Supporting information

A comprehensive survey of the Mn(I) carbonyls as CO-releasing molecules over the last two decades

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Table 1 The CO releasing kinetics of Mn(I) carbon monoxide releasing properties

CORM	Activation method	CO release Monitoring	CO equivalents (Or moles)	$t_{1/2}$ (min or s)	Solvent used	k_{CO} (min^{-1} or s^{-1})	Quantum yield (Φ_{CO})	Ref
3.1.1. Monodentate ancillary ligands								
CORM-1 [a]	Cold light	*Mb			DMSO			23
1a and **1b** [b]	365 nm	Mb	**1a**: 2.2 ± 0.1 equiv. **1b**: 2.6 ± 0.4 equiv.	**1a**: 6.4 ± 0.1 min **1b**: 5.6 min	Aqueous media			44
2	468 nm	Mb		21.21 min	DMSO	5.05×10^{-4} s^{-1}		45
3a–3f	350 nm	Mb	2 ± 0.33 equiv.		DCM (< 5 %)			46
3.1.2. *N,N*-bidentate ligands **3.1.2.1.** 2,2'-Bipyridine photoCORMs								
4–6	510 nm	Mb		**4a**: 693 s **4b**: 1733 s **5**: 288 s **6**: 1066 s	THF			47, 48
7 [c]	Green, blue, and UV light	Mb/CO detector	2.2 moles	Green: 13 min Blue: 4 min UV: 1 min	PBS	Mb (min^{-1}): Green: 0.053, Blue: 0.173, and UV: 0.693. CO detector (g/(mol·min)) Green: 15.15, Blue: 30.49, and UV: 38.42		48
4a, **8a** and **8b**	405 or 470 nm	*FTIR and ^{1}H NMR spectroscopy			CH_3CN		**4a**: 0.22 ± 0.01 **8a**: 0.20 ± 0.01 **8b**: 0.32 ± 0.02	50
9a–9c	405 or 470 nm	FTIR and ^{1}H NMR spectroscopy			CH_3CN		**9a**: 0.17 ± 0.01 **9b**: 0.15 ± 0.01 **9c**: 0.19 ± 0.01	50, 51
10a and **10b**	405 nm	FTIR, UV-vis, and ^{1}H NMR spectroscopy			CH_3CN		**10a**: 0.38 ± 0.01 **10b**: 0.27 ± 0.01	50
4a, **11a–11c**	420 (**4**, **11a**), 470 (**11b**), 510 (**11c**) nm	Ultrafast *TA spectroscopy			CH_3CN (**4a**, **11a–11c**) and $CHCl_3$ (**4a**)			52
12a–12d	365 nm	Mb	**12a**: 1.66 equiv. **12b**: 2.05 equiv. **12c**: 2.18 equiv. **12d**: 2.22 equiv.	**12a**: 8.41 min **12b**: 5.04 min **12c**: 8.86 min **12d**: 10.70 min	DMSO			54
13a, 13b, 14, 15a, and **15b**	365 nm	Mb	**13a**: 2.4 equiv. **13b**: 1.0 equiv. **14**: 2.1 equiv. **15a**: 1.4 equiv.	**13a**: 5.7 min **13b**: 6.4min **14**: 4.8 min **15a**: 9.5 min	DMSO			55

			15b: 2.0 equiv.	**15b**: 6.9 min				
16a–16e	365 nm	Mb	**16a**: 1.4 equiv. **16b**: 1.4 equiv. **16c**: 1.5 equiv. **16d**: 1.7 equiv. **16e**: 2.2 equiv.	**16a**: 9.5 min **16b**: 11.4 min **16c**: 13.9 min **16d**: 3.9 min **16e**: 8.7 min	DMSO			56
17a and **17b** [d]	365 nm	Mb	**17a**: 2.01 equiv. **17b**: 1.31 equiv.	**17a**: 12.41 min **17b**: 14.05 min	DMSO			57
3.1.2.2. 1,10-phenanthroline photoCORMs								
4, 18–20	UV light and low power (15 mW/cm^2) visible light	UV-vis, and Mb.			DCM	**4**: Vis: 1.21 ± 0.02 UV: 12.11 ± 0.0 **18**: Vis: 4.65 ± 0.03 UV: 2.44 ± 0.03 **19**: Vis: 3.44 ± 0.02 UV: 3.18 ± 0.02 **20**: Vis: 6.29 ± 0.03 UV: 0.94 ± 0.03		58
21	Low power (15 mW/cm^2) visible light (> 405 nm)	FTIR and Mb.	3 CO were released		CH_3CN	10.5 ± 0.02	0.35 ± 0.03	59
22	Low power (15 mW/cm^2) visible light	FTIR and Mb.	3 CO were released		CH_3CN, and 2% (v/v) CH_3CN/ PBS	0.13	0.39 ± 0.03	60
23 and **24**	365–555 nm	FTIR and ^{1}H NMR spectroscopy			Acetone DCM			61
25	Low power (10 mW/cm^2) visible light	Mb			PBS	0.0030 ± 0.010 (s^{-1})		62
26	420 nm	Mb	**26**: 2.3 ± 0.02	**26**: 3.31 ± 2.30	PBS			63
27a	350 nm	Mb, *EPR, FTIR, and NMR spectroscopy			CH_3CN, DCM, CH_3CN/H_2O, and H_2O			65
27b	Low power (15 mW/cm^2) visible light	Mb, EPR, and FTIR spectroscopy			CH_3CN, DMSO and PBS	PBS: 0.44 ± 0.02 CH_3CN: 0.51 ± 0.02		66
28–30	435–450 nm	Mb	1.4 equiv.	**28**: 23 min **29a**: 13 min **29b**: 10 min **30**: 6 min	DCM and 0.5% (v/v) DMSO/H_2O			67

