



wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 1, 2016 – 08:49 AM GMT

PDB ID : 3G5N
Title : Triple ligand occupancy crystal structure of cytochrome P450 2B4 in complex with the inhibitor 1-biphenyl-4-methyl-1H-imidazole
Authors : Gay, S.C.; Sun, L.; Maekawa, K.; Halpert, J.R.; Stout, C.D.
Deposited on : 2009-02-05
Resolution : 2.50 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
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 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
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) : trunk26865

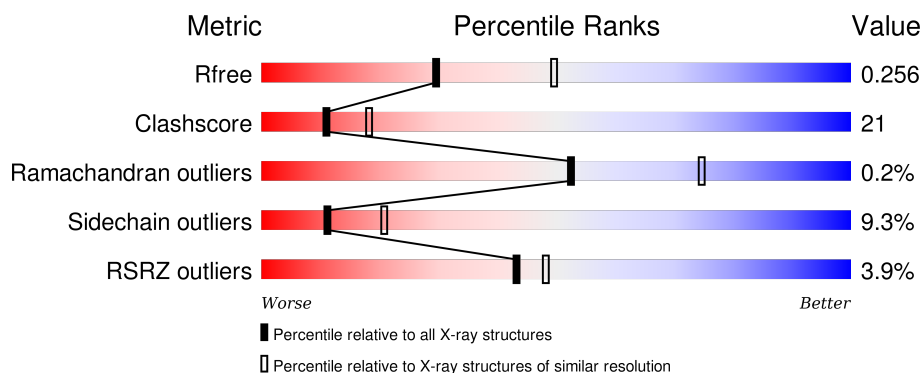
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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}	91344	3553 (2.50-2.50)
Clashscore	102246	4242 (2.50-2.50)
Ramachandran outliers	100387	4156 (2.50-2.50)
Sidechain outliers	100360	4158 (2.50-2.50)
RSRZ outliers	91569	3562 (2.50-2.50)

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	476	<div> <div>4%</div> <div>67% 24% 5% .</div> </div>
1	B	476	<div> <div>2%</div> <div>65% 25% . 5%</div> </div>
1	C	476	<div> <div>5%</div> <div>61% 29% 5% 5%</div> </div>
1	D	476	<div> <div>4%</div> <div>64% 27% . 5%</div> </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
3	PB2	A	503	-	-	X	X
3	PB2	B	502	-	-	X	-
3	PB2	B	503	-	-	X	-
3	PB2	C	502	-	-	X	X
3	PB2	C	503	-	-	X	X
3	PB2	D	502	-	-	X	-
3	PB2	D	503	-	-	X	X
4	CM5	A	504	-	-	-	X
4	CM5	B	504	-	-	-	X
4	CM5	C	504	-	-	-	X
4	CM5	D	504	-	-	-	X

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 14746 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 Cytochrome P450 2B4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	456	Total	C	N	O	S	0	0	0
			3573	2310	607	646	10			
1	B	451	Total	C	N	O	S	0	1	0
			3511	2269	596	637	9			
1	C	452	Total	C	N	O	S	0	1	0
			3504	2265	599	631	9			
1	D	451	Total	C	N	O	S	0	0	0
			3526	2277	600	639	10			

There are 132 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	21	ALA	GLU	ENGINEERED	UNP P00178
A	?	-	PHE	DELETION	UNP P00178
A	?	-	SER	DELETION	UNP P00178
A	?	-	LEU	DELETION	UNP P00178
A	?	-	LEU	DELETION	UNP P00178
A	?	-	LEU	DELETION	UNP P00178
A	?	-	LEU	DELETION	UNP P00178
A	?	-	LEU	DELETION	UNP P00178
A	?	-	ALA	DELETION	UNP P00178
A	?	-	PHE	DELETION	UNP P00178
A	?	-	LEU	DELETION	UNP P00178
A	?	-	ALA	DELETION	UNP P00178
A	?	-	GLY	DELETION	UNP P00178
A	?	-	LEU	DELETION	UNP P00178
A	?	-	LEU	DELETION	UNP P00178
A	?	-	LEU	DELETION	UNP P00178
A	?	-	LEU	DELETION	UNP P00178
A	?	-	LEU	DELETION	UNP P00178
A	?	-	PHE	DELETION	UNP P00178
A	?	-	ARG	DELETION	UNP P00178
A	22	LYS	GLY	ENGINEERED	UNP P00178

