No.	Cat.	W	Synthesis method	Reactor type	(H_2/CO_2) [Dilu./ (Agent)]	Conditions			(F/W)	Reduction condition			S		X	Y	Ref.
						p	T	Temp. range		Stream	T	Time	(%)		(%)	(%)	
		(gr)			(%)	(MPa)	(°C)	(°C)	(L/kg.h)		(°C)	(hr)	CH_3OH	CO	CO_2	CH_3OH	
1	$CuO/ZnO/Al_2O_3$ (47/47/6 wt%)	1.8 (cm^3)	Co-precipitation (Hydrolysis)	Flow reactor	3 [-]	1.3	240	160 - 280	3600*	H_2	300	6.0	57.9	42	48.3	28	[1]
2	CuO/ZnO (47/53 wt%)	1.8 (cm^3)	Co-precipitation	Flow reactor	3 [-]	1.3	240	160 - 280	3600*	H_2	300	6.0	38.9	56.5	31.6	12.3	[1]
3	CuO/ZnO (50/40 wt%)	0.3	Co-precipitation	Fixed-bed	3 [-]	11	300	250 - 400	6500	H_2	300	18	92.1	-	31.7	29.2	[2],[3],[4]
4	CuO/ ZnO/MgO (50/40/10 wt %)	0.3	Co-precipitation	Fixed-bed	3 [-]	11	300	250 - 400	6500	H_2	300	18	99.9	-	23.1	23.1	[2],[3],[4]
5	CuO/ ZnO/La_2O_3 (50/40/10 wt %)	0.3	Co-precipitation	Fixed-bed	3 [-]	11	300	250 - 400	6500	H_2	300	18	99.9	-	29.5	29.5	[2],[3],[4]
6	CuO/ ZnO/ThO_2 (50/40/10 wt %)	0.3	Co-precipitation	Fixed-bed	3 [-]	11	300	250 - 400	6500	H_2	300	18	99.7	-	29.6	29.5	[2],[3],[4]
7	CuO/ ZnO/Nd_2O_3 (50/40/10 wt%)	0.3	Co-precipitation	Fixed-bed	3 [-]	11	300	250 - 400	6500	H_2	300	18	99	-	32.5	32.2	[2],[3],[4]
8	CuO/ ZnO/Y_2O_3 (50/40/10 wt%)	0.3	Co-precipitation	Fixed-bed	3 [-]	11	300	250 - 400	6500	H_2	300	18	98.5	-	31.5	31.0	[2],[3],[4]
9	CuO/ ZnO/In_2O_3 (50/40/10 wt%)	0.3	Co-precipitation	Fixed-bed	3 [-]	11	300	250 - 400	6500	H_2	300	18	91	-	39	35.5	[2],[3],[4]
10	CuO/ZnO (49/51 wt%)	0.7	Deposition–precipitation	Fixed-bed	4 [-]	5.0	240	220 - 280	17100	$CO_2 + H_2$	240	3.0	63	-	7.0	4.4	[2],[3],[5]
11	CuO/ZnO (40 Cu/60 ZnO wt%)	1.0	Co-precipitation	Fixed-bed	3 [-]	5.0	250	240 - 300	-	H_2	450	5.0	-	-	-	7.5	[6]
12	CuO/ZnO (5.6 Cu/ 94.4 ZnO wt%)	0.5	Decomposition-Impregnation	Fixed-bed	3 [-]	2.0	270	250 - 270	18000	H_2	300	6.0	100	-	2.2	2.2	[7],[8]
13	CuO/ZnO (Cu= 15 wt%)	0.5	Decomposition & Impregnation	Fixed-bed	9 [-]	0.7	225	160 - 225	2000	H_2	250	3.0	60	-	4.0	2.4	[9],[10]
14	CuO/ZnO (50/50 wt%)	1.0	Co-precipitation	Fixed-bed	3 [-]	5.0	250	220 - 280	18000	10% H_2/He	250	-	42.1	57.9	-	8.0	[11],[12]
15	CuO/ZnO (42.9 Cu/26.6 Zn wt%)	1 .0 (cm^3)	Co-precipitation	Fixed-bed	3 [-]	5.0	270	210 - 270	4000*	5% H_2/N_2	260	6.0	40.12	57.74	20.47	8.2	[13],[14],[15]
16	CuO/ZnO (atomic ratio: Cu/Zn= 2/1)	0.3	Ammonia hydrothermal process	Fixed-bed	3 [-]	3.0	240	220 - 280	0.54**	H_2	270	1.0	78.2		16.5	12.9	[16]
17	Cu/Zn	0.2	Commercial (Süd-Chemie AG)	Membrane reactor (MR)	3 [-]	4.3	200	200	5000*	-	-	-	-	-	-	2.3	[17]

18	Cu/Zn	0.2	Commercial (Süd-Chemie AG)	Fixed bed	3 [-]	4.3	200	200	5000*	-	-	-	-	-	-	2.5	[17]