31	730 nm	Mb, EPR, and FTIR spectroscopy			$CHCl_3$ and CH_3CN	**31**: 0.0566 ± 0.0008 min^{-1}	**31**: 0.064 ± 0.002	68
3.1.2.3. $\kappa^2N^1N^2$- terpyridine photoCORMs								
32a–32h	372 nm	FTIR and ^{1}H NMR spectroscopy			CH_3CN		**32e**: 0.7	70, 71
33a–33h	372 nm	FTIR and ^{1}H NMR spectroscopy			CH_3CN and H_2O			71
34 and **35**	405 and 451 nm 750 and 800 nm lasers	*GC–TCD	**35**: 2.53 ± 0.06 (After 180 min of illumination at 451 nm in aerobic EtOH)		H_2O, EtOH, EtOH/ H_2O, and EtOH/PBS		**35** at 451 nm Aerobic EtOH: 0.258–0.277 Anaerobic EtOH: 0.233–0.252	72
36	410 nm	Mb		9.8 min[e]	CH_3CN	0.07065		73
37–42	- 468 nm - 525 nm	Mb	At 468 nm: **37**: 3.00 ± 0.03 equiv. **39**: 5.66 ± 0.16 equiv.[f] **41**: 2.64 ± 0.03 equiv.	**37**: 1.52 ± 0.03 min **39**: 1.68 ± 0.04 min **41**: 2.22 ± 0.15 min	DMSO	**37**: (0.76 ± 0.01) × 10^{-2} s^{-1} **39**: (7.0 ± 0.05) × 10^{-2} s^{-1} **41**: (5.0 ± 0.03) × 10^{-2} s^{-1}		74
3.1.2.4. Benzimidazole and benzothiazole photoCORMs								
43a and **43b**, **44**	468 nm	Mb and ^{1}H NMR spectroscopy		**43a**: 7.82 min **43b**: 2.53 min **44**: 11.42 min	DMSO	**43a**: 0.0014 s^{-1} **43b**: 0.0045 s^{-1} **44**: 0.0010 s^{-1}		75
45 and **46**	468 nm	Mb	2.5 equiv.	**45**: 7.2 min **46**: 2.59 min	DMSO	**45**: 0.0016 s^{-1} **46**: 0.0037 s^{-1}		76
47, **48**, **49a**, **49b**, **50**	468 nm	Mb	**47** and **48**: 2 equiv. **49** and **50**: 5 equiv.	**47**: 3.28 **48**: 3.05 **49a**: 2.04 **49b**: 10.07 **50**: 3.75	DMSO	**47**: 35.3 × 10^{-4} s^{-1} **48**: 38.1 × 10^{-4} s^{-1} **49a**: 56.9 × 10^{-4} s^{-1} **49b**: 11.5 × 10^{-4} s^{-1} **50**: 30.8 × 10^{-4} s^{-1}		77
43a[75], **44**[77], **51**[78] and **52**[78]	365 nm	Mb, CO sensor, and FTIR spectroscopy		**43a**: 15 min **44**: 5 min **51**: 6 min **52**: 10 min	DMSO and CH_3CN	**43a**: 1.9 **44**: 10.8 **51**: 8.0 **52**: 3.4	**43a**: 0.12 **44**: 0.36 **51**: 0.28 **52**: 0.16	75, 77, 78
53a–53h	412–525 nm	CO sensor, and FTIR spectroscopy	468 nm: 0.9–1.8 equiv. 525 nm: **53f**: 0.9 equiv.		DMSO and 10 % (v/v) DMSO/H_2O			79
54	400–440 nm	Mb			DCM CH_3CN 40% (v/v) CH_3CN/H_2O	4.32 ± 0.01 (DCM) 1.05 ± 0.01 (CH_3CN) 0.23 ± 0.01 (40% (v/v) CH_3CN/H_2O)		80

					20% (v/v) DMSO/H_2O	0.61 ± 0.01 (20% (v/v) DMSO/H_2O)		
55 and **56**	Low power (10 mW/cm^2) visible light	Mb			CH_3CN	**55**: 0.98 ± 0.02 **56**: 2.51 ± 0.02		81
57	Low power (15 mW/cm^2) visible light	Mb, EPR, and FTIR spectroscopy			CH_3CN DMSO PBS	PBS: 1.54 ± 0.02 CH_3CN: 0.91 ± 0.02		66
58 and **59**	low-power (mW levels) broadband visible light	Mb			DCM	**58**: 0.96 min^{-1}		82
3.1.2.5. *N,N*-Schiff-base PhotoCORMs								
60a, 60b, 61a, 61b, 62a, 62b	400–550 nm	Mb			CH_3CN THF	**60**: (2.1 ± 0.1) × 10^{-3} s^{-1} **60b**: (1.1 ± 0.1) × 10^{-3} s^{-1} **61a**: (2.6 ± 0.1) × 10^{-3} s^{-1} **61b**: (2.0 ± 0.1) × 10^{-3} s^{-1} **62b**: (1.4 ± 0.1) × 10^{-3} s^{-1}	**60a**: 0.340 ± 0.010 **60b**: 0.116 ± 0.010 **61a**: 0.370 ± 0.010 **61b**: 0.208 ± 0.010 **62b**: 0.130 ± 0.010	83
63 and **64**	≥ 520 nm	Mb, and FTIR spectroscopy			DMSO 10 % (v/v) DMSO/H_2O CH_2Cl_2 CH_3CN	**63**: 25.9 ± 0.2[g] **64**: 11.1 ± 0.2	**63**: 15.2 s	84
65–**67**	Low power (10–15 mW/cm^2) visible light	Mb, and EPR, spectroscopy			DMSO, DCM and PBS	**65**: 5.56 ± 0.02[h] **66**: 12.43 ± 0.02 **67**: 2.84 ± 0.02		85
68	468 nm 525 nm		525 nm: one equiv. 468 nm: three equiv.	525 nm: 27.85 ± 1.60 min 468 nm: 2.01 ± 0.21 min	DMSO	525 nm: (0.40 ± 0.03) × 10^{-3} s^{-1} 468 nm: (0.59 ± 0.03) × 10^{-2} s^{-1}		86
69 and **70**	Broad band (15 mW/cm^2) visible light	Mb			2% (v/v) CH_3CN/PBS CH_3CN DCM $CHCl_3$	**69**: 1.03 **70**: 0.66	**69**: 0.35 ± 0.02 **70**: 0.23 ± 0.02	87
62c–**62f** **71a**–**71d**	525 nm 468 nm	Mb, and FTIR spectroscopy	525 nm: one (**62d**, **71b**) 468 nm: three (**62d**, **71b**)	**62d**: 1.91 ± 0.16 min **71b**: 2.27 ± 0.27 min	DMSO DCM	**62d**: (0.60 ± 0.05) × 10^{-2} s^{-1} **71b**: (0.50 ± 0.05) × 10^{-2} s^{-1}		88
72a–**72f**	365 nm	FTIR			DMSO and DCM			89
73 and **74**	365 nm		**73**: 2	**73**: 22.28 min	DMSO/PBS			90