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Chain	Residue	Modelled	Actual	Comment	Reference
A	23	LYS	HIS	ENGINEERED	UNP P00178
A	24	THR	PRO	ENGINEERED	UNP P00178
A	25	SER	LYS	ENGINEERED	UNP P00178
A	26	SER	ALA	ENGINEERED	UNP P00178
A	27	LYS	HIS	ENGINEERED	UNP P00178
A	29	LYS	ARG	ENGINEERED	UNP P00178
A	221	SER	PRO	SEE REMARK 999	UNP P00178
A	226	TYR	HIS	ENGINEERED	UNP P00178
A	492	HIS	-	EXPRESSION TAG	UNP P00178
A	493	HIS	-	EXPRESSION TAG	UNP P00178
A	494	HIS	-	EXPRESSION TAG	UNP P00178
A	495	HIS	-	EXPRESSION TAG	UNP P00178
B	21	ALA	GLU	ENGINEERED	UNP P00178
B	?	-	PHE	DELETION	UNP P00178
B	?	-	SER	DELETION	UNP P00178
B	?	-	LEU	DELETION	UNP P00178
B	?	-	LEU	DELETION	UNP P00178
B	?	-	LEU	DELETION	UNP P00178
B	?	-	LEU	DELETION	UNP P00178
B	?	-	LEU	DELETION	UNP P00178
B	?	-	LEU	DELETION	UNP P00178
B	?	-	ALA	DELETION	UNP P00178
B	?	-	PHE	DELETION	UNP P00178
B	?	-	LEU	DELETION	UNP P00178
B	?	-	ALA	DELETION	UNP P00178
B	?	-	GLY	DELETION	UNP P00178
B	?	-	LEU	DELETION	UNP P00178
B	?	-	LEU	DELETION	UNP P00178
B	?	-	LEU	DELETION	UNP P00178
B	?	-	LEU	DELETION	UNP P00178
B	?	-	LEU	DELETION	UNP P00178
B	?	-	PHE	DELETION	UNP P00178
B	?	-	ARG	DELETION	UNP P00178
B	22	LYS	GLY	ENGINEERED	UNP P00178
B	23	LYS	HIS	ENGINEERED	UNP P00178
B	24	THR	PRO	ENGINEERED	UNP P00178
B	25	SER	LYS	ENGINEERED	UNP P00178
B	26	SER	ALA	ENGINEERED	UNP P00178
B	27	LYS	HIS	ENGINEERED	UNP P00178
B	29	LYS	ARG	ENGINEERED	UNP P00178
B	221	SER	PRO	SEE REMARK 999	UNP P00178
B	226	TYR	HIS	ENGINEERED	UNP P00178
B	492	HIS	-	EXPRESSION TAG	UNP P00178

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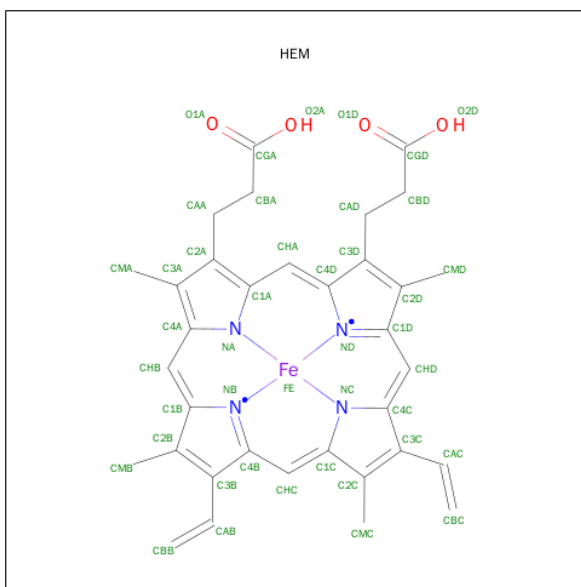
Chain	Residue	Modelled	Actual	Comment	Reference
B	493	HIS	-	EXPRESSION TAG	UNP P00178
B	494	HIS	-	EXPRESSION TAG	UNP P00178
B	495	HIS	-	EXPRESSION TAG	UNP P00178
C	21	ALA	GLU	ENGINEERED	UNP P00178
C	?	-	PHE	DELETION	UNP P00178
C	?	-	SER	DELETION	UNP P00178
C	?	-	LEU	DELETION	UNP P00178
C	?	-	LEU	DELETION	UNP P00178
C	?	-	LEU	DELETION	UNP P00178
C	?	-	LEU	DELETION	UNP P00178
C	?	-	LEU	DELETION	UNP P00178
C	?	-	ALA	DELETION	UNP P00178
C	?	-	PHE	DELETION	UNP P00178
C	?	-	LEU	DELETION	UNP P00178
C	?	-	ALA	DELETION	UNP P00178
C	?	-	GLY	DELETION	UNP P00178
C	?	-	LEU	DELETION	UNP P00178
C	?	-	LEU	DELETION	UNP P00178
C	?	-	LEU	DELETION	UNP P00178
C	?	-	LEU	DELETION	UNP P00178
C	?	-	LEU	DELETION	UNP P00178
C	?	-	PHE	DELETION	UNP P00178
C	?	-	ARG	DELETION	UNP P00178
C	22	LYS	GLY	ENGINEERED	UNP P00178
C	23	LYS	HIS	ENGINEERED	UNP P00178
C	24	THR	PRO	ENGINEERED	UNP P00178
C	25	SER	LYS	ENGINEERED	UNP P00178
C	26	SER	ALA	ENGINEERED	UNP P00178
C	27	LYS	HIS	ENGINEERED	UNP P00178
C	29	LYS	ARG	ENGINEERED	UNP P00178
C	221	SER	PRO	SEE REMARK 999	UNP P00178
C	226	TYR	HIS	ENGINEERED	UNP P00178
C	492	HIS	-	EXPRESSION TAG	UNP P00178
C	493	HIS	-	EXPRESSION TAG	UNP P00178
C	494	HIS	-	EXPRESSION TAG	UNP P00178
C	495	HIS	-	EXPRESSION TAG	UNP P00178
D	21	ALA	GLU	ENGINEERED	UNP P00178
D	?	-	PHE	DELETION	UNP P00178
D	?	-	SER	DELETION	UNP P00178
D	?	-	LEU	DELETION	UNP P00178
D	?	-	LEU	DELETION	UNP P00178
D	?	-	LEU	DELETION	UNP P00178

