



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 25, 2020 – 05:29 PM BST

PDB ID : 3W0L  
Title : The crystal structure of Xenopus Glucokinase and Glucokinase Regulatory Protein complex  
Authors : Choi, J.M.; Seo, M.H.; Kyeong, H.H.; Kim, E.; Kim, H.S.  
Deposited on : 2012-10-31  
Resolution : 2.92 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](mailto: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 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 : 2.13  
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) : 2.13

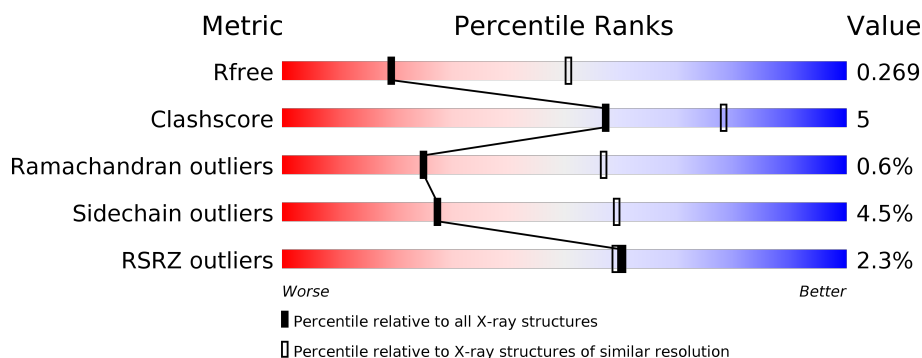
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.92 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	2307 (2.94-2.90)
Clashscore	141614	2531 (2.94-2.90)
Ramachandran outliers	138981	2462 (2.94-2.90)
Sidechain outliers	138945	2464 (2.94-2.90)
RSRZ outliers	127900	2248 (2.94-2.90)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	458	
1	C	458	
2	B	619	
2	D	619	

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 15800 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 Glucokinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	426	Total	C	N	O	S	0	0	0
			3319	2075	564	648	32			
1	C	407	Total	C	N	O	S	0	0	0
			3175	1988	540	616	31			

- Molecule 2 is a protein called Glucokinase regulatory protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	598	Total	C	N	O	S	0	0	0
			4668	2946	806	894	22			
2	D	577	Total	C	N	O	S	0	0	0
			4499	2846	776	856	21			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	530	GLN	HIS	SEE REMARK 999	UNP Q91754
D	530	GLN	HIS	SEE REMARK 999	UNP Q91754

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).

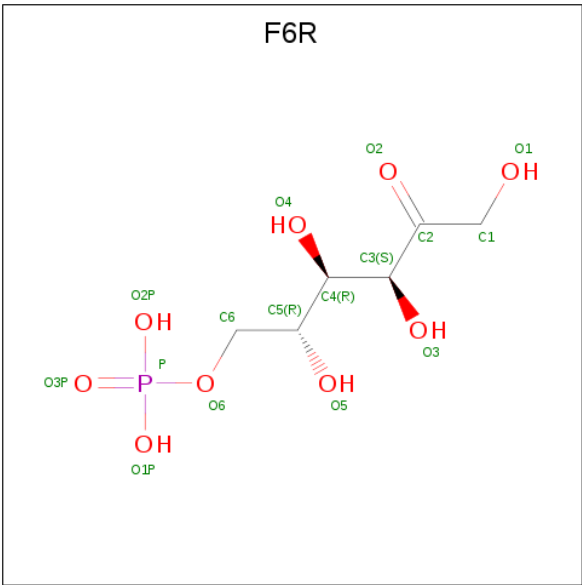


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Na	0	0
			1	1		
4	C	1	Total	Na	0	0
			1	1		

- Molecule 5 is FRUCTOSE -6-PHOSPHATE (three-letter code: F6R) (formula: C<sub>6</sub>H<sub>13</sub>O<sub>9</sub>P).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	B	1	Total	C	O	P	0	0
			16	6	9	1		
5	D	1	Total	C	O	P	0	0
			16	6	9	1		

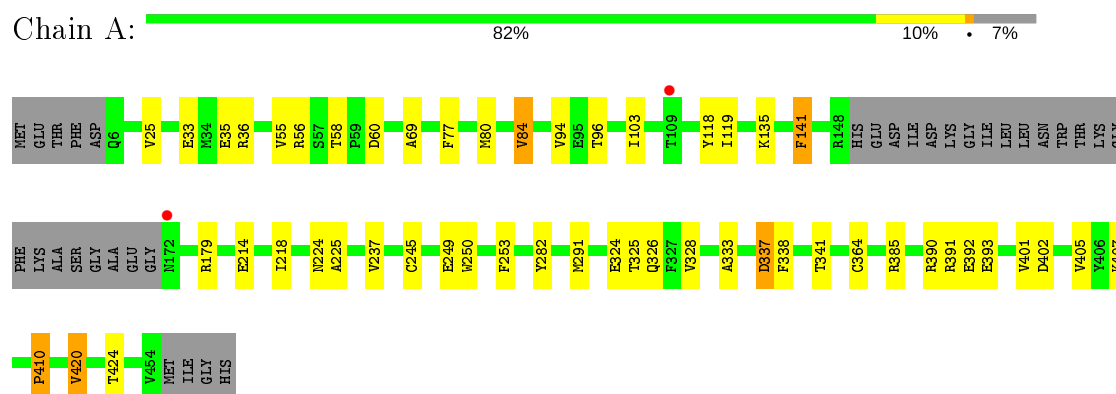
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	32	Total	O	0	0
			32	32		
6	B	26	Total	O	0	0
			26	26		
6	C	15	Total	O	0	0
			15	15		
6	D	12	Total	O	0	0
			12	12		