3.1.2.6. Azo-pyridine photoCORMs								
75a and **75b**	≥ 520 nm	Mb			DCM, CH_3CN 20 % (v/v) CH_3CN/H_2O	DCM: **75a**: 21.94 ± 0.01 min^{-1} **75b**: 15.28 ± 0.01 min^{-1} CH_3CN: **75a**: 11.216 ± 0.01 min^{-1} 20 % (v/v) CH_3CN/H_2O: **75a**: 4.987 ± 0.01 min^{-1}	CH_3CN: **75a**: 0.48 ± 0.01	91, 92
76a–**76e**	≥ 625 nm	Mb	In the dark **76a**–**76b**: ≤ 0.1 equiv. **76c**–**76e**: ≈ 0.7 equiv.	$t_{1/2}$ (h) CH_2Cl_2 **76a**: 3.52 ± 0.06 **76b**: 3.60 ± 0.05 **76c**: 1.21 ± 0.14 **76d**: 0.48 ± 0.01 **76e**: 0.41 ± 0.01 DMSO **76a**: 1.50 ± 0.05 **76b**: 1.13 ± 0.17 **76c**: 0.76 ± 0.05 (3.05 ± 0.30)[i] (0.85 ± 0.11)[i] **76d**: 0.21 ± 0.01 (1.07 ± 0.02)[i] (0.50 ± 0.05)[i] **76e**: 0.31 ± 0.01 (1.23 ± 0.03)[i] (0.54 ± 0.07)[i]	DMSO and DCM			93
3.1.2.7. Other *N*,*N*-bidentate photoCORMs								
77a–**77l**	365 and 480 nm	Portable CO sensor	Illumination for 30 min: **77a** (solid phase): 0.086 (365 nm) and 0.089 (480 nm) CO/CORM		Solid state MeOH			94
78–**81a**	380 nm	FTIR and UV-vis spectroscopy as well as COP-1			DCM and CH_3CN	DCM **78**: (3.0 ± 0.1) × 10^{-3} s^{-1} **79**: (4.0 ± 0.1) × 10^{-3} s^{-1} **80**: (4.9 ± 0.1) × 10^{-3} s^{-1} **81**: (2.3 ± 0.1) × 10^{-3} s^{-1} CH_3CN **78**: (1.3 ± 0.1) × 10^{-3} s^{-1} **79**: (3.0 ± 0.1) × 10^{-3} s^{-1} **80**: (1.0 ± 0.1) × 10^{-3} s^{-1} **81**: (1.0 ± 0.1) × 10^{-3} s^{-1}	DCM **78**: ___ **79**: 0.05 ± 0.01 **80**: 0.06 ± 0.01 **81**: 0.02 ± 0.01	95, 96
81a	307 nm 350 nm	Mb			CH_3CN	307 nm: (11.7 ± 0.2) × 10^{-2} s^{-1} 350 nm: (5.2 ± 0.2) × 10^{-3} s^{-1}	(5.2 ± 0.2) × 10^{-3}	95

81b	468 nm	Mb	3 equiv.	17.28 ± 3.6 min	DMSO	(7.0 ± 0.10) × 10^{-4} s^{-1}		97
82	365 nm	Mb	1.3 moles		DMSO			98
3.1.3. *N,O*-bidentate ligands								
83	400 and 465 nm	Mb	465 nm: 1.4 moles 400 nm: 2 moles		DMSO			99–101
84 and **85**	400–700 nm	Mb and IR spectroscopy			CH_3CN MeOH (Mb)	**84**: (1.92 ± 0.02) × 10^{-3} and (2.76 ± 0.03) × 10^{-3} **85**: (3.30 ± 0.01) × 10^{-3} and (4.46 ± 0.04) × 10^{-3}		103
86a and **86b**	468 nm	Mb	DMSO: **86a**: 2.75 ± 0.03 equiv. **86b**: 2.33 ± 0.02 equiv. H_2O: **86a**: 0.66 equiv. **86b**: 1.31 equiv.	DMSO: **86a**: 10.26 min **86b**: 8.93 min H_2O: **86a**: 5.4 min **86b**: 5.2 min	DMSO H_2O	DMSO: **86a**: 1.1 × 10^{-3} s^{-1} **86b**: 1.3 × 10^{-3} s^{-1} H_2O: **86a**: 2.1 × 10^{-3} s^{-1} **86b**: 2.2 × 10^{-3} s^{-1}		104
87	468 nm	Mb	3 equiv.	4.54 ± 0.17 min	DMSO	(26.0 ± 0.18) × 10^{-3} s^{-1}		97
88	- UV (365–370 nm) - Blue (465–470 nm) - Green (520–530 nm)	- Mb - CO detector	Mb: UV: 2.3 moles Blue: 2.1 moles Green: 1.4 moles	Mb: UV: 7 min Blue: 37 min Green: 62 min	PBS	Mb: (min^{-1}) / CO detector: (g/mol.min) UV: 0.099 / 2.74 Blue: 0.019 / 2.07 Green: 0.011 / 1.11		49
3.1.4. *N,S*- and *N,Se*-bidentate ligands								
89	468 and 525 nm	Mb and CO sensor	CO sensor: 468 nm: 1.5 equiv. 525 nm: 1.0 equiv. Mb: 468 nm: 2.62 equiv. 525 nm: 1.70 equiv.	Mb: 468 nm: 1.0 ± 0.1 min 525 nm: 15.0 ± 0.2 min	DMSO	Mb: 468 nm: 0.01155 s^{-1} 525 nm: 0.00066 s^{-1}		106
90a, **90b** and **91**	468 nm	Mb	**90a**–**90b**: 2 equiv. **91**: one equiv.		DMSO			107
92–**94**	380 nm	*COP-1 UV IR NMR	3 COs		DCM, CH_3CN PBS, pH 7.4	UV: **92**: (1.82 ± 0.03) 10^{-3} s^{-1} **93**: (7.76 ± 0.15) 10^{-3} s^{-1} **94**: (7.87 ± 0.15) 10^{-3} s^{-1}		108
95a–**95d**	365 nm (UV) 405 nm (purple) 435 nm (blue)	Mb	(equiv.) UV Purple Blue **95a**: 2.04, 1.64, 1.08 **95b**: 2.43, 2.23, 1.24 **95c**: 2.17, 2.01, 1.85 **95d**: 2.05, 1.55, 1.32	(s) UV Purple Blue **95a**: 11.03 8.46 92.31		(s^{-1}) UV Purple Blue **95a**: 0.0262, 0.0139, 0.00666 **95b**: 0.0121, 0.0138, 0.0181 **95c**: 0.0184, 0.0145, 0.00488 **95d**: 0.0195, 0.057, 0.0064		110

