

Observed and calculated wavenumbers (in cm^{-1}) for all cold and hot bands of $^{13}\text{CO}_2$ and $^{12}\text{CO}_2$ recorded by ICLAS-VeCSEL between 8800 and 9530 cm^{-1} .

The observed minus calculated values are given in parentheses in units of the last quoted digit.

Lines overlapped with atmospheric water lines or other CO_2 lines are marked by * and were not included in the fitting.

Assignments and wavenumbers (cm^{-1}) of the observed rotational lines of the 20032–00001 and 20033–00001 transitions of $^{12}\text{C}^{16}\text{O}_2$.

	20032 – 00001		20033 – 00001	
<i>J</i>	<i>P(J)</i>	<i>Obs-Calc</i>	<i>R(J)</i>	<i>Obs-Calc</i>
0		9517.719(0)		9389.754(6)
2	9515.376(-2)	9519.183(1)	9387.406(-1)	9391.232(2)
4	9513.717(-2)	9520.568(-1)	9385.765(-3)	9392.651(1)
6	9511.981(-3)	9521.876(0)	9384.068(3)	9394.007(0)
8	9510.169(-1)	9523.106(-0)	9382.297(-4)	9395.301(0)
10	9508.277(-1)	9524.259(1)	9380.472(-2)	9396.535(3)
12	9506.311(2)	9525.331(-1)	9378.587(3)	9397.701(2)
14	9504.263(-0)	9526.330(2)	9376.629(-2)	9398.803(-1)
16	9502.141(3)	9527.246(0)	9374.610(-4)	9399.848(3)
18	9499.931(-6)	9528.086(1)	9372.534(-1)	9400.825(3)
20	9497.653(-3)	9528.849(2)	9370.390(-4)	9401.739(3)
22	9495.297(-2)	9529.533(2)	9368.185(-2)	9402.586(0)
24	9492.865(1)	9530.139(3)	9365.918(-1)	9403.372(1)
26	9490.353(1)	9530.666(3)	9363.581(-5)	9404.091(-1)
28	9487.760(-1)	9531.115(3)	9361.190(0)	9404.749(2)
30	9485.092(-2)	9531.487(5)	9358.729(1)	9405.337(-1)
32	9482.347(-1)	9531.779(5)	9356.209(5)	9405.862(-1)
34	9479.522(-3)	9531.992(3)	9353.611(-3)	9406.322(-1)
36	9476.622(-3)	9532.130(6)*	9350.960(0)	9406.715(-2)
38	9473.652(5)	9532.164(-17)*	9348.237(-3)	9407.052(7)
40	9470.590(-1)	9532.164(5)*	9345.453(-3)	9407.310(4)
42	9467.457(-2)	9532.057(-1)	9342.608(3)	9407.498(-1)
44	9464.244(-4)	9531.882(3)	9339.689(0)	9407.623(-1)
46	9460.959(-1)	9531.619(-2)	9336.703(-2)	9407.676(-7)*
48	9457.591(-3)	9531.286(2)	9333.659(4)	9407.676(4)*
50	9454.149(-1)	9530.870(0)	9330.536(-2)	
52	9450.628(-2)	9530.374(-0)	9327.352(-1)	
54	9447.033(2)	9529.803(1)		
56	9443.355(-0)	9529.146(-4)		
58	9439.599(-3)	9528.423(5)		
60	9435.770(-1)	9527.611(3)		
62	9431.858(-4)	9526.721(3)		
64		9525.757(7)*		

Assignments and wavenumbers (cm^{-1}) of the observed rotational lines of the 50012 – 00001, 50013 – 00001 and 50014–00001 transitions of $^{12}\text{C}^{16}\text{O}_2$.