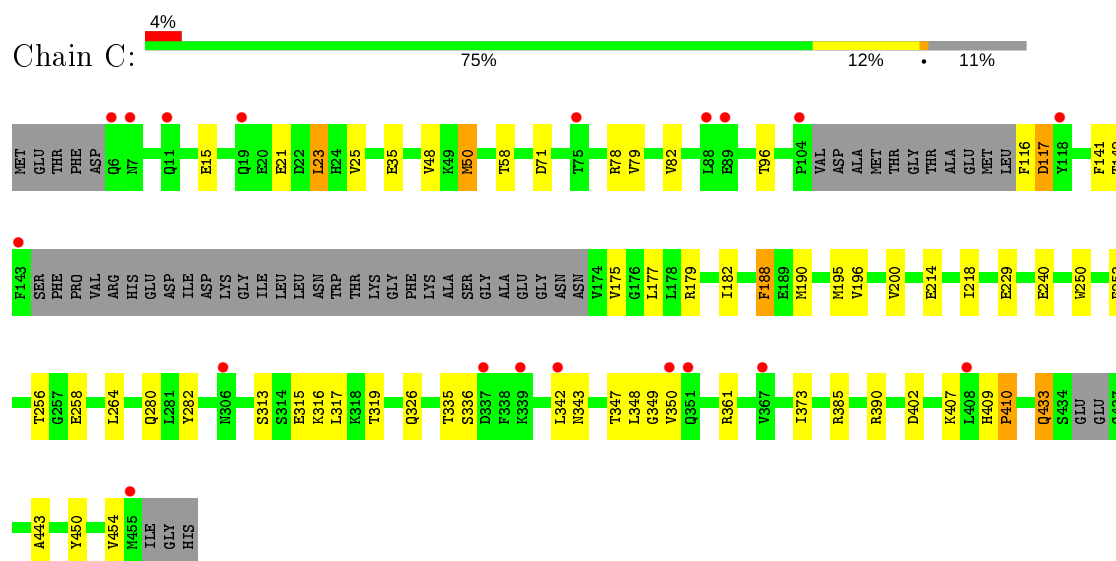
### 3 Residue-property plots [i](#)

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.

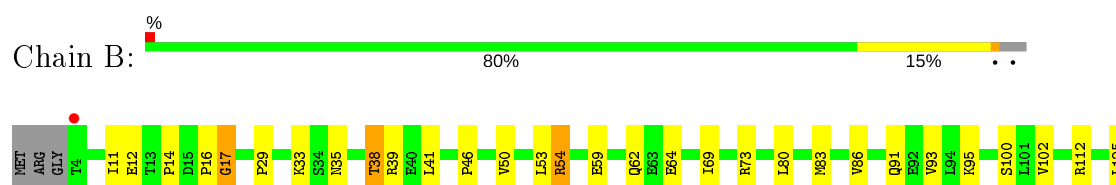
- Molecule 1: Glucokinase



- Molecule 1: Glucokinase



- Molecule 2: Glucokinase regulatory protein





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	109.32Å 130.03Å 175.12Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	28.48 – 2.92 28.48 – 2.92	Depositor EDS
% Data completeness (in resolution range)	97.3 (28.48-2.92) 88.8 (28.48-2.92)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.69 (at 2.90Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.3_928)	Depositor
R, $R_{free}$	0.242 , 0.277 0.230 , 0.269	Depositor DCC
$R_{free}$ test set	2705 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	44.5	Xtriage
Anisotropy	0.725	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.30 , 32.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.45$ , $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.90	EDS
Total number of atoms	15800	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	54.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.91% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: NA, SO4, F6R

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	0.21	0/3367	0.35	0/4532
1	C	0.21	0/3219	0.35	0/4327
2	B	0.21	0/4748	0.38	0/6419
2	D	0.21	0/4574	0.37	0/6177
All	All	0.21	0/15908	0.37	0/21455

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3319	0	3270	24	0
1	C	3175	0	3135	26	0
2	B	4668	0	4718	53	0
2	D	4499	0	4557	54	0
3	A	5	0	0	0	0
3	B	10	0	0	0	0
3	C	5	0	0	0	0
4	A	1	0	0	0	0
4	C	1	0	0	0	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	B	16	0	11	1	0
5	D	16	0	11	2	0
6	A	32	0	0	0	0
6	B	26	0	0	0	0
6	C	15	0	0	0	0
6	D	12	0	0	0	0
All	All	15800	0	15702	155	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 5.