				95b: 12.47 17.20 95.75 **95c**: 12.69 46.28 56.81 **95d**: 44.54 59.59 65.90				
96	Insufficiently soluble for the Mb assay							111
3.1.5.1. Polynuclear photoCORMs **3.1.5.1.** Homonuclear photoCORMs								
97a, **97b** and **98**	410 nm	Mb	**97a**: 7.56 ± 0.02 equiv. **97b**: 15.24 ± 0.15 equiv. **98**: 1.51 ± 0.07 equiv.	**97a**: 14.54 ± 0.25 min **97b**: 16.84 ± 0.56 min **98**: 7.41 ± 0.24 min	10 % (v/v) DMSO/H_2O	**97a**: 0.000795 s^{-1} **97b**: 0.000686 s^{-1} **98**: 0.001558 s^{-1}	**97a**: (2.66 ± 0.16) x 10^{-3} **97b**: (2.71 ± 0.49) x 10^{-3} **98**: (3.15 ± 0.27) x 10^{-3}	113
99a–**99h**	470 nm	Mb and IR gas phase spectroscopy	Mb: **99a**: 3 molecules[j] IR spectroscopy: Dark 2.37 ± 0.06 molecules Illumination 7.41 ± 0.31 molecules	IR spectroscopy: Dark 459 ± 80 s Illumination 750 ± 340 s	DMSO	IR spectroscopy: Dark 459 ± 80 s Illumination 750 ± 340 s		114
100	365 and 405 nm	Portable CO sensor and IR spectroscopy	CO sensor: (μmol/mg) 405 nm *100-PLA: 8.1–8.3 *100-PMMA: 11.0–11.7 365 nm: 100-PLA: 10.7 100-PMMA: 11.5–11.6		Solvent-free			115
101 and **102**	365, 405, 470 and 480 nm	Mb and IR gas phase spectroscopy	**101** (equiv.) Mb: 365 nm: 5.36 405 nm: 4.57 480 nm: 2.82 Gas IR spectroscopy: 365 nm: 6.4 ± 0.4 470 nm: 6.0 ± 0.5	**101** Gas IR spectroscopy: 365 nm: 920 ± 90 s 470 nm: 920 ± 140 s	PBS			116
103 and **104**	365 nm	Mb	**104**: 1.8 mol		DMSO			117 – 119
105a–**105d**	365 nm	Mb						120
106a–**106h**	365 nm	Mb	**106e**: 2.65 ± 0.13 moles **106f**: 3.61 ± 0.089 moles					121

107a–**107f**	365 nm	Mb	**107b**: 2.89 ± 0.024 equiv.					122
108a and **108b**	365 nm	Mb FTIR	Mb: **108a**: 1.73 ± 0.21 equiv. **108b**: 1.87 ± 0.05 equiv.	Mb: **108a**: 9.21 × 10^2 min **108b**: 3.27 × 10^2 min	DMSO			123
109a–**109 h**	520–560 nm	Mb	**109e**: 3.83 ± 0.09 equiv. **109g**:3.18 ± 0.12 equiv.	**109e**: 5.37 × 10^2 s **109g**: 5.82 × 10^2 s	PBS	**109e**: 1.29 × 10^{-3} s^{-1} **109g**: 1.19 × 10^{-3} s^{-1}		124
110	520–530 nm (Green) 465–470 nm (Blue) 365–370 nm (UV)	Mb	Green: 2.5 equiv. Blue: 2.9 equiv. UV: 2.8 equiv.	Green: 10 min Blue: 6 min UV: 2 min	PBS	Green: 0.069 min^{-1} Blue: 0.116 min^{-1} UV: 0.347 min^{-1}		125
3.1.5.2. Heteronuclear photoCORMs								
111a–**111 d**	Deep red (**111a**–**111b**) NIR (**111c**–**111d**)	GC-TCD	**111b** (mol): Aerobic CH_3CN: 2.28[k] (453 nm), 2.01[k] (659 nm), 1.96[l] (659 nm) Anaerobic CH_3CN: < 0.09[k] Anaerobic 90 % (v/v) $CH_3CN/CHCl_3$: < 0.07[k] Aerobic CH_2Cl_2: 1.87[k]		Aerobic CH_3CN Anaerobic CH_3CN 90 % (v/v) CH_3CN/ $CHCl_3$ Aerobic CH_2Cl_2			129
112 and **113**	470 and 627 nm	FTIR and GC	3 equiv.		CH_3CN		Φ_{470}[m] **112**: 0.37 ± 0.06 (0.22 ± 0.03)[n] **113**: 0.16 ± 0.03 (0.049 ± 0.008)[n] Φ_{627}[m] **112**: 0.38 ± 0.04 **113**: 0.13 ± 0.01	130
114a and **114b**	470 nm	FTIR	**114a**: 3 COs were released		CH_3CN			131
115a–**115f**	365 nm	UV-vis. and FTIR spectroscopy			CH_3CN			132
3.1.6. Tridentate ligands **3.1.6.1.** Di-(2-picolyl)amine based photoCORMs								
117, **118** and **119a**–**119 c**	365 nm	Mb	**119a**: 1.59 equiv. **119b**: 2.65 equiv. **119c**: 1.65 equiv.	20 min for all	DMSO			134

120	365 nm	Mb	365 nm: 3.2 ± 0.1 equiv. Dark incubation: 2.2 ± 0.1 equiv.		DMSO			136
121	365 nm	IR spectro-electrochemistry	3 COs		CH_3CN/ 0.1 M $(Bu_4N)PF_6$			137
122a and **122b**	410 nm	Mb		**122a**: 16.7 min **122b**: 23.2 min	CH_3CN	**122a**: 0.0416 ± 0.0025 min^{-1} **122b**: 0.02983 ± 0.00113 min^{-1}	**122a**: 0.599 ± 0.036 **122b**: 0.426 ± 0.016	138
123 and **124**	307 nm 350 nm	Mb		1.4–2.2 min	CH_3CN PBS	307 nm **123:** (9.1 ± 0.2) × 10^{-2} s^{-1} **124:** (8.1 ± 0.2) × 10^{-2} s^{-1} 350 nm **123:** (6.0 ± 0.2) × 10^{-3} s^{-1} **124:** CH_3CN: (8.3 ± 0.2) × 10^{-3} s^{-1} PBS: 5.6 × 10^{-3} s^{-1}	**123:** 0.07 ±0.01 **124:** 0.06 ± 0.01	95
124-Al-MCM-41	> 350 nm	Mb			PBS	**124-Al-MCM-41** released CO more slowly than from **124**.		139
125 and **126**	405 nm H_2O_2	Mb	3 COs		Aqueous PBS			140
127	490 nm 470 nm 450 nm 413 nm 365 nm	Mb and Confocal laser scanning microscopy	Confocal laser scanning microscopy: 150 ppm at 470 nm		1% (v/v) (DMSO/ PBS)	490 nm: 5 min^{-1}	365 nm: 8% 413 nm: 7.7% 450: 3.5 % 490 nm: 1.2%	141
128	405 nm	Mb	**128**: 3 equiv. **128** entrapped on a paper strip: 1.5 μM mg^{-1}		DMSO		1.5 ± 0.2%	142
129 and **130**	two-photon laser beam (800 nm)	CO gas sensor	**129**: 220 ppm **130**: 145 ppm **129** and **130** embedded in poly(L-lactide-co-D/L-lactide) nonwoven fabric material released about 22 and 10 ppm, respectively.		CH_3CN			143
131 and **132**	550 nm	Mb, Solution IR and CO sensor	**131:** Mb and Solution IR: 3 equiv. **132:** CO sensor: 50 ppm **132-PTFE:** 45 ppm		2% (v/v) (DMSO/ PBS)	**131–132:** 13 s^{-1}		146
133–135	550–560 nm > 345 nm	UV-vis. and Gas chromatography	About 2.5 units	**133**: 49.9 s At 345 nm: **133**: 6.8 s **135**: 1.7 min	CH_3CN	**133**: 0.01389 s^{-1}	At 475nm: **133**: 0.42 **134**: 0.025	147

