



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 14, 2020 – 09:15 am BST

PDB ID : 2XJO  
Title : Crystal structure of Streptococcus suis Dpr with nickel  
Authors : Haikarainen, T.; Thanassoulas, A.; Stavros, P.; Nounesis, G.; Haataja, S.;  
Papageorgiou, A.C.  
Deposited on : 2010-07-06  
Resolution : 2.10 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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.

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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 : 2.11  
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) : 2.11

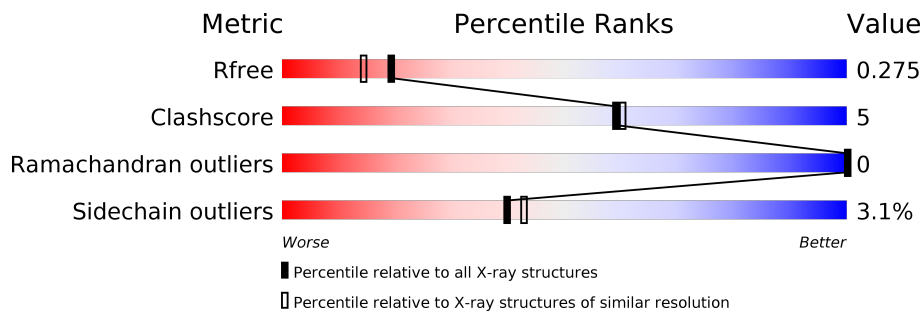
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.10 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	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)

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  $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	165	80% 11% 9%
1	B	165	79% 12% 8%
1	C	165	77% 14% 9%
1	D	165	82% 10% 8%
1	E	165	81% 10% 8%
1	F	165	85% 7% 8%
1	G	165	79% 11% 10%

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Mol	Chain	Length	Quality of chain
1	H	165	 81% 10% 8%
1	I	165	 73% 16% 8%
1	J	165	 81% 10% 8%
1	K	165	 81% 10% 8%
1	L	165	 80% 11% 8%

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 15560 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 DNA PROTECTION DURING STARVATION PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	150	1218	775	200	236	7	0	2	0
1	B	151	1223	779	201	236	7	0	3	0
1	C	150	1197	762	197	232	6	0	0	0
1	D	152	1259	798	208	246	7	0	5	0
1	E	151	1221	777	200	238	6	0	3	0
1	F	151	1235	785	202	242	6	0	3	0
1	G	149	1227	778	201	242	6	0	4	0
1	H	151	1216	775	200	235	6	0	2	0
1	I	151	1212	772	202	232	6	0	3	0
1	J	151	1223	778	200	239	6	0	3	0
1	K	152	1252	793	206	247	6	0	6	0
1	L	152	1243	789	203	245	6	0	6	0

- Molecule 2 is NICKEL (II) ION (three-letter code: NI) (formula: Ni).

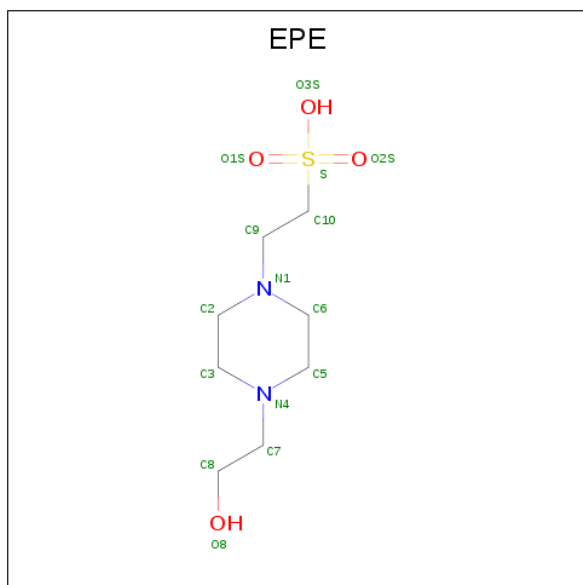
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	G	1	Total	Ni	0	0
			1	1		
2	J	1	Total	Ni	0	0
			1	1		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	D	1	Total Ni 1 1	0	0
2	K	1	Total Ni 1 1	0	0
2	E	1	Total Ni 1 1	0	0
2	H	1	Total Ni 1 1	0	0
2	B	1	Total Ni 1 1	0	0
2	I	1	Total Ni 1 1	0	0
2	C	1	Total Ni 1 1	0	0
2	A	1	Total Ni 1 1	0	0
2	L	1	Total Ni 1 1	0	0
2	F	1	Total Ni 1 1	0	0