19	Cu/Zn	5.0	Commercial	Fixed-bed	2 [-]	2.1	280	270 - 350	0.2**	H_2	300	3.0	19.3	80	15.1	2.9	[2],[18]
20	CuO/ZnO/ Al_2O_3 (50/40/10 wt %)	0.3	Co-precipitation	Fixed-bed	3 [-]	11	300	250 - 400	6500	H_2	300	18	93.9	-	27.9	26.2	[2],[3],[4]
21	CuO/ZnO/Al_2O_3 (CuO/ZnO= 2 molar ratio)	1.0 (cm^3)	Co-precipitation	Microreactor	4.5 [(6% CO)]	4.0	230	200 - 250	6000*	H_2	170, 250	-	-	-	-	22-24	[11],[19]
22	CuO/ZnO/Al_2O_3 (60 Cu/30 Zn/10 Al mol%)	3.0	Oxalate-gel Co-precipitation	Autoclave semi-batch reactor	2.8 [2.75% Ar]	5.0	170	170 - 300	400	5% H_2/Ar	220	10	72.9	27.1	25.9	18.9	[20],[21],[22]
23	CuO/ZnO/Al_2O_3 (Citric acid/ salt molar ratio = 1.25)	2.0	Direct combustion method	Fixed-bed	3 [-]	3.0	240	210 - 290	3600*	H_2	270	1.0	63.8	-	16.2	10.3	[9],[23]
24	CuO/ZnO/Al_2O_3 (45 Cu/45 Zn/10 Al wt%)	0.5 (cm^3)	Gel-network-coprecipitation	Fixed-bed	3 [-]	2.0	240	180 - 300	3600*	5% H_2/Ar	240	10	31.3	-	20.1	6.3	[24], [25]
25	CuO/ZnO/Al_2O_3	8.0	Commercial (MK-101, Haldor Topsoe)	Membrane reactor (MR)	3 [-]	2.0	206	180 - 280	6000*	6.4% H_2/N_2	250	24	75	-	11.6	8.7	[24], [26]
26	CuO/ZnO/Al_2O_3	8.0	Commercial (MK-101, Haldor Topsoe)	Fixed bed reactor	3 [-]	20	210	180 - 280	6000*	6.4% H_2/N_2	250	24	48	-	5	2.4	[24], [26]
27	CuO/ZnO/Al_2O_3 (mass ratio: 1/1/6)	0.5	Impregnation	Fixed-bed	3 [11% N_2]	5.0	270	250 - 270	3600*	10% H_2/N_2	290	3.0	55.3	-	14	7.7	[27]
28	CuO/ZnO/Al_2O_3/Cr_2O_3 (43/20/34/3 wt%)	1.0	Co-precipitation	Fixed-bed	3 [10% Ar]	3.0	190	190 - 280	12000	H_2	250	0.5	83.3	16.7	4.6	3.8	[2],[28]
29	CuO/ZnO/Al_2O_3/Cr_2O_3 (43/20/34/3 wt%)	1.0	Co-precipitation	Fixed-bed	3 [10% Ar]	7.0	250	190 - 280	1800*	H_2	250	0.5	78.9	20.5	-	19.9	[11],[28]
30	CuO/ZnO/Al_2O_3 (42/47/11 wt%)	0.2 - 0.5	coprecipitating metals on alumina	Flow reactor	5 [-]	0.1	190	190 - 280	5400	20% H_2/N_2	280	-	18.7	81.3	-	0.4	[11],[29]
31	CuO/ZnO/Al_2O_3 (50/45/5 wt%)	1.0	Co-precipitation	Fixed-bed	3 [-]	5.0	250	220 - 280	18000	10% H_2/He	250	-	52.3	47.7	-	11.2	[11],[12]
32	CuO/ZnO/Al_2O_3 (50 Cu/25 Zn/25 Al mol%)	0.5	Co-precipitation	Fixed-bed	3	5.0	250	230 - 270	12000	H_2	300	8.0	39.7	59.7	19.7	7.8	[2],[30]
33	CuO/ZnO/Al_2O_3	0.5	Commercial (Süd-Chemie AG)	Microrector	3 [10% N_2]	3.0	240	180 - 250	4400	H_2	300	1.0	48.4	-	15.9	7.7	[7],[31]
34	CuO/ZnO/Al_2O_3 (45 Cu/45 Zn/10 Al mol%)	0.5 (cm^3)	Oxalate gel Co-precipitation	Fixed-bed	3 [-]	2.0	240	180 - 300	3600*	5% H_2/Ar	240	10	36.3	63.7	19.3	7.0	[2],[32]

35	$CuO/ZnO/Al_2O_3$	-	Commercial (Süd-Chemie AG)	Fixed-bed	3 [4% Ar]	4.1	250	250	0.16**	H_2	300	2.0	36	64	17	6.1	[33]
