WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Jun 24, 2025 – 05:04 pm BST

PDB ID	:	7OUT / pdb_00007out
Title	:	HIV-1 REVERSE TRANSCRIPTASE COMPLEX WITH DNA AND IN-HIBITOR RMC-264
Authors	:	Martinez, S.E.; Singh, A.K.; Gu, W.; Das, K.
Deposited on	:	2021-06-13
Resolution	:	3.20 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:
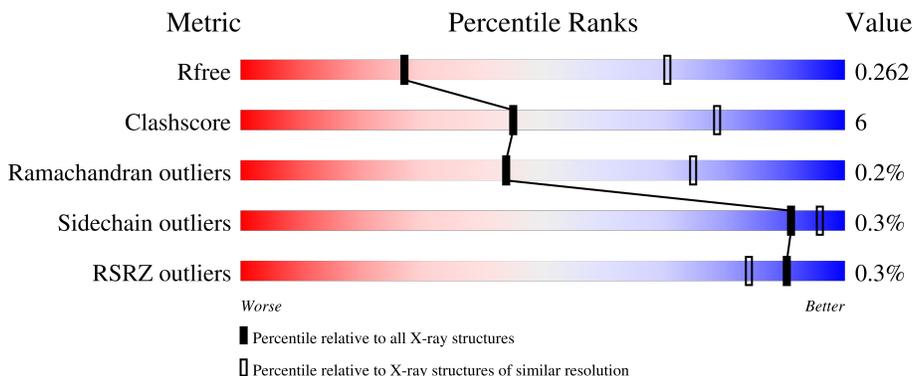
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 3.20 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	Percentile Ranks	Value
Rfree		0.262
Clashscore		6
Ramachandran outliers		0.2%
Sidechain outliers		0.3%
RSRZ outliers		0.3%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	1370 (3.20-3.20)
Clashscore	180529	1497 (3.20-3.20)
Ramachandran outliers	177936	1479 (3.20-3.20)
Sidechain outliers	177891	1478 (3.20-3.20)
RSRZ outliers	164620	1371 (3.20-3.20)

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 <=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	556	81% 18%
1	C	556	.% 86% 14%
2	B	428	82% 14% •
2	D	428	81% 15% •
3	E	27	41% 44% 15%

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Mol	Chain	Length	Quality of chain
3	T	27	59% · 30% · 11%
4	F	21	57% · 33% · 5% · 5%
4	P	21	48% · 38% · 10% · 5%

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 17621 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Reverse transcriptase/ribonuclease H.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	C	555	Total 4509	C 2919	N 750	O 832	S 8	0	0	0
1	A	556	Total 4521	C 2927	N 752	O 833	S 9	0	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-1	MET	-	initiating methionine	UNP P03366
C	0	VAL	-	expression tag	UNP P03366
C	258	CYS	GLN	conflict	UNP P03366
C	280	SER	CYS	conflict	UNP P03366
C	498	ASN	ASP	conflict	UNP P03366
A	-1	MET	-	initiating methionine	UNP P03366
A	0	VAL	-	expression tag	UNP P03366
A	258	CYS	GLN	conflict	UNP P03366
A	280	SER	CYS	conflict	UNP P03366
A	498	ASN	ASP	conflict	UNP P03366

- Molecule 2 is a protein called Reverse transcriptase/ribonuclease H.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	411	Total 3398	C 2213	N 563	O 616	S 6	0	0	0
2	B	412	Total 3391	C 2206	N 560	O 619	S 6	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	280	SER	CYS	conflict	UNP P03366
B	280	SER	CYS	conflict	UNP P03366

- Molecule 3 is a DNA chain called DNA (5'-D(P*GP*GP*TP*CP*GP*GP*CP*GP*CP*CP*CP*GP*AP*AP*CP*AP*GP*GP*GP*AP*CP*TP*G)-3').

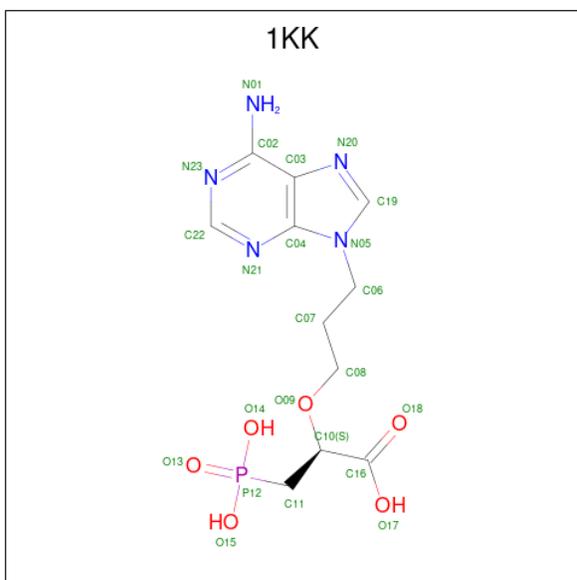| Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	23	Total 477	C 223	N 95	O 136	P 23	0	0	0
3	T	24	Total 494	C 233	N 97	O 141	P 23	0	0	0

- Molecule 4 is a DNA chain called DNA (5'-D(*CP*AP*GP*TP*CP*CP*CP*TP*GP*TP*TP*CP*GP*GP*(MRG)P*CP*GP*CP*CP*(DDG))-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	20	Total 403	C 192	N 72	O 120	P 19	0	0	0
4	P	20	Total 403	C 192	N 72	O 120	P 19	0	0	0

