wwPDB X-ray Structure Validation Summary Report (i)

Aug 31, 2020 – 09:37 AM BST

PDB ID	:	1DU3
Title	:	Crystal structure of TRAIL-SDR5
Authors	:	Cha, S.-S.; Sung, B.-J.; Oh, B.-H.
Deposited on	:	2000-01-14
Resolution	:	2.20 Å(reported)

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

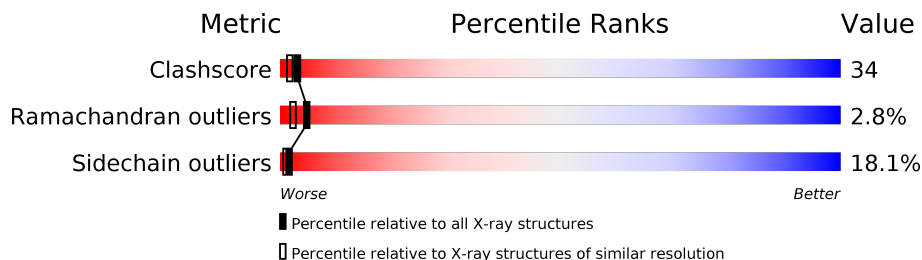|		
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	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 2.20 Å.

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

Metric	Percentile Ranks	Value
Clashscore		34
Ramachandran outliers		2.8%
Sidechain outliers		18.1%

Worse   *Better*

■ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution

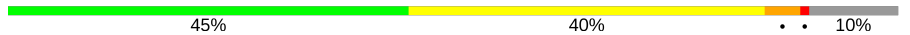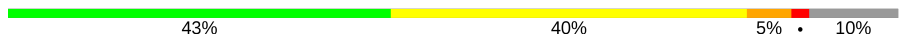| Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on 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%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	130	25% 36% 8% 31%
1	B	130	34% 39% 12% 15%
1	C	130	18% 38% 12% · 31%
1	G	130	33% 40% 10% 17%
1	H	130	28% 31% 10% · 31%
1	I	130	22% 34% 12% · 31%
2	D	168	46% 39% 5% · 10%
2	E	168	40% 39% 9% · 10%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	F	168	36% / 48% / 7% / 10%
2	J	168	45% / 40% / · · / 10%
2	K	168	43% / 40% / 5% · / 10%
2	L	168	36% / 45% / 10% / 10%

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
3	ZN	E	1	-	-	X	-

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 12108 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 DEATH RECEPTOR 5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	90	Total 701	C 419	N 122	O 148	S 12	0	0	0
1	B	110	Total 833	C 497	N 148	O 172	S 16	0	0	0
1	C	90	Total 697	C 417	N 121	O 147	S 12	0	0	0
1	G	108	Total 833	C 498	N 150	O 169	S 16	0	0	0
1	H	90	Total 691	C 414	N 118	O 147	S 12	0	0	0
1	I	90	Total 701	C 419	N 122	O 148	S 12	0	0	0

- Molecule 2 is a protein called TNF-RELATED APOPTOSIS INDUCING LIGAND.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	152	Total 1252	C 797	N 217	O 234	S 4	0	0	0
2	E	152	Total 1252	C 797	N 217	O 234	S 4	0	0	0
2	F	152	Total 1246	C 794	N 214	O 234	S 4	0	0	0
2	J	152	Total 1248	C 795	N 217	O 232	S 4	0	0	0
2	K	152	Total 1252	C 797	N 217	O 234	S 4	0	0	0
2	L	152	Total 1238	C 789	N 212	O 233	S 4	0	0	0

- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

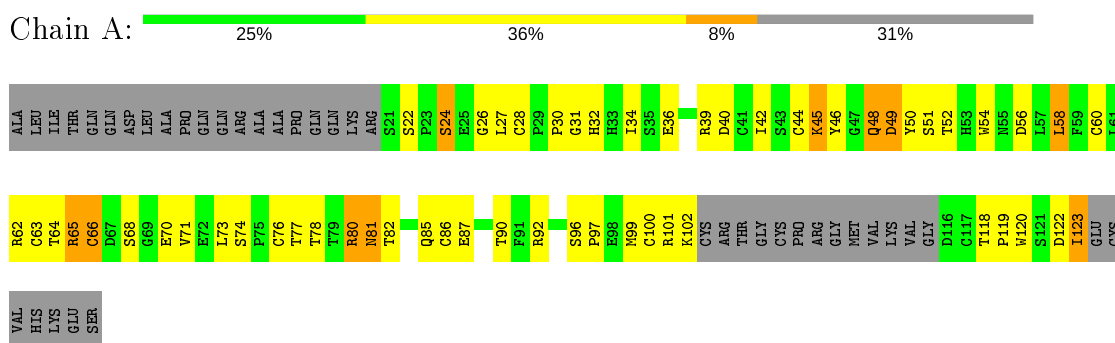| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	K	1	Total 1	Zn 1	0	0
3	E	1	Total 1	Zn 1	0	0

- Molecule 4 is water.

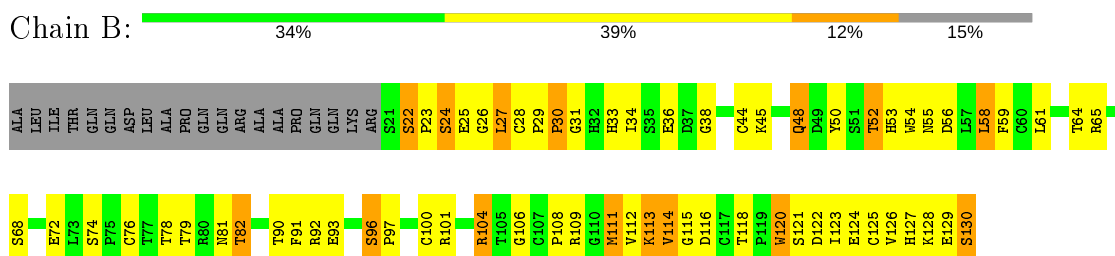| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	26	Total 26	O 26	0	0
4	B	23	Total 23	O 23	0	0
4	C	6	Total 6	O 6	0	0
4	D	22	Total 22	O 22	0	0
4	E	14	Total 14	O 14	0	0
4	F	13	Total 13	O 13	0	0
4	G	16	Total 16	O 16	0	0
4	H	7	Total 7	O 7	0	0
4	I	11	Total 11	O 11	0	0
4	J	8	Total 8	O 8	0	0
4	K	9	Total 9	O 9	0	0
4	L	7	Total 7	O 7	0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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. 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.

Note EDS was not executed.

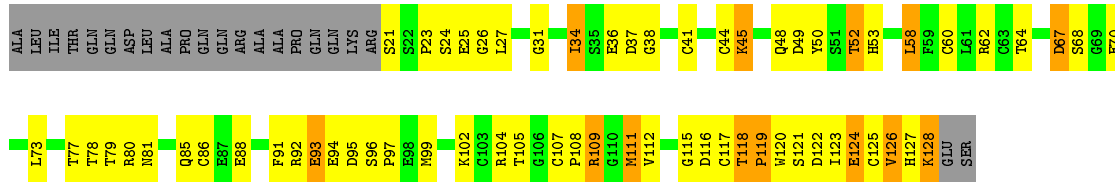- Molecule 1: DEATH RECEPTOR 5

Chain A:

- Molecule 1: DEATH RECEPTOR 5

Chain B:

- Molecule 1: DEATH RECEPTOR 5

Chain C:

- Molecule 1: DEATH RECEPTOR 5

Chain G:

