Full wwPDB X-ray Structure Validation Report ⓘ

Nov 5, 2023 – 03:44 PM EST

PDB ID	:	3AH8
Title	:	Structure of heterotrimeric G protein Galpha-q beta gamma in complex with an inhibitor YM-254890
Authors	:	Nishimura, A.; Kitano, K.; Takasaki, J.; Taniguchi, M.; Mizuno, N.; Tago, K.; Hakoshima, T.; Itoh, H.
Deposited on	:	2010-04-20
Resolution	:	2.90 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:

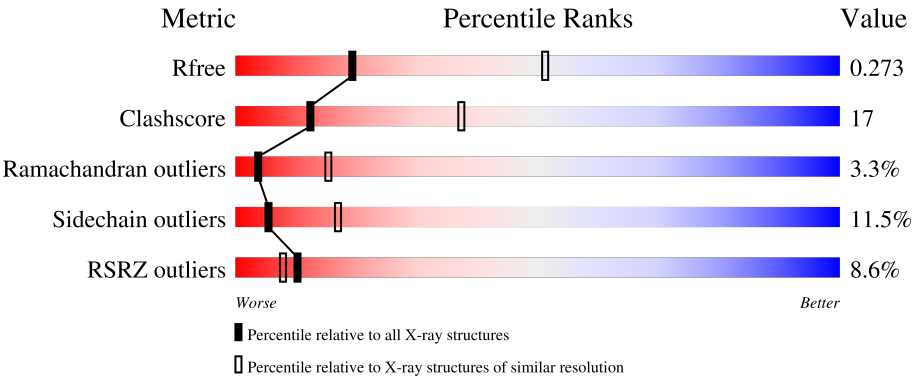
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 2.90 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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	355	10% 61% 30% 5% .
2	B	340	6% 52% 39% 5% .
3	G	78	10% 47% 12% . . 36%
4	Y	9	11% 11% 33% 56%

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	OTH	Y	4	-	X	-	-
4	HF2	Y	6	-	-	X	-
4	MAA	Y	9	-	-	X	-

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 5827 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 Guanine nucleotide-binding protein G(i) subunit alpha-1/Guanine nucleotide-binding protein G(q) subunit alpha chimeric protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	342	2818	1788	483	534	13	0	0	0

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	5	GLY	-	expression tag	UNP P10824
A	6	ALA	-	expression tag	UNP P10824
A	7	MET	-	expression tag	UNP P10824
A	35	ARG	-	linker	UNP P10824
A	36	SER	-	linker	UNP P10824

- Molecule 2 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	330	2530	1562	454	493	21	0	0	0

- Molecule 3 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	G	50	383	239	67	74	3	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	1	GLY	-	expression tag	UNP P63212
G	2	ALA	-	expression tag	UNP P63212

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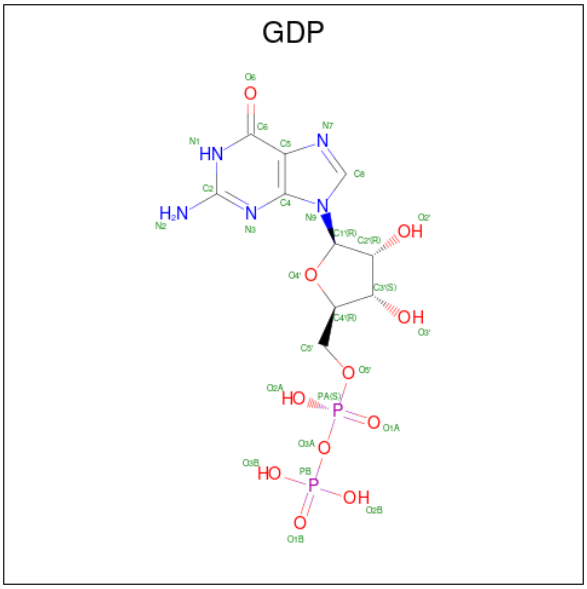
Chain	Residue	Modelled	Actual	Comment	Reference
G	3	MET	-	expression tag	UNP P63212
G	4	ASP	-	expression tag	UNP P63212
G	5	PRO	-	expression tag	UNP P63212
G	6	GLU	-	expression tag	UNP P63212
G	7	PHE	-	expression tag	UNP P63212
G	75	SER	CYS	engineered mutation	UNP P63212

- Molecule 4 is a protein called YM-254890.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	Y	9	Total	C	N	O	0	0	0
			68	46	7	15			

- Molecule 5 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).



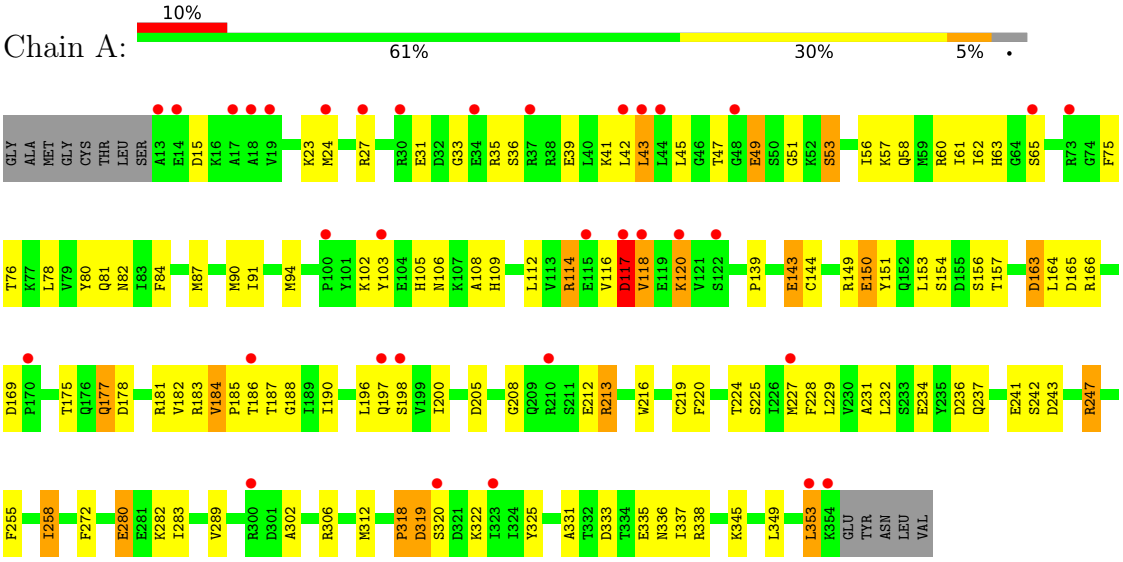
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	P	0	0
			28	10	5	11	2		

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 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.