	50012 – 00001		50013 – 00001		50014– 00001	
<i>J</i>	<i>P(J)</i>	<i>R(J)</i>	<i>P(J)</i>	<i>R(J)</i>	<i>P(J)</i>	<i>R(J)</i>
0						
2			8963.643(-5)			
4			8962.035(-8)	8968.986(-3)		8835.228(-1)
6			8960.403(-1)	8970.432(-6)		8836.657(-1)
8	9131.412(-2)			8971.850(-3)		8838.045(-1)
10				8973.229(-2)		8839.388(-6)
12	9128.108(2)	9147.497(3)			8823.228(10)	8840.693(-7)
14	9126.417(-8)*	9148.917(3)		8975.888(-1)	8821.456(11)*	8841.963(-3)
16		9150.308(-7)	8951.710(11)	8977.167(2)	8819.636(5)	8843.190(-1)
18		9151.699(2)	8949.853(-2)	8978.420(11)	8817.777(1)	8844.377(0)
20		9153.057(-4)	8947.983(4)	8979.622(4)	8815.884(2)	8845.522(0)
22		9154.406(-1)	8946.077(7)	8980.798(3)		8846.622(-6)
24		9155.748(12)*	8944.132(4)	8981.964(26)*		8847.693(-1)
26		9157.053(5)	8942.154(1)	8983.043(-5)		8848.717(-3)
28		9158.341(-2)	8940.150(5)	8984.121(-4)		8849.707(0)
30			8938.100(-7)	8985.161(-9)		8850.657(3)
32			8933.927(-7)	8986.180(-3)		
34			8931.793(-8)	8987.159(-5)		8852.439(5)
36			8929.643(5)	8988.114(0)		8853.267(1)
38			8963.643(-5)	8989.035(1)		8854.053(-6)
40				8989.929(6)		8835.228(-1)
42				8990.782(1)		
44				8991.587(-24)*		

Assignments and wavenumbers (cm^{-1}) of the observed rotational lines of the 21132 – 01101 and 21133 -- 01101 hot bands of $^{12}\text{C}^{16}\text{O}_2$.

<i>J</i>	21132 -- 01101				21133 -- 01101			
	21132e - 01101e		21132f – 01101f		21133e - 01101e		21133f – 01101f	
	<i>P(J)</i>	<i>R(J)</i>	<i>P(J)</i>	<i>R(J)</i>	<i>P(J)</i>	<i>R(J)</i>	<i>P(J)</i>	<i>R(J)</i>
0								
1		9479.612(1)		9480.361(3)				
2								
3	9475.708(3)	9481.041(4)						
4			9474.880(-1)	9481.762(2)				
5	9474.010(4)							
6			9473.154(2)	9483.082(-7)			9315.065(1)	
7	9472.239(11)*	9483.656(2)				9325.649(7)		
8			9471.352(0)	9484.344(-1)				9326.336(-5)
9	9470.378(5)	9484.846(-1)			9312.357(-4)	9326.887(-5)		
10			9469.478(0)	9485.529(0)			9311.482(8)	9327.583(-1)
11	9468.440(0)	9485.959(-2)			9310.485(-1)	9328.075(0)		
12			9467.526(-7)*	9486.638(-2)*			9309.583(-5)	9328.762(-4)
13	9466.427(-4)	9486.995(-3)			9308.547(2)	9329.186(-5)		
14			9465.516(1)	9487.684(7)			9307.644(4)	9329.891(6)
15	9464.339(-5)	9487.955(-3)			9306.542(4)	9330.243(1)		
16			9463.424(-0)	9488.647(4)			9305.627(-4)	9330.946(4)
17	9462.179(-3)	9488.840(-3)			9304.463(-2)	9331.231(5)		
18			9461.260(-2)	9489.538(1)			9303.567(7)	9331.939(0)
19	9459.936(-6)	9489.651(0)			9302.328(2)	9332.135(-9)		
20			9459.028(1)				9301.429(0)	9332.872(0)
21					9300.123(3)	9332.991(-3)		
22			9456.721(0)	9491.106(-0)			9299.232(-2)	9333.764(21)*
23	9455.242(3)	9491.045(2)			9297.859(11)*	9333.760(-18)*		
24			9454.343(0)	9491.782(-1)			9296.982(3)	9334.544(-9)*
25	9452.777(1)	9491.628(0)			9295.518(7)	9334.487(-7)		
26			9451.894(1)	9492.385(-2)			9294.664(2)	9335.300(1)
27	9450.242(2)	9492.140(1)			9293.095(-12)*	9335.148(5)		
28			9449.376(4)				9292.276(-7)	9335.999(17)*
29	9447.636(5)	9492.578(0)			9290.633(-3)	9335.716(-9)		
30			9446.778(-1)	9493.380(1)			9289.845(2)	
31	9444.951(0)				9288.099(1)	9336.241(3)		
32			9444.110(-5)	9493.767(0)			9287.342(2)	
33	9442.201(1)	9493.246(3)			9285.496(3)	9336.703(19)*		
34			9441.377(-3)	9494.081(-2)			9284.791(17)*	
35	9439.382(2)	9493.463(-9)*						
36			9438.572(-2)	9494.333(6)				
37	9436.484(-6)	9493.630(-1)*						
38			9435.698(1)	9494.504(3)*				
39	9433.535(1)*							
40			9432.749(-1)	9494.615(12) *				
41	9430.489(-23)*							
42								
43								
44			9426.643(-2)					