3.1.6.2. Pyrazolyl and imidazolyl photoCORMs								
136	365 nm	Mb IR spectroscopy	About 2 COs 3 COs		DMSO CH_3CN			149 - 152
137	365 nm	Mb	1.7 equiv.					153
138 and **139**	365 nm	Mb	**138a–138b**: 2 moles **139a–139c**: 1 mole		DMSO			155
140–143	365 nm	Mb	**140**: 1.61±0.29 equiv. **141**: 1.37±0.08 equiv. **142**: 2.28±0.01 equiv. **143**: 1.04±0.28 equiv.	**140**: 19 min **141**: 32 min **142**: 17 min **143**: 13 min	DMSO			156
144a–144c **145a–145b**	365 nm 410 nm	Mb	**144a**: 2.3 ± 0.1 equiv. **144b**: 2.5 ± 0.1 equiv. **144c**: 2.3 ± 0.1 equiv. **145a**: 2.1 ± 0.1 equiv. **145b**: 2.1 ± 0.1 equiv.	**144a**: 21.6 ± 0.3 min **144b**: 21.3 ± 0.5 min **144c**: 18.5 ± 0.2 min **145a**: 25.8 ± 0.2 min° **145b**: 28.7 ± 0.8 min	DMSO	**144a**: 0.00642 s^{-1} **144b**: 0.01060 s^{-1} **144c**: 0.01208 s^{-1} **145a**: 0.00783 s^{-1} **145b**: 0.00745 s^{-1}	**144a**: (5.9 ± 0.2) × 10^{-3} **144b**: (6.3 ± 0.4) × 10^{-3} **144c**: (6.6 ± 0.1) × 10^{-3} **145a**: (4.4 ± 0.2) × 10^{-3} **145b**: (4.3 ± 0.2) × 10^{-3}	157
146, **147** and **148a** and **148b**	365 nm	Mb - **146**: IR spectroscopy[151]	**146–147**, **148a**: ≈ 2 equiv. **148b**: 1.42 ± 0.04 equiv. **146**: 3 COs[151]	**146**: 6.73 min **147**: 11.35 min **148a**: 3.77 min **148b**: 217 min	DMSO **146**: CH_3CN[151]			44, 151 158, 159
149	405 nm 470 nm	Mb and IR gas phase spectroscopy	IR: 405 nm: 2.92 ± 0.45 CO 470 nm: 2.79 ± 0.56 CO Mb: 2 COs	IR: 405 nm: 408 ± 81 s 470 nm: 1950 ± 310 s	PBS			161
3.1.6.3. Other tridentate based photoCORMs								
150	365 nm	Mb	1 equiv.	93.0 ± 9.2 min	DMSO			111
151 and **152**	365 nm 405 nm 380 nm	- IR gas phase spectroscopy - Mb	IR, at 365 nm: **151**: 2.86 ± 0.28 CO **152**: 2.61 ± 0.12 CO		PBS	Myoglobin, at 380 nm: **151**: 236 ± 24 s **152**: 384 ± 6 s		162
3.1.7. Drug based photoCORMs								
153	525 nm 468 nm	Mb	525 nm: 1 equiv. 470 nm: 2.85 equiv.		DMSO			163
154 and **155**	412–468 nm	Mb	**155**: 0.5 equiv. (410 nm), < 0.5 equiv. (468 nm)		DMSO			164

3.2. Tetracarbonyl Mn(I) photoCORMs								
156a and **156b**	365–400 nm	Mb	3 COs	365 nm: **156a**: 960 s (40 μM) **156b**: 1740 s (40 μM) 400 nm: **156a**: 300 s (10 μM), 360 s (40 μM)	DMSO			165
157a–157f	365 nm 400 nm	Mb (365 nm)	**157c**, **157d**: 3 COs	**157a**: 23 min **157b**: 17 min **157c**: 27 min **157d**: 18 min **157e**: 30 min **157f**: 14 min				166
158–162	400 nm	Mb	**158**, **159**: about 3 COs **162**: 2.5 equiv.		DMSO			167
4. Thermal and redox Mn(I) CORMs **4.1.** CORM-401								
163	Spontaneous	Mb[168, 169] GC[168]	Mb: 3.2 equiv.[169] GC: 0.33 equiv.[169] 3 COs[168]	0.8 min[169]	PBS[168, 169]			168, 169
4.2. Other Mn(I) CORMs								
165–168	Spontaneous	Hemoglobin assay		**165**: 11.1 min **166**: 8.6 min **167**: 11.3 min **168**: 65 min	Aqueous solutions			207
169	100 W Xe arc lamp 355 nm	Time-resolved IR			THF CH_3CN			209
170–172	Thermally and 400 nm	Mb			H_2O			210

[a] CORM-1 reduces acute hypertension and coronary vasoconstriction in rats.
[b] Complexes **1a** and **1b** released 1.1 ± 0.1 ($t_{1/2}$ = 124 min) and 2 ($t_{1/2}$ = 73 min) equivalents, respectively of CO under dark conditions upon dissolution in aqueous media.
[c] Complex **7** can block the release of NO and TNF-α in LPS-stimulated RAW264.7 macrophages without clear cytotoxicity.
[d] Along with an increase in concentration and CO release, antioxidant activities of **17a** and **17b** have also grown.
[e] When F^- ions are present, the rate of CO release is rapid and has a $t_{1/2} < 1$ (0.8608) min (k_{CO} = 0.805 min^{-1}).
[f] Upon illumination of **39** at 525 nm, approximately 4 equivalents of CO were released.
[g] The k_{CO} values of **63** in DCM and CH_3CN were 19.7 ± 0.2 ($t_{1/2}$ = 15.2 s) and 16.9 ± 0.2 min^{-1} upon illumination at 520 nm, respectively.
[h] The k_{CO} values of **65** were 5.11 ± 0.02 min^{-1} using light with power of 10 mW/cm^2 and 2.35 ± 0.02 min^{-1} using power of 1 mW/cm^2.
[i] Under dark conditions.
[j] Prior to illumination, **99a** released 0.1 molecule of CO/CORM under dark conditions.
[k] 2.75 mM, [m] 0.13 mM.

[l] PF_6^- salts of the complexes in CH_3CN at ambient temperature.
[m] Cl^- salts of the complexes in H_2O at ambient temperature.
[n] Upon illumination at 410 nm, the $t_{1/2}$ value reached to 132 min as a result of the poor absorption at this higher wavelength.
[o] The quantity of CO released by CORM-401 increased in presence of oxidants.
[*]Abbreviations:
Mb: myoglobin assay.
FTIR: Fourier transform infrared spectroscopy.
TA: time-resolved.
EPR: electron paramagnetic resonance.
GC: Gas chromatography.
TCD: thermal conductivity detector.
COP-1: carbon monoxide Probe 1.
PLA: poly(L-lactide-co-D/L-lactide).
PMMA: poly(methyl methacrylate).