36	$Cu/ZnO/Al_2O_3$ (37.5/41/21.5 wt%)	0.135	Co-precipitation	Fixed-bed	3.9 [12.4% N_2]	5.0	240	200 - 240	7800*	H_2	280	12.0	36	64	17.2	6.1	[34]
37	$Cu/ZnO/Al_2O_3$ (60 Cu/30 Zn/10 Al mol%)	0.5 (cm^3)	Complexes decomposition	Fixed-bed	3 [1% N_2]	3.0	240	200 - 260	12000*	5% H_2/N_2	302	6.0	42.5	-	12	5.1	[35]
38	$CuO/ZnO/Al_2O_3$ (49/36/15 wt%)	0.5	Convential co-precipitation	Fixed-bed	4 [-]	3.0	250	180 - 320	6000	H_2	250	3.5	50	-	5.05	2.5	[36]
39	$CuO/ ZnO/Al_2O_3$ (9.51 Cu/ 4.70 Zn wt%, mole ratio: Cu/Zn= 2.07)	-	Hydrothermal	Microreactor	3 [3% N_2]	5.0	250	220 - 260	10000	10% H_2/N_2	250	5.0	77.9	22	19.7	15.3	[37]
40	$CuO/ ZnO/Al_2O_3$ (50.6 Cu/ 22 Zn/3.5 Al wt%)	1.0	Co-precipitation	Fixed-bed	3 [-]	3.0	250	220 - 350	2730*	H_2	350	4.0	-	-	10.1	7.9	[38]
41	$CuO/ZnO/ \gamma\text{-}Al_2O_3$	0.7	Ammonia deposition-precipitation	Fixed-bed	3 [3% N_2]	4.0	240	220 - 240	1500	H_2	240	6.0	56.5	43.5	18.3	10.3	[39]
42	$CuO/ZnO/ \gamma\text{-}Al_2O_3$ (30 CuO/30 ZnO/40 Al_2O_3 wt%)	0.5	precipitation	Fixed-bed	3 [-]	5.0	280	280	36000	30% H_2/N_2	400	2.0	31.5	-	3.1	1	[40]
43	$CuO/ZnO/Al_2O_3/ZrO_2$	1.0	Co-precipitation	Fixed-bed flow reactor	3 [-]	5.0	250	250	18000	10% H_2/He	250	-	-	-	-	11.9	[11],[41]
44	$CuO/ZnO/Al_2O_3/ZrO_2$ (2 Cu/1 Zn/1.2 Al/0.1 Zr atomic ratio)	1.5 (cm^3)	Co-precipitation	Fixed-bed	3 [3% N_2]	5.0	190	190	4000*	H_2	280	6.0	81.8	18.2	10.7	8.8	[42]
45	$CuO/ZnO/ZrO_2/Al_2O_3$ (50 Cu/25 Zn/18.75 Zr/6.25 Al mol %)	1.0	Co-precipitation	Fixed-bed	4 [-% He]	3.0	250	250	-	10% H_2/N_2	430	3.0	66.4	-	15.4	10.2	[43]
46	$CuO/ZnO/Al_2O_3/ZrO_2$ (2 Cu/1 Zn/1.2 Al/0.9Zr molar ratio)	1.5	Co-precipitation & spray drying	Fixed-bed	3 [3% N_2]	5.0	250	250	4000	H_2	300	8.0	61.5	38.5	25.9	15.9	[44]
47	$CuO/ZnO/Al_2O_3/ZrO_2$ (2 Cu/1 Zn/1.2 Al/0.9Zr molar ratio & 10 wt% alumina sol)	15	Co-precipitation & spray drying	Slurry phase continuous stirred reactor	3 [3% N_2]	3	220	220	2000	H_2	300	8.0	61.7	38.2	13.6	8.4	[44]
48	$CuO/ZnO/Al_2O_3/ZrO_2$ (60 Cu/30 Zn/5 Al/5 Zr moL%)	-	Co-precipitation	Fixed-bed	3 [-]	4.0	240	200 - 280	9742*	5% H_2/N_2	240	10	47.2	52.76	18.79	8.9	[20],[21],[45]
49	$CuO/ZnO/Al_2O_3/ZrO_2$ (Cu/Zn/Al/Zr: 50/25/17.5/7.5 mol %)	1.5 (cm^3)	Co-precipitation	Fixed-bed	3 [-]	5.0	250	230 - 270	4000*	H_2	330	8.0	47.40	52.6	22.5	10.6	[46],[47]

50	$CuO/ZnO/Al_2O_3/ZrO_2$ ($Cu^{2+}/Zn^{2+}/Al^{3+}/Zr^{4+}$: atomic ratio= 6/3/0.5/0.5)	1.0	Liquid reduction	Fixed-bed	3 [-]	5.0	270	230 - 270	4600*	H_2	230	4.0	57.6	42.4	24.5	14.1	[48]
51	$CuO/ZnO/Al_2O_3/ZrO_2$ (Cu= 54.62 wt%)	1.5 (cm^3)	Co-precipitation	Fixed-bed	3 [-]	5.0	250	230 - 290	4000*	H_2	350	8.0	55	44.4	23.9	13.1	[49]