All (155) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:513:LYS:NZ	5:B:701:F6R:O5	2.21	0.74
2:D:101:LEU:HD22	2:D:170:LYS:HG2	1.73	0.71
2:D:112:ARG:NH1	2:D:144:SER:O	2.28	0.67
2:D:21:LEU:HD13	2:D:23:GLY:H	1.59	0.66
2:B:112:ARG:NH1	2:B:144:SER:O	2.29	0.65
2:B:11:ILE:HD11	2:B:54:ARG:HH12	1.62	0.65
1:C:71:ASP:HB3	1:C:78:ARG:HB3	1.77	0.65
2:B:311:LYS:HB3	2:B:456:ILE:HG12	1.80	0.63
2:D:536:VAL:HG11	2:D:577:LEU:HB2	1.80	0.63
2:B:38:THR:O	2:B:38:THR:OG1	2.13	0.63
2:D:434:VAL:HG21	2:D:452:ILE:HD13	1.81	0.63
1:C:316:LYS:HG3	1:C:348:LEU:HB3	1.81	0.63
2:B:93:VAL:HG11	2:B:102:VAL:HG23	1.81	0.62
1:A:58:THR:OG1	1:A:60:ASP:OD1	2.15	0.62
1:C:23:LEU:HD21	1:C:373:ILE:HB	1.82	0.62
2:B:53:LEU:HD12	2:B:487:THR:HG23	1.82	0.61
1:C:196:VAL:HG13	1:C:200:VAL:HB	1.83	0.61
1:C:315:GLU:O	1:C:319:THR:OG1	2.19	0.60
1:C:229:GLU:OE1	1:C:385:ARG:NH1	2.34	0.60
2:D:64:GLU:HA	2:D:73:ARG:HG3	1.83	0.60
1:A:324:GLU:OE1	1:A:326:GLN:NE2	2.32	0.60
2:D:233:LEU:HA	2:D:236:LEU:HD12	1.82	0.60
2:D:444:LEU:HD12	2:D:445:PRO:HD2	1.83	0.60
1:A:337:ASP:N	1:A:337:ASP:OD2	2.35	0.59
2:B:180:CYS:O	2:B:208:PHE:N	2.35	0.59
2:B:568:LYS:NZ	2:B:591:ASN:OD1	2.35	0.59
1:A:402:ASP:OD2	1:A:407:LYS:NZ	2.28	0.59

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:568:LYS:NZ	2:D:591:ASN:OD1	2.35	0.59
1:A:214:GLU:OE1	1:A:390:ARG:NH1	2.33	0.59
1:A:56:ARG:NH2	1:A:135:LYS:O	2.35	0.58
2:D:567:ASP:OD2	2:D:568:LYS:N	2.36	0.58
2:D:575:VAL:HG13	2:D:586:SER:HB3	1.85	0.58
1:C:48:VAL:HG12	1:C:50:MET:HG2	1.86	0.58
2:D:62:GLN:OE1	2:D:73:ARG:NH1	2.37	0.57
2:D:539:GLN:NE2	2:D:569:VAL:O	2.37	0.57
2:B:206:VAL:HG21	2:B:270:LEU:HD21	1.86	0.57
2:D:513:LYS:NZ	5:D:701:F6R:O5	2.32	0.57
2:B:505:VAL:HG11	2:B:600:ILE:HD11	1.88	0.56
2:B:80:LEU:HD23	2:B:83:MET:HE3	1.87	0.56
2:D:53:LEU:HD12	2:D:487:THR:HG23	1.88	0.56
2:D:474:LYS:NZ	2:D:478:GLU:OE2	2.39	0.56
2:B:414:ASP:HB3	2:B:417:GLN:HG2	1.88	0.56
1:A:77:PHE:HB2	1:A:103:ILE:HD11	1.88	0.55
2:B:14:PRO:O	2:B:62:GLN:NE2	2.40	0.54
2:D:253:GLY:O	2:D:502:ASN:ND2	2.41	0.53
2:B:86:VAL:HB	2:B:273:LEU:HD11	1.91	0.53
1:C:117:ASP:OD1	1:C:117:ASP:N	2.37	0.53
1:A:35:GLU:HG2	1:A:385:ARG:HH12	1.74	0.52
1:C:175:VAL:HG22	1:C:195:MET:HG3	1.92	0.52
1:C:343:ASN:O	1:C:347:THR:OG1	2.23	0.52
2:D:15:ASP:N	2:D:15:ASP:OD2	2.41	0.52
2:D:25:GLU:O	2:D:33:LYS:NZ	2.43	0.52
2:B:463:LEU:HD12	2:B:473:GLN:HG2	1.92	0.51
2:B:93:VAL:HG13	2:B:100:SER:HB3	1.93	0.51
1:C:313:SER:HB3	1:C:317:LEU:HB3	1.91	0.51
2:B:579:ARG:NH1	2:B:603:SER:OG	2.44	0.51
1:C:407:LYS:HE2	1:C:433:GLN:HG3	1.92	0.51
2:D:191:LEU:HD11	2:D:205:LEU:HD13	1.92	0.51
2:B:218:ARG:NE	2:B:223:HIS:O	2.44	0.51
1:C:142:THR:HG21	1:C:443:ALA:H	1.75	0.51
2:D:347:GLU:O	2:D:351:THR:OG1	2.26	0.51
2:B:180:CYS:N	2:B:181:GLY:HA3	2.25	0.50
2:D:406:LEU:HD11	2:D:435:ILE:HG13	1.94	0.50
2:B:411:LEU:HD23	2:B:442:GLN:HG3	1.92	0.50
1:C:218:ILE:HG12	1:C:402:ASP:HB3	1.93	0.50
2:B:59:GLU:O	2:B:73:ARG:NH2	2.45	0.50
2:B:249:VAL:HG13	2:B:261:LYS:HE2	1.94	0.49
2:B:510:ASN:H	2:B:514:LEU:HD12	1.78	0.49