Table 2 Antimicrobial properties of the tested Mn(I) carbon monoxide releasing molecules.

CORM	Activation wavelength	Bacteria/Fungi	Antimicrobial/Antifungal activity	Ref.
3.1.1. Monodentate ancillary ligands				
3a–3f	350 nm	*Escherichia coli*	• All **3a–3f**, except for **3d** exhibited no antibacterial activity. • MIC = 128 μg/mL in the dark and 256 μg/mL if light induced	46
3.1.2. *N,N*-bidentate ligands **3.1.2.1.** 2,2'-Bipyridine photoCORMs				
17a and **17b**	365 nm	*Escherichia coli*, *Bacillus subtilis*, *Micrococcus luteus*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, and Listeria monocytogenes. *Candida albicans* and *Aspergillus niger*.	• Both displayed moderate to strong antimicrobial activity against some strains. • **17a** exhibited antifungal activity against *Candida albicans* and *Aspergillus niger*, in the dark. • Antioxidant activities of **17a** and **17b** have been grown after illumination.	57
3.1.2.2. 1,10-Phenanthroline photoCORMs				
23 and **24**	365–555 nm	*Escherichia coli*	• While **23d** did not inhibit *E. coli* from growing, the photolyzed solution completely suppresses the bacterial growth. • The toxicity had been attributed to the presence of phenanthroline species.	61
28–30	435–450 nm	Multi-drug resistant bacteria	• The toxicity appears to be related to the combination of CO release and iCORM, based on the difference in toxicity under light and dark settings. • **30** displayed poor antibacterial activity at low doses, however it was active only at ≥ 128 μg/mL against the Gram-negative bacteria. • They were only mildly harmful to *Galleria mellonella*.	67
3.1.2.3. $\kappa^2N^1N^2$- terpyridine photoCORMs				
37–42	468 nm 525 nm	*Escherichia coli*, *Candida albicans* *Candida neoformans*	• **41** displayed toxicity to *Escherichia coli* with MIC value of 8 μg/mL. • All compounds exhibited antifungal activities against *C. albicans* and *C. neoformans* (MIC = 4–32 μg/mL).	74

3.1.2.5. *N,N*-Schiff-base photoCORMs				
68	468 nm 525 nm	*Candida albicans* *Candida neoformans*	• **68** displayed antifungal activity (16 μg/mL) against *C. albicans* and *C. neoformans* in the dark. • **68** was harmful to the HEK-293 with CC_{50} of 12.56 μg/mL.	86
3.1.3. *N,O*-bidentate ligands				
83	400 and 465 nm	*E. coli* W3110	• *E. coli* W3110 cell growth is inhibited by **83** after only irradiation. • When **83** is pre-irradiated before the addition of *E. coli* W3110 cells, the growth profile of the bacteria is like that observed in the absence of CORM indicating that the bactericidal effect is caused by in situ breakdown of the CORM in the presence of cells. • Both **83** and its iCORM are not toxic to the tested bacteria.	99–101
3.1.4. *N,S*- and *N,Se*-bidentate ligands				
95a–95d	365–435 nm	*Corynebacterium diphtheriae*, *Yersinia enterocolitia* and *Micrococcus luteus*.	• The complexes may inhibit the growth of the tested microbes. • Blue light significantly improves their antibacterial properties. • iCORMs were inactive than the parent compounds. • The CO release brought on by irradiation is what caused the growth inhibition.	110
3.1.6. Tridentate ligands **3.1.6.1.** Di-(2-picolyl)amine based photoCORMs				
120	365 nm	*Escherichia coli*	• Upon illumination, a pronounced and concentration-dependent reduction in the rate of treated *E. coli* growth was seen when using medium with succinate (the only carbon source) was observed.	136
133–135	550–560 nm > 345 nm	*Escherichia coli*	• Against *E. coli*, the loaded non-woven fabric demonstrated substantial reductions in bacterial growth after being exposed to light for 6 h.	147
4. Thermal and redox Mn(I) CORMs **4.1.** CORM-401				
163	Spontaneously	*Escherichia coli* *Pseudomonas aeruginosa*	• **163** inhibits bacterial growth when used in conjunction with cefotaxime and trimethoprim, studies on fractional inhibition show no interaction.	194

			• The resistance of *P. aeruginosa* to **163** may be due the failure of these bacteria to accumulate **163** intracellularly.	

Table 3 Cytotoxic properties of Mn(I) carbon monoxide releasing molecules

CORM	Activation wavelength	Cell line *	Cytotoxic activity	Ref.
3.1.1. Monodentate ancillary ligands				
2	468 nm	THP-1 and BM.	• Under dark conditions, **2** showed mild selective cytotoxic effect with IC_{50} = 68.02 ± 5.7 μg/mL THP-1, and no negative effects were observed against BM cells. • The cytotoxicity of **2** did not largely alter upon the illumination with IC_{50} = 72.62 ± 5.6 μg/mL. • Upon illumination **2** caused extreme cytotoxicity against BM cells with IC_{50} = 4.67 ± 0.2 μg/mL.	45
3a–3f	350 nm	3T3 fibroblasts	• When incubated at 100 μM, **3a**–**3f** showed a distinct toxic effect in the dark and under light conditions.	46
3.1.2. *N,N*-bidentate ligands **3.1.2.1.** 2,2'-Bipyridine photoCORMs				
7	Green, blue, and UV light	RAW264.7 macrophages	• Both **7** and its iCORM are almost non-toxic. • **7** can block the release of NO and TNF-α in LPS-stimulated RAW264.7 macrophages without clear cytotoxicity.	49
13a, **13b**, **14**, **15a** and **15b**	365 nm	MCF-7	• IC_{50} (μM) values upon illumination are 3.1 ± 0.1, 21 ± 1, 10 ± 1, 2.91 ± 0.07 and 9.7 ± 0.6 in that order.	55
16a–16e	365 nm	MCF-7	• **16a–16e** displayed enhanced antiproliferation properties upon illumination. • IC_{50} (μM) values upon illumination were 2.91, 12.25, 1.79, 1.43 and < 1, respectively.	56
3.1.2.2. 1,10-Phenanthroline photoCORMs				
21 and **22**	Low-power visible light	HEK-293 and HT29	• HT29 cells are eradicated with 100 μM of **21** or **22**, leading to a drop to 10–48 % when exposed to visible light. • No toxicity against HEK-293 cells.	59, 60
25	Low power (10 mW/cm^2) visible light	OVCAR-5 and SKOV-3	• The CO alone was responsible for the cytotoxicity, and the targeted delivery of CO required the presence of the appropriate antigen on the surface of the cancer cells. • Neither **25** in the dark nor the light-inactivated **25** resulted in any substantial cell death.	62
26, **26-B_{12}**	420 nm	MCF-7	• In the dark, the B_{12} conjugated photoCORMs display a lower toxicity than the corresponding parents.	63