52	$CuO/ZnO/Al_2O_3/ZrO_2$ (molar ratio: 2/1/1.2/0.1)	1.5 (cm^3)	Co-precipitation	Fixed-bed	3 [3% N_2]	5.0	250	170 - 310	4000*	H_2	350	6.0	61.3	38.2	25.6	15.7	[2],[50]
53	$CuO/ZnO/Al_2O_3/ZrO_2$ (50 Cu/25 Zn/22.5 Al/2.5 Zr mol%)	0.5	Co-precipitation	Fixed-bed	3 [-]	5.0	250	230 - 270	12000	H_2	300	8.0	48	51.5	24.7	11.9	[2],[30]
54	$CuO/ ZnO/ Al_2O_3/TiO_2/SiO_2$ (49/39.2/9.8/1/1 wt%)	1.0	Co-precipitation	Fixed-bed	3 [-]	2.6	260	260	3600*	10% H_2/N_2	270	2.0	41.17	-	40.7	16.7	[1],[51]
55	$CuO/ZnO/ZrO_2/Al_2O_3$ /reduced graphene oxide (8/6/3/3/80 wt%)	0.8	Co-precipitation	Fixed-bed	3 [-]	2.0	240	200 - 280	6075*	10% H_2/N_2	250	2.0	-	-	14.7	11.6	[52]
56	$CuO/ZnO/ZrO_2/Al_2O_3$ (Cu/ZnO/ZrO2/Al2O3= 40/30/15/15 wt%)	1.0	Conventional co-precipitation	Fixed-bed	3 [-]	3.0	230	180 - 250	0.1**	5% H_2/N_2	250	4.0	60.3	-	23.2	14	[53]
57	$CuO-ZnO-ZrO_2-MgO/Al_2O_3$ (2 Cu/1 Zn/0.9 Zr/0.1 Mg molar ratio & Cu/Al_2O_3=10 wt%)	5.0	Impregnation	Fixed-bed	3 [-]	2.0	250	230-310	1400*	H_2	350	6.0	36.0	61.61	12.12	4.36	[54]
58	$CuO/ZnO/Al_2O_3$-(CHT-F) (41.34 Cu/21.09 Zn/8.14 Al/0.7 F wt%)	1.5 (cm^3)	Co-precipitation	Fixed-bed	3 [-]	5.0	270	230 - 270	4000*	H_2	330	8.0	43.7	56.3	23.7	10.3	[55]
59	Fluorine-modified $CuO/ZnO/Al_2O_3/ZrO_2$ [atomic ratio: $Cu^{2+}/Zn^{2+}/(Al^{3+}+Zr^{4+})$= 2/1/1]	1.5 (cm^3)	Co-precipitation	Fixed-bed	3 [-]	5.0	250	200 - 300	4000*	H_2	330	8.0	53.5	-	21.1	11.3	[56]
60	$CuO/ZnO/Al_2O_3/MnO_2$ (50 Cu/25 Zn/22.5 Al/2.5 Mn mol%)	0.5	Co-precipitation	Fixed-bed	3 [-]	5.0	250	230 - 270	12000	H_2	300	8.0	43	56.5	22.3	9.6	[2],[30]
61	$CuO/ZnO/Al_2O_3/La_2O_3$ (50 Cu/25 Zn/22.5 Al/2.5 La mol%)	0.5	Co-precipitation	Fixed-bed	3 [-]	5.0	250	230 - 270	12000	H_2	300	8.0	43.8	55.7	23.3	10.2	[2],[30]
62	$CuO/ZnO/Al_2O_3/CeO_2$ (50 Cu/25 Zn/22.5 Al/2.5 Ce mol%)	0.5	Co-precipitation	Fixed-bed	3 [-]	5.0	250	230 - 270	12000	H_2	300	8.0	45.9	53.6	23.6	10.8	[2],[30]
63	$CuO/ZnO/Al_2O_3/Y_2O_3$ (50 Cu/25 Zn/22.5 Al/2.5 Y mol%)	0.5	Co-precipitation	Fixed-bed	3 [-]	5.0	250	230 - 270	12000	H_2	300	8.0	47.1	52.4	26.9	12.7	[2],[30]

64	$CuO/ZnO/ZrO_2/Al_2O_3/Ga_2O_3$	1.0	Co-precipitation	Fixed-bed	3 [-]	5.0	250	250	18000	10% H_2/He	250	-	-	-	-	12.2	[11],[41]
65	$CuO/ZnO/ZrO_2/Al_2O_3/Ga_2O_3$	1.0	Co-precipitation	Fixed-bed	3.4 [(3% CO)]	5.0	250	250	10000*	10% H_2/He	250	-	-	-	-	21	[11],[41]
66	$CuO/ZnO/Cr_2O_3$ (34.5/34.5/31 wt%)	1.8 (cm^3)	Co-precipitation	Flow reactor	3 [-]	1.3	340	300 to 380	3600*	H_2	300	6.0	14.8	73.2	11	1.6	[1]
67	CuO/ZnO/MgO (47/47/6 wt%)	1.8 (cm^3)	Co-precipitation	Flow reactor	3 [-]	1.3	240	160-280	3600*	H_2	300	6.0	41.2	58.9	30.7	12.6	[1]