Assignments and wavenumbers (cm⁻¹) of the observed rotational lines of the 20031–00001, 20032–00001, 20033–00001 and 50013–00001 transitions of ¹³C¹⁶O₂.

	20031 – 00001		20032 – 00001		20033 – 00001		50013 – 00001	
<i>J</i>	<i>P</i> (<i>J</i>)	<i>R</i> (<i>J</i>)	<i>P</i> (<i>J</i>)	<i>R</i> (<i>J</i>)	<i>P</i> (<i>J</i>)	<i>R</i> (<i>J</i>)	<i>P</i> (<i>J</i>)	<i>R</i> (<i>J</i>)
0		9404.885(-5)		9302.901(0)				
2	9402.546(-2)	9406.353(-2)	9300.560(1)	9304.374(4)	9157.300(-1)	9161.135(2)		8837.849(0)
4	9400.890(-2)	9407.742(-2)	9298.901(-6)	9305.772(4)	9155.671(1)	9162.564(-3)		8839.313(-2)
6	9399.162(3)	9409.058(2)	9297.185(2)	9307.096(4)	9153.986(4)	9163.949(4)	8830.732(3)	8840.734(-3)
8	9397.352(3)	9410.292(0)	9295.385(-0)	9308.344(-0)	9152.244(5)	9165.267(1)	8829.032(2)	8842.112(-6)
10	9395.465(1)	9411.453(2)	9293.516(0)	9309.520(-3)	9150.435(-3)	9166.530(-0)	8827.294(4)	8843.448(-8)
12	9393.502(1)	9412.534(0)	9291.574(0)	9310.626(-2)	9148.574(-7)	9167.735(-4)	8825.514(7)	8844.751(-0)
14	9391.467(3)	9413.541(0)	9289.556(-3)	9311.657(-5)	9146.664(-4)	9168.889(-0)	8823.691(10)*	8846.001(-3)
16	9389.350(-0)	9414.468(-3)	9287.471(0)	9312.620(-1)	9144.701(2)	9169.984(0)		8847.211(-2)
18	9387.159(-1)	9415.325(0)	9285.315(5)	9313.508(0)	9142.674(1)	9171.015(-5)*	8819.910(7)	8848.384(2)
20	9384.894(-0)	9416.104(1)	9283.078(1)	9314.323(1)	9140.590(-0)	9172.007(6)*		8849.507(0)
22	9382.550(-3)	9416.804(-0)	9280.755(-16)*	9315.061(-0)	9138.450(-1)	9172.932(8)*	8815.969(12)*	8850.595(6)
24	9380.135(-1)	9417.430(-1)	9278.389(-4)	9315.727(-1)	9136.256(1)	9173.788(-0)		
26	9377.644(-0)	9417.981(0)	9275.942(-0)	9316.320(-1)	9134.004(2)	9174.596(0)		8852.626(-1)
28	9375.078(1)	9418.461(6)	9273.416(-1)	9316.839(-1)	9131.697(5)	9175.345(0)		8853.575(-8)
30	9372.434(-1)	9418.861(6)	9270.819(-0)	9317.285(-1)	9129.325(0)	9176.036(0)		8854.497(1)
32	9369.717(-1)	9419.182(3)	9268.148(-1)	9317.656(-1)	9126.897(-2)	9176.667(-1)		8855.362(-4)
34	9366.927(0)	9419.431(3)	9265.407(1)	9317.951(-3)	9124.419(2)	9177.241(-2)		8856.199(5)
36	9364.058(-4)	9419.602(-0)	9262.589(1)	9318.177(-1)	9121.876(-1)	9177.755(-3)		8856.999(19)*
38	9361.121(-1)	9419.708(7)*	9259.700(1)	9318.326(-1)	9119.283(5)	9178.213(-1)		8857.738(15)*
40	9358.107(-2)		9256.741(5)	9318.398(-4)	9116.617(-5)	9178.615(4)		
42	9355.020(-2)		9253.701(3)		9113.907(-0)	9178.968(20)*		
44	9351.857(-5)		9250.589(0)					
46	9348.630(0)		9247.404(-0)					
48	9345.324(-1)		9244.152(6)					
50	9341.943(-3)		9240.810(-5)					
52	9338.502(4)							
54	9334.981(5)							
56	9331.382(-3)							