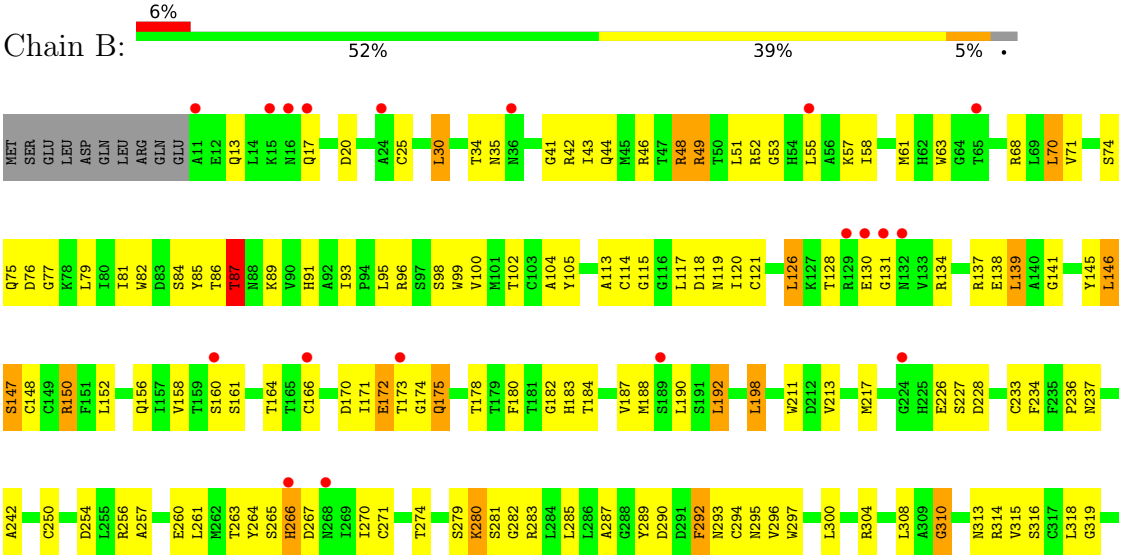
• Molecule 1: Guanine nucleotide-binding protein G(i) subunit alpha-1/Guanine nucleotide-binding protein G(q) subunit alpha chimeric protein

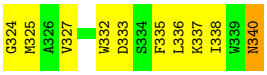
Chain A:



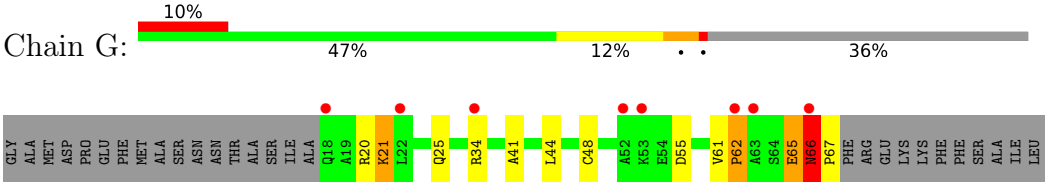
• Molecule 2: Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1

Chain B:

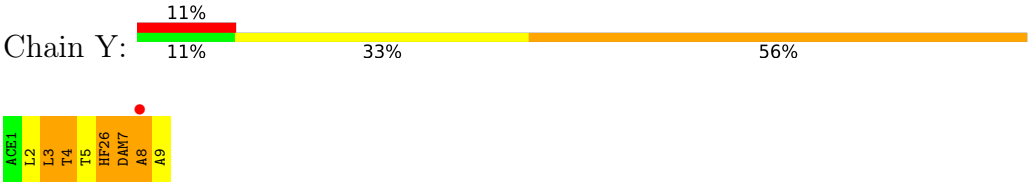




• Molecule 3: Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2



• Molecule 4: YM-254890



4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 41	Depositor
Cell constants a, b, c, α, β, γ	173.34Å 173.34Å 60.95Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.90 19.65 – 2.90	Depositor EDS
% Data completeness (in resolution range)	94.1 (20.00-2.90) 94.1 (19.65-2.90)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.53 (at 2.93Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.259 , 0.315 0.283 , 0.273	Depositor DCC
R_{free} test set	975 reflections (5.13%)	wwPDB-VP
Wilson B-factor (Å^2)	77.9	Xtriage
Anisotropy	1.025	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 52.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.026 for -k,-h,-l	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	5827	wwPDB-VP
Average B, all atoms (Å^2)	91.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.37% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: ACE, HF2, DAM, THC, GDP, MAA, OTH, HL2

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	0.45	1/2874 (0.0%)	0.60	1/3878 (0.0%)
2	B	0.39	0/2577	0.61	0/3494
3	G	1.20	4/388 (1.0%)	0.68	1/524 (0.2%)
4	Y	0.35	0/4	0.67	0/4
All	All	0.51	5/5843 (0.1%)	0.61	2/7900 (0.0%)

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	G	66	ASN	CG-ND2	15.97	1.72	1.32
3	G	65	GLU	CD-OE2	-9.09	1.15	1.25
1	A	15	ASP	CG-OD2	8.86	1.45	1.25
3	G	66	ASN	CB-CG	6.79	1.66	1.51
3	G	65	GLU	CG-CD	6.30	1.61	1.51

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	15	ASP	CB-CG-OD2	-8.25	110.88	118.30
3	G	66	ASN	CB-CG-ND2	-5.26	104.07	116.70

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	2818	0	2785	88	0
2	B	2530	0	2438	89	0
3	G	383	0	393	15	0
4	Y	68	0	63	14	0
5	A	28	0	12	4	0
All	All	5827	0	5691	195	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 17.