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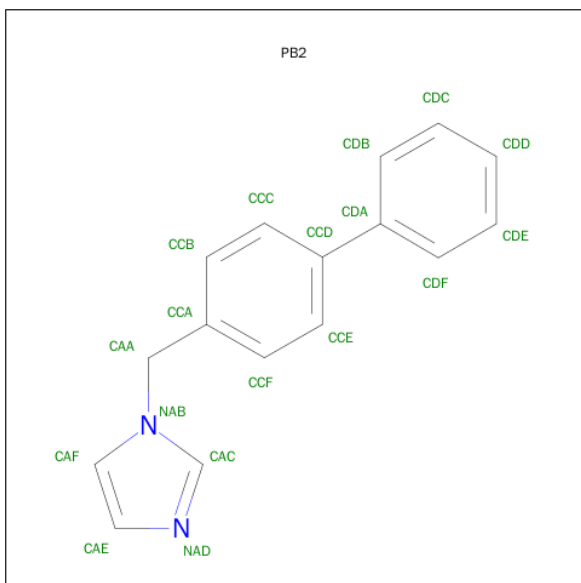
Chain	Residue	Modelled	Actual	Comment	Reference
D	?	-	LEU	DELETION	UNP P00178
D	?	-	LEU	DELETION	UNP P00178
D	?	-	ALA	DELETION	UNP P00178
D	?	-	PHE	DELETION	UNP P00178
D	?	-	LEU	DELETION	UNP P00178
D	?	-	ALA	DELETION	UNP P00178
D	?	-	GLY	DELETION	UNP P00178
D	?	-	LEU	DELETION	UNP P00178
D	?	-	LEU	DELETION	UNP P00178
D	?	-	LEU	DELETION	UNP P00178
D	?	-	LEU	DELETION	UNP P00178
D	?	-	LEU	DELETION	UNP P00178
D	?	-	PHE	DELETION	UNP P00178
D	?	-	ARG	DELETION	UNP P00178
D	22	LYS	GLY	ENGINEERED	UNP P00178
D	23	LYS	HIS	ENGINEERED	UNP P00178
D	24	THR	PRO	ENGINEERED	UNP P00178
D	25	SER	LYS	ENGINEERED	UNP P00178
D	26	SER	ALA	ENGINEERED	UNP P00178
D	27	LYS	HIS	ENGINEERED	UNP P00178
D	29	LYS	ARG	ENGINEERED	UNP P00178
D	221	SER	PRO	SEE REMARK 999	UNP P00178
D	226	TYR	HIS	ENGINEERED	UNP P00178
D	492	HIS	-	EXPRESSION TAG	UNP P00178
D	493	HIS	-	EXPRESSION TAG	UNP P00178
D	494	HIS	-	EXPRESSION TAG	UNP P00178
D	495	HIS	-	EXPRESSION TAG	UNP P00178

- Molecule 2 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).