- Molecule 5 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total 1	Mg 1	0	0

- Molecule 6 is (S)-2-(3-(6-amino-9H-purin-9-yl)propoxy)-3-phosphonopropanoic acid (CCD ID: 1KK) (formula: $C_{11}H_{16}N_5O_6P$) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
6	A	1	23	11	5	6	1	0	0

• Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	C	1	1	1	0	0

3 Residue-property plots ⓘ

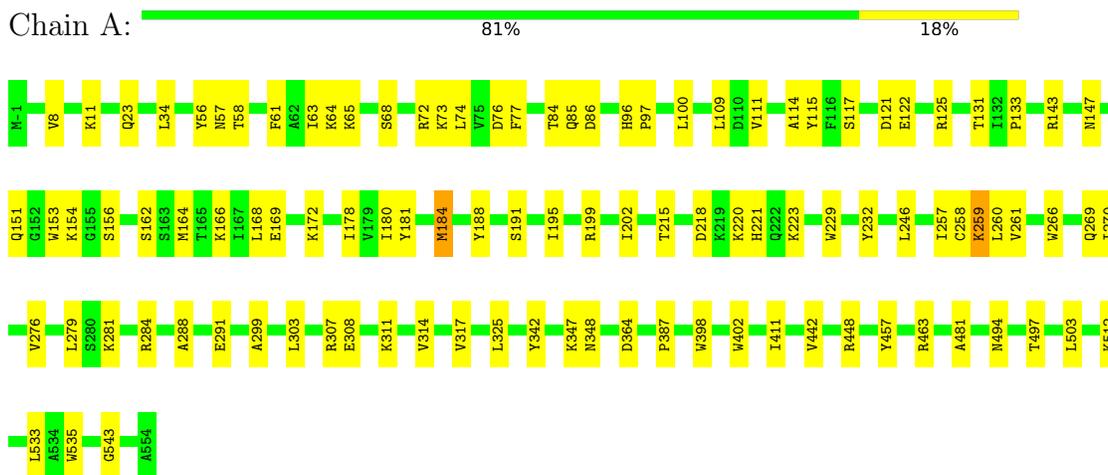These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density.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

• Molecule 1: Reverse transcriptase/ribonuclease H

Chain C:

• Molecule 1: Reverse transcriptase/ribonuclease H

Chain A:

• Molecule 2: Reverse transcriptase/ribonuclease H

Chain D:

• Molecule 2: Reverse transcriptase/ribonuclease H

Chain B:

• Molecule 3: DNA (5'-D(P*GP*GP*TP*CP*GP*GP*CP*GP*CP*CP*CP*GP*AP*AP*CP*A
P*GP*GP*GP*AP*CP*TP*G)-3'

Chain E:

• Molecule 3: DNA (5'-D(P*GP*GP*TP*CP*GP*GP*CP*GP*CP*CP*CP*GP*AP*AP*CP*A
P*GP*GP*GP*AP*CP*TP*G)-3'

Chain T:

• Molecule 4: DNA (5'-D(*CP*AP*GP*TP*CP*CP*CP*TP*GP*TP*TP*CP*GP*GP*(MRG)
P*CP*GP*CP*CP*(DDG))-3'

Chain F:

• Molecule 4: DNA (5'-D(*CP*AP*GP*TP*CP*CP*CP*TP*GP*TP*TP*CP*GP*GP*(MRG)
P*CP*GP*CP*CP*(DDG))-3'

Chain P:

DA C803 A804 G805 T806 C807 C814 G815 G816 G817 C818 G819 G822

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	89.60Å 132.58Å 139.42Å 90.00° 98.72° 90.00°	Depositor
Resolution (Å)	53.81 – 3.20 53.81 – 3.20	Depositor EDS
% Data completeness (in resolution range)	99.9 (53.81-3.20) 99.9 (53.81-3.20)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.43 (at 3.19Å)	Xtriage
Refinement program	PHENIX 1.19.1_4122	Depositor
R, R_{free}	0.219 , 0.265 0.219 , 0.262	Depositor DCC
R_{free} test set	1569 reflections (2.95%)	wwPDB-VP
Wilson B-factor (Å^2)	115.0	Xtriage
Anisotropy	0.230	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 81.6	EDS
L-test for twinning[2]	$< |L| > = 0.48, < L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	17621	wwPDB-VP
Average B, all atoms (Å^2)	145.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.97% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: 1KK, MRG, MG, DDG

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	0.29	0/4639	0.48	2/6303 (0.0%)
1	C	0.22	0/4627	0.41	2/6289 (0.0%)
2	B	0.20	0/3488	0.41	1/4740 (0.0%)
2	D	0.21	0/3496	0.40	3/4749 (0.1%)
3	E	0.34	0/536	0.53	0/826
3	T	0.36	0/555	0.66	0/856
4	F	0.35	0/400	0.66	0/612
4	P	0.38	0/400	0.75	1/612 (0.2%)
All	All	0.25	0/18141	0.46	9/24987 (0.0%)

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	259	LYS	N-CA-C	-9.06	100.88	112.93
2	B	424	LYS	N-CA-C	-8.11	104.38	112.97
2	D	420	PRO	CA-C-N	-7.57	112.54	120.03
2	D	420	PRO	C-N-CA	-7.57	112.54	120.03
1	C	332	GLN	N-CA-C	7.23	122.25	111.04
1	A	184	MET	CB-CA-C	-6.78	108.74	116.54
2	D	425	LEU	N-CA-C	6.11	118.73	111.71
1	C	332	GLN	CB-CA-C	-5.99	101.87	111.39
4	P	807	DC	C2'-C3'-O3'	-5.42	103.38	111.50

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4521	0	4587	67	0
1	C	4509	0	4567	47	0
2	B	3391	0	3413	36	0
2	D	3398	0	3424	36	0
3	E	477	0	256	8	0
3	T	494	0	269	5	0
4	F	403	0	224	5	0
4	P	403	0	224	6	0
5	A	1	0	0	0	0
6	A	23	0	0	2	0
7	C	1	0	0	0	0
All	All	17621	0	16964	198	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 6.