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:33:GLU:OE2	1:A:36:ARG:NH1	2.45	0.49
1:C:182:ILE:HG23	1:C:188:PHE:HB3	1.94	0.49
2:D:287:THR:HG23	2:D:290:CYS:H	1.78	0.48
1:A:84:VAL:HG12	1:A:94:VAL:HG23	1.94	0.48
1:C:82:VAL:HG22	1:C:96:THR:HG22	1.95	0.48
2:B:112:ARG:NH2	2:B:347:GLU:OE1	2.46	0.48
1:C:179:ARG:NH1	1:C:190:MET:O	2.46	0.48
2:B:272:THR:HG23	2:B:294:ILE:HB	1.94	0.48
2:D:112:ARG:NH2	2:D:347:GLU:OE1	2.46	0.48
2:D:276:VAL:HG21	2:D:291:LEU:HD23	1.96	0.47
1:A:333:ALA:HB2	1:A:410:PRO:HG2	1.94	0.47
2:D:182:LEU:HD13	2:D:209:ASN:HB2	1.97	0.47
2:D:206:VAL:HG21	2:D:270:LEU:HD21	1.97	0.47
2:B:191:LEU:HD11	2:B:205:LEU:HD13	1.97	0.47
2:B:64:GLU:HB3	2:B:73:ARG:HG2	1.97	0.47
1:C:214:GLU:OE1	1:C:390:ARG:NH2	2.32	0.47
2:D:462:ILE:HD11	2:D:464:PHE:CZ	2.50	0.47
2:D:440:ALA:HA	2:D:441:GLY:HA2	1.56	0.46
2:D:106:GLY:HA2	2:D:187:ILE:HD11	1.98	0.46
2:D:315:LEU:HD13	2:D:433:GLN:HG2	1.97	0.46
2:B:399:VAL:HG22	2:B:428:LYS:HB3	1.96	0.46
1:A:179:ARG:NH2	2:B:412:ASP:OD1	2.46	0.46
1:C:256:THR:OG1	1:C:258:GLU:OE1	2.25	0.46
2:D:119:ASN:ND2	2:D:370:ILE:O	2.48	0.46
2:D:167:CYS:HB3	2:D:173:VAL:HG21	1.98	0.46
2:B:333:GLY:HA3	2:B:338:GLY:HA2	1.98	0.45
1:C:253:PHE:O	1:C:282:TYR:HB2	2.17	0.45
2:D:415:LEU:HD23	2:D:418:ILE:HD12	1.98	0.45
1:C:409:HIS:HA	1:C:410:PRO:HD3	1.79	0.45
1:A:119:ILE:HG21	1:A:141:PHE:HZ	1.82	0.45
1:C:15:GLU:HG2	1:C:264:LEU:HD22	1.98	0.45
2:D:536:VAL:HG21	2:D:577:LEU:HD13	1.99	0.45
2:B:46:PRO:HG3	2:B:317:LYS:HE2	1.99	0.44
2:D:38:THR:OG1	2:D:502:ASN:ND2	2.50	0.44
2:D:229:VAL:HA	2:D:232:ARG:HD2	1.99	0.44
2:D:180:CYS:N	5:D:701:F6R:O1P	2.51	0.44
2:D:155:ASN:OD1	2:D:157:GLN:NE2	2.50	0.44
1:C:335:THR:OG1	1:C:336:SER:N	2.51	0.44
2:D:272:THR:HG23	2:D:294:ILE:HB	2.00	0.43
1:A:291:MET:HB3	1:A:325:THR:HG23	2.00	0.43
2:B:364:THR:HA	2:B:365:GLY:HA2	1.63	0.43

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:440:ALA:HA	2:B:441:GLY:HA2	1.50	0.43
2:D:364:THR:HA	2:D:365:GLY:HA2	1.53	0.43
2:B:50:VAL:O	2:B:54:ARG:HB3	2.19	0.43
2:B:550:GLN:O	2:B:554:THR:OG1	2.37	0.43
2:B:91:GLN:O	2:B:95:LYS:HG3	2.18	0.43
2:D:252:GLU:HA	2:D:261:LYS:HD3	2.01	0.43
2:D:365:GLY:N	2:D:369:SER:OG	2.47	0.42
1:A:69:ALA:HB3	1:A:80:MET:HB3	2.00	0.42
2:B:452:ILE:HA	2:B:453:PRO:HD3	1.93	0.42
2:D:29:PRO:O	2:D:33:LYS:HG3	2.19	0.42
2:B:406:LEU:HD11	2:B:435:ILE:HG13	2.00	0.42
1:C:78:ARG:NH2	1:C:450:TYR:OH	2.53	0.42
2:B:35:ASN:HB3	2:B:38:THR:HG23	2.01	0.42
2:B:237:HIS:ND1	2:B:243:PHE:HA	2.35	0.42
2:D:301:ALA:HA	2:D:460:TRP:HZ3	1.84	0.42
2:D:143:ARG:O	2:D:147:THR:HG22	2.20	0.42
2:B:16:PRO:HA	2:B:17:GLY:HA3	1.81	0.42
1:A:237:VAL:HG22	2:B:462:ILE:HB	2.01	0.42
2:D:25:GLU:OE2	2:D:524:ARG:NH1	2.52	0.42
1:A:103:ILE:HD13	1:A:118:TYR:HE2	1.85	0.42
2:B:125:LEU:HB3	2:B:130:LYS:HB2	2.01	0.42
2:B:500:PHE:CD2	2:B:501:ARG:HG3	2.55	0.42
2:D:30:ILE:HA	2:D:33:LYS:HD2	2.02	0.42
2:B:207:GLY:O	2:B:246:ASN:HA	2.20	0.41
2:B:411:LEU:HD12	2:B:411:LEU:HA	1.86	0.41
2:D:11:ILE:HG22	2:D:303:LYS:HB2	2.02	0.41
2:D:24:TYR:O	2:D:33:LYS:NZ	2.46	0.41
2:D:401:GLU:HG2	2:D:429:THR:HA	2.02	0.41
1:C:21:GLU:O	1:C:25:VAL:HG23	2.21	0.41
1:C:35:GLU:OE1	1:C:385:ARG:NH2	2.41	0.41
1:A:55:VAL:HB	1:A:245:CYS:HB3	2.03	0.41
2:B:408:ILE:HG13	2:B:435:ILE:HB	2.03	0.41
1:A:328:VAL:HG13	1:A:364:CYS:HB3	2.01	0.41
1:A:218:ILE:HG12	1:A:402:ASP:HB3	2.01	0.41
2:B:29:PRO:O	2:B:33:LYS:HG3	2.21	0.41
1:A:338:PHE:HB3	1:A:341:THR:HB	2.03	0.41
1:A:420:VAL:O	1:A:424:THR:N	2.54	0.41
2:B:355:ASP:OD1	2:B:356:TRP:N	2.54	0.41
2:B:578:LEU:HA	2:B:578:LEU:HD12	1.84	0.41
2:D:450:LYS:HB2	2:D:450:LYS:HE3	1.96	0.41
1:A:253:PHE:O	1:A:282:TYR:HB2	2.20	0.40