68	$CuO/ZnO/TiO_2$ (30/30/40 wt%)	0.5	Co-precipitation	Fixed-bed	4 [-]	1.0	240	150-260	9200	-	-	-	21.9	78.1	-	3.4	[11],[57]
69	$CuO/ZnO/ZrO_2$ (40 Cu/30 Zn/30 Zr mol %)	0.25	Reverse co-precipitation	Fixed-bed	3 [-]	2.0	240	220-280	-	H_2	300	4.0	32.3	-	13.2	4.3	[58]
70	$CuO/ZnO/ZrO_2$ (47/47/11 wt%)	1.8 (cm^3)	Co-precipitation	Fixed-bed	3 [-]	1.3	220	160 - 280	3600*	H_2	300	6.0	59.9	38.4	29.1	17.4	[1]
71	$CuO/ZnO/ZrO_2$ (50/20/30 wt%)	0.5	Glycine-nitrate combustion	Fixed-bed	3 [-]	3.0	220	180 - 280	3600*	10% H_2/N_2	300	3.0	71.1	-	12	8.5	[7],[59]
72	$CuO/ZnO/ZrO_2$ (50/20/30 wt%)	0.5	Urea-nitrate combustion	Fixed-bed	3 [-]	3.0	240	180 - 280	3600*	10% H_2/N_2	300	3.0	56.2	-	17	9.6	[7],[60]
73	$CuO/ZnO/ZrO_2$ (20/70/10 wt%)	1.0	Citrate decomposition	Fixed-bed	3 [-]	2.6	240	240	3600*	10% H_2/N_2	250	2.0	45.8	54.2	32.9	15.1	[61]
74	$CuO/ZnO/ZrO_2$ (50 Cu/20 Zn/30 Zr mol%)	0.5	Surfactant-assisted co-precipitation	Fixed-bed	3 [12% N_2]	3.0	240	-	3600*	10% H_2/N_2	300	3.0	54.1	-	12.1	6.5	[62]
75	$CuO/ZnO/ZrO_2$ (43.2/14.5/ZrO_2 wt%)	0.5	Reverse coprecipitation	Fixed-bed	3 [8% N_2]	5.0	240	180 - 240	8800	H_2	300	1.0	64	-	22.4	14.3	[63]
76	$CuO/ZnO/ZrO_2$ (62.4/25/12.6 wt %)	2.0	Citrate decomposition method	Fixed-bed	3 [12% N_2]	8.0	220	160 - 240	-	7% H_2/N_2	-	-	61	-	8	4.9	[64]
77	$CuO/ZnO/ZrO_2$ (60 Cu/30 Zn/10 Zr mol%)	1.0 (cm^3)	precipitation-reduction method	Fixed-bed	3 [-]	5.0	270	230 - 270	4600*	H_2	230	4.0	56.8	43.2	23	13.1	[9],[65]
78	$CuO/ZrO_2/ZnO$ (36/54/10 wt%)	0.7	Deposition-Co-precipitation	Fixed-bed	4 [-]	5.0	240	220 - 280	17100	$CO_2 + H_2$	240	3.0	58	-	13.3	7.7	[2],[3],[5]
79	$CuO/ZnO/ZrO_2$ (37.5/41/21.5 wt%)	0.125	Co-precipitation	Fixed-bed	3 [-]	5.0	260	240 - 320	10000*	H_2	300	12	50	50	19.6	9.8	[66]
80	$CuO/ZnO/ZrO_2/MnO$ (65/23/9/3 wt%)	2.0	Complexing with citric acid	Fixed-bed	3 [-]	8.0	220	180 - 250	3300*	10% H_2/N_2, CO_2+H_2	200, 350	15, 2	-	-	-	31	[7],[75]

81	$CuO/ZnO/ZrO_2$ (23.8 Cu/34.6 Zn/8.0 Zr/33.7 O atom %)	2.0	Co-precipitation	Fixed-bed	3 [-]	8.0	220	180 - 250	3300*	10% H_2/N_2	200, 350	15, 2	68	-	21	14.3	[7],[67]
82	$CuO/ZnO/ZrO_2$ (15.1/41.8/43.1 wt%)	0.5	Reverse co-precipitation	Microreactor	3 [10% N_2]	3.0	240	180 - 250	4400	H_2	300	1.0	48.4	-	17.5	8.5	[7],[68]
83	$Cu/ZnO/ZrO_2$ (50/40/10 wt %)	1.0	Co-precipitation	Fixed-bed	3 [-]	5.0	250	250	18000	10% H_2/He	250	-	-	-	-	10.4	[11],[12]
84	$CuO/ZnO/ZrO_2$ (31.6/24.0/44.4 wt%)	0.5	Reverse co-precipitation	Microreactor	3 [10% N_2]	1.0	200	160 - 200	8800	H_2	300	1.0	-	-	3.2	2.1	[7],[69]
85	$CuO/ZnO/ZrO_2$ (50 Cu/20 Zn/30 Zr mol%)	-	Solid-state reaction	Fixed-bed	3 [-]	3.0	240	-	3600*	10% H_2/N_2	300	3.0	58	-	15.7	9.1	[24],[70]