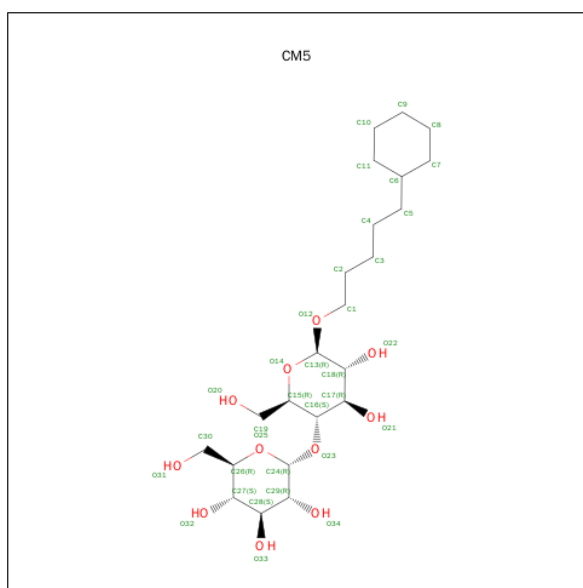
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	B	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	C	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	D	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

- Molecule 3 is 1-(BIPHENYL-4-YLMETHYL)-1H-IMIDAZOLE (three-letter code: PB2) (formula: C₁₆H₁₄N₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C N 18 16 2	0	0
3	A	1	Total C 12 12	0	0
3	B	1	Total C N 18 16 2	0	0
3	B	1	Total C N 18 16 2	0	0
3	B	1	Total C N 18 16 2	0	0
3	B	1	Total C 12 12	0	0
3	C	1	Total C N 18 16 2	0	0
3	C	1	Total C N 18 16 2	0	0
3	C	1	Total C 12 12	0	0
3	D	1	Total C N 18 16 2	0	0
3	D	1	Total C N 18 16 2	0	0
3	D	1	Total C 12 12	0	0

- Molecule 4 is 5-CYCLOHEXYL-1-PENTYL-BETA-D-MALTOSE (three-letter code: CM5) (formula: C₂₃H₄₂O₁₁).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			22	17	5		
4	B	1	Total	C	O	0	0
			22	17	5		
4	C	1	Total	C	O	0	0
			22	17	5		
4	D	1	Total	C	O	0	0
			22	17	5		

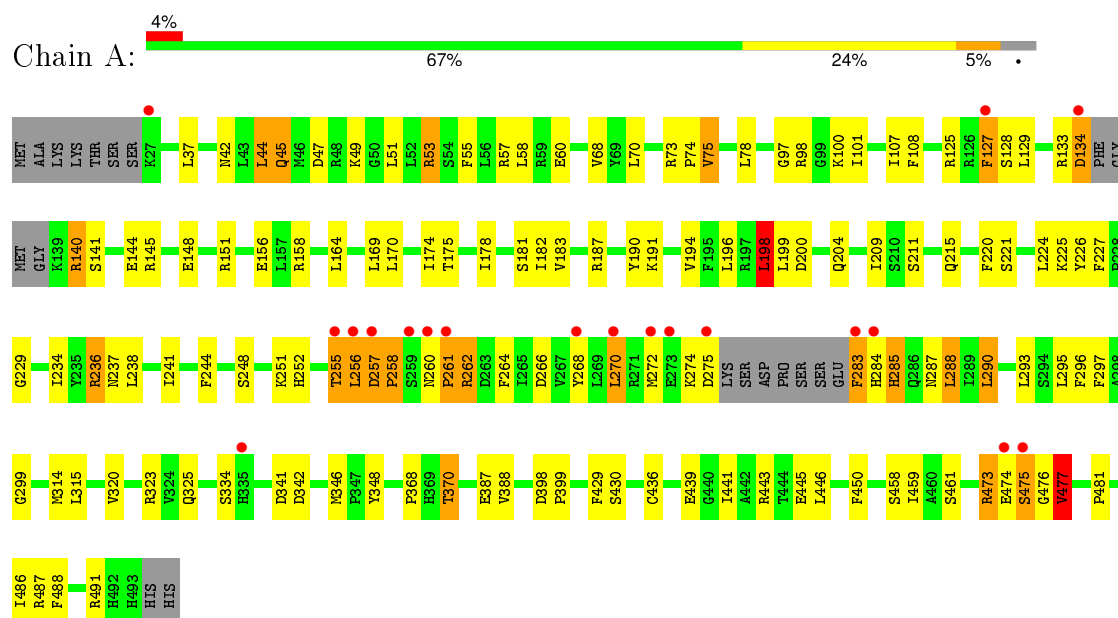
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	56	Total	O	0	0
			56	56		
5	B	40	Total	O	0	0
			40	40		
5	C	30	Total	O	0	0
			30	30		
5	D	54	Total	O	0	0
			54	54		

