



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 7, 2017 – 12:22 PM EDT

PDB ID : 3FDM
Title : alpha/beta foldamer in complex with Bcl-xL
Authors : Fairlie, W.D.; Lee, E.F.; Smith, B.J.; Czabotar, P.E.; Colman, P.M.; Sadowsky, J.D.; Peterson-Kaufman, K.J.; Gellman, S.H.
Deposited on : unknown
Resolution : 2.26 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

<http://wwpdb.org/validation/2016/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 : 1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20029824
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20029824

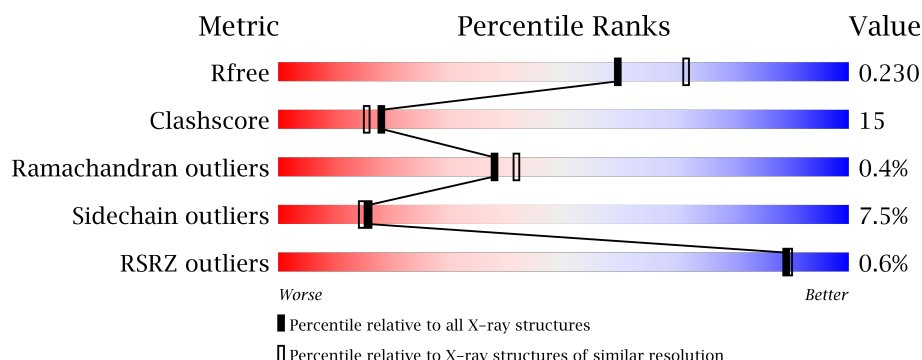
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.26 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}	100719	1062 (2.26-2.26)
Clashscore	112137	1178 (2.26-2.26)
Ramachandran outliers	110173	1145 (2.26-2.26)
Sidechain outliers	110143	1146 (2.26-2.26)
RSRZ outliers	101464	1066 (2.26-2.26)

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 ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	158	<div> <div>68%</div> <div>22%</div> <div>• 7%</div> </div>
1	B	158	<div> <div>72%</div> <div>17%</div> <div>• 8%</div> </div>
1	C	158	<div> <div>70%</div> <div>16%</div> <div>• 11%</div> </div>
2	D	17	<div> <div>82%</div> <div>12%</div> <div>6%</div> </div>
2	E	17	<div> <div>53%</div> <div>29%</div> <div>12%</div> <div>6%</div> </div>

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	F	17	 <div>76%24%</div>

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
2	XPC	E	1	-	-	X	-
3	EDO	A	210	-	-	-	X
3	EDO	A	211	-	-	-	X
3	EDO	A	215	-	-	-	X
3	EDO	A	216	-	-	-	X
3	EDO	B	210	-	-	-	X
3	EDO	B	212	-	-	-	X
3	EDO	B	213	-	-	-	X

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 4223 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 Apoptosis regulator Bcl-X.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	147	Total	C	N	O	S	0	3	0
			1196	762	202	226	6			
1	B	146	Total	C	N	O	S	0	0	0
			1172	748	198	221	5			
1	C	141	Total	C	N	O	S	0	1	0
			1147	733	195	215	4			

There are 15 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-4	GLY	-	EXPRESSION TAG	UNP Q07817
A	-3	PRO	-	EXPRESSION TAG	UNP Q07817
A	-2	LEU	-	EXPRESSION TAG	UNP Q07817
A	-1	GLY	-	EXPRESSION TAG	UNP Q07817
A	0	SER	-	EXPRESSION TAG	UNP Q07817
B	-4	GLY	-	EXPRESSION TAG	UNP Q07817
B	-3	PRO	-	EXPRESSION TAG	UNP Q07817
B	-2	LEU	-	EXPRESSION TAG	UNP Q07817
B	-1	GLY	-	EXPRESSION TAG	UNP Q07817
B	0	SER	-	EXPRESSION TAG	UNP Q07817
C	-4	GLY	-	EXPRESSION TAG	UNP Q07817
C	-3	PRO	-	EXPRESSION TAG	UNP Q07817
C	-2	LEU	-	EXPRESSION TAG	UNP Q07817
C	-1	GLY	-	EXPRESSION TAG	UNP Q07817
C	0	SER	-	EXPRESSION TAG	UNP Q07817

- Molecule 2 is a protein called alpha/beta-peptide foldamer.