● Molecule 1: DEATH RECEPTOR 5
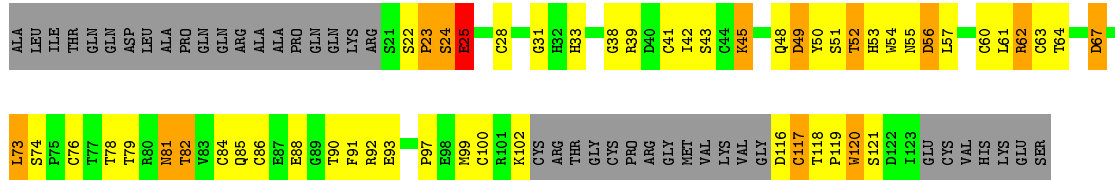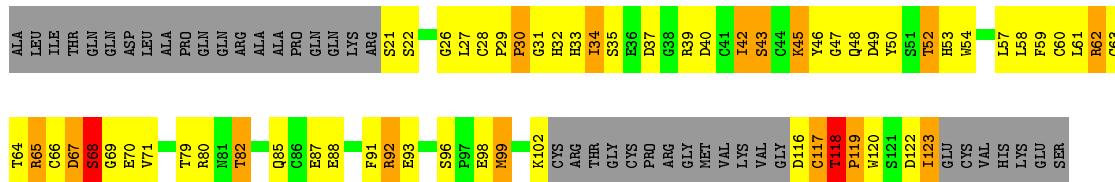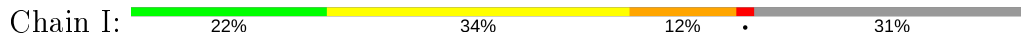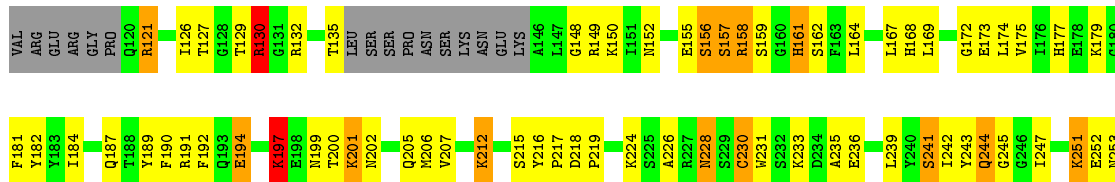
Chain H:

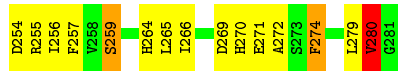● Molecule 1: DEATH RECEPTOR 5

Chain I:

● Molecule 2: TNF-RELATED APOPTOSIS INDUCING LIGAND

Chain D:

● Molecule 2: TNF-RELATED APOPTOSIS INDUCING LIGAND

Chain E:

D254 R255 I256 F257 V258 S259 H264 L265 I266 D269 H270 E271 A272 S273 F274 L279 V280 G281

• Molecule 2: TNF-RELATED APOPTOSIS INDUCING LIGAND

Chain F:

| 36% | 48% | 7% | 10% |

VAL ARG GLU ARG GLY PRO Q120 A123 A124 H125 I126 T127 G128 T129 R130 G131 R132 S133 N134 T135 LEU SER SER PRO ASN SER LYS ASN GLU LYS A146 L147 G148 R149 K150 I151 N152 S153 W154 E155 S156 S157 R158 H161 S162 F163 L164 S165 N166 L167 H168 L169 R170 N171 G172 E173 K179

G180 F181 I184 Y185 S186 Q187 T188 Y189 F190 R191 F192 Q193 E194 E195 I196 K201 Q205 Q208 Y209 I210 Y211 K212 Y213 T214 S215 Y216 P217 D218 P219 I220 L221 L222 M223 K224 C230 W231 S232 K233 D234 A235 E236 Y237 G238 L239 I242 Y243 Q244 G245 G246 I247 F248 E249 L250 K251

E252 N253 D254 R255 I256 F257 V260 E263 I266 D269 H270 E271 A272 S273 F274 F278 L279 V280 G281

• Molecule 2: TNF-RELATED APOPTOSIS INDUCING LIGAND

Chain J:

| 45% | 40% | • • | 10% |

VAL ARG GLU ARG GLY PRO Q120 R121 I126 T127 G128 T129 R130 G131 R132 S133 N134 T135 LEU SER SER PRO ASN LYS ASN GLU LYS A146 S153 W154 E155 R158 S162 L167 E173 L174 E178 K179 Y182 Y183 I184 Y185 S186 Q187 T188 Y189 F190 R191 F192 Q193 E194

E195 I196 K197 E198 N199 T200 K201 N202 D203 K204 Q205 M206 V207 T214 S215 Y216 P217 D218 L222 M223 K224 S225 A226 R227 N228 S229 C230 W231 S232 K233 E236 Y237 G238 L239 I242 Y243 Q244 G245 G246 I247 L250 K251 E252 N253 D254 R255 I256 F257 E263 H264 L265 I266 H270