All (198) 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:A:64:LYS:NZ	1:A:68:SER:O	1.95	0.98
2:B:421:PRO:HB2	2:B:423:VAL:HG22	1.67	0.77
1:C:334:GLN:HB3	1:C:512:LYS:HE2	1.70	0.73
1:C:120:LEU:HD12	1:C:121:ASP:H	1.57	0.70
1:A:151:GLN:NE2	6:A:602:1KK:O15	2.25	0.70
1:A:56:TYR:O	1:A:143:ARG:NH2	2.28	0.66
1:A:317:VAL:HG11	1:A:347:LYS:HB3	1.79	0.65
3:E:709:DC:H2'	3:E:710:DG:C8	2.33	0.64
1:A:34:LEU:HD22	1:A:73:LYS:HD2	1.80	0.64
2:D:125:ARG:HE	2:D:147:ASN:HA	1.61	0.63
4:P:816:DG:H2"	4:P:817:MRG:H8	1.80	0.63
1:C:172:LYS:HE2	1:C:180:ILE:HB	1.81	0.62
2:B:254:VAL:HG13	2:B:283:LEU:HD22	1.80	0.62
1:A:184:MET:HG2	4:P:822:DDG:H2'	1.81	0.62
2:B:73:LYS:NZ	2:B:146:TYR:OH	2.32	0.62
2:B:267:ALA:HB2	2:B:425:LEU:HD11	1.82	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:181:TYR:HB2	1:A:188:TYR:HB3	1.81	0.61
2:D:246:LEU:HD12	2:D:307:ARG:HG2	1.83	0.61
2:D:199:ARG:HA	2:D:202:ILE:HD12	1.83	0.60
1:C:21:VAL:O	1:C:57:ASN:ND2	2.34	0.60
1:A:172:LYS:HE2	1:A:180:ILE:HB	1.82	0.60
1:C:308:GLU:HA	1:C:311:LYS:HE2	1.83	0.60
3:E:709:DC:H2'	3:E:710:DG:H8	1.66	0.59
1:A:111:VAL:HG13	1:A:215:THR:O	2.01	0.59
1:C:181:TYR:HB2	1:C:188:TYR:HB3	1.85	0.58
2:D:122:GLU:OE1	2:D:125:ARG:NH1	2.37	0.58
1:A:503:LEU:HD12	1:A:533:LEU:HD13	1.86	0.57
1:A:503:LEU:HD22	1:A:535:TRP:HB2	1.87	0.57
1:C:57:ASN:OD1	1:C:131:THR:HG23	2.05	0.56
2:B:125:ARG:NH1	2:B:147:ASN:O	2.38	0.56
1:A:402:TRP:O	2:B:331:LYS:NZ	2.31	0.56
2:D:81:ASN:HB3	2:D:154:LYS:HD2	1.86	0.56
2:B:56:TYR:HE2	2:B:126:LYS:HE2	1.71	0.55
1:A:125:ARG:HE	1:A:147:ASN:HA	1.71	0.55
2:D:358:ARG:NH2	2:D:405:TYR:O	2.31	0.55
1:A:266:TRP:O	1:A:269:GLN:HG2	2.07	0.55
1:C:171:PHE:CD2	1:C:205:LEU:HD13	2.43	0.54
1:C:301:LEU:O	1:C:305:GLU:HG3	2.08	0.54
1:A:151:GLN:CD	6:A:602:1KK:O15	2.50	0.54
2:B:82:LYS:HD3	2:B:413:GLU:OE2	2.07	0.54
2:B:305:GLU:O	2:B:309:ILE:HG13	2.08	0.53
1:C:21:VAL:HB	1:C:59:PRO:HD3	1.90	0.53
3:E:707:DG:H2'	3:E:708:DG:C8	2.43	0.53
2:B:378:GLU:O	2:B:382:ILE:HG13	2.09	0.53
1:C:331:LYS:HB3	1:C:421:PRO:HG2	1.90	0.53
2:D:88:TRP:CZ2	2:D:154:LYS:HD3	2.44	0.52
1:A:261:VAL:HG13	1:A:276:VAL:HG11	1.90	0.52
1:C:24:TRP:HD1	1:C:59:PRO:HB3	1.74	0.52
1:C:543:GLY:N	2:D:283:LEU:O	2.41	0.52
2:D:359:GLY:HA3	2:D:366:LYS:HD2	1.90	0.52
1:A:543:GLY:N	2:B:283:LEU:O	2.40	0.52
2:B:167:ILE:HG23	2:B:212:TRP:CD1	2.45	0.52
2:B:101:LYS:HD3	2:B:382:ILE:HG23	1.92	0.52
1:A:61:PHE:CZ	1:A:76:ASP:HB2	2.44	0.52
1:A:448:ARG:NH2	3:T:723:DC:H1'	2.25	0.52
2:D:365:VAL:HG11	2:D:401:TRP:HB2	1.91	0.51
1:A:61:PHE:O	1:A:74:LEU:HB2	2.09	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:257:ILE:O	2:B:261:VAL:HG23	2.10	0.51
2:D:163:SER:O	2:D:167:ILE:HG13	2.11	0.51
1:A:164:MET:HE3	1:A:168:LEU:HD11	1.92	0.51
4:P:818:DC:H2'	4:P:819:DG:C8	2.45	0.51
1:C:120:LEU:HD12	1:C:121:ASP:N	2.26	0.51
4:P:818:DC:H2'	4:P:819:DG:H8	1.76	0.51
1:A:111:VAL:HG12	1:A:114:ALA:HB2	1.93	0.51
3:E:703:DG:H21	3:E:705:DT:H73	1.76	0.50