Assignments and wavenumbers (cm⁻¹) of the observed rotational lines of the 21131 – 01101 and 21132 -- 01101 hot band of ¹³C¹⁶O₂.

<i>J</i>	21131 -- 01101				21132 -- 01101			
	21131 <i>e</i> - 01101 <i>e</i>		21131 <i>f</i> - 01101 <i>f</i>		21132 <i>e</i> - 01101 <i>e</i>		21132 <i>f</i> - 01101 <i>f</i>	
	<i>P</i> (<i>J</i>)	<i>R</i> (<i>J</i>)	<i>P</i> (<i>J</i>)	<i>R</i> (<i>J</i>)	<i>P</i> (<i>J</i>)	<i>R</i> (<i>J</i>)	<i>P</i> (<i>J</i>)	<i>R</i> (<i>J</i>)
0								
1								
2								
3								9264.568(-6)
4				9405.664(-15)*		9265.274(5)		
5	9397.963(2)					9266.625(-2)	9259.103(7)	9265.983(0)
6			9397.101(29)*	9407.010(7)			9257.376(0)	9267.326(1)
7	9396.187(0)	9407.619(2)				9267.910(-2)		
8			9395.281(15)*	9408.250(-3)			9255.583(-5)	9268.593(-3)
9	9394.338(2)	9408.810(-4)			9254.634(2)	9269.124(1)		
10			9393.390(4)	9409.425(-5)				9269.798(-1)
11	9392.404(-6)	9409.933(-2)			9252.717(-1)	9270.259(-2)		
12				9410.532(1)			9251.804(1)	9270.934(1)
13	9390.412(5)	9410.976(-4)			9250.736(3)	9271.326(1)		
14				9411.552(-7)			9249.811(2)	9271.996(-3)
15	9388.331(3)	9411.950(0)			9248.671(-1)	9272.315(-0)		
16			9387.307(1)				9247.746(1)	9272.996(1)
17	9386.176(1)	9412.842(-2)			9246.543(3)	9273.233(0)		
18			9385.131(-0)	9413.392(-1)			9245.617(4)	9273.923(0)
19	9383.947(1)	9413.647(-15)*			9244.338(3)	9274.078(0)		
20			9382.883(-1)	9414.194(-5)			9243.415(2)	9274.784(3)
21	9381.643(1)				9242.057(0)	9274.851(1)		
22			9380.562(-0)	9414.939(8)			9241.145(0)	9275.562(-9)*
23	9379.269(4)	9415.078(-1)			9239.704(-4)	9275.562(11)*		
24			9378.171(3)	9415.585(-4)			9238.804(-4)	9276.289(-3)
25	9376.815(1)	9415.665(-11)*			9237.279(-8)*	9276.177(-3)		
26			9375.702(2)				9236.406(3)	9276.945(1)
27	9374.287(-4)				9234.794(-2)	9276.735(-3)		
28			9373.158(-1)				9233.928(-1)	9277.527(0)
29	9371.682(-14)*	9416.655(1)			9232.239(6)	9277.224(-1)		
30			9370.545(1)				9231.404(16)*	9278.038(-4)
31	9369.005(-25)*				9229.615(14)*	9277.641(-1)		
32			9367.861(5)				9228.779(-1)	
33					9226.899(-0)	9277.985(-4)		
34			9365.091(-5)				9226.102(-0)	9278.868(2)
35						9278.271(4)		
36								9279.176(1)
37								
38								9279.417(0)
39						9278.626(7)		
40								9279.594(4) *
41						9278.689(-5)		
42								9279.720(25)*