E271 A272 F275 G276 A277 F278 L279 V280 G281

• Molecule 2: TNF-RELATED APOPTOSIS INDUCING LIGAND

Chain K:

| 43% | 40% | 5% • | 10% |

VAL ARG GLU ARG GLY PRO Q120 R121 V122 I126 T127 G128 T129 R130 G131 R132 S133 N134 T135 LEU SER SER PRO ASN SER LYS ASN GLU LYS A146 R149 K150 I151 N152 E155 S156 S157 R158 H161 S162 L167 H168 L169 R170 N171 G172 E173 L174 V175 I176 H177 E178 K179 G180 F181

Y182 Y183 I184 Y185 S186 Q187 T188 Y189 F190 R191 F192 Q193 E194 E195 I196 K197 E198 N199 T200 K201 N202 M206 V207 K212 S215 Y216 P217 D218 P219 A226 R227 N228 S229 C230 W231 S232 K233 D234 A235 L239 Y240 S241 I242 Y243 Q244 G245 G246 I247 K251 E252 N253 D254 R255 I256
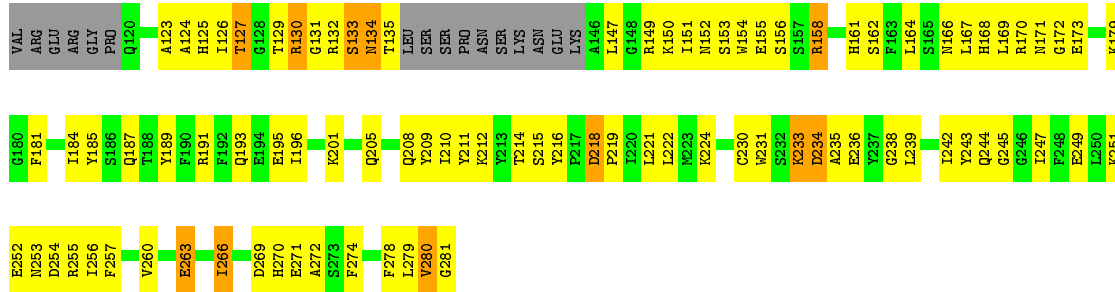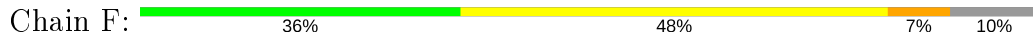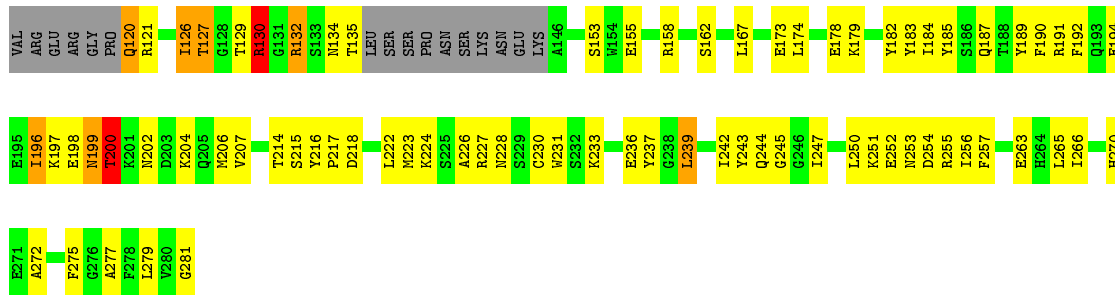
F257 V258 S259 I266 H270 E271 A272 S273 F274 L279 V280 G281