			• Comparing the toxicity levels of the dark and light studies revealed that there were no noticeable changes or trends.	
27b	low-power visible light	MDA-MB-231	• 100 μM of **27b** reduced the cell viability by about 50% upon illumination.	66
3.1.2.3. $\kappa^2N^1N^2$- terpyridine photoCORMs				
37–42		HEK-293	• **37** experienced serve cytotoxicity to normal HEK-293 with IC_{50} of 4.878 μg/mL.	74
3.1.2.4. Benzimidazole and benzothiazole photoCORMs				
43a[75], **44**[77], **51**[78], **52**[78]	365 nm	SK-Hep1 and HL-7702	• Bright green fluorescence is detected in cells after incubation with **51** and **52**. • **51** has superior anticancer activity against SK-Hep1 cells.	75, 77, 78
57	Low power (15 mW/cm^2) visible light	MDA-MB-231	• iCORM is nontoxic. • 100 μM of **57** reduce the cell viability by about 50% upon illumination.	66
58 and **59**	low-power (mW levels)	HT-29 and HEK-293	• The CO-catheter could be used to administer CO to cancerous areas during adjuvant treatment for colon cancer.	82
3.1.2.5. *N,N*-Schiff-base photoCORMs				
68	468 nm 525 nm	HEK-293	• **68** was harmful with CC_{50} of 12.56 μg/mL.	86
69 and **70**	15 mW visible light	HT-29	• When irradiated, both **69** (IC_{50} = 40 μM) and **70** (IC_{50} = 70 μM) gained cytotoxicity. • The free ligands, and their iCORMs are nontoxic in the dark.	87
62c–62f **71a–71d**	525 nm 468 nm	HepG2	• The CORMs were inactive against HepG2 cells in the dark. • When exposed to light, **62c**, **62d**, **71a** and **71b** released CO in a comparable way, but their impact on the cell viability was very different, indicating that the iCORM was the primary cause of the cytotoxicity. • **62d** (IC_{50} = 7.1 μM) showed the highest phototoxicity.	88
72a–72f	365 nm	HepG2	• **72b** and **72d** are inactive in the dark, • **72a** and **72c** demonstrate cytotoxicity, with IC_{50} values of 18.1 and 11.8 μM, respectively. • The cytotoxicity of **72a** and **72c** increased with illumination, IC_{50} = 7.9 and 6.6 μM. • The inactive compounds turned active upon illumination, IC_{50} = 5.7 μM (**72b**) and 6.7 μM (**72d**). • The nitro derivatives **72e** and **72f** are inactive before and after illumination. • Synergistic effect between iCORM and CO.	89
3.1.2.6. Azo-pyridine photoCORMs				
75a and **75b**	≥ 520 nm	HeLa and MDA-MB-231	• 75 μM of **75a** and illumination time of 10 min caused about 60% reduction in the cell viability.	91, 92

3.1.2.7. Other *N,N*-bidentate photoCORMs				
81b	468 nm	HEK-293T and MDA-MB-231	• **81b** exhibits significant cytotoxicity both in the dark and when exposed to light, with IC_{50} values of 19.62 and 11.43 μM, respectively. • It displayed the same cytotoxic pattern against the normal HEK-293T. • The cell viability of the co-treated cells is much lower than that of the cells treated only with Paclitaxel drug and lower than that of the cells treated with **82**.	97
82	365 nm	HCT-15, A549 and HeLa	• **82** displayed a photocytotoxicity with IC_{50} values of 7.15 ± 0.24, 12.5 ± 1.33, and 20.7 ± 0.94, respectively.	98
3.1.3. *N,O*-bidentate ligands				
84 and **85**	400–700 nm 350 nm	HeLa	• The complexes were non-cytotoxic in the dark (IC_{50} > 50 μM). • After 30 min of illumination, both complexes reduced the cell viability with IC_{50} values in the range of 7.29–36.05 μM.	103
86a and **86b**	468 nm	HEK-283T, MDA-MB-231 and SW-620.	• **86a** and **86b** had no effect up to 50 μM.	104
87	468 nm	HEK-283T and MDA-MB-231.	• **87** is inactive up to 50 μM against MDA-MB-231 under both dark and light conditions.	97
88	- UV (365–370) - Blue (465–470) - Green (520–530) nm	RAW264.7	• **88** and its iCORM are almost non-toxic. • It can block the release of NO and TNF-α in LPS-stimulated RAW264.7 macrophages without obvious cytotoxicity.	49
3.1.4. *N,S*- and *N,Se*-bidentate ligands				
95a–95d	365–435 nm	A549 and HEK-293T.	• In a dose-dependent manner, **95a–95d** and their iCORMs exhibit cytotoxic effects. • The cytotoxicity was not significantly changed by irradiation. • The cytotoxicity of **95b** against HEK293T cells was increased by blue light irradiation.	110
3.1.5. Polynuclear photoCORMs **3.1.5.1.** Homonuclear photoCORMs				
103 and **104**	365 nm	A549, HeLa, MDA MB-231, HCT-15 and HEK-293	• Upon illumination, **103** was cytotoxic against HCT-15 and A549 cells with IC_{50} values of 28.7 ± 0.16 and 15.7 ± 0.98 μM, respectively. • Upon illumination, **104** exhibited broad-spectrum inhibitory effects against HCT-15, HeLa, A549 and MDA MB-231 cells with low IC_{50} values of 15.4 ± 0.67 (HeLa), 15.8±1.75 (A549) and 14.5 ± 0.97 (HCT-15).	117–119