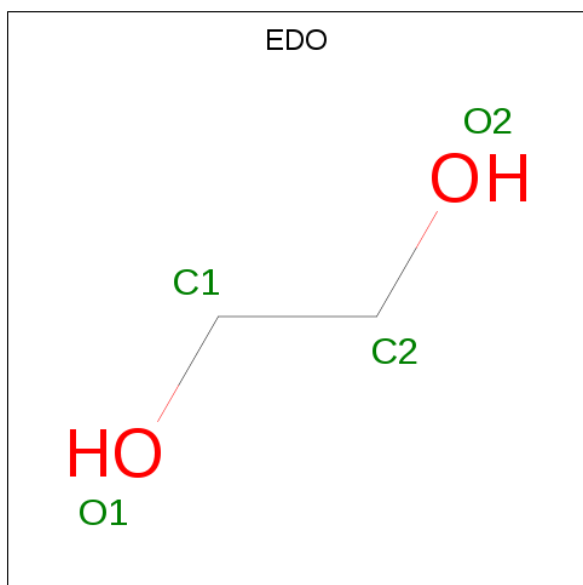
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	D	16	Total	C	N	O	0	0	1
			122	79	25	18			

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	E	16	Total	C	N	O	0	1	1
			129	83	28	18			
2	F	17	Total	C	N	O	0	0	1
			125	81	25	19			

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		

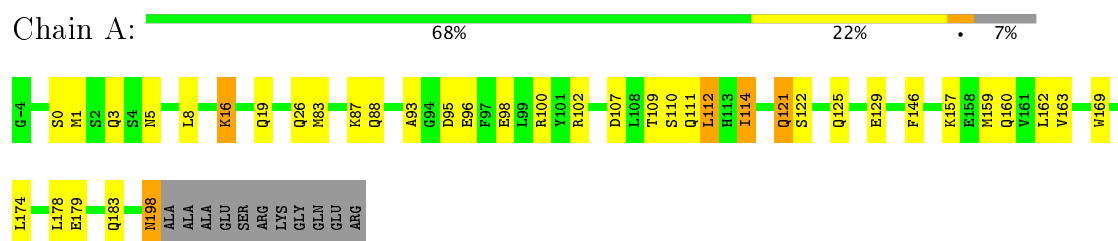
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	106	Total	O	0	0
			106	106		
4	B	92	Total	O	0	0
			92	92		
4	C	72	Total	O	0	0
			72	72		
4	D	9	Total	O	0	0
			9	9		
4	E	8	Total	O	0	0
			8	8		
4	F	1	Total	O	0	0
			1	1		

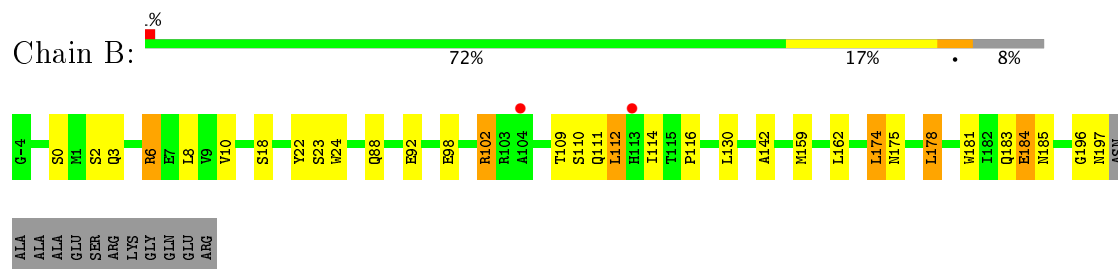
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

