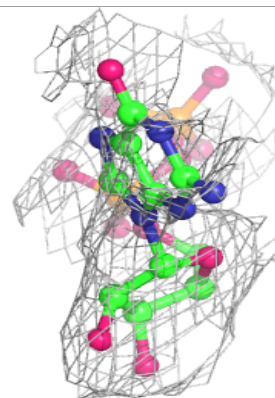
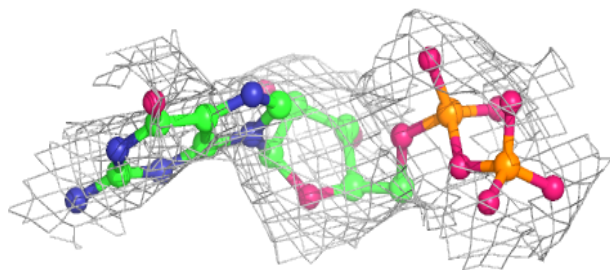
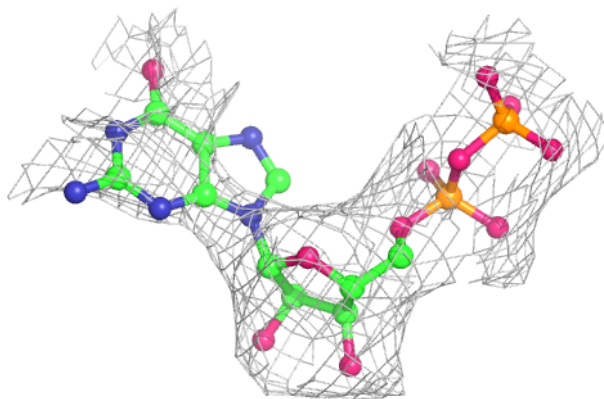
**Electron density around GDP D 1002:**

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

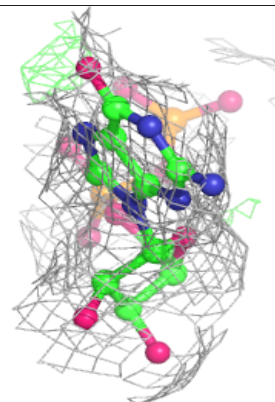
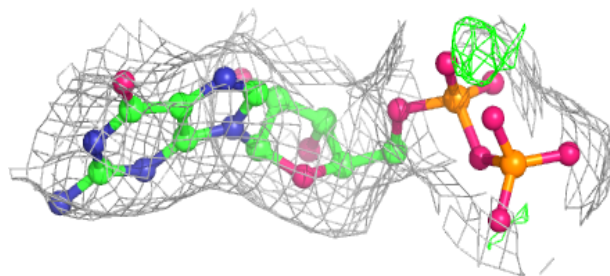
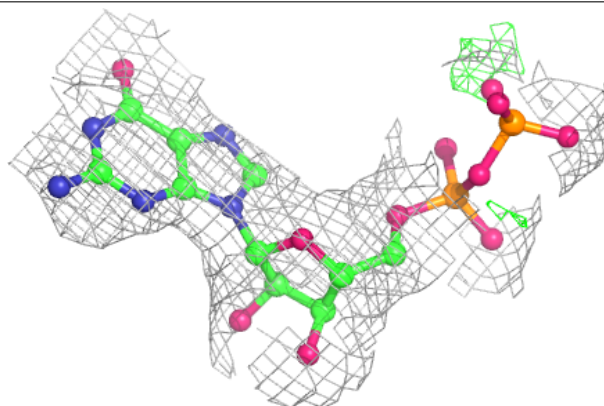


Electron density around GDP E 1002:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

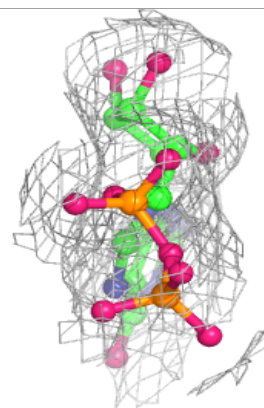
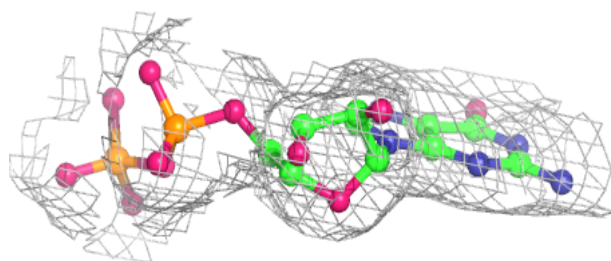
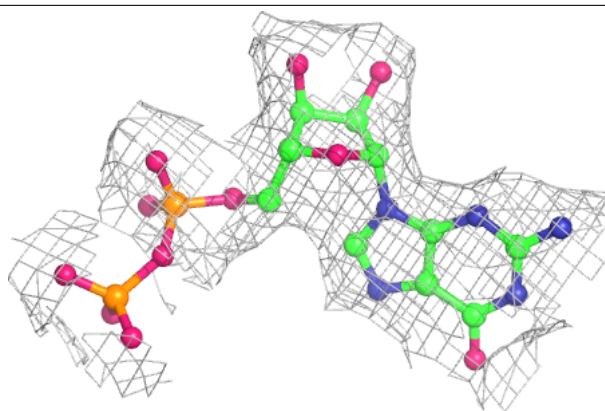
**Electron density around GDP A 1002:**