All (195) 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)
4:Y:4:OTH:C22	4:Y:4:OTH:OG1	1.67	1.40
3:G:66:ASN:ND2	3:G:66:ASN:CG	1.72	1.39
1:A:186:THR:HB	1:A:190:ILE:HD11	1.34	1.04
1:A:335:GLU:HG2	1:A:338:ARG:HH21	1.20	1.02
2:B:48:ARG:HD2	2:B:340:ASN:HB2	1.48	0.95
2:B:44:GLN:HE21	2:B:46:ARG:HH12	1.04	0.94
4:Y:4:OTH:C22	4:Y:4:OTH:CB	2.50	0.88
2:B:86:THR:O	2:B:87:THR:HB	1.76	0.85
2:B:294:CYS:HB3	2:B:308:LEU:HB2	1.61	0.82
2:B:198:LEU:HA	2:B:213:VAL:HG23	1.63	0.79
1:A:335:GLU:HG2	1:A:338:ARG:NH2	1.98	0.79
2:B:81:ILE:HD13	2:B:91:HIS:HB2	1.65	0.77
1:A:23:LYS:HE2	1:A:27:ARG:HH22	1.49	0.77
2:B:147:SER:OG	2:B:188:MET:HA	1.86	0.76
1:A:255:PHE:HA	1:A:258:ILE:HG22	1.67	0.76
4:Y:6:HF2:CG	4:Y:7:DAM:HM1	2.16	0.75
2:B:48:ARG:HD2	2:B:340:ASN:CB	2.17	0.74
1:A:177:GLN:O	1:A:181:ARG:HG3	1.86	0.74
2:B:95:LEU:HD13	2:B:100:VAL:HG11	1.69	0.73
1:A:53:SER:O	1:A:57:LYS:HG3	1.90	0.72
1:A:190:ILE:HB	1:A:205:ASP:HB3	1.73	0.71
2:B:44:GLN:HE21	2:B:46:ARG:NH1	1.85	0.70
1:A:280:GLU:HA	1:A:283:ILE:HG22	1.73	0.70
1:A:318:PRO:O	1:A:319:ASP:HB3	1.91	0.69
1:A:36:SER:O	1:A:39:GLU:HG2	1.93	0.68
1:A:33:GLY:HA3	2:B:55:LEU:HD13	1.75	0.68
4:Y:6:HF2:CD2	4:Y:7:DAM:HM1	2.23	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:51:LEU:HB2	2:B:336:LEU:HB2	1.75	0.67
1:A:75:PHE:HA	1:A:78:LEU:HD12	1.77	0.67
1:A:103:TYR:HB2	1:A:106:ASN:HD22	1.60	0.66
1:A:229:LEU:HG	1:A:272:PHE:HB2	1.78	0.66
1:A:45:LEU:HD13	1:A:258:ILE:HD11	1.77	0.66
1:A:280:GLU:CB	1:A:302:ALA:HB2	2.26	0.66
2:B:44:GLN:NE2	2:B:46:ARG:HH12	1.87	0.66
4:Y:8:ALA:N	4:Y:9:MAA:HA	2.11	0.65
1:A:280:GLU:HB3	1:A:302:ALA:HB2	1.78	0.65
2:B:25:CYS:SG	3:G:34:ARG:HG2	2.39	0.62
2:B:271:CYS:HB2	2:B:290:ASP:HB2	1.80	0.61
2:B:237:ASN:HD21	3:G:44:LEU:HD22	1.65	0.61
1:A:87:MET:O	1:A:91:ILE:HG12	2.00	0.61
2:B:48:ARG:HH11	2:B:340:ASN:HB3	1.64	0.60
1:A:62:ILE:HB	1:A:63:HIS:HD2	1.65	0.60
4:Y:4:OTH:C22	4:Y:4:OTH:HB	2.30	0.60
2:B:198:LEU:HB2	2:B:211:TRP:O	2.01	0.60
2:B:233:CYS:HB3	2:B:242:ALA:HB3	1.82	0.60
1:A:255:PHE:O	1:A:258:ILE:HG22	2.03	0.59
2:B:265:SER:O	2:B:266:HIS:HB2	2.03	0.59
2:B:30:LEU:HD23	3:G:41:ALA:HB1	1.85	0.59
2:B:115:GLY:HA3	2:B:146:LEU:HD13	1.85	0.59
2:B:283:ARG:HD3	2:B:300:LEU:HD12	1.85	0.58
3:G:66:ASN:ND2	3:G:66:ASN:CB	2.67	0.58
1:A:60:ARG:HG2	1:A:65:SER:O	2.04	0.58
2:B:117:LEU:HD23	2:B:145:TYR:HB3	1.84	0.58
2:B:289:TYR:HB2	2:B:293:ASN:O	2.04	0.58
1:A:213:ARG:HD3	1:A:216:TRP:CZ2	2.38	0.58
1:A:151:TYR:CE2	1:A:153:LEU:HB2	2.39	0.58
1:A:31:GLU:HB3	1:A:35:ARG:NH2	2.19	0.57
1:A:102:LYS:HB3	1:A:139:PRO:HD2	1.86	0.57
1:A:237:GLN:HB3	1:A:247:ARG:HG3	1.87	0.56
1:A:318:PRO:O	1:A:319:ASP:CB	2.53	0.56
4:Y:6:HF2:O	4:Y:7:DAM:C	2.50	0.56
1:A:186:THR:OG1	1:A:208:GLY:HA3	2.06	0.56
1:A:213:ARG:HA	1:A:216:TRP:CE2	2.40	0.56
1:A:149:ARG:O	1:A:237:GLN:HA	2.06	0.56
2:B:254:ASP:HB2	2:B:261:LEU:HD11	1.87	0.56
1:A:219:CYS:O	2:B:99:TRP:HZ3	1.88	0.55
1:A:103:TYR:HB2	1:A:106:ASN:ND2	2.21	0.55