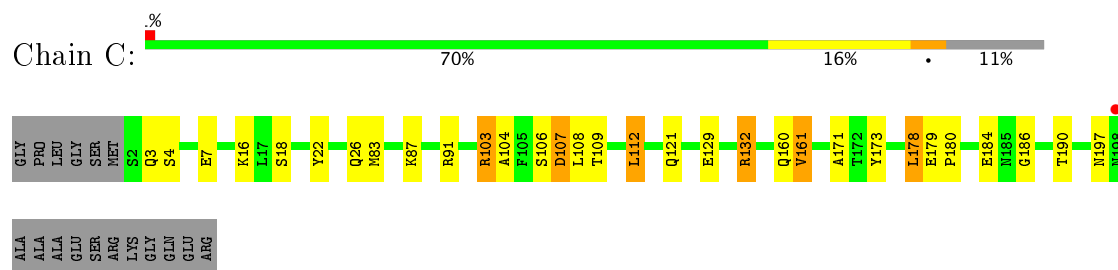
• Molecule 1: Apoptosis regulator Bcl-X



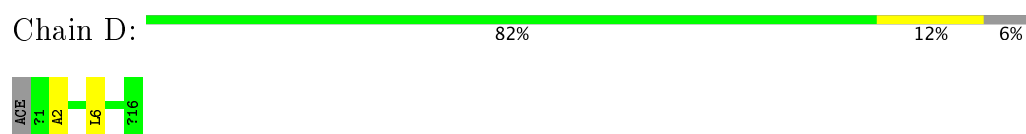
• Molecule 1: Apoptosis regulator Bcl-X



• Molecule 1: Apoptosis regulator Bcl-X



• Molecule 2: alpha/beta-peptide foldamer



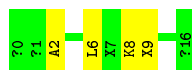
• Molecule 2: alpha/beta-peptide foldamer

Chain E:  53% 29% 12% 6%



- Molecule 2: alpha/beta-peptide foldamer

Chain F:  76% 24%



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	73.16 Å 92.28 Å 165.67 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.14 – 2.26 47.14 – 2.26	Depositor EDS
% Data completeness (in resolution range)	95.2 (47.14-2.26) 95.1 (47.14-2.26)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	11.46 (at 2.27 Å)	Xtriage
Refinement program	REFMAC 5.4.0067	Depositor
R, R_{free}	0.172 , 0.235 0.171 , 0.230	Depositor DCC
R_{free} test set	1299 reflections (5.41%)	DCC
Wilson B-factor (Å ²)	24.4	Xtriage
Anisotropy	0.206	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 51.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	4223	wwPDB-VP
Average B, all atoms (Å ²)	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.57% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ACE, XPC, EDO, B3L, XCP, NH2

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	0.75	0/1232	0.77	1/1667 (0.1%)
1	B	0.80	1/1201 (0.1%)	0.77	1/1626 (0.1%)
1	C	0.66	0/1179	0.73	1/1596 (0.1%)
2	D	0.90	0/76	0.80	0/92
2	E	0.58	0/86	0.82	0/103
2	F	0.47	0/76	0.48	0/92
All	All	0.74	1/3850 (0.0%)	0.75	3/5176 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
2	D	0	2
2	E	0	1
2	F	0	2
All	All	0	5

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	184	GLU	CG-CD	-6.79	1.41	1.51

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	26	GLN	O-C-N	-6.10	112.93	122.70
1	B	6	ARG	NE-CZ-NH1	-6.00	117.30	120.30
1	C	161	VAL	CB-CA-C	-5.41	101.12	111.40

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	D	2	ALA	Peptide
2	D	6	LEU	Peptide
2	E	2	ALA	Peptide
2	F	2	ALA	Peptide
2	F	6	LEU	Peptide

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	1196	0	1141	46	0
1	B	1172	0	1118	32	0
1	C	1147	0	1092	24	0
2	D	122	0	127	0	0
2	E	129	0	136	19	0
2	F	125	0	129	2	0
3	A	28	0	42	8	0
3	B	16	0	24	4	0
4	A	106	0	0	3	0
4	B	92	0	0	5	0
4	C	72	0	0	1	0
4	D	9	0	0	0	0
4	E	8	0	0	0	0
4	F	1	0	0	0	0
All	All	4223	0	3809	117	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 15.

All (117) 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:83[A]:MET:CE	1:A:87:LYS:HE3	1.66	1.25
2:F:8:LYS:HG3	2:F:9:B3L:HD	1.22	1.16