86	$CuO/ZnO/ZrO_2$ (45Cu/45 Zn/10 Zr mol%)	0.5 (cm^3)	Oxalate co-precipitation	Fixed-bed	3 [-]	2.0	240	240	3600*	5% H_2/Ar	240	10.0	38.4	-	18.5	7.1	[71]
87	$ZrO_2/CuO/ZnO$ (33.1 Cu/32.3 Zn/13.5 Zr wt%)	1 .0 (cm^3)	Successive-precipitation	Fixed-bed	3 [-]	5.0	250	210 - 270	4000*	5% H_2/N_2	260	6.0	60.45	39.55	26.41	16	[13],[14],[15]
88	$CuO/ZnO/ZrO_2$ (Cu/Zn/Zr : 34.1/31.6/6.9 wt%)	1.0	Co-precipitation	Fixed-bed	3 [-]	2.0	250	230 - 270	-	H_2	300	4.0	29.3	-	19.4	5.7	[20],[21],[72]
89	$CuO/ZnO/ZrO_2$ (56.8/27.7/15.5 wt%)	0.125	Gel-oxalate coprecipitation	Fixed-bed	3 [10% N_2]	3.0	240	180 - 240	10000*	H_2	300	1.0	51.2	48.6	18	9.2	[73]
90	$CuO/ZrO_2/ZnO$ (35 Cu/35 ZrO/30 ZnO wt%)	0.5	Co-precipitation	Fixed-bed	3 [-]	0.9	200	140 - 260	-	H_2	250	1.0	47.5	-	5.86	2.8	[74]
91	$CuO/ZnO/ZrO_2/MnO$ (65/23/9/3 wt%)	2.0	Co-precipitation as carbonates	Fixed-bed	3 [-]	8.0	220	180 - 250	3300*	10% H_2/N_2, CO_2+H_2	200, 350	15, 2	-	-	-	30	[7],[75]
92	$CuO/ZnO/ZrO_2/B_2O_3$ (65/23/9/3 wt%)	2.0	Co-precipitation	Fixed-bed	3 [-]	8.0	220	180 - 250	3300*	10% H_2/N_2, CO_2+H_2	200, 350	15, 2	-	-	-	35	[7],[75]
93	$CuO/ZnO/ZrO_2/In_2O_3$ (65/23/9/3 wt%)	2.0	Co-precipitation	Fixed-bed	3 [-]	8.0	220	180 - 250	3300*	10% H_2/N_2, CO_2+H_2	200, 350	15, 2	-	-	-	9.0	[7],[75]
94	$CuO/ZnO/ZrO_2/Gd_2O_3$ (65/23/9/3 wt%)	2.0	Co-precipitation	Fixed-bed	3 [-]	8.0	220	180 - 250	3300*	10% H_2/N_2, CO_2+H_2	200, 350	15, 2	-	-	-	31	[7],[75]
95	$CuO/ZnO/ZrO_2/Y_2O_3$ (65/23/9/3 wt%)	2.0	Co-precipitation	Fixed-bed	3 [-]	8.0	220	180 - 250	3300*	10% H_2/N_2, CO_2+H_2	200, 350	15, 2	-	-	-	38	[7],[75]
96	$CuO/ZnO/TiO_2/ZrO_2$ (40/40/10/10 mol%)	0.5	Oxalate co-precipitation	Fixed-bed	3 [12% N_2]	3.0	240	200 - 280	2400	10 % H_2/Ar	300	3.0	43.8	-	17.4	7.6	[9],[76]

97	$CuO/ZnO/ZrO_2/Ce_2O_3$ (65.3 Cu/26.3 ZnO/4.5 ZrO_2/3.9 Ce_2O_3 wt%)	2.0	Decomposition	Fixed-bed	3 [12% N_2]	8.0	220	160 - 240	-	7% H_2/N_2	-	-	69	-	15	10.3	[64]
98	$CuO/ZnO/ZrO_2/La_2O_3$ (65.3 Cu/26.3 ZnO/4.5 ZrO_2/3.9 La_2O_3 wt%)	2.0	Decomposition	Fixed-bed	3 [12% N_2]	8.0	220	160 - 240	-	7% H_2/N_2	-	-	70	-	17	11.9	[64]
99	$CuO/ZnO/ZrO_2/Cr_2O_3$ (65.2 Cu/26.3 ZnO/7.7 ZrO_2/0.7 Cr_2O_3 wt%)	2.0	Decomposition	Fixed-bed	3 [12% N_2]	8.0	220	160 - 240	-	7% H_2/N_2	-	-	68	-	18	12.2	[64]
100	$CuO/ZnO/SiO_2$ (5 Cu/5 Zn/90 Si wt%)	1.0	Impregnation	Fixed-bed	2 [10% Ar]	3.0	220	220	6000	H_2	700	4.0	70	30		0.9	[11],[77]
101	$Cu/ZnO/SiO_2$ (5 Cu/5 Zn/90 Si wt%)	1.0	Alkoxide	Fixed-bed	2 [10% Ar]	3.0	220	220	6000	H_2	700	4.0	90.6	9.1		0.3	[11],[77]
102	$CuO/ZnO/SiO_2$ (11.75 Cu/5.45 Zn/82.8 Si wt%)	0.7	-	Fixed bed	3 [3% N_2]	5.0	270	250 - 270	6000	H_2	280	6.0	61.8	-	11.9	7.4	[78]