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



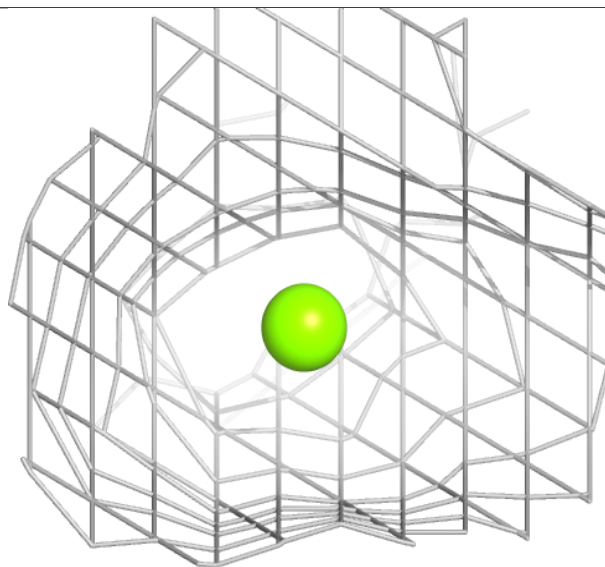
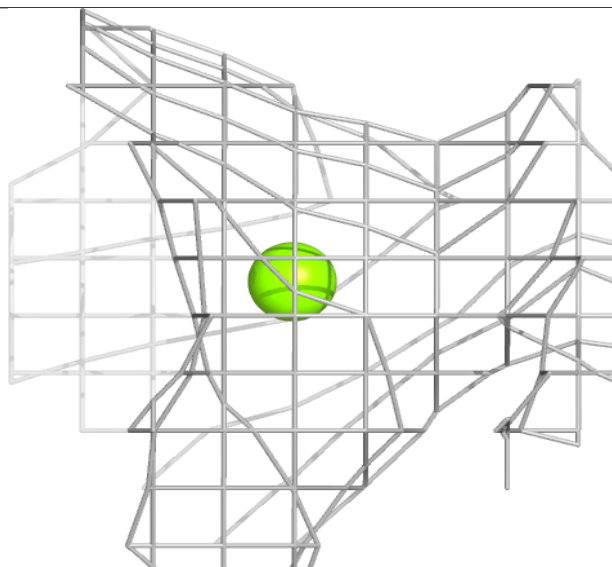
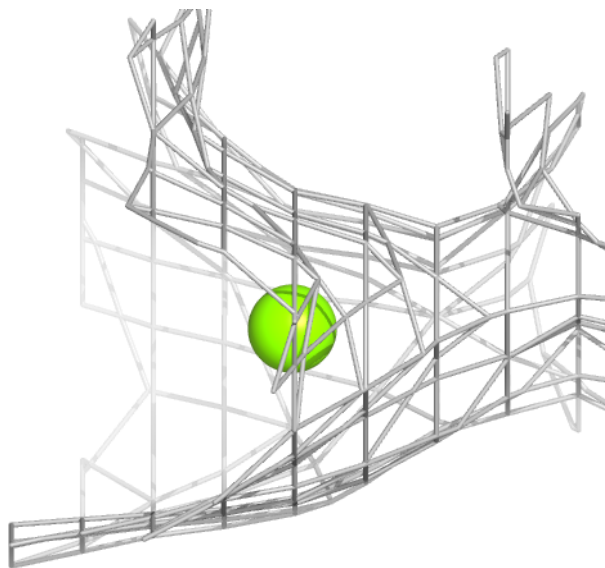
Electron density around GDP K 1002:

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



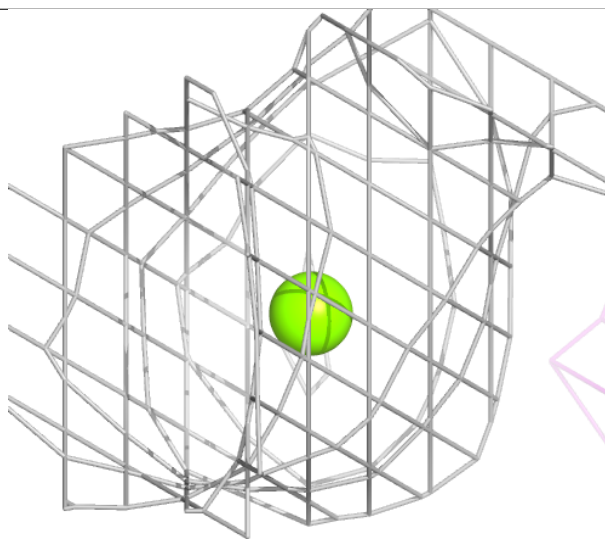
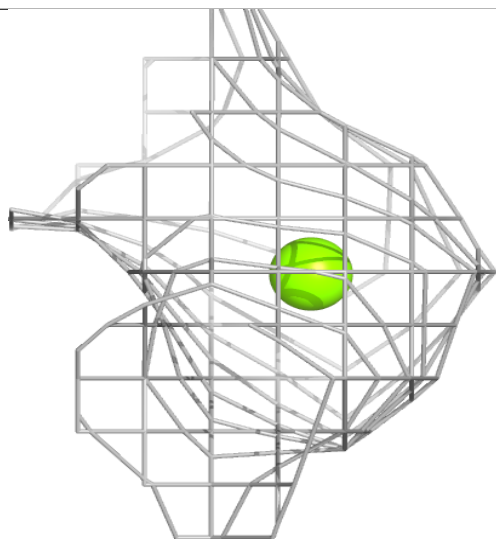
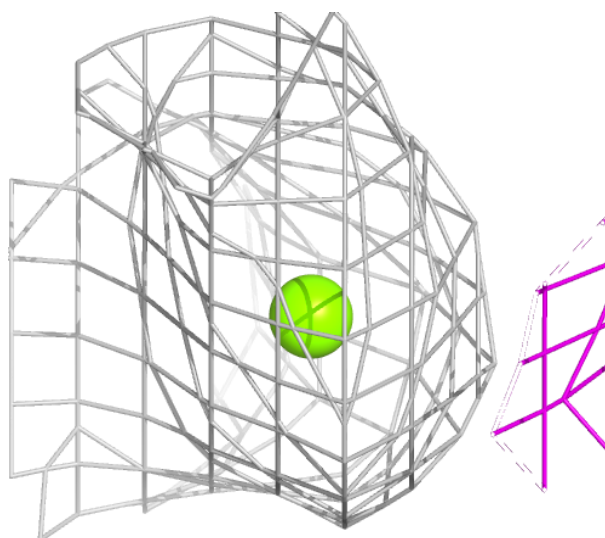
Electron density around MG K 1001:

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



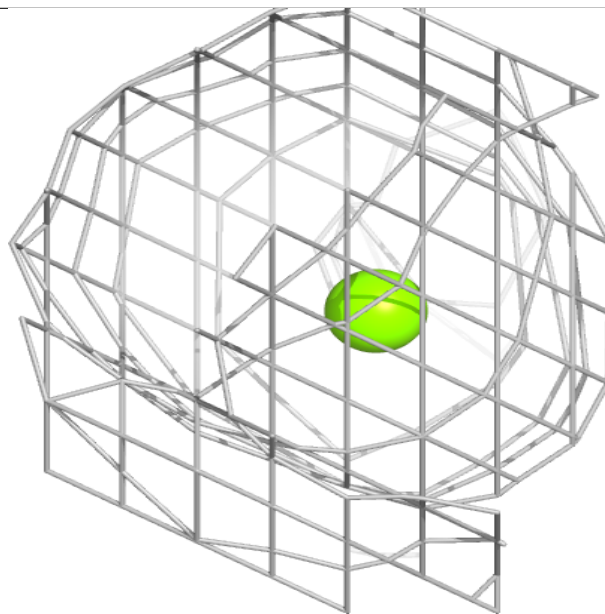
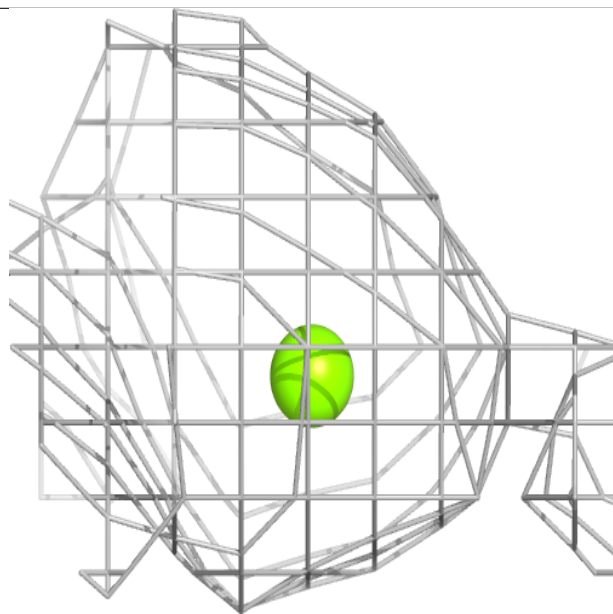
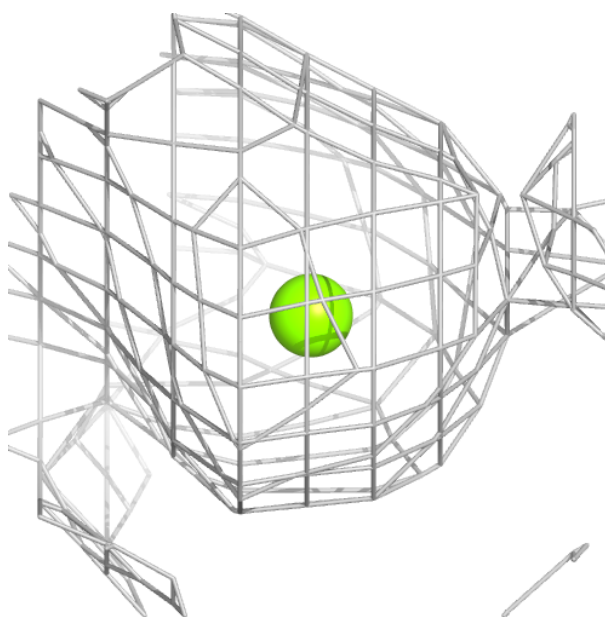
Electron density around MG E 1001:

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



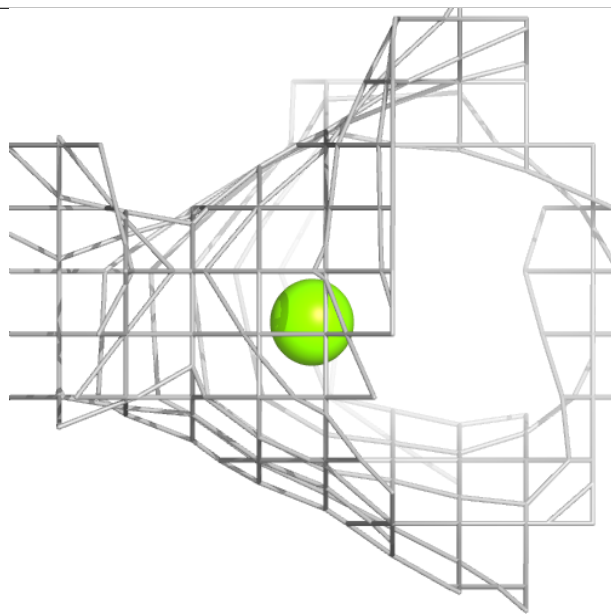
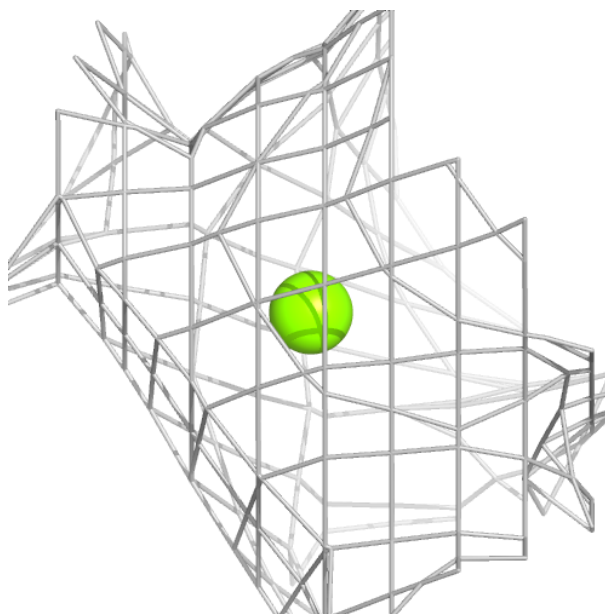
Electron density around MG A 1001:

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



Electron density around MG D 1001:

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



6.5 Other polymers [i](#)

There are no such residues in this entry.