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:83[A]:MET:HE2	1:A:87:LYS:CE	1.78	1.12
1:C:132:ARG:NH2	1:C:132:ARG:HG3	1.58	1.07
2:E:4[A]:ARG:NH1	2:E:4[A]:ARG:HG2	1.64	1.05
1:A:157:LYS:HB2	1:A:159:MET:HE2	1.37	1.05
1:C:132:ARG:CG	1:C:132:ARG:HH21	1.73	1.01
2:E:1:XPC:HB	2:E:4[A]:ARG:HG3	1.43	1.00
2:E:4[A]:ARG:HG2	2:E:4[A]:ARG:HH11	0.86	1.00
2:E:4[A]:ARG:CG	2:E:4[A]:ARG:HH11	1.78	0.97
1:A:157:LYS:HD3	1:A:159:MET:HE1	1.48	0.96
1:A:114:ILE:HD11	1:A:162:LEU:HD12	1.47	0.96
2:E:1:XPC:HGA	2:E:4[A]:ARG:NE	1.80	0.95
1:A:114:ILE:CD1	1:A:162:LEU:CD1	2.44	0.95
1:A:114:ILE:HD11	1:A:162:LEU:CD1	1.97	0.94
1:A:88:GLN:HE22	3:A:216:EDO:H22	1.31	0.94
1:C:132:ARG:HG3	1:C:132:ARG:HH21	0.79	0.93
2:E:8:LYS:HG3	2:E:9:B3L:HD	1.51	0.91
1:A:198:ASN:HD22	3:A:213:EDO:H22	1.34	0.89
1:B:88:GLN:HG3	4:B:243:HOH:O	1.72	0.89
1:B:98:GLU:O	1:B:102:ARG:HG2	1.78	0.83
1:C:26:GLN:HG2	1:C:83:MET:HE2	1.59	0.81
1:B:196:GLY:O	1:B:197:ASN:HB3	1.78	0.81
1:A:179:GLU:O	1:A:183[A]:GLN:HG3	1.82	0.80
1:A:121:GLN:O	1:A:125:GLN:HG3	1.81	0.79
1:A:83[A]:MET:HE2	1:A:87:LYS:HE3	0.83	0.78
2:E:1:XPC:HGA	2:E:4[A]:ARG:CZ	2.16	0.75
2:E:1:XPC:HGA	2:E:4[A]:ARG:CD	2.19	0.72
1:A:157:LYS:CB	1:A:159:MET:HE2	2.18	0.72
1:C:129:GLU:OE1	1:C:132:ARG:NH1	2.24	0.71
2:E:1:XPC:CB	2:E:4[A]:ARG:HG3	2.22	0.69
2:E:4[A]:ARG:CG	2:E:4[A]:ARG:NH1	2.47	0.66
1:C:132:ARG:NH2	1:C:132:ARG:CG	2.43	0.66
1:A:0[B]:SER:H	1:A:3:GLN:HE21	1.45	0.65
1:A:5:ASN:HD22	1:B:175:ASN:HD22	1.43	0.64
1:A:183[A]:GLN:NE2	4:A:304:HOH:O	2.28	0.64
1:B:110:SER:O	1:B:112:LEU:N	2.31	0.63
1:A:0[A]:SER:H	1:A:3:GLN:HE21	1.46	0.63
1:A:157:LYS:HB2	1:A:159:MET:CE	2.23	0.61
1:B:3:GLN:HG2	1:B:6:ARG:NH2	2.15	0.61
1:A:98:GLU:HG2	1:A:102:ARG:HH21	1.64	0.61
1:A:125:GLN:O	1:A:129:GLU:HG3	2.03	0.59
1:B:116:PRO:HD3	1:B:159:MET:SD	2.42	0.59