3:E:706:DC:H2'	3:E:707:DG:C8	2.46	0.50
3:E:720:DG:H2"	3:E:721:DG:C8	2.46	0.50
2:D:254:VAL:O	2:D:258:GLN:HG3	2.11	0.50
1:C:125:ARG:HD3	1:C:147:ASN:HA	1.93	0.50
1:C:458:VAL:HG12	2:D:286:THR:HG21	1.94	0.50
1:C:454:LYS:HZ3	1:C:554:ALA:HB3	1.76	0.50
1:C:454:LYS:NZ	1:C:554:ALA:HB3	2.26	0.50
1:C:288:ALA:HB3	1:C:291:GLU:HB2	1.94	0.49
1:A:246:LEU:HD22	1:A:260:LEU:HD12	1.95	0.49
2:B:257:ILE:HG22	2:B:283:LEU:HD11	1.93	0.49
3:E:713:DC:H2'	3:E:714:DG:C8	2.48	0.49
1:C:37:ILE:HG22	1:C:41:MET:HE2	1.94	0.49
2:D:13:LYS:HD3	2:D:85:GLN:H	1.76	0.49
1:A:288:ALA:HB3	1:A:291:GLU:HB2	1.95	0.49
1:C:343:GLN:HG3	1:C:349:LEU:HD11	1.94	0.49
2:D:73:LYS:NZ	2:D:146:TYR:OH	2.41	0.49
2:B:91:GLN:HG2	2:B:92:LEU:HG	1.95	0.49
1:C:305:GLU:O	1:C:309:ILE:HG13	2.13	0.48
1:A:457:TYR:HE1	1:A:463:ARG:HG2	1.79	0.48
2:B:193:LEU:HB3	2:B:197:GLN:HG3	1.96	0.48
1:A:162:SER:O	1:A:166:LYS:HG3	2.14	0.48
1:C:65:LYS:HD2	1:C:70:LYS:HB2	1.96	0.48
2:B:371:ALA:O	2:B:375:ILE:HG13	2.14	0.47
1:A:11:LYS:O	1:A:85:GLN:HG2	2.14	0.47
2:B:115:TYR:O	2:B:149:LEU:HB2	2.15	0.47
1:A:122:GLU:OE1	1:A:125:ARG:NH1	2.47	0.47
2:B:23:GLN:HG2	2:B:133:PRO:HD3	1.95	0.47
2:D:265:ASN:O	2:D:268:SER:OG	2.25	0.47
1:A:57:ASN:HD21	1:A:131:THR:HG22	1.79	0.47
1:A:342:TYR:HB3	1:A:348:ASN:HA	1.97	0.47
1:C:503:LEU:HD22	1:C:535:TRP:HB2	1.95	0.47
1:C:23:GLN:HE22	1:C:60:VAL:H	1.61	0.47
1:C:58:THR:HG21	1:C:77:PHE:CE1	2.50	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:178:ILE:HG13	1:A:191:SER:HB3	1.97	0.47
2:D:191:SER:OG	2:D:198:HIS:ND1	2.32	0.46
2:D:260:LEU:HD21	2:D:303:LEU:HD13	1.97	0.46
1:A:199:ARG:HA	1:A:202:ILE:HD12	1.97	0.46
2:D:276:VAL:HG22	2:D:277:ARG:HH21	1.81	0.46
1:A:398:TRP:CZ2	1:A:411:ILE:HG13	2.51	0.46
2:B:54:ASN:HB3	2:B:143:ARG:HH21	1.81	0.46
2:B:245:VAL:O	2:B:263:LYS:NZ	2.40	0.46
1:A:65:LYS:HB2	1:A:65:LYS:HE2	1.77	0.46
1:A:109:LEU:HA	1:A:220:LYS:O	2.15	0.46
2:D:376:THR:O	2:D:380:ILE:HG13	2.16	0.46
1:A:195:ILE:HD11	1:A:199:ARG:NH2	2.31	0.46
1:A:281:LYS:HG2	1:A:284:ARG:NH2	2.30	0.46
2:D:423:VAL:O	2:D:424:LYS:C	2.58	0.46
2:D:21:VAL:HB	2:D:59:PRO:HD3	1.98	0.46
1:A:97:PRO:HD3	1:A:232:TYR:CE2	2.50	0.45
1:A:497:THR:O	1:A:535:TRP:HA	2.16	0.45
1:C:164:MET:HE2	1:C:187:LEU:HD11	1.98	0.45
3:T:724:DT:H2"	3:T:725:DG:C8	2.52	0.45
1:A:100:LEU:HD11	1:A:229:TRP:CZ3	2.51	0.45
1:A:199:ARG:NH1	1:A:223:LYS:HB3	2.31	0.45
2:D:101:LYS:HD3	2:D:382:ILE:HG23	1.99	0.45
1:A:199:ARG:HH12	1:A:223:LYS:HB3	1.81	0.45
2:B:169:GLU:HB3	2:B:170:PRO:HD3	1.99	0.45
1:C:405:TYR:CE2	1:C:407:GLN:HB2	2.51	0.44
1:A:61:PHE:CE2	1:A:76:ASP:HB2	2.53	0.44
4:P:804:DA:H4'	4:P:805:DG:OP1	2.17	0.44
1:C:131:THR:HG22	1:C:143:ARG:HG2	1.98	0.44
1:C:250:ASP:OD1	1:C:251:SER:N	2.49	0.44
1:C:443:ASP:OD1	1:C:444:GLY:N	2.50	0.44
1:A:442:VAL:HB	1:A:481:ALA:HB1	1.99	0.44
2:D:170:PRO:O	2:D:174:GLN:HG3	2.18	0.44
1:A:153:TRP:HE3	1:A:156:SER:OG	2.01	0.44