• Molecule 2: TNF-RELATED APOPTOSIS INDUCING LIGAND

Chain L:
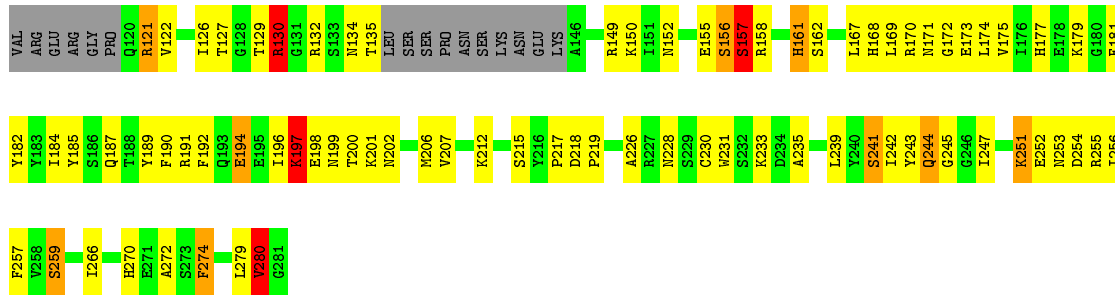
| 36% | 45% | 10% | 10% |

VAL ARG GLU ARG GLY PRO Q120 H125 I126 T127 G128 T129 R130 G131 R132 S133 N134 T135 LEU SER SER PRO ASN SER LYS ASN GLU LYS A146 L147 G148 R149 K150 I151 N152 S153 W154 E155 S156 S157 R158 H161 S162 F163 L164 S165 N166 L167 H168 L169 R170 N171 G172 E173 K179 G180 F181

I184 Y185 S186 Q187 T188 Y189 F192 Q193 E194 E195 I196 K197 E198 N199 T200 K201 K204 Q208 Y209 I210 Y211 K212 S215 Y216 P217 D218 P219 I220 L221 L222 M223 K224 S225 S229 C230 W231 S232 K233 D234 A235 E236 L239 I242 Y243 Q244 G245 G246 I247 F248 E249 L250 K251

E252 N253 D254 R255 I256 V260 E263 I266 D269 H270 E271 A272 S273 F274 F278 L279 V280 G281

4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	68.63Å 124.81Å 128.37Å 90.00° 104.49° 90.00°	Depositor
Resolution (Å)	8.00 – 2.20	Depositor
% Data completeness (in resolution range)	(Not available) (8.00-2.20)	Depositor
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.851	Depositor
R, R_{free}	0.291 , 0.291	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	12108	wwPDB-VP
Average B, all atoms (Å^2)	25.0	wwPDB-VP

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:
ZN

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	0.56	0/716	0.82	0/969
1	B	2.32	1/849 (0.1%)	1.89	2/1149 (0.2%)
1	C	0.51	0/712	0.72	0/964
1	G	0.62	0/851	0.80	0/1150
1	H	0.58	0/706	0.79	0/957
1	I	0.98	1/716 (0.1%)	1.35	3/969 (0.3%)
2	D	0.86	5/1282 (0.4%)	0.81	1/1724 (0.1%)
2	E	0.61	0/1282	0.79	0/1724
2	F	0.69	1/1276 (0.1%)	0.82	0/1717
2	J	0.62	0/1278	0.78	0/1719
2	K	0.61	0/1282	0.78	0/1724
2	L	0.64	0/1268	0.82	0/1708
All	All	0.89	8/12218 (0.1%)	0.95	6/16474 (0.0%)

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	F	0	1

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	130	SER	C-O	-64.68	0.00	1.23
1	I	117	CYS	C-N	21.03	1.82	1.34
2	D	198	GLU	CG-CD	13.28	1.71	1.51
2	D	198	GLU	CD-OE1	9.92	1.36	1.25
2	F	191	ARG	C-N	-9.60	1.11	1.34

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	130	SER	CA-C-O	-57.19	0.00	120.10
1	I	117	CYS	O-C-N	-25.30	82.22	122.70
1	I	117	CYS	C-N-CA	17.40	165.20	121.70
1	I	117	CYS	CA-C-N	17.17	154.98	117.20
1	B	127	HIS	O-C-N	-5.34	114.15	122.70

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	F	205	GLN	Mainchain

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	701	0	619	46	0
1	B	833	0	735	75	1
1	C	697	0	613	94	0
1	G	833	0	755	63	0
1	H	691	0	602	55	0
1	I	701	0	618	65	0
2	D	1252	0	1197	80	0
2	E	1252	0	1200	81	0
2	F	1246	0	1188	99	0
2	J	1248	0	1196	73	0
2	K	1252	0	1200	75	0
2	L	1238	0	1172	105	0
3	E	1	0	0	2	0
3	K	1	0	0	1	0
4	A	26	0	0	0	0
4	B	23	0	0	3	2
4	C	6	0	0	2	0
4	D	22	0	0	7	0
4	E	14	0	0	2	0
4	F	13	0	0	2	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	G	16	0	0	0	1
4	H	7	0	0	0	3
4	I	11	0	0	1	1
4	J	8	0	0	0	0
4	K	9	0	0	1	0
4	L	7	0	0	2	0
All	All	12108	0	11095	772	4

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 34.