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:163:VAL:HG11	3:B:212:EDO:H12	1.84	0.59
2:E:1:XPC:HB	2:E:4[A]:ARG:CG	2.26	0.59
1:B:3:GLN:HA	1:B:6:ARG:HD2	1.85	0.58
1:A:114:ILE:CD1	1:A:162:LEU:HD13	2.31	0.58
1:C:186:GLY:HA3	1:C:190:THR:OG1	2.04	0.57
1:C:112:LEU:HD12	4:C:285:HOH:O	2.04	0.57
2:E:1:XPC:CG	2:E:4[A]:ARG:CZ	2.83	0.57
2:E:8:LYS:CG	2:E:9:B3L:HD	2.28	0.56
1:B:88:GLN:O	1:B:92:GLU:HG3	2.04	0.56
1:A:160:GLN:HG2	4:A:285:HOH:O	2.04	0.56
1:C:106:SER:HA	1:C:109:THR:HB	1.87	0.55
1:A:93:ALA:HA	3:A:210:EDO:H22	1.88	0.55
1:C:26:GLN:CG	1:C:83:MET:HE2	2.33	0.55
1:A:16:LYS:HD2	1:A:19:GLN:OE1	2.08	0.54
1:A:114:ILE:HG23	4:A:32:HOH:O	2.08	0.54
1:A:157:LYS:HD3	1:A:159:MET:CE	2.31	0.54
1:A:114:ILE:HD13	1:A:162:LEU:HD13	1.89	0.53
1:C:109:THR:HA	1:C:112:LEU:HD22	1.90	0.53
1:B:88:GLN:NE2	4:B:247:HOH:O	2.41	0.52
1:B:18:SER:HA	1:B:22:TYR:O	2.11	0.50
1:B:116:PRO:HA	1:B:162:LEU:HD21	1.93	0.50
1:C:109:THR:O	1:C:112:LEU:HB2	2.11	0.49
2:F:8:LYS:CG	2:F:9:B3L:HD	2.16	0.49
1:C:104:ALA:O	1:C:107:ASP:HB2	2.11	0.49
1:A:1:MET:HE3	1:B:183:GLN:HE22	1.78	0.49
1:A:107:ASP:O	1:A:111:GLN:HG3	2.12	0.49
1:A:169:TRP:HD1	3:A:211:EDO:H21	1.78	0.48
1:C:87:LYS:O	1:C:91:ARG:HG3	2.13	0.48
1:B:174:LEU:HA	1:B:178:LEU:HB2	1.95	0.48
1:B:22:TYR:O	3:B:211:EDO:H21	2.13	0.48
1:B:88:GLN:CG	4:B:243:HOH:O	2.46	0.48
1:B:130:LEU:CD1	2:E:7:XCP:HGA	2.44	0.47
1:B:142:ALA:HB1	2:E:6:LEU:HD22	1.96	0.47
1:A:114:ILE:CD1	1:A:162:LEU:HD11	2.38	0.47
1:B:110:SER:C	1:B:112:LEU:H	2.18	0.46
2:E:1:XPC:CB	2:E:4[A]:ARG:CG	2.90	0.46
1:A:95:ASP:HA	3:A:214:EDO:H21	1.99	0.45
1:A:0[B]:SER:OG	1:A:3:GLN:HG3	2.16	0.45
1:B:23:SER:HB3	3:B:211:EDO:H22	1.98	0.45
1:C:18:SER:HA	1:C:22:TYR:O	2.16	0.45
1:A:96:GLU:OE2	1:A:100:ARG:HD2	2.17	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:103:ARG:HB3	1:C:103:ARG:HE	1.63	0.44
1:C:173:TYR:CE1	1:C:178:LEU:HD13	2.52	0.44
1:B:102:ARG:HD3	1:B:102:ARG:HA	1.54	0.44
1:B:24:TRP:HA	3:B:212:EDO:H11	1.99	0.44
1:C:179:GLU:N	1:C:180:PRO:CD	2.80	0.44
1:C:180:PRO:O	1:C:184:GLU:HG3	2.18	0.44
1:B:114:ILE:O	1:B:114:ILE:HG13	2.17	0.44
1:C:83:MET:O	1:C:87:LYS:HG3	2.18	0.44
1:A:83[A]:MET:CE	1:A:87:LYS:CE	2.59	0.44
1:A:198:ASN:HB3	3:A:210:EDO:H12	1.99	0.44
1:A:146:PHE:HA	3:A:215:EDO:H21	2.00	0.43
1:B:2:SER:O	1:B:6:ARG:HG3	2.18	0.43
1:B:0:SER:OG	1:B:3:GLN:HG3	2.19	0.43
1:B:88:GLN:NE2	4:B:243:HOH:O	2.51	0.43
1:A:112:LEU:HG	1:A:122:SER:HB3	2.01	0.43
2:E:8:LYS:HG3	2:E:9:B3L:CD	2.36	0.43
1:A:121:GLN:HG2	1:A:125:GLN:HE21	1.84	0.43
1:A:1:MET:CE	1:B:183:GLN:NE2	2.82	0.43
1:B:181:TRP:CE2	1:B:185:ASN:ND2	2.87	0.42
1:C:3:GLN:HE21	1:C:171:ALA:HB3	1.84	0.42
1:A:109:THR:HA	1:A:112:LEU:HD22	2.01	0.42
1:A:114:ILE:HD13	1:A:162:LEU:CD1	2.38	0.42
1:B:23:SER:HA	4:B:216:HOH:O	2.20	0.42
1:B:3:GLN:HG2	1:B:6:ARG:HH22	1.83	0.42
1:B:130:LEU:HD12	2:E:7:XCP:HGA	2.02	0.42
1:A:198:ASN:HB3	3:A:210:EDO:C1	2.50	0.42
1:B:10:VAL:HG13	1:B:24:TRP:CE2	2.55	0.42
1:A:114:ILE:HG13	1:A:159:MET:HE1	2.02	0.41
1:A:0[A]:SER:H	1:A:3:GLN:NE2	2.16	0.41
1:C:26:GLN:NE2	1:C:83:MET:CE	2.84	0.41
2:E:1:XPC:HGA	2:E:4[A]:ARG:CG	2.51	0.40
1:C:129:GLU:OE2	1:C:132:ARG:NE	2.54	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	148/158 (94%)	147 (99%)	1 (1%)	0	100	100
1	B	144/158 (91%)	140 (97%)	3 (2%)	1 (1%)	25	25
1	C	140/158 (89%)	136 (97%)	3 (2%)	1 (1%)	25	25
2	D	10/17 (59%)	10 (100%)	0	0	100	100
2	E	11/17 (65%)	10 (91%)	1 (9%)	0	100	100
2	F	10/17 (59%)	10 (100%)	0	0	100	100
All	All	463/525 (88%)	453 (98%)	8 (2%)	2 (0%)	38	42