1:A:84:PHE:CD1	1:A:116:VAL:HG11	2.42	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:150:ARG:HG3	2:B:192:LEU:HD22	1.89	0.54
2:B:52:ARG:HG3	2:B:335:PHE:HE1	1.73	0.54
1:A:151:TYR:HE2	1:A:153:LEU:HB2	1.72	0.54
1:A:43:LEU:HD13	1:A:45:LEU:HD11	1.90	0.54
1:A:49:GLU:HG3	5:A:1:GDP:H5"	1.90	0.53
1:A:49:GLU:N	5:A:1:GDP:O2B	2.40	0.53
1:A:94:MET:HE3	1:A:144:CYS:HB2	1.91	0.53
1:A:42:LEU:HB3	1:A:227:MET:CE	2.39	0.53
2:B:274:THR:OG1	2:B:315:VAL:O	2.18	0.53
2:B:325:MET:O	2:B:340:ASN:ND2	2.39	0.52
1:A:57:LYS:O	1:A:61:ILE:HG13	2.08	0.52
2:B:102:THR:HG21	2:B:148:CYS:HA	1.91	0.52
2:B:254:ASP:HB3	2:B:257:ALA:HB3	1.92	0.52
3:G:62:PRO:HB2	3:G:65:GLU:OE1	2.09	0.52
1:A:60:ARG:NH1	4:Y:6:HF2:O	2.44	0.51
2:B:160:SER:HB2	2:B:187:VAL:CG1	2.41	0.50
2:B:77:GLY:HA2	2:B:98:SER:HA	1.93	0.50
2:B:180:PHE:HB3	2:B:211:TRP:CE3	2.46	0.50
1:A:302:ALA:O	1:A:306:ARG:HG3	2.12	0.50
1:A:349:LEU:O	1:A:353:LEU:HB2	2.11	0.50
2:B:260:GLU:OE2	2:B:263:THR:OG1	2.30	0.50
2:B:121:CYS:HB3	2:B:139:LEU:HB2	1.93	0.50
1:A:186:THR:HB	1:A:190:ILE:CD1	2.24	0.50
2:B:327:VAL:O	2:B:338:ILE:HA	2.12	0.50
2:B:43:ILE:HG21	2:B:296:VAL:HG11	1.93	0.49
2:B:290:ASP:O	2:B:314:ARG:HB3	2.12	0.49
2:B:71:VAL:HG12	2:B:81:ILE:HG13	1.92	0.49
1:A:187:THR:HG22	4:Y:3:HL2:HD1	1.94	0.49
2:B:310:GLY:O	2:B:337:LYS:NZ	2.39	0.49
2:B:152:LEU:HD11	2:B:158:VAL:HG23	1.94	0.49
2:B:270:ILE:HG22	2:B:270:ILE:O	2.13	0.49
1:A:325:TYR:N	1:A:325:TYR:CD2	2.81	0.49
3:G:20:ARG:O	3:G:21:LYS:HB2	2.13	0.49
1:A:255:PHE:HA	1:A:258:ILE:CG2	2.40	0.49
1:A:31:GLU:HB3	1:A:35:ARG:HH21	1.78	0.48
1:A:280:GLU:HB2	1:A:302:ALA:HB2	1.95	0.48
2:B:63:TRP:HE1	2:B:319:GLY:C	2.17	0.48
1:A:196:LEU:HD22	1:A:345:LYS:HD2	1.94	0.48
2:B:250:CYS:HB2	2:B:264:TYR:HB2	1.94	0.47
1:A:186:THR:CB	1:A:190:ILE:HD11	2.24	0.47
2:B:237:ASN:ND2	3:G:44:LEU:HD22	2.27	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:231:ALA:HB3	1:A:234:GLU:HB2	1.96	0.47
2:B:173:THR:HG23	2:B:175:GLN:HB2	1.97	0.47
2:B:79:LEU:HB3	2:B:93:ILE:HB	1.96	0.47
2:B:166:CYS:SG	2:B:187:VAL:HG11	2.55	0.47
2:B:120:ILE:HG23	2:B:138:GLU:O	2.15	0.47
2:B:285:LEU:HB3	2:B:297:TRP:HB2	1.97	0.47
1:A:236:ASP:OD2	1:A:282:LYS:NZ	2.47	0.47
1:A:42:LEU:HB3	1:A:227:MET:HE1	1.97	0.46
2:B:126:LEU:O	2:B:128:THR:HG23	2.15	0.46
1:A:23:LYS:HE2	1:A:27:ARG:NH2	2.24	0.46
2:B:281:SER:HB3	3:G:55:ASP:HB2	1.97	0.46
2:B:104:ALA:HB3	2:B:113:ALA:HB3	1.97	0.46
2:B:171:ILE:O	2:B:172:GLU:C	2.54	0.46
1:A:232:LEU:C	1:A:234:GLU:H	2.18	0.46
2:B:48:ARG:NH1	2:B:340:ASN:HB3	2.29	0.46
3:G:66:ASN:O	3:G:67:PRO:O	2.34	0.46
4:Y:9:MAA:O	4:Y:9:MAA:HM3	2.16	0.46
1:A:280:GLU:HA	1:A:283:ILE:CG2	2.42	0.46
2:B:121:CYS:HB2	2:B:146:LEU:HD11	1.98	0.46
2:B:74:SER:C	2:B:76:ASP:H	2.18	0.46
3:G:61:VAL:O	3:G:62:PRO:O	2.34	0.46
1:A:43:LEU:HD22	1:A:45:LEU:HG	1.96	0.45
2:B:266:HIS:ND1	2:B:267:ASP:O	2.44	0.45
2:B:333:ASP:OD1	2:B:335:PHE:HB2	2.16	0.45
1:A:117:ASP:O	1:A:118:VAL:C	2.55	0.45