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:180:CYS:SG	2:B:258:SER:HB2	2.61	0.40
1:A:224:ASN:OD1	1:A:225:ALA:N	2.51	0.40
2:D:56:CYS:HB3	2:D:261:LYS:HD2	2.03	0.40
2:B:453:PRO:HB2	2:B:454:SER:H	1.70	0.40
2:D:147:THR:HG23	2:D:149:GLN:HG2	2.03	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	422/458 (92%)	410 (97%)	11 (3%)	1 (0%)	47	77
1	C	399/458 (87%)	373 (94%)	23 (6%)	3 (1%)	19	49
2	B	594/619 (96%)	556 (94%)	34 (6%)	4 (1%)	22	53
2	D	565/619 (91%)	527 (93%)	34 (6%)	4 (1%)	22	53
All	All	1980/2154 (92%)	1866 (94%)	102 (5%)	12 (1%)	25	57

All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	453	PRO
2	D	453	PRO
2	B	548	SER
1	A	410	PRO
1	C	454	VAL
2	D	260	MET
1	C	410	PRO
2	D	350	PRO
2	D	140	GLY
2	B	69	ILE

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
2	B	17	GLY
1	C	349	GLY

### 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	363/388 (94%)	350 (96%)	13 (4%)	35	67
1	C	347/388 (89%)	330 (95%)	17 (5%)	25	56
2	B	524/541 (97%)	506 (97%)	18 (3%)	37	69
2	D	504/541 (93%)	474 (94%)	30 (6%)	19	47
All	All	1738/1858 (94%)	1660 (96%)	78 (4%)	27	59

All (78) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	VAL
1	A	84	VAL
1	A	96	THR
1	A	141	PHE
1	A	249	GLU
1	A	250	TRP
1	A	337	ASP
1	A	391	ARG
1	A	392	GLU
1	A	393	GLU
1	A	401	VAL
1	A	405	VAL
1	A	420	VAL
2	B	12	GLU
2	B	38	THR
2	B	39	ARG
2	B	41	LEU
2	B	54	ARG
2	B	222	TRP

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
2	B	232	ARG
2	B	249	VAL
2	B	260	MET
2	B	344	ASP
2	B	396	LEU
2	B	411	LEU
2	B	420	LYS
2	B	473	GLN
2	B	547	LEU
2	B	550	GLN
2	B	577	LEU
2	B	579	ARG
1	C	23	LEU
1	C	50	MET
1	C	58	THR
1	C	79	VAL
1	C	116	PHE
1	C	117	ASP
1	C	141	PHE
1	C	177	LEU
1	C	188	PHE
1	C	240	GLU
1	C	250	TRP
1	C	280	GLN
1	C	326	GLN
1	C	342	LEU
1	C	350	VAL
1	C	361	ARG
1	C	433	GLN
2	D	5	ARG
2	D	15	ASP
2	D	18	LYS
2	D	21	LEU
2	D	68	LEU
2	D	74	LEU
2	D	101	LEU
2	D	157	GLN
2	D	170	LYS
2	D	195	MET
2	D	199	ASP
2	D	216	ASN
2	D	222	TRP

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Res	Type
2	D	259	ARG
2	D	286	VAL
2	D	344	ASP
2	D	377	LEU
2	D	388	HIS
2	D	410	THR
2	D	411	LEU
2	D	424	LEU
2	D	433	GLN
2	D	462	ILE
2	D	466	GLU
2	D	477	ARG
2	D	499	ILE
2	D	504	MET
2	D	505	VAL
2	D	528	GLN
2	D	532	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	149	GLN
2	B	473	GLN
2	D	157	GLN
2	D	502	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry