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	111	GLN
1	C	197	ASN

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	127/131 (97%)	118 (93%)	9 (7%)	17	16
1	B	123/131 (94%)	116 (94%)	7 (6%)	24	24
1	C	121/131 (92%)	110 (91%)	11 (9%)	11	9
2	D	7/7 (100%)	7 (100%)	0	100	100
2	E	8/7 (114%)	5 (62%)	3 (38%)	0	0
2	F	7/7 (100%)	7 (100%)	0	100	100
All	All	393/414 (95%)	363 (92%)	30 (8%)	16	14

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	8	LEU
1	A	16	LYS
1	A	110	SER
1	A	112	LEU
1	A	114	ILE
1	A	121	GLN
1	A	174	LEU
1	A	178	LEU
1	A	198	ASN
1	B	8	LEU
1	B	102	ARG
1	B	109	THR
1	B	112	LEU
1	B	174	LEU
1	B	178	LEU
1	B	184	GLU
1	C	4	SER
1	C	7	GLU
1	C	103	ARG
1	C	107	ASP
1	C	108	LEU
1	C	112	LEU
1	C	121	GLN
1	C	132	ARG
1	C	160	GLN
1	C	161	VAL
1	C	178	LEU
2	E	4[A]	ARG
2	E	4[B]	ARG
2	E	6	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	3	GLN
1	A	88	GLN
1	A	121	GLN
1	A	125	GLN
1	A	128	ASN
1	A	198	ASN
1	B	3	GLN
1	B	88	GLN
1	B	128	ASN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	175	ASN
1	B	183	GLN
1	C	3	GLN
1	C	26	GLN
1	C	128	ASN
1	C	177	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

15 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	$\# Z > 2$
2	XPC	D	1	2	4,8,9	2.15	2 (50%)	4,10,12	2.25	1 (25%)
2	XCP	D	3	2	8,8,9	1.11	1 (12%)	6,10,12	1.91	1 (16%)
2	XCP	D	5	2	8,8,9	1.12	1 (12%)	6,10,12	1.90	1 (16%)
2	XCP	D	7	2	8,8,9	1.01	0	6,10,12	1.84	3 (50%)
2	B3L	D	9	2	8,8,9	0.56	0	8,9,11	1.10	0
2	XPC	E	1	2	4,8,9	1.61	2 (50%)	4,10,12	1.21	0
2	XCP	E	3	2	8,8,9	1.24	1 (12%)	6,10,12	1.77	2 (33%)
2	XCP	E	5	2	8,8,9	1.45	2 (25%)	6,10,12	1.63	1 (16%)
2	XCP	E	7	2	8,8,9	1.37	1 (12%)	6,10,12	1.82	1 (16%)
2	B3L	E	9	2	8,8,9	0.60	0	8,9,11	0.96	0
2	XPC	F	1	2	4,8,9	1.76	2 (50%)	4,10,12	1.63	1 (25%)
2	XCP	F	3	2	8,8,9	1.03	1 (12%)	6,10,12	2.43	2 (33%)
2	XCP	F	5	2	8,8,9	1.27	2 (25%)	6,10,12	1.97	2 (33%)
2	XCP	F	7	2	8,8,9	1.21	1 (12%)	6,10,12	1.31	1 (16%)
2	B3L	F	9	2	8,8,9	0.67	0	8,9,11	0.73	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
2	XPC	D	1	2	-	0/1/12/14	0/1/1/1
2	XCP	D	3	2	-	0/1/12/14	0/1/1/1
2	XCP	D	5	2	-	0/1/12/14	0/1/1/1
2	XCP	D	7	2	-	0/1/12/14	0/1/1/1
2	B3L	D	9	2	-	0/7/7/8	0/0/0/0
2	XPC	E	1	2	-	0/1/12/14	0/1/1/1
2	XCP	E	3	2	-	0/1/12/14	0/1/1/1
2	XCP	E	5	2	-	0/1/12/14	0/1/1/1
2	XCP	E	7	2	-	0/1/12/14	0/1/1/1
2	B3L	E	9	2	-	0/7/7/8	0/0/0/0
2	XPC	F	1	2	-	0/1/12/14	0/1/1/1
2	XCP	F	3	2	-	0/1/12/14	0/1/1/1
2	XCP	F	5	2	-	0/1/12/14	0/1/1/1
2	XCP	F	7	2	-	0/1/12/14	0/1/1/1
2	B3L	F	9	2	-	0/7/7/8	0/0/0/0