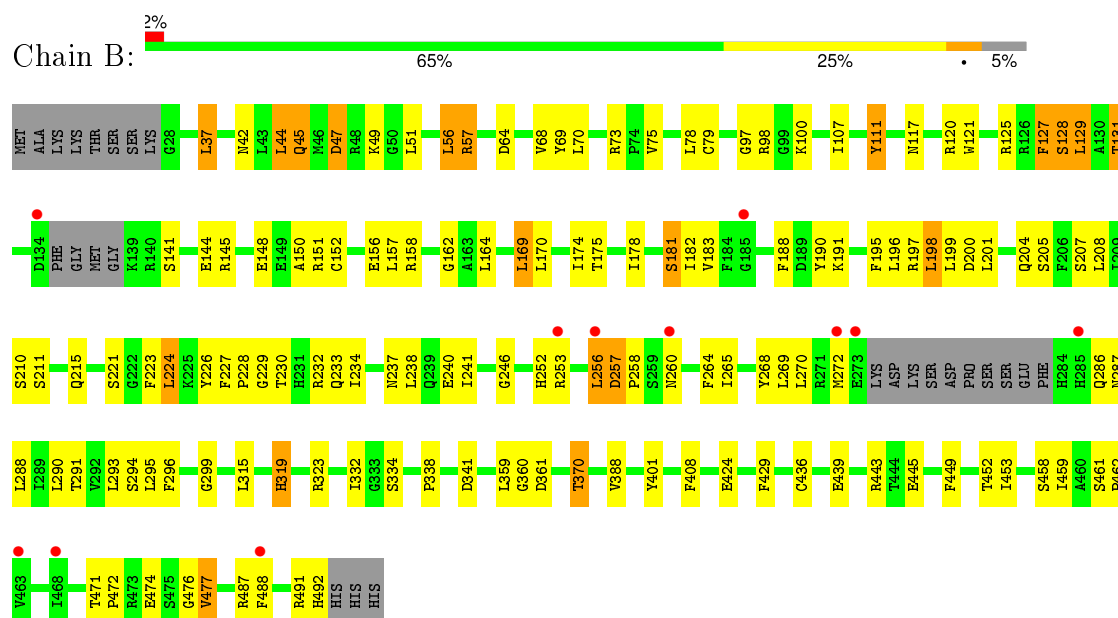
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