1:A:183:ARG:O	1:A:185:PRO:HD3	2.16	0.45
2:B:226:GLU:O	2:B:227:SER:HB2	2.16	0.45
2:B:52:ARG:CG	2:B:335:PHE:HE1	2.29	0.45
1:A:78:LEU:HD22	1:A:184:VAL:HA	1.98	0.45
2:B:280:LYS:CG	2:B:324:GLY:HA3	2.46	0.45
1:A:156:SER:HB3	1:A:181:ARG:HE	1.82	0.45
1:A:109:HIS:HA	1:A:112:LEU:HD22	1.98	0.45
2:B:150:ARG:HG2	2:B:190:LEU:HD11	1.97	0.45
2:B:292:PHE:CD1	2:B:313:ASN:C	2.90	0.45
5:A:1:GDP:O3B	5:A:1:GDP:O1A	2.36	0.44
2:B:152:LEU:HD13	2:B:156:GLN:HB3	1.98	0.44
1:A:51:GLY:HA2	5:A:1:GDP:O2A	2.17	0.44
3:G:66:ASN:N	3:G:67:PRO:CD	2.81	0.44
1:A:149:ARG:HA	1:A:237:GLN:NE2	2.32	0.44
2:B:183:HIS:CD2	2:B:187:VAL:HG22	2.53	0.44
2:B:256:ARG:HH12	3:G:44:LEU:HD21	1.83	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:340:ASN:HD22	2:B:340:ASN:HA	1.55	0.44
1:A:331:ALA:HA	1:A:337:ILE:HD11	1.99	0.43
2:B:158:VAL:HG12	2:B:190:LEU:HD22	1.99	0.43
4:Y:8:ALA:H	4:Y:9:MAA:HA	1.83	0.43
2:B:160:SER:HB2	2:B:187:VAL:HG11	2.00	0.43
1:A:56:ILE:HD11	1:A:205:ASP:HB2	1.98	0.43
1:A:163:ASP:O	1:A:164:LEU:C	2.56	0.43
2:B:82:TRP:CZ3	2:B:89:LYS:HE3	2.53	0.43
1:A:333:ASP:HB3	1:A:336:ASN:HB3	2.01	0.43
2:B:49:ARG:HD2	2:B:84:SER:O	2.18	0.43
2:B:138:GLU:O	2:B:139:LEU:C	2.57	0.43
1:A:108:ALA:O	1:A:112:LEU:HD13	2.19	0.42
1:A:114:ARG:HB2	1:A:114:ARG:HH11	1.85	0.42
1:A:82:ASN:HD21	1:A:183:ARG:H	1.67	0.42
1:A:154:SER:O	1:A:157:THR:HG23	2.20	0.42
1:A:196:LEU:O	1:A:198:SER:N	2.53	0.42
4:Y:4:OTH:H24	4:Y:6:HF2:HD2	2.02	0.42
2:B:283:ARG:HA	2:B:283:ARG:HD2	1.91	0.42
2:B:79:LEU:HD22	2:B:93:ILE:HG13	2.01	0.42
2:B:34:THR:HG21	2:B:300:LEU:HD22	2.02	0.41
4:Y:9:MAA:O	4:Y:9:MAA:CM	2.67	0.41
1:A:75:PHE:O	1:A:76:THR:C	2.58	0.41
1:A:139:PRO:O	1:A:143:GLU:HB3	2.20	0.41
4:Y:6:HF2:HD2	4:Y:6:HF2:HA	1.67	0.41
1:A:82:ASN:HD21	1:A:183:ARG:N	2.18	0.41
1:A:241:GLU:C	1:A:243:ASP:H	2.23	0.41
2:B:170:ASP:O	2:B:174:GLY:N	2.48	0.41
2:B:58:ILE:O	2:B:316:SER:OG	2.29	0.41
2:B:295:ASN:HD21	2:B:304:ARG:HH21	1.68	0.41
1:A:228:PHE:CE1	1:A:255:PHE:HB2	2.55	0.41
2:B:30:LEU:HD23	3:G:41:ALA:CB	2.50	0.41
2:B:279:SER:O	2:B:282:GLY:N	2.48	0.41
1:A:94:MET:CE	1:A:144:CYS:HB2	2.51	0.41
2:B:57:LYS:HB2	2:B:332:TRP:HA	2.03	0.41
2:B:61:MET:HE3	2:B:70:LEU:HD13	2.03	0.41
2:B:287:ALA:C	2:B:318:LEU:HD11	2.41	0.41
1:A:42:LEU:HB3	1:A:227:MET:HE2	2.03	0.41
1:A:80:TYR:O	1:A:84:PHE:HD2	2.03	0.40
2:B:137:ARG:HG3	2:B:171:ILE:HG23	2.03	0.40
1:A:166:ARG:NH2	1:A:178:ASP:OD1	2.54	0.40
1:A:216:TRP:CE3	1:A:220:PHE:HE2	2.38	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:255:PHE:CA	1:A:258:ILE:HG22	2.42	0.40
1:A:333:ASP:HB3	1:A:336:ASN:CB	2.51	0.40
2:B:85:TYR:CE1	3:G:67:PRO:HB3	2.57	0.40
1:A:322:LYS:HD2	1:A:322:LYS:HA	1.87	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	340/355 (96%)	298 (88%)	33 (10%)	9 (3%)	5 20
2	B	328/340 (96%)	269 (82%)	47 (14%)	12 (4%)	3 13
3	G	48/78 (62%)	40 (83%)	6 (12%)	2 (4%)	3 10
4	Y	1/9 (11%)	0	0	1 (100%)	0 0
All	All	717/782 (92%)	607 (85%)	86 (12%)	24 (3%)	4 15