			• Upon illumination, **104** also showed IC_{50} (μM) values of 21.37 ± 1.72 (A549), 24.12 ± 1.03 (HeLa), 21.89 ± 0.59 (MDA MB-231), and 13.69 ± 0.91 (HCT-15). • **104** showed low toxicity against normal HEK-293 cells (> 50 μM).	
105a–105d	365 nm	HEK-293, HCT-15, HeLa and A549.	• **105b**: minimum action on HCT-15 (13.18 ± 2.57 μM) and HeLa (12.05 ± 3.12 μM) cells, but potent against A549. • **105c**: at 365 nm, displayed potency (IC_{50} = 11.41–33.12 μM) against malignant cell lines. • **105c** triggers cellular machinery related to apoptosis. It showed no toxicity against HEK-293 cells. • **105d:** minimum toxicity toward all tested cells.	120
106a–106h	365 nm	HEK-293, A549, HCT-15 and HeLa.	• **106f** was the most potent compound against lung (IC_{50} = 6.74 ± 1.77), cervical (IC_{50} = 4.92 ± 0.89), and colon (IC_{50} = 2.54 ± 0.579) cancer cells • **106f** was not toxic against normal HEK-293 cells.	121
107a–107f	365 nm	HeLa, A549, HCT-15 and HEK-293 .	• **107b** exhibited cytotoxicity with IC_{50} values in the range of 1.78–50.38 μM in the dark against cancer cells and no effect on HEK-293 cells. • **107c** and **107f** exhibited selective cytotoxic effect against HCT-15 and HeLa cells with IC_{50} = 31.14 ± 3.81 μM and 5.05 ± 0.76 μM, respectively. • **107d** showed cytotoxicity against HeLa, A549 and HCT-15 cells with IC_{50} = 4.23 ± 0.56, 23.37 ± 1.41 and 16.38 ± 1.94 μM, respectively.	122
109a–109h	520–560 nm	HeLa, HCT-15, A549 and HEK-293.	• Under dark conditions, apoptosis was induced by **109e** and **109g** treatment to the cancer cells.	123
110	520–530 (Green) 465–470 (Blue) 365–370 (UV) nm	RAW264.7	• **110** and its iCORM did not substantially reduce the cell viability. • **110** prevented LPS-stimulated RAW264.7 macrophages from secreting NO and TNF-a without clearly cytotoxic side effects.	125
3.1.5.2. Heteronuclear photoCORMs				
115a–115f	365 nm	HEK-293T.	• **115a** and **115c** exhibited strongest cytotoxicity against HEK-293T with LD_{50} ≥ 10 μM. • The rest of the complexes showed weaker cytotoxicity in the range of 20–40 μM.	132
3.1.6. Tridentate ligands **3.1.6.1.** Di-(2-picolyl)amine based photoCORMs				
117, **118** and **119a–119c**	365 nm	HCT116 and HepG2	• Under both dark and illumination conditions, **118**, **119a** and **119b** exhibited no cytotoxicity. • **117** and **119c** displayed cytotoxicity that is not related to the CO-releasing process. • When irradiated, the IC_{50} values of **117** in HCT116 and HepG2 cells were (50 ± 21) and (60 ± 13), while in the dark were (41 ± 6) and (61 ± 10), respectively.	134

			• The copolymer **117** exhibited cytotoxicity, whereas neither the bpma ligands nor the polymer exhibited significant cytotoxicity.	
127	490, 470, 450, 413 and 365 nm	HepaRG® and LX-2.	• Up to a dose of 250 μM, **127** and its iCORM revealed no cytotoxic effects against the tested cells.	141
128	405 nm	LX-2 and HepaRG®	• **128** exhibited moderate cytotoxicity to LX-2 and HepaRG® ($IC_{50} \approx 30$ nM).	142
129 and **130**	Two-photon laser beam (800 nm)	HeLa and LX-2	• The complexes were non-toxic to both cell lines even at higher concentrations.	143
131 and **132**	550 nm	HEK cells	• Both **131** and **132** showed lower cytotoxicity toward HEK cells than their iCORMs.	146
133–135	550–560 nm > 345 nm	L929 and C6.	• Under low intensity light exposure, the non-woven fabric significantly killed C6 cancer cells while exhibiting minimal toxicity to 1929 cell lines.	147
3.1.6.2. Pyrazolyl and imidazolyl photoCORMs				
136	365 nm	HT-29	• **136** exhibits photoinitiated cytotoxicity, resulting in a decrease in cell biomass by 30%.	149, 150
149	405 nm 470 nm	LX-2 and HepaRG®	• **149** exhibited no cytotoxic effects on HepaRG® and LX-2 at concentrations < 63 μmol L^{-1}. • HepaRG® (EC_{50} = 100 μmol L^{-1}) was discovered to be more responsive to **149** than LX-2 (EC_{50} = 146 μmol L^{-1})	161
3.1.6.3. Other tridentate based photoCORMs				
151 and **152**	365 nm 405 nm 380 nm	LX-2 and HepaRG®	• Both complexes were found to be non-toxic for HepaRG® or LX-2 cells. • Unlike **151**, complex **152** accumulates in cells enabling administration of CO inside of cells.	162
3.2. Tetracarbonyl Mn(I) photoCORMs				
156a and **156b**	365–400 nm	Murine RAW 264.7 macrophages	• **156a** was viable at 10 μM, but when exposed to light, the cell viability was reduced to 80%. • **156b** and its iCORM displayed no cytotoxicity. • The LDH assay showed that **156a** and **156b** did not induce the release of LDH up to 100 μM.	165
158–162	400 nm	Murine RAW 264.7 macrophages	• At 50 μM, **159** exhibited a low level of cytotoxicity, and at 100 μM, it significantly reduced cell viability. • The photo by-products of **158** and **159** had no influence on the cell viability and LDH release.	167

			• Transformation of **159** into **160** during the assay may be the cause of this toxicity. • **161** was safe to RAW 264.7 cells at 50 µM. • Under dark and light condition, **162** is not toxic.	
4. Thermal and redox Mn(I) CORMs **4.1.** CORM-401				
163	Spontaneous	Murine RAW264.7 macrophages, hLMVEC and MDA-MB-231-luc2-tdTomato.	• 100 µM of **163** decreased the cell viability by 25%, • The amount of nitrite formed in response to treatment of lipopolysaccharide was decreased by 70%. • Breast cancer cell transmigration through hLMVEC was significantly reduced by **163** and PAPA NONOate alone or in combination.	168, 170
4.2. Other Mn(I) CORMs				
164		HeLa	• With IC_{50} = 402.86 µM, **164** was cytotoxic against Hela cells.	206

*Cell lines:

THP-1: human leukemia monocytic cells. BM: bone marrow cells. 3T3 fibroblasts: cells of murine embryonic fibroblasts. RAW264.7 macrophages: macrophages derived from a tumour created by the Abelson mouse leukemia virus in a male mouse. MCF-7: breast cancer cells. HEK-293: human embryonic kidney cells. HT29: colorectal adenocarcinoma.

OVCAR-5: metastatic gastrointestinal carcinoma. SKOV-3: human ovarian cancer cells. MDA-MB-231: triple negative breast cancer cells. SK-Hep1: hepatic adenocarcinoma.

HL-7702: human liver cells. HepG2: hepatocarcinoma. HeLa: cervical cancer cells. HCT-15: human colon cancer cells. A549: lung cancer cells. SW-620: colorectal cancer cells. HCT116: human colorectal cancer cells. HepaRG®: Parenchymal hepatocyte-like cells. LX-2: non-parenchymal hepatic stellate cell-like cells. L929: NCTC clone 929 of strain L.

C6: rat glioma cells. hLMVEC: human lung microvascular endothelial cells. MDA-MB-231-luc2-tdTomato: human breast cancer cells.

Note: The citation of the references in the table matches the information provided in the main article.