3:T:710:DG:H2'	3:T:711:DC:C6	2.52	0.44
1:C:402:TRP:O	2:D:331:LYS:NZ	2.46	0.44
2:D:282:LEU:HD21	2:D:295:LEU:HA	1.99	0.44
1:C:76:ASP:OD1	1:C:78:ARG:HG3	2.18	0.44
2:B:399:GLU:HA	2:B:402:TRP:HD1	1.83	0.44
4:F:803:DC:H2'	4:F:804:DA:C8	2.52	0.44
1:A:169:GLU:OE2	2:B:49:LYS:NZ	2.49	0.44
2:D:114:ALA:HB2	2:D:214:LEU:HD13	1.98	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:279:LEU:HD23	1:A:299:ALA:HB1	2.00	0.43
2:B:106:VAL:HG22	2:B:190:GLY:HA3	2.00	0.43
1:C:111:VAL:HG22	1:C:185:ASP:HB2	1.99	0.43
1:A:34:LEU:HD22	1:A:73:LYS:CD	2.48	0.43
1:A:84:THR:HB	1:A:154:LYS:HE2	2.00	0.43
1:A:111:VAL:CG1	1:A:114:ALA:HB2	2.47	0.43
1:C:287:LYS:HD3	1:C:287:LYS:H	1.84	0.43
2:D:13:LYS:HG2	2:D:86:ASP:OD1	2.19	0.43
2:D:38:CYS:SG	2:D:132:ILE:HD11	2.58	0.43
2:D:63:ILE:HD13	2:D:74:LEU:HD22	2.01	0.43
2:D:191:SER:HG	2:D:198:HIS:HD1	1.59	0.43
1:A:257:ILE:C	1:A:259:LYS:H	2.25	0.43
2:B:246:LEU:HD12	2:B:307:ARG:HG2	2.00	0.42
2:B:316:GLY:HA2	2:B:318:TYR:CE2	2.53	0.42
1:C:475:GLN:HB3	1:C:501:TYR:CE2	2.55	0.42
1:A:494:ASN:HB3	2:B:289:LEU:HD12	2.00	0.42
1:A:8:VAL:O	1:A:121:ASP:HB2	2.18	0.42
1:A:58:THR:HG21	1:A:77:PHE:CD1	2.53	0.42
1:A:308:GLU:HA	1:A:311:LYS:HE2	2.02	0.42
1:A:325:LEU:HB3	1:A:387:PRO:HB3	2.01	0.42
2:B:332:GLN:HB2	2:B:336:GLN:HB2	2.01	0.42
1:A:303:LEU:HD23	1:A:307:ARG:HG3	2.01	0.42
2:B:211:ARG:HG3	2:B:212:TRP:CD1	2.54	0.42
1:C:16:MET:HB3	1:C:83:ARG:HD3	2.01	0.42
1:C:206:ARG:NH2	1:C:216:THR:O	2.53	0.42
1:C:230:MET:O	4:F:821:DC:H5"	2.20	0.42
1:A:96:HIS:CG	1:A:97:PRO:HD2	2.54	0.42
4:F:817:MRG:H2'	4:F:818:DC:C6	2.54	0.42
1:C:247:PRO:O	1:C:307:ARG:NH2	2.53	0.41
2:D:64:LYS:HE3	2:D:71:TRP:CE2	2.54	0.41
2:D:138:GLU:HG2	2:D:139:THR:HG23	2.01	0.41
1:A:86:ASP:O	2:B:55:PRO:HB3	2.20	0.41
1:C:357:MET:HE3	1:C:359:GLY:O	2.20	0.41
1:C:218:ASP:HA	1:C:221:HIS:HB2	2.03	0.41
1:A:23:GLN:HG2	1:A:133:PRO:HD3	2.02	0.41
3:T:707:DG:H2'	3:T:708:DG:C8	2.55	0.41
1:A:398:TRP:CH2	1:A:411:ILE:HG13	2.55	0.41
2:B:101:LYS:CD	2:B:382:ILE:HG23	2.50	0.41
3:E:710:DG:H2'	3:E:711:DC:C6	2.56	0.41
4:P:814:DC:H2"	4:P:815:DG:H8	1.86	0.41
2:D:17:ASP:O	2:D:83:ARG:HD3	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:195:ILE:O	2:B:199:ARG:HG3	2.20	0.41
2:D:125:ARG:NE	2:D:147:ASN:HA	2.33	0.41
1:A:364:ASP:OD1	1:A:512:LYS:NZ	2.39	0.41
4:F:818:DC:H2'	4:F:819:DG:C8	2.56	0.41
1:A:96:HIS:NE2	1:A:269:GLN:OE1	2.45	0.41
4:F:820:DC:H2'	4:F:821:DC:C6	2.56	0.41
2:D:237:ASP:OD1	2:D:238:LYS:HG2	2.21	0.40
1:A:74:LEU:HD22	3:T:705:DT:C2	2.56	0.40
1:A:115:TYR:C	1:A:117:SER:H	2.29	0.40
1:C:276:VAL:HG12	1:C:276:VAL:O	2.21	0.40
1:C:41:MET:HB3	1:C:46:LYS:HB2	2.04	0.40
1:C:287:LYS:HG2	1:C:288:ALA:N	2.36	0.40
1:A:270:ILE:HG13	1:A:314:VAL:HG13	2.04	0.40
1:C:442:VAL:HG12	1:C:457:TYR:HB3	2.04	0.40
1:C:548:VAL:O	1:C:552:VAL:HG22	2.22	0.40
1:A:218:ASP:HA	1:A:221:HIS:HB2	2.04	0.40
2:B:191:SER:OG	2:B:198:HIS:ND1	2.44	0.40
2:B:423:VAL:C	2:B:425:LEU:H	2.29	0.40