All (24) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	197	GLN
1	A	319	ASP
2	B	87	THR
2	B	139	LEU
2	B	266	HIS
3	G	21	LYS
3	G	62	PRO
1	A	120	LYS
1	A	150	GLU
2	B	126	LEU
2	B	228	ASP

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Mol	Chain	Res	Type
4	Y	8	ALA
1	A	118	VAL
1	A	165	ASP
2	B	41	GLY
2	B	310	GLY
1	A	117	ASP
1	A	318	PRO
2	B	53	GLY
2	B	182	GLY
2	B	131	GLY
2	B	236	PRO
1	A	188	GLY
2	B	141	GLY

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	311/321 (97%)	277 (89%)	34 (11%)	6 19
2	B	273/283 (96%)	238 (87%)	35 (13%)	4 13
3	G	41/63 (65%)	38 (93%)	3 (7%)	14 38
All	All	625/667 (94%)	553 (88%)	72 (12%)	5 17

All (72) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	24	MET
1	A	41	LYS
1	A	43	LEU
1	A	47	THR
1	A	49	GLU
1	A	53	SER
1	A	58	GLN
1	A	81	GLN
1	A	90	MET

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Mol	Chain	Res	Type
1	A	105	HIS
1	A	114	ARG
1	A	117	ASP
1	A	120	LYS
1	A	143	GLU
1	A	150	GLU
1	A	163	ASP
1	A	169	ASP
1	A	175	THR
1	A	177	GLN
1	A	182	VAL
1	A	184	VAL
1	A	200	ILE
1	A	212	GLU
1	A	213	ARG
1	A	224	THR
1	A	225	SER
1	A	242	SER
1	A	247	ARG
1	A	258	ILE
1	A	280	GLU
1	A	289	VAL
1	A	312	MET
1	A	320	SER
1	A	353	LEU
2	B	13	GLN
2	B	17	GLN
2	B	20	ASP
2	B	30	LEU
2	B	35	ASN
2	B	42	ARG
2	B	48	ARG
2	B	49	ARG
2	B	68	ARG
2	B	70	LEU
2	B	75	GLN
2	B	87	THR
2	B	96	ARG
2	B	105	TYR
2	B	114	CYS
2	B	118	ASP
2	B	119	ASN

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Mol	Chain	Res	Type
2	B	130	GLU
2	B	134	ARG
2	B	146	LEU
2	B	147	SER
2	B	150	ARG
2	B	161	SER
2	B	164	THR
2	B	172	GLU
2	B	175	GLN
2	B	178	THR
2	B	184	THR
2	B	192	LEU
2	B	198	LEU
2	B	217	MET
2	B	234	PHE
2	B	280	LYS
2	B	292	PHE
2	B	340	ASN
3	G	25	GLN
3	G	48	CYS
3	G	66	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	58	GLN
1	A	63	HIS
1	A	106	ASN
1	A	152	GLN
1	A	197	GLN
2	B	13	GLN
2	B	44	GLN
2	B	75	GLN
2	B	239	ASN
2	B	293	ASN
3	G	25	GLN

5.3.3 RNA

There are no RNA molecules in this entry.

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

7 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	HF2	Y	6	4	10,11,12	0.51	0	12,13,15	1.37	1 (8%)
4	HL2	Y	3	4	7,8,9	0.42	0	7,10,12	2.42	5 (71%)
4	MAA	Y	9	4	4,5,6	0.41	0	1,5,7	0.07	0
4	DAM	Y	7	4	4,5,6	0.64	0	3,5,7	3.54	3 (100%)
4	HL2	Y	2	4	7,8,9	0.69	0	7,10,12	1.40	1 (14%)
4	THC	Y	5	4	8,9,10	0.25	0	9,11,13	1.08	1 (11%)
4	OTH	Y	4	4	7,8,9	3.77	3 (42%)	6,9,11	3.14	2 (33%)

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	HF2	Y	6	4	-	4/5/6/8	0/1/1/1
4	HL2	Y	3	4	-	4/9/10/12	-
4	MAA	Y	9	4	-	0/1/4/6	-
4	DAM	Y	7	4	-	0/0/4/6	-
4	HL2	Y	2	4	-	6/9/10/12	-
4	THC	Y	5	4	-	0/8/10/12	-
4	OTH	Y	4	4	-	6/7/10/12	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	Y	4	OTH	OG1-C22	7.03	1.67	1.42
4	Y	4	OTH	OG1-CB	6.17	1.53	1.42
4	Y	4	OTH	CG2-CB	3.33	1.59	1.51

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	Y	4	OTH	C22-OG1-CB	-7.08	103.09	114.38
4	Y	7	DAM	CM-N-CA	-4.71	116.29	123.45
4	Y	6	HF2	CG-CB-CA	-4.30	107.06	113.64
4	Y	3	HL2	CD1-CG-CB	3.75	117.31	111.20
4	Y	7	DAM	CB-CA-N	-3.20	118.14	125.91
4	Y	3	HL2	CG-CB-CA	2.75	119.72	113.69
4	Y	3	HL2	O-C-CA	-2.72	117.66	124.78
4	Y	4	OTH	CG2-CB-CA	-2.68	107.88	113.16
4	Y	7	DAM	O-C-CA	-2.27	122.30	125.22
4	Y	5	THC	O-C-CA	-2.25	118.56	124.83
4	Y	2	HL2	OH-CB-CG	2.18	114.44	109.89
4	Y	3	HL2	CD2-CG-CB	-2.12	107.75	111.20
4	Y	3	HL2	OH-CB-CG	-2.06	105.59	109.89

There are no chirality outliers.