Of 8 ligands modelled in this entry, 2 are monoatomic - leaving 6 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z  > 2$	Counts	RMSZ	# $ Z  > 2$
3	SO4	A	501	-	4,4,4	0.14	0	6,6,6	0.05	0
5	F6R	D	701	-	14,15,15	1.31	1 (7%)	16,21,21	0.97	1 (6%)
3	SO4	C	501	-	4,4,4	0.14	0	6,6,6	0.06	0
3	SO4	B	702	-	4,4,4	0.14	0	6,6,6	0.05	0
5	F6R	B	701	-	14,15,15	1.43	2 (14%)	16,21,21	1.02	0
3	SO4	B	703	-	4,4,4	0.14	0	6,6,6	0.05	0

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	F6R	D	701	-	-	7/20/20/20	-
5	F6R	B	701	-	-	9/20/20/20	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	701	F6R	O5-C5	-2.50	1.38	1.43
5	D	701	F6R	O5-C5	-2.38	1.38	1.43
5	B	701	F6R	C6-C5	-2.36	1.48	1.51

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	D	701	F6R	O4-C4-C5	2.10	113.88	108.81

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	D	701	F6R	C4-C5-C6-O6
5	D	701	F6R	O5-C5-C6-O6
5	B	701	F6R	O5-C5-C6-O6
5	B	701	F6R	O3-C3-C4-O4
5	B	701	F6R	O3-C3-C4-C5
5	D	701	F6R	O3-C3-C4-O4
5	B	701	F6R	C4-C5-C6-O6
5	D	701	F6R	O2-C2-C3-O3
5	B	701	F6R	O2-C2-C3-O3
5	D	701	F6R	C1-C2-C3-O3
5	B	701	F6R	C1-C2-C3-O3
5	D	701	F6R	C5-C6-O6-P
5	D	701	F6R	C6-O6-P-O1P
5	B	701	F6R	C6-O6-P-O1P
5	B	701	F6R	C6-O6-P-O3P
5	B	701	F6R	C2-C3-C4-O4

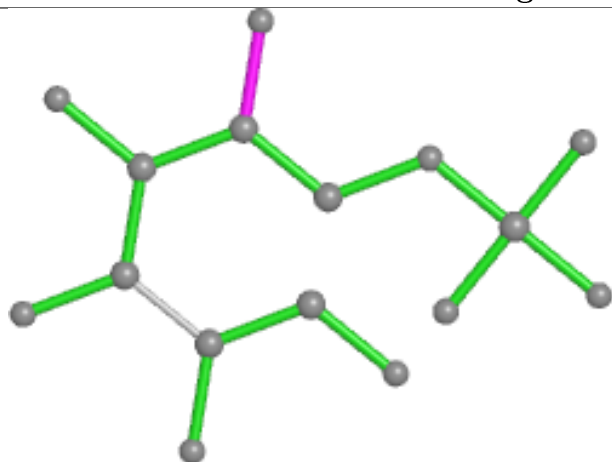
There are no ring outliers.

2 monomers are involved in 3 short contacts:

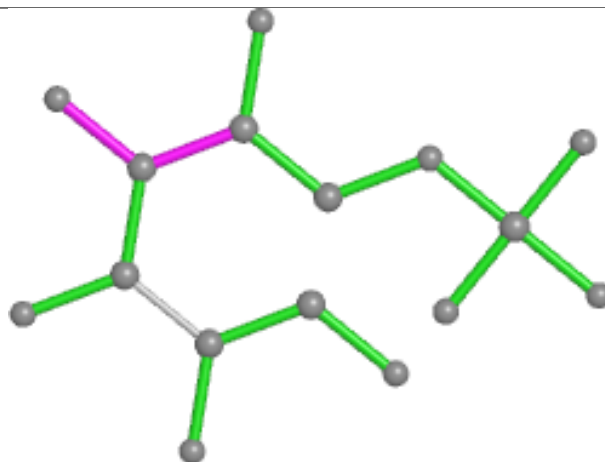
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	701	F6R	2	0
5	B	701	F6R	1	0

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.