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	7	XCP	CA-CB	-3.08	1.52	1.55
2	D	3	XCP	CA-CB	-2.67	1.52	1.55
2	D	1	XPC	CA-CB	-2.67	1.52	1.55
2	E	5	XCP	CA-CB	-2.60	1.52	1.55
2	F	5	XCP	CA-CB	-2.56	1.52	1.55
2	F	3	XCP	CA-CB	-2.32	1.52	1.55
2	F	1	XPC	CA-CB	-2.30	1.53	1.55
2	E	1	XPC	CA-CB	-2.24	1.53	1.55
2	F	5	XCP	CA-C	2.04	1.53	1.50
2	E	1	XPC	CA-C	2.19	1.53	1.50
2	F	7	XCP	CA-C	2.34	1.54	1.50
2	F	1	XPC	CA-C	2.51	1.54	1.50
2	E	3	XCP	CA-C	2.59	1.54	1.50
2	E	5	XCP	CA-C	2.81	1.54	1.50
2	D	5	XCP	CA-C	2.82	1.54	1.50
2	D	1	XPC	CA-C	3.11	1.55	1.50

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
2	D	1	XPC	CE-CA-C	-3.50	107.35	113.15
2	E	3	XCP	O-C-CA	-2.18	120.10	125.29
2	F	1	XPC	O-C-CA	-2.16	120.14	125.29
2	D	7	XCP	O-C-CA	-2.08	120.33	125.29
2	F	7	XCP	CE-CA-CB	2.02	104.97	100.96
2	F	3	XCP	CD-CG-CB	2.11	107.82	104.18
2	D	7	XCP	CD-CG-CB	2.23	108.03	104.18
2	F	5	XCP	CD-CG-CB	2.67	108.78	104.18
2	E	5	XCP	CE-CA-CB	3.03	106.98	100.96
2	D	7	XCP	CE-CA-CB	3.15	107.21	100.96
2	E	3	XCP	CE-CA-CB	3.25	107.40	100.96
2	E	7	XCP	CE-CA-CB	3.47	107.84	100.96
2	F	5	XCP	CE-CA-CB	3.53	107.95	100.96
2	D	5	XCP	CE-CA-CB	3.82	108.53	100.96
2	D	3	XCP	CE-CA-CB	4.04	108.98	100.96
2	F	3	XCP	CE-CA-CB	5.01	110.89	100.96

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 16 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	1	XPC	9	0
2	E	7	XCP	2	0
2	E	9	B3L	3	0
2	F	9	B3L	2	0

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

11 ligands 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	$\# Z > 2$
3	EDO	A	210	-	3,3,3	0.33	0	2,2,2	0.53	0
3	EDO	A	211	-	3,3,3	0.43	0	2,2,2	0.51	0
3	EDO	A	212	-	3,3,3	0.65	0	2,2,2	0.22	0
3	EDO	A	213	-	3,3,3	0.64	0	2,2,2	0.30	0
3	EDO	A	214	-	3,3,3	0.49	0	2,2,2	0.18	0
3	EDO	A	215	-	3,3,3	0.47	0	2,2,2	0.22	0
3	EDO	A	216	-	3,3,3	0.40	0	2,2,2	0.69	0
3	EDO	B	210	-	3,3,3	0.68	0	2,2,2	0.20	0
3	EDO	B	211	-	3,3,3	0.42	0	2,2,2	0.78	0
3	EDO	B	212	-	3,3,3	0.66	0	2,2,2	0.37	0
3	EDO	B	213	-	3,3,3	0.41	0	2,2,2	0.40	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
3	EDO	A	210	-	-	0/1/1/1	0/0/0/0
3	EDO	A	211	-	-	0/1/1/1	0/0/0/0
3	EDO	A	212	-	-	0/1/1/1	0/0/0/0
3	EDO	A	213	-	-	0/1/1/1	0/0/0/0
3	EDO	A	214	-	-	0/1/1/1	0/0/0/0
3	EDO	A	215	-	-	0/1/1/1	0/0/0/0
3	EDO	A	216	-	-	0/1/1/1	0/0/0/0
3	EDO	B	210	-	-	0/1/1/1	0/0/0/0
3	EDO	B	211	-	-	0/1/1/1	0/0/0/0
3	EDO	B	212	-	-	0/1/1/1	0/0/0/0
3	EDO	B	213	-	-	0/1/1/1	0/0/0/0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