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	Y	2	HL2	CA-CB-CG-CD1
4	Y	2	HL2	CA-CB-CG-CD2
4	Y	2	HL2	OH-CB-CG-CD1
4	Y	2	HL2	OH-CB-CG-CD2
4	Y	3	HL2	CA-CB-CG-CD1
4	Y	3	HL2	CA-CB-CG-CD2
4	Y	3	HL2	OH-CB-CG-CD1
4	Y	3	HL2	OH-CB-CG-CD2
4	Y	4	OTH	CB-CA-N-C24
4	Y	4	OTH	N-CA-CB-OG1
4	Y	4	OTH	N-CA-CB-CG2
4	Y	4	OTH	C-CA-CB-OG1
4	Y	4	OTH	C-CA-CB-CG2
4	Y	6	HF2	OA-CA-CB-CG
4	Y	6	HF2	CA-CB-CG-CD2
4	Y	2	HL2	C-CA-CB-CG
4	Y	2	HL2	N-CA-CB-CG
4	Y	6	HF2	CA-CB-CG-CD1
4	Y	4	OTH	CG2-CB-OG1-C22
4	Y	6	HF2	C-CA-CB-CG

There are no ring outliers.

5 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	Y	6	HF2	6	0
4	Y	3	HL2	1	0
4	Y	9	MAA	4	0
4	Y	7	DAM	3	0
4	Y	4	OTH	4	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

1 ligand is modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
5	GDP	A	1	-	24,30,30	0.98	1 (4%)	30,47,47	1.27	4 (13%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	GDP	A	1	-	-	3/12/32/32	0/3/3/3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	1	GDP	C6-N1	-2.09	1.34	1.37

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	A	1	GDP	PA-O3A-PB	-3.38	121.24	132.83
5	A	1	GDP	C8-N7-C5	2.84	108.41	102.99
5	A	1	GDP	C3'-C2'-C1'	2.33	104.48	100.98
5	A	1	GDP	C5-C6-N1	2.10	117.66	113.95

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	1	GDP	PA-O3A-PB-O2B
5	A	1	GDP	PA-O3A-PB-O3B
5	A	1	GDP	O4'-C4'-C5'-O5'

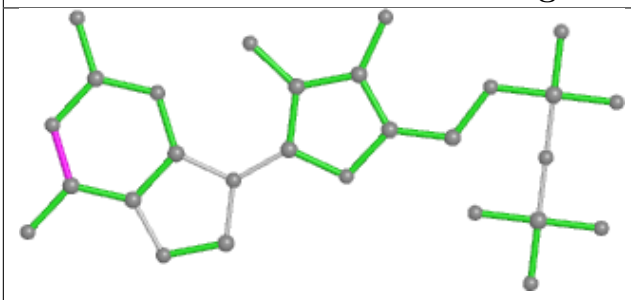
There are no ring outliers.

1 monomer is involved in 4 short contacts:

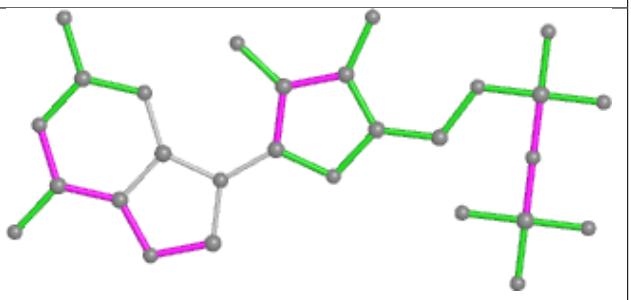
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	1	GDP	4	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less 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.

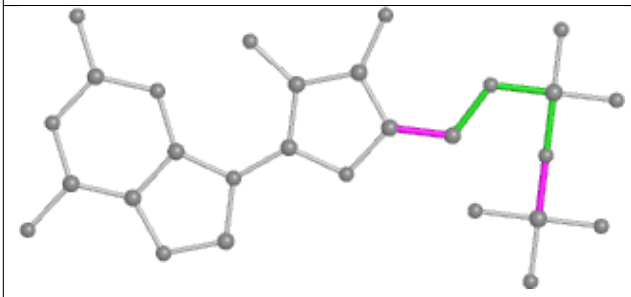
Ligand GDP A 1



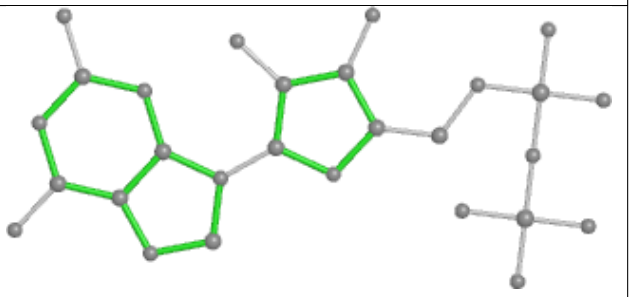
Bond lengths



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, 95^{th} 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	342/355 (96%)	0.60	34 (9%) 7 5	83, 91, 98, 107	0
2	B	330/340 (97%)	0.55	19 (5%) 23 19	83, 91, 98, 102	0
3	G	50/78 (64%)	0.81	8 (16%) 1 1	91, 93, 96, 98	0
4	Y	1/9 (11%)	2.78	1 (100%) 0 0	104, 104, 104, 104	0
All	All	723/782 (92%)	0.60	62 (8%) 10 8	83, 91, 98, 107	0

All (62) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	17	ALA	7.2
3	G	22	LEU	6.0
1	A	353	LEU	5.3
2	B	129	ARG	4.8
2	B	130	GLU	4.7
1	A	197	GLN	4.6
1	A	198	SER	4.5
1	A	18	ALA	4.2
2	B	131	GLY	4.2
1	A	30	ARG	4.1
1	A	117	ASP	4.0
2	B	132	ASN	3.7
1	A	27	ARG	3.7
2	B	36	ASN	3.6
1	A	24	MET	3.5
1	A	170	PRO	3.3
2	B	65	THR	3.2
2	B	268	ASN	3.1
2	B	55	LEU	3.1
1	A	320	SER	3.0
1	A	354	LYS	2.9