103	$Cu/ZnO/Cr_2O_3$ (50/45/5 wt %)	1.0	Co-precipitation	Fixed-bed	3 [-]	5.0	250	250	18000	10% H_2/He	250	-	-	-	-	9.4	[11],[12]
104	$Cu/ZnO/Cr_2O_3$ (34.7/44.5/20.8 wt%)	0.2-0.6 (cm^3)	Precipitation	Fixed-bed	2.7 [-]	2.0	265	220 – [100	6000*	diluted syngas	350	-	8.9	91	18.1	1.6	[2],[79]
105	$CuO/ZnO/TiO_2$ (45Cu/45Zn/10Ti mol %)	0.5	Co-precipitation	Fixed-bed	3 [12% N_2]	3.0	233	200 - 280	2400*	10% H_2/N_2	300	3.0	48		17	8.1	[80]
106	$CuO/ZnO/TiO_2$ (30/35/35 wt%)	3.0	Conventional co-precipitation	Fixed-bed	3 [-]	7.0	220	190 - 220	2000*	H_2	350	0.5	77.8	22.1	25.8	20.1	[81]
107	CuO/ZnO/rGO (CuZn= 10 wt%)	0.25	Modified Hummers	Fixed-bed	3 [-]	1.5	250	200 - 300	2400*	H_2	350	2.0	5.1	33.9	26	1.3	[9],[82]
108	$CuO/ZnO/SiO_2$ (5 Cu/5 ZnO wt%)	0.5	Impregnation	Fixed-bed	3 [-]	2.0	270	250 - 270	18000	10% H_2/He	300	2.0	47.2	51.8	2.0	0.9	[7],[83]
109	$CuO/ZnO/Cr_2O_3$ (molar ratio: 6/14/5)	1.0	Co-precipitation	Fixed-bed	3 [-]	5.0	250	170 - 320	3000	1% H_2 in N_2	250	12	63.3	36.7	25.6	16.2	[11],[84]
111	CuO/Al_2O_3 (40/60 wt%)	0.7	Deposition–precipitation	Fixed-bed	4 [-]	5.0	240	220 - 280	17100	$CO_2 + H_2$	240	1.0	47	-	3.6	1.7	[2],[3],[5]
110	CuO/Cr_2O_3-Al_2O_3 (40/60 wt%)	0.7	Deposition–precipitation	Fixed-bed	4 [-]	5.0	240	220 - 280	17100	$CO_2 + H_2$	240	1.0	49	-	9.6	4.7	[2],[3],[5]
112	$CuO/ZrO_2/Al_2O_3$ (36/54/10 wt%)	0.7	Deposition-Co-precipitation	Fixed-bed	4 [-]	5.0	240	220 - 280	17100	$CO_2 + H_2$	240	1.0	62	-	13	8.0	[2],[3],[5]
113	$CuO/ZrO_2/SiO_2$-Al_2O_3 (36/54/10 wt%)	0.7	Deposition-Co-precipitation	Fixed-bed	4 [-]	5.0	240	220 - 280	17100	$CO_2 + H_2$	240	1.0	61	-	12	7.3	[2],[3],[5]
114	$CuO/ZrO_2/Cr_2O_3$-Al_2O_3 (36/54/10 wt%)	0.7	Deposition-Co-precipitation	Fixed-bed	4 [-]	5.0	240	220 - 280	17100	$CO_2 + H_2$	240	1.0	63	-	11.7	7.3	[2],[3],[5]

115	$CuO/ZrO_2/WO_3$-Al_2O_3 (36/54/10 wt%)	0.7	Deposition-Co-precipitation	Fixed-bed	4 [-]	5.0	240	220 - 280	17100	$CO_2 + H_2$	240	1.0	65	-	10.2	6.6	[2],[3],[5]
116	$CuO/ZrO_2/SiO_2$-MgO (36/54/10 wt%)	0.7	Deposition-Co-precipitation	Fixed-bed	4 [-]	5.0	240	220 - 280	17100	$CO_2 + H_2$	240	1.0	62	-	11	6.8	[2],[3],[5]
117	$La_2O_3/CuO/ZrO_2$ (La= 5 molar %, La/Cu/Zr= 4.8/47.6/47.6 atom %, molar ratio: Cu/Zr= 0.55)	0.5	Urea-nitrate combustion	Fixed-bed	3 [12% N_2]	3.0	220	200 - 280	3600*	10% H_2/N_2	300	3.0	66	34	6.2	4.3	[85]
118	CuO/ZrO_2 (40/60 wt%)	0.7	Deposition–precipitation	Fixed-bed	4 [-]	5.0	240	220 - 280	17100	$CO_2 + H_2$	240	1.0	68	-	9.7	6.6	[2],[3],[5]
119	CuO/TiO_2 (40/60 wt%)	0.7	Deposition–precipitation	Fixed-bed	4 [-]	5.0	240	220 - 280	17100	$CO_2 + H_2$	240	1.0	59	-	6.9	4.0	[2],[3],[5]