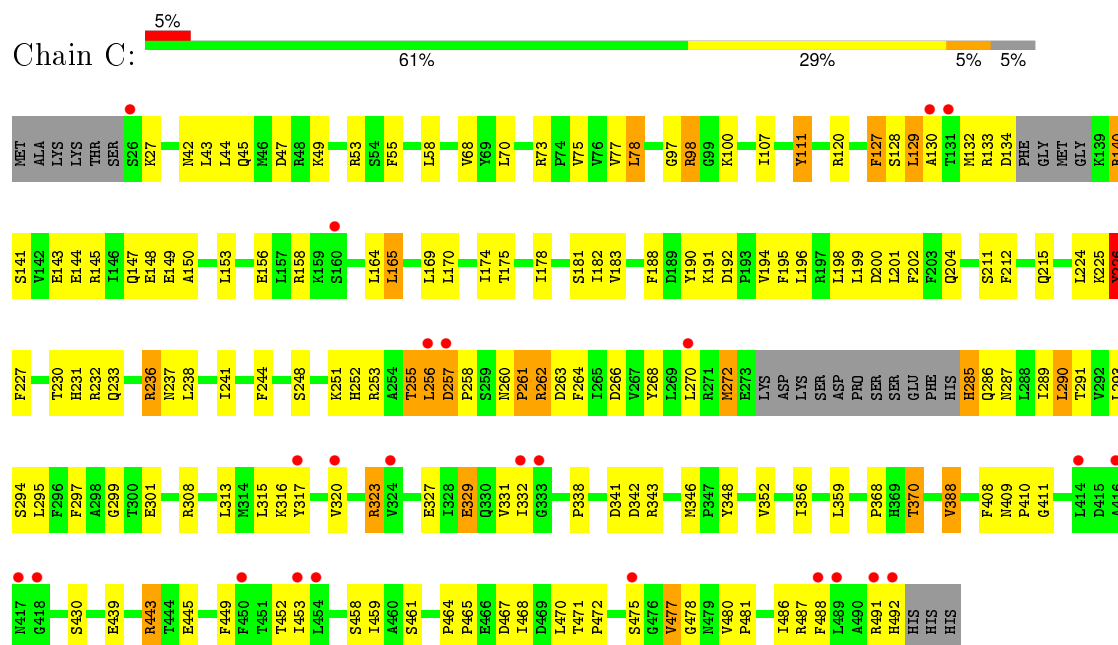
• Molecule 1: Cytochrome P450 2B4



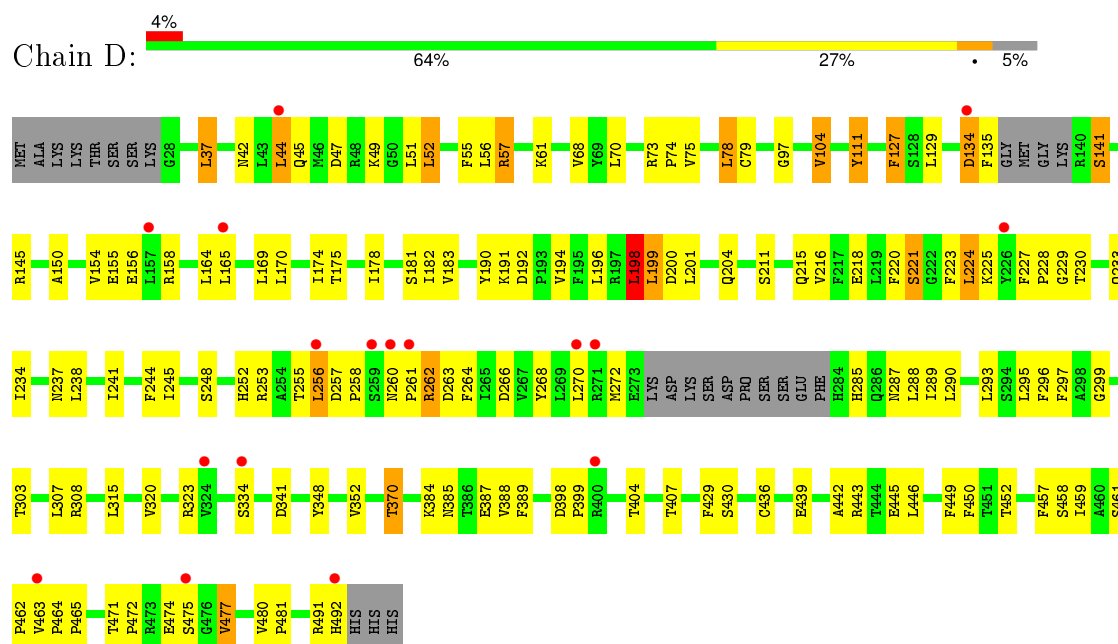
• Molecule 1: Cytochrome P450 2B4



• Molecule 1: Cytochrome P450 2B4



• Molecule 1: Cytochrome P450 2B4



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	86.70Å 152.53Å 181.90Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.48 – 2.50 45.48 – 2.50	Depositor EDS
% Data completeness (in resolution range)	97.0 (45.48-2.50) 97.0 (45.48-2.50)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	0.08	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.79 (at 2.51Å)	Xtriage
Refinement program	PHENIX (phenix.refine)	Depositor
R, R_{free}	0.218 , 0.247 0.230 , 0.256	Depositor DCC
R_{free} test set	4089 reflections (5.27%)	DCC
Wilson B-factor (Å ²)	56.1	Xtriage
Anisotropy	0.010	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 52.6	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	3 of 81677 reflections (0.004%)	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	14746	wwPDB-VP
Average B, all atoms (Å ²)	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.54% 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, 0.375 respectively for untwinned datasets, and 0.333, 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: HEM, CM5, PB2

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	0.95	2/3661 (0.1%)	0.92	3/4974 (0.1%)
1	B	0.90	1/3598 (0.0%)	0.86	2/4893 (0.0%)
1	C	0.90	2/3592 (0.1%)	0.91	4/4888 (0.1%)
1	D	0.90	2/3613 (0.1%)	0.88	3/4912 (0.1%)
All	All	0.91	7/14464 (0.0%)	0.89	12/19667 (0.1%)

The worst 5 of 7 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	75	VAL	CB-CG1	-5.96	1.40	1.52
1	D	79	CYS	CB-SG	-5.94	1.72	1.81
1	A	388	VAL	CB-CG1	-5.76	1.40	1.52
1	B	388	VAL	CB-CG1	-5.56	1.41	1.52
1	C	388	VAL	CB-CG1	-5.25	1.41	1.52

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	111	TYR	N-CA-C	-5.81	95.32	111.00
1	D	198	LEU	CA-CB-CG	5.74	128.50	115.30
1	C	98	ARG	NE-CZ-NH1	-5.70	117.45	120.30
1	D	111	TYR	N-CA-C	-5.68	95.67	111.00
1	C	443	ARG	NE-CZ-NH2	-5.66	117.47	120.30

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	3573	0	3494	146	0
1	B	3511	0	3429	139	0
1	C	3504	0	3407	183	0
1	D	3526	0	3440	139	0
2	A	43	0	30	9	0
2	B	43	0	30	11	0
2	C	43	0	30	5	0
2	D	43	0	30	12	0
3	A	30	0	23	11	0
3	B	66	0	51	22	0
3	C	48	0	37	19	0
3	D	48	0	37	18	0
4	A	22	0	30	1	0
4	B	22	0	30	4	0
4	C	22	0	30	7	0
4	D	22	0	30	1	0
5	A	56	0	0	3	0
5	B	40	0	0	6	0
5	C	30	0	0	0	0
5	D	54	0	0	3	0
All	All	14746	0	14158	600	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 21.