There are no symmetry-related clashes.

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	554/556 (100%)	532 (96%)	21 (4%)	1 (0%)	44	75
1	C	553/556 (100%)	536 (97%)	17 (3%)	0	100	100
2	B	408/428 (95%)	386 (95%)	22 (5%)	0	100	100
2	D	407/428 (95%)	390 (96%)	14 (3%)	3 (1%)	19	54
All	All	1922/1968 (98%)	1844 (96%)	74 (4%)	4 (0%)	44	75

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	231	GLY
2	D	424	LYS
2	D	423	VAL
1	A	63	ILE

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	497/497 (100%)	495 (100%)	2 (0%)	89	94
1	C	495/497 (100%)	495 (100%)	0	100	100
2	B	372/390 (95%)	371 (100%)	1 (0%)	91	96
2	D	372/390 (95%)	370 (100%)	2 (0%)	86	93
All	All	1736/1774 (98%)	1731 (100%)	5 (0%)	91	96

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	422	LEU
2	D	423	VAL
1	A	72	ARG
1	A	258	CYS
2	B	422	LEU

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

Mol	Chain	Res	Type
1	C	348	ASN
2	D	269	GLN
2	D	361	HIS
1	A	255	ASN
1	A	315	HIS
1	A	336	GLN
1	A	373	GLN
1	A	407	GLN

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Mol	Chain	Res	Type
1	A	524	GLN
1	A	545	ASN
2	B	197	GLN
2	B	269	GLN
2	B	348	ASN
2	B	394	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

4 non-standard protein/DNA/RNA residues are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
4	DDG	P	822	4,3	17,23,24	1.09	2 (11%)	15,33,36	1.04	2 (13%)
4	DDG	F	822	4,3	17,23,24	1.08	2 (11%)	15,33,36	0.86	1 (6%)
4	MRG	F	817	4,3	18,24,29	1.09	2 (11%)	19,35,42	0.69	1 (5%)
4	MRG	P	817	4,3	18,24,29	1.05	2 (11%)	19,35,42	0.68	1 (5%)

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	DDG	P	822	4,3	-	3/3/18/19	0/3/3/3
4	DDG	F	822	4,3	-	0/3/18/19	0/3/3/3
4	MRG	F	817	4,3	-	1/3/21/27	0/3/3/3
4	MRG	P	817	4,3	-	3/3/21/27	0/3/3/3

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	F	817	MRG	C5-C6	-2.66	1.42	1.47
4	P	822	DDG	C5-C6	-2.64	1.42	1.47
4	P	817	MRG	C5-C6	-2.63	1.42	1.47
4	F	822	DDG	C5-C6	-2.58	1.42	1.47
4	F	822	DDG	C8-N7	-2.41	1.30	1.35
4	P	822	DDG	C8-N7	-2.41	1.30	1.35
4	P	817	MRG	C8-N7	-2.40	1.30	1.35
4	F	817	MRG	C8-N7	-2.34	1.31	1.35

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	P	822	DDG	C3'-C2'-C1'	2.50	105.67	102.78
4	P	822	DDG	O6-C6-C5	2.17	128.61	124.37
4	F	822	DDG	O6-C6-C5	2.16	128.59	124.37
4	P	817	MRG	O6-C6-C5	2.14	128.55	124.37
4	F	817	MRG	O6-C6-C5	2.02	128.31	124.37

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	P	817	MRG	O4'-C4'-C5'-O5'
4	P	817	MRG	C3'-C4'-C5'-O5'
4	P	822	DDG	C3'-C4'-C5'-O5'
4	P	817	MRG	C4'-C5'-O5'-P
4	P	822	DDG	O4'-C4'-C5'-O5'
4	F	817	MRG	O4'-C4'-C5'-O5'
4	P	822	DDG	C4'-C5'-O5'-P