- Molecule 3 is 4-(2-HYDROXYETHYL)-1-PIPERAZINE ETHANESULFONIC ACID (three-letter code: EPE) (formula: C<sub>8</sub>H<sub>18</sub>N<sub>2</sub>O<sub>4</sub>S).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total C N O S 15 8 2 4 1	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	G	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
3	K	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
3	L	1	Total	C	N	O	S	0	0
			15	8	2	4	1		

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	J	1	Total	Ca	0	0
			1	1		
4	D	1	Total	Ca	0	0
			1	1		
4	K	1	Total	Ca	0	0
			1	1		
4	B	1	Total	Ca	0	0
			1	1		
4	I	1	Total	Ca	0	0
			1	1		
4	F	2	Total	Ca	0	0
			2	2		

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	G	1	Total	Cl	0	0
			1	1		
5	J	1	Total	Cl	0	0
			1	1		
5	D	1	Total	Cl	0	0
			1	1		
5	E	1	Total	Cl	0	0
			1	1		
5	B	1	Total	Cl	0	0
			1	1		
5	I	1	Total	Cl	0	0
			1	1		


- Molecule 6 is water.

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
6	A	58	Total 58	O 58	0	0
6	B	92	Total 92	O 92	0	0
6	C	42	Total 42	O 42	0	0
6	D	96	Total 96	O 96	0	0
6	E	38	Total 38	O 38	0	0
6	F	79	Total 79	O 79	0	0
6	G	46	Total 46	O 46	0	0
6	H	48	Total 48	O 48	0	0
6	I	54	Total 54	O 54	0	0
6	J	61	Total 61	O 61	0	0
6	K	75	Total 75	O 75	0	0
6	L	60	Total 60	O 60	0	0

### 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. 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.

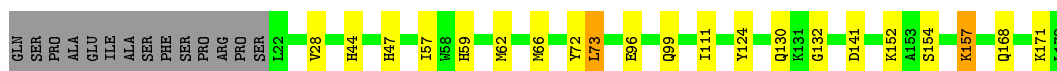
- Molecule 1: DNA PROTECTION DURING STARVATION PROTEIN

Chain A: 



- Molecule 1: DNA PROTECTION DURING STARVATION PROTEIN

Chain B: 




- Molecule 1: DNA PROTECTION DURING STARVATION PROTEIN

Chain C: 




- Molecule 1: DNA PROTECTION DURING STARVATION PROTEIN

Chain D: 




- Molecule 1: DNA PROTECTION DURING STARVATION PROTEIN

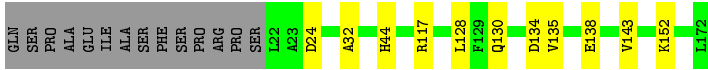
Chain E: 



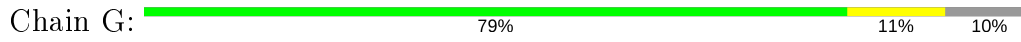
- Molecule 1: DNA PROTECTION DURING STARVATION PROTEIN

Chain F: 

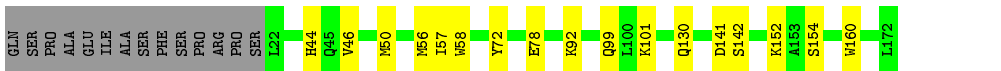
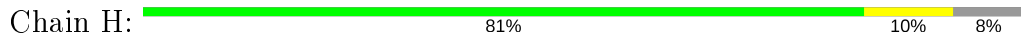




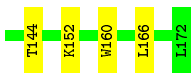
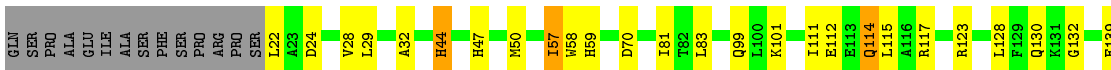
● Molecule 1: DNA PROTECTION DURING STARVATION PROTEIN



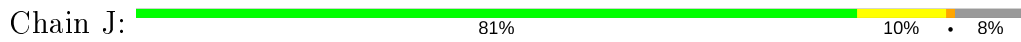
● Molecule 1: DNA PROTECTION DURING STARVATION PROTEIN



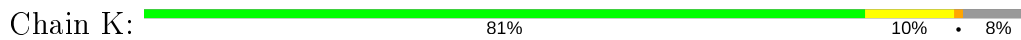
● Molecule 1: DNA PROTECTION DURING STARVATION PROTEIN