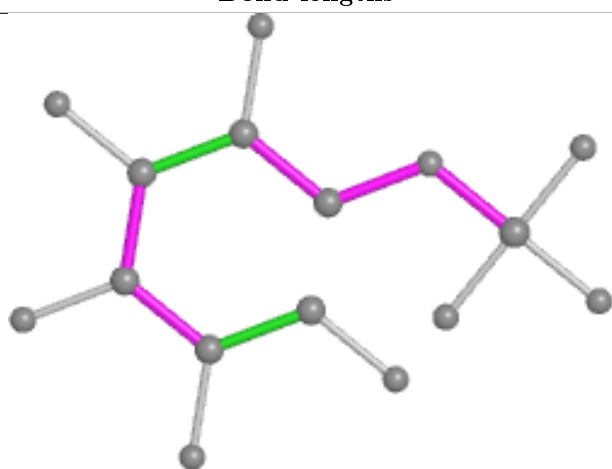
## Ligand F6R D 701



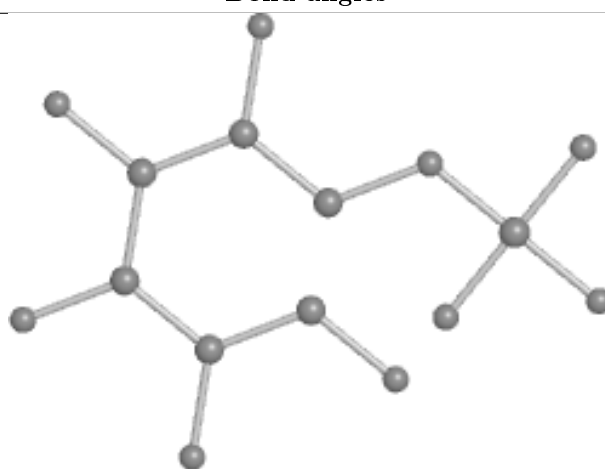
Bond lengths



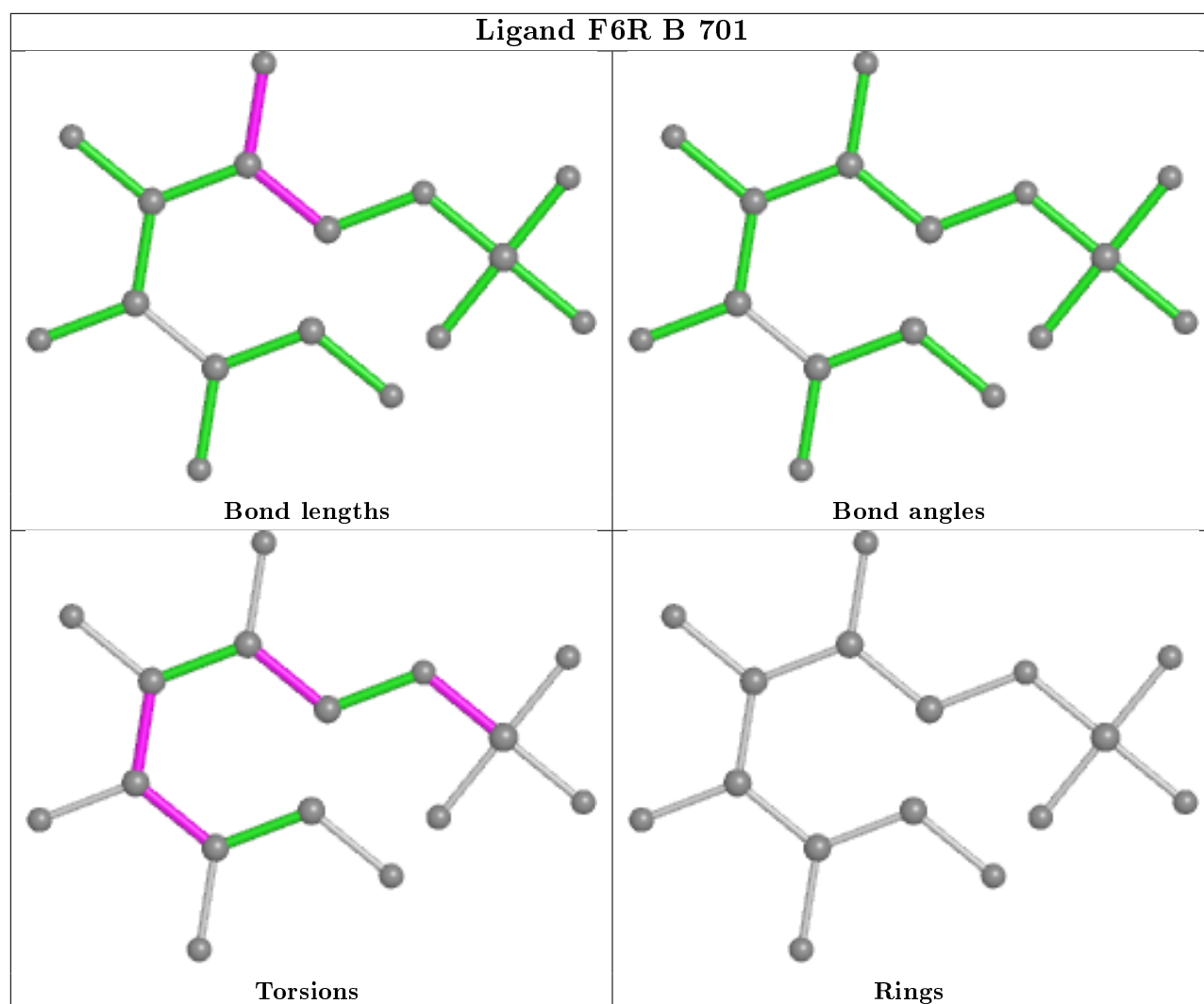
Bond angles



Torsions



Rings



## 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	426/458 (93%)	-0.12	2 (0%) 91 91	24, 44, 73, 96	0
1	C	407/458 (88%)	0.25	19 (4%) 31 28	27, 55, 105, 126	0
2	B	598/619 (96%)	-0.17	4 (0%) 87 88	25, 44, 72, 97	0
2	D	577/619 (93%)	0.20	22 (3%) 40 37	26, 59, 103, 127	0
All	All	2008/2154 (93%)	0.03	47 (2%) 60 59	24, 50, 95, 127	0

All (47) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	104	PRO	4.4
1	C	7	ASN	4.2
2	B	4	THR	4.2
1	C	11	GLN	3.7
2	D	68	LEU	3.6
1	C	351	GLN	3.5
2	D	280	ALA	3.3
2	D	595	SER	3.2
1	C	6	GLN	3.2
2	D	22	ALA	3.1
2	D	531	GLN	3.1
2	D	21	LEU	3.0
2	D	357	ARG	3.0
2	D	580	SER	3.0
2	D	598	SER	3.0
2	D	171	LYS	2.9
1	C	75	THR	2.9
1	A	172	ASN	2.9
1	C	342	LEU	2.9
2	D	558	GLY	2.8
1	C	306	ASN	2.8