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	P	822	DDG	1	0
4	F	817	MRG	1	0
4	P	817	MRG	1	0

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 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
6	1KK	A	602	5	21,24,24	1.70	5 (23%)	21,34,34	1.43	4 (19%)

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
6	1KK	A	602	5	-	10/15/16/16	0/2/2/2

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	602	1KK	O09-C10	4.46	1.50	1.43
6	A	602	1KK	C22-N21	2.54	1.36	1.32
6	A	602	1KK	C22-N23	2.51	1.38	1.33
6	A	602	1KK	C02-N01	2.10	1.41	1.34
6	A	602	1KK	C06-N05	2.00	1.54	1.49

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	602	1KK	O09-C10-C16	-3.16	107.44	112.21
6	A	602	1KK	C03-C02-N01	2.70	124.45	120.35
6	A	602	1KK	O13-P12-C11	-2.69	106.56	111.54
6	A	602	1KK	O17-C16-C10	2.34	119.72	113.03

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	602	1KK	N05-C06-C07-C08
6	A	602	1KK	C07-C06-N05-C04
6	A	602	1KK	C07-C06-N05-C19
6	A	602	1KK	C11-C10-C16-O17
6	A	602	1KK	C11-C10-C16-O18
6	A	602	1KK	C16-C10-O09-C08
6	A	602	1KK	O09-C10-C16-O17
6	A	602	1KK	O09-C10-C16-O18
6	A	602	1KK	C07-C08-O09-C10
6	A	602	1KK	C10-C11-P12-O13

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	602	1KK	2	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 1KK A 602

Bond lengths

Bond angles

Torsions

Rings
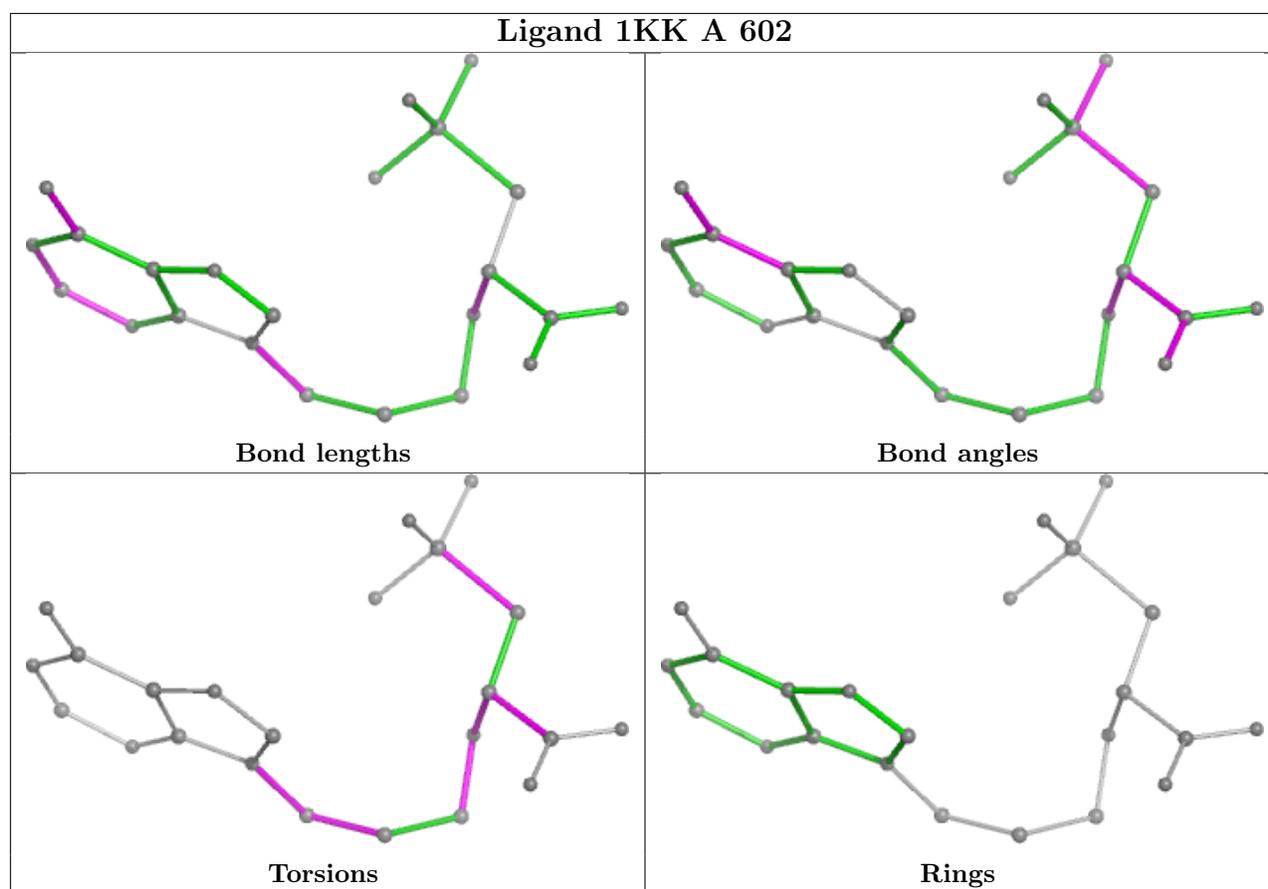
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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(Å²)	Q<0.9
1	A	556/556 (100%)	-0.65	0	100	100	53, 155, 242, 299	0
1	C	555/556 (99%)	-0.51	3 (0%)	87	78	56, 148, 240, 358	0
2	B	412/428 (96%)	-0.73	1 (0%)	92	87	71, 132, 187, 211	0
2	D	411/428 (96%)	-0.69	2 (0%)	87	78	55, 116, 170, 213	0
3	E	23/27 (85%)	-0.56	0	100	100	155, 179, 221, 321	0
3	T	24/27 (88%)	-0.66	0	100	100	159, 185, 288, 306	0
4	F	18/21 (85%)	-0.91	0	100	100	121, 181, 208, 212	0
4	P	18/21 (85%)	-0.99	0	100	100	118, 175, 216, 219	0
All	All	2017/2064 (97%)	-0.64	6 (0%)	90	84	53, 137, 225, 358	0