Assignments and wavenumbers (cm^{-1}) of the observed rotational lines of the 20031–00001 and 20032–00001 transitions of $^{18}\text{O}^{13}\text{C}^{16}\text{O}$.

<i>J</i>	20031 – 00001		20032 – 00001	
	<i>P</i> (<i>J</i>)	<i>R</i> (<i>J</i>)	<i>P</i> (<i>J</i>)	<i>R</i> (<i>J</i>)
1			9197.452(-5)	9199.619(5)
2		9305.096(-8)		9200.295(-2)
3	9300.731(-5)		9195.935(3)	9200.967(4)
4	9299.951(2)	9306.429(3)	9195.144(1)	9201.614(3)
5	9299.142(-4)		9194.338(3)	9202.243(1)
6	9298.324(-2)	9307.681(-1)	9193.515(4)	9202.856(0)
7	9297.495(6)		9192.668(-1)	9203.449(-2)
8	9296.640(3)	9308.877(7)	9191.810(0)	9204.026(-3)
9	9295.768(1)		9190.930(-4)	9204.586(-4)
10	9294.876(-4)	9309.999(7)	9190.032(-7)	9205.131(-1)
11	9293.977(1)	9310.550(22)*	9189.121(-7)	9205.655(-3)*
12	9293.058(1)	9311.051(5)	9188.200(2)	9206.166(1)
13	9292.121(0)	9311.534(-15)*	9187.253(3)	9206.659(3)
14	9291.166(-1)	9312.035(0)	9186.280(-6)	9207.127(-1)
15	9290.198(1)		9185.305(1)	9207.584(1)
16	9289.206(-5)	9312.952(-4)	9184.308(4)	9208.020(1)
17	9288.206(-2)	9313.393(1)	9183.288(1)	9208.442(2)
18	9287.185(-3)	9313.805(-6)	9182.256(4)	9208.840(-1)
19	9286.153(0)	9314.226(13)*	9181.210(10)*	9209.225(-0)
20	9285.097(-3)	9314.594(-5)	9180.129(-1)	9209.593(1)
21	9284.028(-2)	9314.979(11)*	9179.044(1)	9209.941(0)
22	9282.950(6)	9315.321(0)	9177.936(-1)	9210.273(1)
23	9281.847(5)		9176.813(-3)	9210.586(1)
24		9315.974(-2)	9175.675(-1)	9210.882(1)
25	9279.594(6)		9174.520(2)	9211.158(-1)
26		9316.565(1)	9173.346(3)	9211.421(0)
27	9277.270(1)		9172.149(-1)	9211.663(0)
28	9276.082(-2)	9317.088(1)	9170.929(-11)*	9211.886(-2)
29			9169.709(-3)	9212.090(-5)
30			9168.466(-1)	9212.283(-2)
31	9272.437(5)		9167.204(-0)	9212.451(-6)
32	9271.177(-5)		9165.925(1)	9212.611(-1)
33			9164.633(7)	9212.745(-3)
34			9163.310(-1)	9212.868(2)
35			9161.986(8)	9212.969(2)
36			9160.628(0)	9213.052(1)
37			9159.251(-8)*	9213.118(2)
38			9157.873(-0)	9213.176(12)*
39			9156.474(4)	
40			9155.047(-3)	
41			9153.607(-5)	