The worst 5 of 772 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:I:117:CYS:C	1:I:118:THR:N	1.82	1.33
1:C:75:PRO:HB3	2:L:170:ARG:HD3	1.30	1.13
1:B:58:LEU:HD23	4:B:3147:HOH:O	1.59	1.02
2:K:202:ASN:HB3	4:K:3043:HOH:O	1.60	1.01
2:K:230:CYS:SG	2:L:230:CYS:SG	2.59	1.01

All (4) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:B:3160:HOH:O	4:H:3078:HOH:O[1_554]	0.57	1.63
4:G:3053:HOH:O	4:I:3050:HOH:O[2_656]	1.19	1.01
4:B:3160:HOH:O	4:H:3105:HOH:O[1_554]	1.82	0.38
1:B:129:GLU:CG	4:H:3079:HOH:O[1_554]	1.85	0.35

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	86/130 (66%)	77 (90%)	6 (7%)	3 (4%)	3	1
1	B	108/130 (83%)	93 (86%)	12 (11%)	3 (3%)	5	2
1	C	86/130 (66%)	61 (71%)	23 (27%)	2 (2%)	6	3
1	G	106/130 (82%)	90 (85%)	14 (13%)	2 (2%)	8	5
1	H	86/130 (66%)	75 (87%)	9 (10%)	2 (2%)	6	3
1	I	86/130 (66%)	72 (84%)	10 (12%)	4 (5%)	2	1
2	D	148/168 (88%)	132 (89%)	13 (9%)	3 (2%)	7	4
2	E	148/168 (88%)	131 (88%)	12 (8%)	5 (3%)	3	1
2	F	148/168 (88%)	124 (84%)	20 (14%)	4 (3%)	5	2
2	J	148/168 (88%)	132 (89%)	13 (9%)	3 (2%)	7	4
2	K	148/168 (88%)	130 (88%)	13 (9%)	5 (3%)	3	1
2	L	148/168 (88%)	125 (84%)	19 (13%)	4 (3%)	5	2
All	All	1446/1788 (81%)	1242 (86%)	164 (11%)	40 (3%)	5	2

5 of 40 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	E	130	ARG
2	E	157	SER
2	E	197	LYS
2	E	280	VAL
1	H	25	GLU

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	84/117 (72%)	64 (76%)	20 (24%)	0	0
1	B	97/117 (83%)	76 (78%)	21 (22%)	1	1
1	C	83/117 (71%)	62 (75%)	21 (25%)	0	0
1	G	99/117 (85%)	78 (79%)	21 (21%)	1	1

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles		
1	H	82/117 (70%)	61 (74%)	21 (26%)	0	0	
1	I	84/117 (72%)	60 (71%)	24 (29%)	0	0	
2	D	134/149 (90%)	117 (87%)	17 (13%)	4	3	
2	E	134/149 (90%)	111 (83%)	23 (17%)	2	1	
2	F	133/149 (89%)	119 (90%)	14 (10%)	7	6	
2	J	133/149 (89%)	113 (85%)	20 (15%)	3	2	
2	K	134/149 (90%)	114 (85%)	20 (15%)	3	2	
2	L	131/149 (88%)	113 (86%)	18 (14%)	3	3	
All	All	1328/1596 (83%)	1088 (82%)	240 (18%)	1	1	

5 of 240 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	F	218	ASP
1	G	124	GLU
2	K	280	VAL
2	F	244	GLN
1	G	67	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 39 such sidechains are listed below:

Mol	Chain	Res	Type
2	F	270	HIS
1	H	81	ASN
2	L	208	GLN
1	G	32	HIS
1	H	32	HIS

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 (i)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

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.

No monomer is involved in short contacts.

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	I	1
2	D	1
2	F	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	I	117:CYS	C	118:THR	N	1.82
1	D	191:ARG	C	192:PHE	N	1.20
1	F	191:ARG	C	192:PHE	N	1.12

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates (i)

EDS was not executed - this section is therefore empty.

6.4 Ligands (i)

EDS was not executed - this section is therefore empty.

6.5 Other polymers (i)

EDS was not executed - this section is therefore empty.