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Mol	Chain	Res	Type	RSRZ
2	B	15	LYS	2.8
3	G	18	GLN	2.8
4	Y	8	ALA	2.8
1	A	19	VAL	2.8
1	A	34	GLU	2.7
3	G	63	ALA	2.7
3	G	52	ALA	2.7
2	B	16	ASN	2.6
1	A	73	ARG	2.6
3	G	53	LYS	2.6
1	A	115	GLU	2.6
1	A	65	SER	2.6
1	A	210	ARG	2.5
1	A	103	TYR	2.5
1	A	13	ALA	2.5
2	B	160	SER	2.5
1	A	323	ILE	2.5
2	B	24	ALA	2.4
1	A	44	LEU	2.4
1	A	14	GLU	2.4
1	A	186	THR	2.4
1	A	300	ARG	2.4
2	B	224	GLY	2.3
2	B	189	SER	2.3
3	G	66	ASN	2.3
2	B	17	GLN	2.3
1	A	37	ARG	2.2
2	B	166	CYS	2.2
1	A	120	LYS	2.2
3	G	62	PRO	2.2
1	A	122	SER	2.2
1	A	118	VAL	2.2
1	A	48	GLY	2.2
2	B	173	THR	2.1
1	A	42	LEU	2.1
2	B	11	ALA	2.1
1	A	100	PRO	2.1
3	G	34	ARG	2.1
1	A	43	LEU	2.0
2	B	266	HIS	2.0
1	A	227	MET	2.0

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} 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
4	HF2	Y	6	11/12	0.81	0.34	101,101,103,104	0
4	DAM	Y	7	6/7	0.81	0.23	103,104,104,104	0
4	HL2	Y	3	9/10	0.86	0.23	100,102,103,105	0
4	OTH	Y	4	9/10	0.86	0.25	100,102,103,103	0
4	THC	Y	5	10/11	0.90	0.22	98,99,100,100	0
4	HL2	Y	2	9/10	0.92	0.20	98,99,100,102	0
4	MAA	Y	9	6/7	0.92	0.14	102,102,103,103	0

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

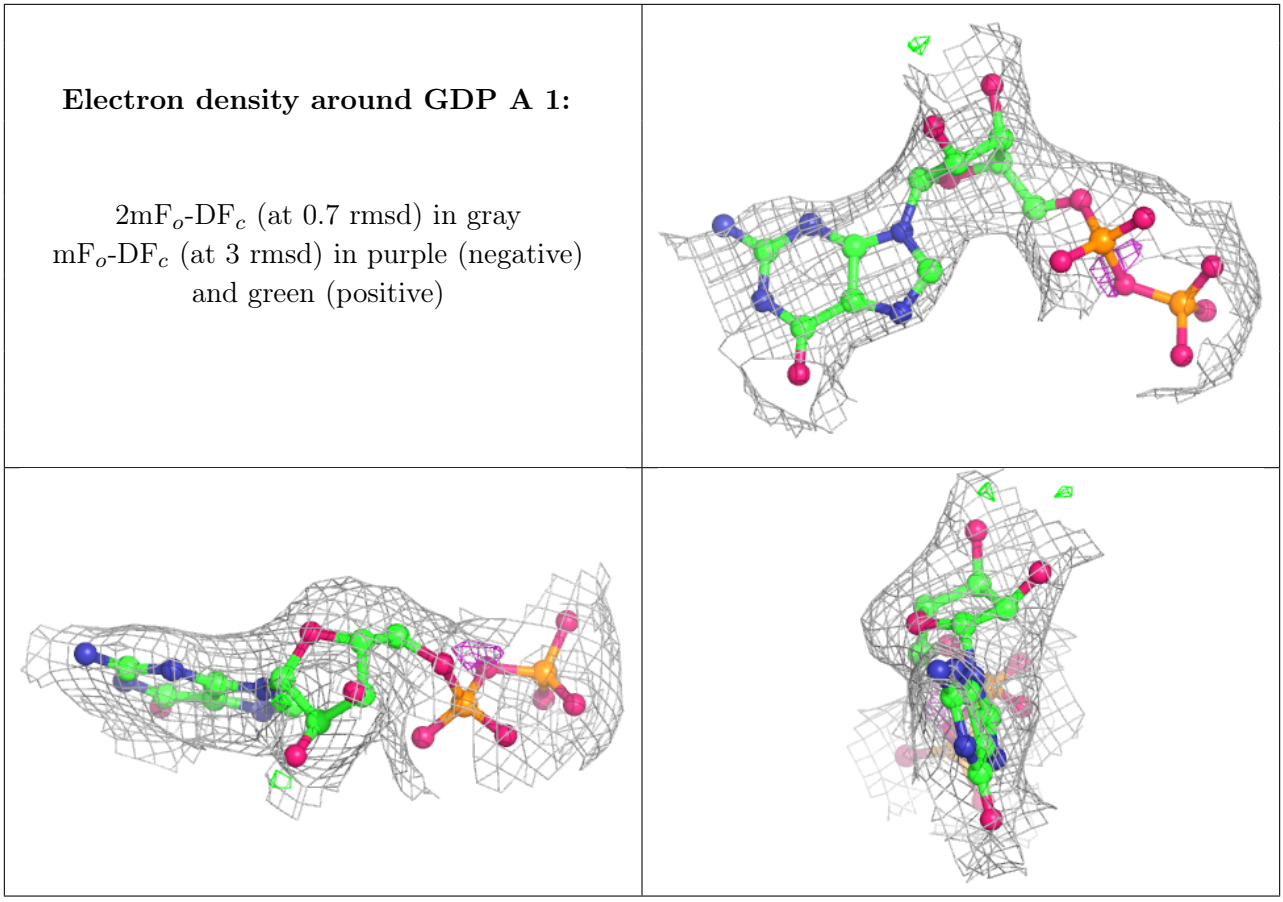
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
5	GDP	A	1	28/28	0.93	0.15	89,91,92,92	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 GDP A 1:

$2mF_o$-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.