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	544	GLY	3.6
2	B	422	LEU	2.9
1	C	545	ASN	2.7
1	C	128	THR	2.6
2	D	422	LEU	2.5
2	D	229	TRP	2.2

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

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.

WORLDWIDE
wwPDB
PROTEIN DATA BANK

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	DDG	P	822	21/22	0.76	0.10	171,200,207,211	0
4	MRG	P	817	22/27	0.78	0.07	173,196,203,214	0
4	MRG	F	817	22/27	0.78	0.08	184,193,215,231	0
4	DDG	F	822	21/22	0.83	0.08	152,175,189,201	0

6.3 Carbohydrates ⓘ

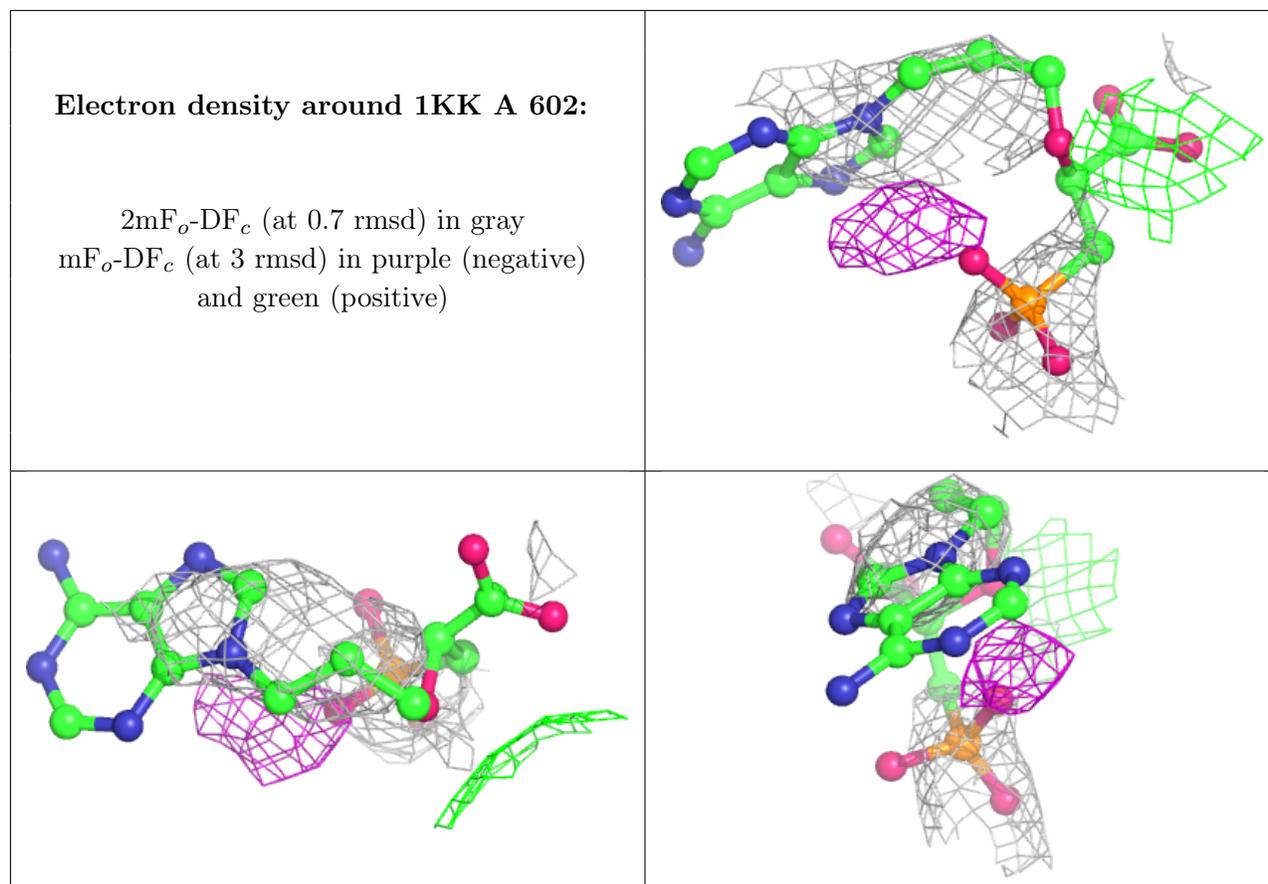There are no oligosaccharides in this entry.

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
6	1KK	A	602	23/23	0.44	0.11	221,246,264,278	0
5	MG	A	601	1/1	0.79	0.08	235,235,235,235	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.

WORLDWIDE
wwPDB
PROTEIN DATA BANK

Electron density around 1KK A 602:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.