The worst 5 of 600 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:C:141:SER:OG	1:C:144:GLU:HG3	1.33	1.26
1:B:56:LEU:O	1:B:56:LEU:HD12	1.35	1.21
1:C:164:LEU:HD23	1:C:487:ARG:CG	1.72	1.19
1:A:141:SER:OG	1:A:144:GLU:HG3	1.42	1.19
1:C:327:GLU:O	1:C:331:VAL:HG23	1.43	1.18

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	450/476 (94%)	427 (95%)	21 (5%)	2 (0%)	39	61
1	B	446/476 (94%)	417 (94%)	29 (6%)	0	100	100
1	C	447/476 (94%)	418 (94%)	27 (6%)	2 (0%)	39	61
1	D	445/476 (94%)	417 (94%)	28 (6%)	0	100	100
All	All	1788/1904 (94%)	1679 (94%)	105 (6%)	4 (0%)	52	75

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	477	VAL
1	C	286	GLN
1	C	261	PRO
1	A	261	PRO

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	381/421 (90%)	344 (90%)	37 (10%)	10	19
1	B	372/421 (88%)	336 (90%)	36 (10%)	10	19
1	C	368/421 (87%)	335 (91%)	33 (9%)	12	22
1	D	376/421 (89%)	343 (91%)	33 (9%)	12	23
All	All	1497/1684 (89%)	1358 (91%)	139 (9%)	11	21

5 of 139 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	256	LEU
1	C	78	LEU
1	D	262	ARG
1	B	290	LEU
1	B	458	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	287	ASN
1	B	319	HIS
1	D	45	GLN
1	B	233	GLN
1	C	287	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

20 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
2	HEM	A	500	1,3	30,50,50	3.05	9 (30%)	24,82,82	2.17	9 (37%)
3	PB2	A	501	2	19,20,20	2.14	6 (31%)	24,26,26	0.80	0
3	PB2	A	503	-	13,13,20	1.88	4 (30%)	16,16,26	0.93	0
4	CM5	A	504	-	23,23,36	0.49	0	29,29,49	2.18	8 (27%)
3	PB2	B	496	-	19,20,20	2.01	6 (31%)	24,26,26	1.29	4 (16%)
2	HEM	B	500	1,3	30,50,50	3.13	7 (23%)	24,82,82	2.25	9 (37%)
3	PB2	B	501	2	19,20,20	2.37	7 (36%)	24,26,26	0.98	1 (4%)
3	PB2	B	502	-	19,20,20	1.99	4 (21%)	24,26,26	0.87	0
3	PB2	B	503	-	13,13,20	1.92	3 (23%)	16,16,26	0.97	0
4	CM5	B	504	-	23,23,36	0.53	0	29,29,49	2.30	11 (37%)
2	HEM	C	500	1,3	30,50,50	3.21	8 (26%)	24,82,82	2.28	9 (37%)
3	PB2	C	501	2	19,20,20	2.10	7 (36%)	24,26,26	1.44	2 (8%)
3	PB2	C	502	-	19,20,20	2.01	4 (21%)	24,26,26	0.94	0
3	PB2	C	503	-	13,13,20	1.97	3 (23%)	16,16,26	1.21	2 (12%)
4	CM5	C	504	-	23,23,36	0.49	0	29,29,49	1.82	5 (17%)
2	HEM	D	500	1,3	30,50,50	2.65	10 (33%)	24,82,82	2.18	10 (41%)
3	PB2	D	501	2	19,20,20	2.17	7 (36%)	24,26,26	1.45	4 (16%)
3	PB2	D	502	-	19,20,20	2.00	4 (21%)	24,26,26	0.70	0
3	PB2	D	503	-	13,13,20	2.01	4 (30%)	16,16,26	0.99	0
4	CM5	D	504	-	23,23,36	0.49	0	29,29,49	2.51	10 (34%)

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	HEM	A	500	1,3	-	0/10/54/54	0/0/8/8
3	PB2	A	501	2	-	0/8/8/8	0/3/3/3
3	PB2	A	503	-	-	0/4/4/8	0/2/2/3
4	CM5	A	504	-	-	0/11/35/65	0/2/2/3
3	PB2	B	496	-	-	0/8/8/8	0/3/3/3
2	HEM	B	500	1,3	-	0/10/54/54	0/0/8/8
3	PB2	B	501	2	-	0/8/8/8	0/3/3/3
3	PB2	B	502	-	-	0/8/8/8	0/3/3/3
3	PB2	B	503	-	-	0/4/4/8	0/2/2/3
4	CM5	B	504	-	-	0/11/35/65	0/2/2/3
2	HEM	C	500	1,3	-	0/10/54/54	0/0/8/8