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
2	D	585	ASP	2.6
2	D	603	SER	2.5
1	C	367	VAL	2.5
2	D	584	GLN	2.5
2	D	565	SER	2.5
1	C	88	LEU	2.4
1	C	339	LYS	2.4
1	C	89	GLU	2.3
1	C	455	MET	2.3
2	D	23	GLY	2.3
1	C	408	LEU	2.3
2	B	281	GLU	2.2
2	D	446	ASN	2.2
1	A	109	THR	2.2
1	C	19	GLN	2.2
2	D	526	THR	2.2
1	C	118	TYR	2.2
2	D	15	ASP	2.2
2	D	578	LEU	2.2
2	D	602	SER	2.2
2	D	579	ARG	2.1
1	C	350	VAL	2.1
2	B	567	ASP	2.1
2	B	129	HIS	2.1
1	C	337	ASP	2.1
1	C	143	PHE	2.1

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

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

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

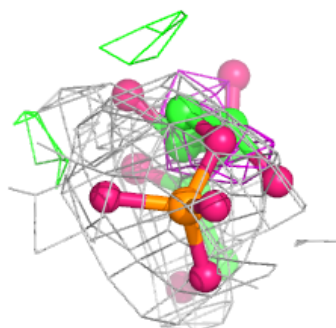
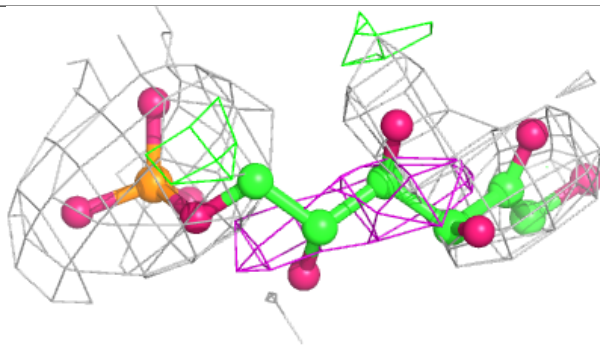
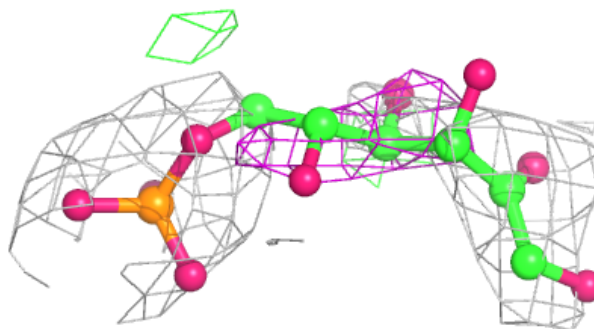
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	F6R	D	701	16/16	0.79	0.33	55,94,102,102	0
3	SO4	B	702	5/5	0.88	0.37	71,72,92,96	0
5	F6R	B	701	16/16	0.90	0.23	36,66,70,72	0
3	SO4	B	703	5/5	0.90	0.33	75,81,103,116	0
4	NA	A	502	1/1	0.96	0.07	42,42,42,42	0
3	SO4	C	501	5/5	0.97	0.11	37,49,63,68	0
3	SO4	A	501	5/5	0.97	0.09	36,42,55,68	0
4	NA	C	502	1/1	0.98	0.08	39,39,39,39	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 F6R D 701:**

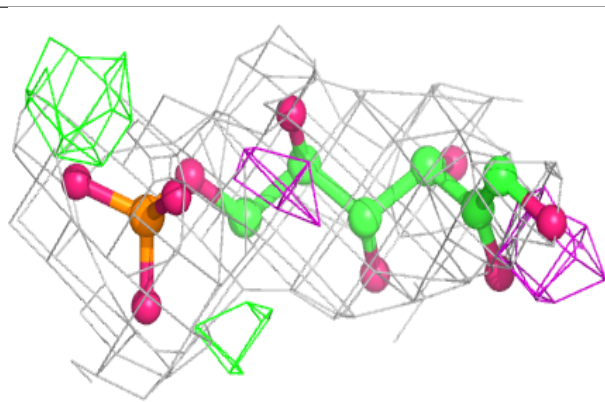
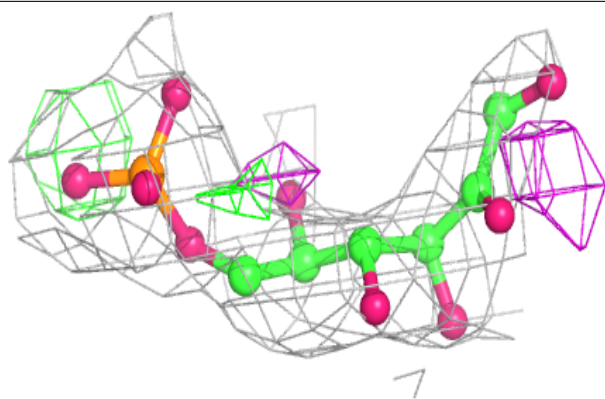
2mF<sub>o</sub>-DF<sub>c</sub> (at 0.7 rmsd) in gray  
mF<sub>o</sub>-DF<sub>c</sub> (at 3 rmsd) in purple (negative)  
and green (positive)





**Electron density around F6R B 701:**

$2mF_o - DF_c$  (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.