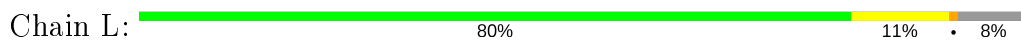
● Molecule 1: DNA PROTECTION DURING STARVATION PROTEIN



● Molecule 1: DNA PROTECTION DURING STARVATION PROTEIN



● Molecule 1: DNA PROTECTION DURING STARVATION PROTEIN



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	104.86Å 137.46Å 141.73Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.10 20.00 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.1 (20.00-2.10) 99.1 (20.00-2.10)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.05 (at 2.09Å)	Xtrriage
Refinement program	REFMAC 5.4.0078	Depositor
R, $R_{free}$	0.176 , 0.222 0.242 , 0.275	Depositor DCC
$R_{free}$ test set	5940 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	41.8	Xtrriage
Anisotropy	0.151	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 30.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.018 for -h,l,k	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	15560	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	42.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.31% 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: NI, CA, EPE, CL

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	0.72	0/1243	0.66	0/1677
1	B	0.78	0/1252	0.72	2/1690 (0.1%)
1	C	0.69	0/1222	0.68	1/1651 (0.1%)
1	D	0.81	0/1284	0.68	0/1732
1	E	0.64	0/1250	0.67	0/1689
1	F	0.83	0/1260	0.71	0/1701
1	G	0.68	1/1252 (0.1%)	0.70	1/1690 (0.1%)
1	H	0.69	0/1245	0.69	1/1681 (0.1%)
1	I	0.70	0/1245	0.69	0/1682
1	J	0.75	0/1252	0.64	0/1692
1	K	0.76	0/1285	0.69	0/1735
1	L	0.71	0/1280	0.72	0/1728
All	All	0.73	1/15070 (0.0%)	0.69	5/20348 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	G	157	LYS	CE-NZ	5.52	1.62	1.49

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	141	ASP	CB-CG-OD1	5.74	123.47	118.30
1	B	73	LEU	CA-CB-CG	5.59	128.17	115.30
1	H	141	ASP	CB-CG-OD1	5.32	123.09	118.30
1	B	141	ASP	CB-CG-OD1	5.24	123.01	118.30
1	G	141	ASP	CB-CG-OD1	5.18	122.97	118.30

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	1218	0	1176	8	0
1	B	1223	0	1182	14	0
1	C	1197	0	1152	11	0
1	D	1259	0	1210	12	0
1	E	1221	0	1170	10	0
1	F	1235	0	1187	9	0
1	G	1227	0	1173	8	0
1	H	1216	0	1176	9	0
1	I	1212	0	1169	18	0
1	J	1223	0	1169	12	0
1	K	1252	0	1195	20	0
1	L	1243	0	1192	14	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
2	G	1	0	0	0	0
2	H	1	0	0	0	0
2	I	1	0	0	0	0
2	J	1	0	0	0	0
2	K	1	0	0	0	0
2	L	1	0	0	0	0
3	B	15	0	17	1	0
3	G	15	0	17	1	0
3	K	15	0	17	1	0
3	L	15	0	17	0	0
4	B	1	0	0	0	0
4	D	1	0	0	0	0
4	F	2	0	0	0	0
4	I	1	0	0	0	0
4	J	1	0	0	0	0
4	K	1	0	0	0	0
5	B	1	0	0	0	0
5	D	1	0	0	0	0
5	E	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	G	1	0	0	0	0
5	I	1	0	0	0	0
5	J	1	0	0	0	0
6	A	58	0	0	0	0
6	B	92	0	0	1	0
6	C	42	0	0	0	0
6	D	96	0	0	4	0
6	E	38	0	0	3	0
6	F	79	0	0	1	0
6	G	46	0	0	0	0
6	H	48	0	0	0	0
6	I	54	0	0	4	0
6	J	61	0	0	0	0
6	K	75	0	0	0	0
6	L	60	0	0	0	0
All	All	15560	0	14219	136	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.