8 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	210	EDO	3	0
3	A	211	EDO	1	0
3	A	213	EDO	1	0
3	A	214	EDO	1	0
3	A	215	EDO	1	0
3	A	216	EDO	1	0
3	B	211	EDO	2	0
3	B	212	EDO	2	0

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	147/158 (93%)	-0.43	0 100 100	12, 18, 31, 43	2 (1%)
1	B	146/158 (92%)	-0.28	2 (1%) 75 78	12, 19, 48, 59	2 (1%)
1	C	141/158 (89%)	-0.04	1 (0%) 87 88	15, 30, 47, 54	3 (2%)
2	D	10/17 (58%)	-0.56	0 100 100	17, 20, 26, 29	0
2	E	10/17 (58%)	-0.31	0 100 100	17, 19, 30, 37	1 (10%)
2	F	10/17 (58%)	0.31	0 100 100	37, 38, 39, 46	1 (10%)
All	All	464/525 (88%)	-0.25	3 (0%) 89 89	12, 21, 45, 59	9 (1%)

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	113	HIS	2.5
1	C	198	ASN	2.5
1	B	104	ALA	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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
2	XCP	F	5	8/9	0.93	0.12	-	33,34,35,35	0
2	XCP	E	3	8/9	0.92	0.12	-	33,33,34,35	0
2	B3L	F	9	9/10	0.95	0.17	-	34,37,37,37	0
2	B3L	D	9	9/10	0.97	0.11	-	18,19,19,20	0

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
2	XPC	E	1	8/9	0.91	0.15	-	39,41,41,43	0
2	XCP	F	7	8/9	0.90	0.12	-	36,37,37,37	0
2	XCP	D	7	8/9	0.98	0.13	-	17,18,19,20	0
2	XCP	F	3	8/9	0.91	0.12	-	36,37,37,38	0
2	XCP	E	5	8/9	0.97	0.12	-	26,27,28,28	0
2	XCP	D	3	8/9	0.97	0.10	-	22,23,24,24	0
2	B3L	E	9	9/10	0.97	0.10	-	19,20,21,22	0
2	XPC	F	1	8/9	0.93	0.16	-	38,38,38,38	0
2	XPC	D	1	8/9	0.93	0.12	-	28,29,30,31	0
2	XCP	E	7	8/9	0.96	0.10	-	23,24,26,26	0
2	XCP	D	5	8/9	0.94	0.12	-	19,19,19,20	0

6.3 Carbohydrates [i](#)

There are no carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(\AA^2)	Q<0.9
3	EDO	A	216	4/4	0.91	0.20	9.64	35,36,39,40	0
3	EDO	A	211	4/4	0.96	0.16	6.09	28,29,30,30	0
3	EDO	B	212	4/4	0.80	0.23	4.82	39,43,45,48	0
3	EDO	A	210	4/4	0.98	0.25	4.60	32,35,35,37	0
3	EDO	B	213	4/4	0.90	0.14	3.56	47,48,48,48	0
3	EDO	A	215	4/4	0.92	0.18	3.10	38,39,40,41	0
3	EDO	B	210	4/4	0.80	0.29	2.53	36,37,40,41	0
3	EDO	B	211	4/4	0.92	0.22	1.70	26,34,37,40	0
3	EDO	A	214	4/4	0.91	0.15	1.61	39,43,43,43	0
3	EDO	A	213	4/4	0.84	0.14	-	44,44,44,45	0
3	EDO	A	212	4/4	0.77	0.17	-	45,46,48,49	0

6.5 Other polymers [i](#)

There are no such residues in this entry.