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	PB2	C	501	2	-	0/8/8/8	0/3/3/3
3	PB2	C	502	-	-	0/8/8/8	0/3/3/3
3	PB2	C	503	-	-	0/4/4/8	0/2/2/3
4	CM5	C	504	-	-	0/11/35/65	1/2/2/3
2	HEM	D	500	1,3	-	0/10/54/54	0/0/8/8
3	PB2	D	501	2	-	0/8/8/8	0/3/3/3
3	PB2	D	502	-	-	0/8/8/8	0/3/3/3
3	PB2	D	503	-	-	0/4/4/8	0/2/2/3
4	CM5	D	504	-	-	0/11/35/65	0/2/2/3

The worst 5 of 93 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	500	HEM	C3B-C4B	-12.27	1.40	1.51
2	A	500	HEM	C3B-C4B	-11.65	1.41	1.51
2	B	500	HEM	C3B-C4B	-11.47	1.41	1.51
2	D	500	HEM	C3B-C4B	-8.50	1.44	1.51
2	B	500	HEM	C3D-C4D	-7.72	1.41	1.51

The worst 5 of 84 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	504	CM5	C13-O14-C15	-7.80	105.30	113.15
4	B	504	CM5	C13-O14-C15	-5.37	107.75	113.15
4	A	504	CM5	C13-O14-C15	-5.01	108.11	113.15
4	A	504	CM5	C1-O12-C13	-4.36	106.33	113.94
3	C	501	PB2	CCC-CCD-CDA	-4.15	113.96	121.39

There are no chirality outliers.

There are no torsion outliers.

All (1) ring outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	C	504	CM5	C13-C15-C16-C17-C18-O14

19 monomers are involved in 115 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	500	HEM	9	0
3	A	503	PB2	11	0
4	A	504	CM5	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	496	PB2	5	0
2	B	500	HEM	11	0
3	B	501	PB2	2	0
3	B	502	PB2	10	0
3	B	503	PB2	7	0
4	B	504	CM5	4	0
2	C	500	HEM	5	0
3	C	501	PB2	1	0
3	C	502	PB2	13	0
3	C	503	PB2	10	0
4	C	504	CM5	7	0
2	D	500	HEM	12	0
3	D	501	PB2	2	0
3	D	502	PB2	7	0
3	D	503	PB2	10	0
4	D	504	CM5	1	0

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data [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	456/476 (95%)	0.12	19 (4%) 40 45	34, 59, 97, 128	0
1	B	451/476 (94%)	0.05	11 (2%) 62 66	27, 61, 98, 125	0
1	C	452/476 (94%)	0.20	24 (5%) 30 34	31, 62, 100, 123	0
1	D	451/476 (94%)	0.10	17 (3%) 44 49	27, 60, 96, 121	0
All	All	1810/1904 (95%)	0.12	71 (3%) 43 48	27, 61, 98, 128	0

The worst 5 of 71 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	475	SER	6.9
1	C	416	ALA	6.5
1	A	283	PHE	6.1
1	C	130	ALA	5.0
1	A	256	LEU	5.0

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 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(Å ²)	Q<0.9
4	CM5	C	504	22/34	0.86	0.45	16.21	20,20,20,20	0
3	PB2	D	503	12/18	0.82	0.45	13.80	62,69,83,85	12
4	CM5	D	504	22/34	0.91	0.37	9.02	20,20,20,20	0
3	PB2	C	503	12/18	0.78	0.40	6.89	57,66,72,72	12
3	PB2	A	503	12/18	0.87	0.37	5.97	53,63,77,78	12
4	CM5	A	504	22/34	0.88	0.28	5.93	20,20,20,20	0
4	CM5	B	504	22/34	0.86	0.35	5.86	20,20,20,20	0
3	PB2	C	502	18/18	0.90	0.29	3.79	54,78,87,89	0
3	PB2	B	503	12/18	0.90	0.24	1.66	61,73,81,85	12
3	PB2	B	496	18/18	0.95	0.21	0.97	53,60,74,76	0
3	PB2	D	502	18/18	0.93	0.17	0.12	43,65,73,74	0
3	PB2	D	501	18/18	0.97	0.19	0.03	27,39,50,51	0
3	PB2	B	502	18/18	0.94	0.18	-0.01	53,68,82,87	0
2	HEM	D	500	43/43	0.98	0.17	-0.05	36,51,59,63	0
3	PB2	C	501	18/18	0.97	0.15	-0.24	30,46,52,52	0
2	HEM	C	500	43/43	0.98	0.14	-0.44	32,51,61,66	0
3	PB2	B	501	18/18	0.98	0.16	-0.58	30,40,46,51	0
2	HEM	B	500	43/43	0.99	0.13	-0.63	31,43,58,63	0
3	PB2	A	501	18/18	0.99	0.15	-0.88	32,35,47,49	0
2	HEM	A	500	43/43	0.98	0.13	-0.89	31,42,51,63	0

6.5 Other polymers [i](#)

There are no such residues in this entry.