The worst 5 of 136 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:K:117[A]:ARG:CG	1:K:117[A]:ARG:HH11	1.55	1.16
1:K:117[A]:ARG:HG3	1:K:117[A]:ARG:NH1	1.52	1.04
1:C:130:GLN:NE2	1:C:152:LYS:HE3	1.82	0.95
1:C:130:GLN:HE21	1:C:152:LYS:HE3	1.32	0.94
1:L:21:SER:N	1:L:22:LEU:HA	1.86	0.88

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	150/165 (91%)	149 (99%)	1 (1%)	0	100	100
1	B	152/165 (92%)	151 (99%)	1 (1%)	0	100	100
1	C	148/165 (90%)	147 (99%)	1 (1%)	0	100	100
1	D	155/165 (94%)	154 (99%)	1 (1%)	0	100	100
1	E	152/165 (92%)	151 (99%)	1 (1%)	0	100	100
1	F	152/165 (92%)	151 (99%)	1 (1%)	0	100	100
1	G	151/165 (92%)	149 (99%)	2 (1%)	0	100	100
1	H	151/165 (92%)	149 (99%)	2 (1%)	0	100	100
1	I	152/165 (92%)	150 (99%)	2 (1%)	0	100	100
1	J	152/165 (92%)	151 (99%)	1 (1%)	0	100	100
1	K	156/165 (94%)	155 (99%)	1 (1%)	0	100	100
1	L	156/165 (94%)	154 (99%)	2 (1%)	0	100	100
All	All	1827/1980 (92%)	1811 (99%)	16 (1%)	0	100	100

There are no Ramachandran outliers to report.

### 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	130/141 (92%)	125 (96%)	5 (4%)	33	34
1	B	131/141 (93%)	127 (97%)	4 (3%)	40	43
1	C	127/141 (90%)	121 (95%)	6 (5%)	26	25
1	D	135/141 (96%)	133 (98%)	2 (2%)	65	71
1	E	130/141 (92%)	127 (98%)	3 (2%)	50	55
1	F	132/141 (94%)	131 (99%)	1 (1%)	81	86
1	G	132/141 (94%)	130 (98%)	2 (2%)	65	71
1	H	130/141 (92%)	126 (97%)	4 (3%)	40	43
1	I	129/141 (92%)	121 (94%)	8 (6%)	18	15

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	J	130/141 (92%)	127 (98%)	3 (2%)	50	55
1	K	135/141 (96%)	131 (97%)	4 (3%)	41	44
1	L	135/141 (96%)	127 (94%)	8 (6%)	19	17
All	All	1576/1692 (93%)	1526 (97%)	50 (3%)	40	41

5 of 50 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	138	GLU
1	I	44	HIS
1	L	95[B]	SER
1	H	44	HIS
1	H	99	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 58 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	145	ASN
1	H	31	GLN
1	L	99	GLN
1	F	149	ASN
1	G	40	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 carbohydrates in this entry.

## 5.6 Ligand geometry

Of 29 ligands modelled in this entry, 25 are monoatomic - leaving 4 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	EPE	K	1173	-	15,15,15	1.03	1 (6%)	18,20,20	1.89	5 (27%)
3	EPE	L	1173	-	15,15,15	0.83	1 (6%)	18,20,20	2.29	6 (33%)
3	EPE	G	1173	-	15,15,15	0.73	0	18,20,20	1.89	4 (22%)
3	EPE	B	1173	-	15,15,15	0.92	1 (6%)	18,20,20	2.20	5 (27%)

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	EPE	K	1173	-	-	3/9/19/19	0/1/1/1
3	EPE	L	1173	-	-	4/9/19/19	0/1/1/1
3	EPE	G	1173	-	-	6/9/19/19	0/1/1/1
3	EPE	B	1173	-	-	6/9/19/19	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	K	1173	EPE	C10-S	3.39	1.82	1.77
3	L	1173	EPE	C10-S	2.73	1.81	1.77
3	B	1173	EPE	C10-S	2.60	1.81	1.77

The worst 5 of 20 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1173	EPE	O1S-S-C10	6.26	114.45	106.92
3	L	1173	EPE	O1S-S-C10	5.17	113.14	106.92
3	G	1173	EPE	O2S-S-C10	4.62	112.48	106.92

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	L	1173	EPE	C5-N4-C3	4.25	118.40	108.83
3	K	1173	EPE	C5-N4-C3	4.02	117.88	108.83

There are no chirality outliers.

5 of 19 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	G	1173	EPE	C10-C9-N1-C2
3	K	1173	EPE	C10-C9-N1-C2
3	B	1173	EPE	C10-C9-N1-C2
3	L	1173	EPE	N4-C7-C8-O8
3	L	1173	EPE	C9-C10-S-O2S

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	K	1173	EPE	1	0
3	G	1173	EPE	1	0
3	B	1173	EPE	1	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

### 6.1 Protein, DNA and RNA chains

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.