120	CuO/ZrO_2 (30/70 wt%)	0.25 (cm^3)	Deposition–precipitation	Fixed-bed	3 [-]	2.0	240	220 - 300	5400*	-	-	-	48.8	-	6.3	3.0	[20],[86],[87]
121	CuO-Zr_2O_3/γ -Al_2O_3 (12 Cu/10 Zr wt%)	2.0 (cm^3)	Impregnation	Microreactor	3 [-]	3.0	260	240 - 260	3600*	H_2	300	3.0	14.6	79.4	16.5	2.4	[71],[88]
122	CuO–V/ γ-Al_2O_3 (12 Cu/6 V wt%)	2.0 (cm^3)	Impregnation	Microreactor	10 [-]	3.0	240	220 - 280	3600*	H_2	300	3.0	24	55	20	4.8	[71],[89]
123	ZnO-CuO/SiO_2 (weight ratio of Cu/SiO_2 : ZnO/SiO_2 = 0.25:0.25 gr)	0.25	Physical mixture	Flow reactor	3 [-]	1.25	250	220 - 280	-	H_2	250	2.0	-	-	-	1.8	[7],[90]
124	CuO/MgO-TiO_2 (MgO-TiO_2= 1% wt, 11 Cu/28 Mg/86.2 Ti atom %)	0.5	Impregnation	Fixed-bed	3 [10% N_2]	3.0	220	180 - 260	4800*	10 % H_2/Ar	300	3.0	37.9	-	5.2	1.97	[9],[91]
125	Cu/ZrO_2 (from Cu_7Zr_3)	1.2	In-situ activation	Fixed-bed	3 [-]	1.5	260	180 - 220	0.13**	$CO_2 + H_2$	280	-	41.6	58.4	9.1	3.8	[2],[92]
126	CuO/TiO_2 (CuO= 30 wt%)	0.5	Co-precipitation	Fixed-bed	4 [-]	1.0	240	150 - 260	9200	-	-	-	42.5	57.5	-	1.4	[11],[56]
127	CuO/ZrO_2 (mass ratio: 27/70)	1.0 (cm^3)	Impregnation-precipitation (IP)	Fixed-bed	3 [-]	2.0	250	250	5400*	H_2	250	3.0	83.48	16.52	13.6	11.3	[93]
128	CuO/ZrO_2 (III)	1.0 (cm^3)	Complexation with citric acid	Fixed-bed	3 [-]	8.0	260	180 - 260	3600*	5% H_2/N_2	200, 350	3, 2	86	14	15	12.9	[94]
129	CuO/ZrO_2 (Cu= 50 wt%)	0.5	Co-precipitation	Fixed-bed	3 [-]	0.9	220	140 - 300	4800	H_2	250	1.0	53.1	46.9	-	1.9	[11],[95]
130	$CuO/CuCr_2O_4$	1.0-1.5	Impregnation	Fixed-bed	1 [-]	3.0	110	110 - 180	-	H_2	300	2.0	50.88	-	7.36	3.74	[96]
131	CuO/a-ZrO_2 (Cu= 10 wt%)	0.5	Incipient wetness impregnation	Fixed-bed	3 [-]	3.0	240	220 - 280	-	H_2	300	4.0	57.8	-	5.1	2.9	[97]
132	CuO/ZrO_2 (50 Cu/50 Zr wt%)	1.0	Co-precipitation	Fixed-bed	3 [-]	1.7	220	200 - 260	-	50% H_2/N_2	260	3.0	71	-	6.55	4.6	[98]

133	CuO/ZrO_2-CNFs (15 CuO/15 ZrO_2 wt%)	0.5	Deposition precipitation	Slurry reactor	3 [-]	3.0	180	180	-	H_2	380	6.0	67	-	10	6.7	[99]
134	CuO/ZrO_2/CNTs-N [(CNTs= 2.98 wt%), mass ratio: 10/40/50]	0.5	Deposition-precipitation	Fixed-bed	3 [8% N_2]	3.0	260	220 - 260	3600	5% H_2/Ar	240	6.0	-	-	11.5	8.6	[100]
135	$CuO/ZnO/Cr_2O_3/Al_2O_3/Ga_2O_3$ (38.1 Cu/29.4 Zn/1.6 Cr_2O_3/13.1 Al_2O_3/17.8 Ga_2O_3 wt%)	-	Intrinsic uniform gelation	Fixed-bed	3 [(3% CO)]	8.0	270	230 - 310	18800*	1% H_2 in N_2	250	4.0	86.6	13.4	-	21.3	[11],[101]
136	$CuO/ZnO/ZrO_2/Ga_2O_3$ (50/15/32/3 wt%)	0.2	Co-precipitation	Fixed-bed	3 [-]	7.0	250	190 - 300	15000	10% H_2/N_2	300	1.0	72	28	22	15.8	[102]
137	$CuO/ZnO/ZrO_2/Ga2O_3$ (65/23/9/3 wt%)	2.0	Complexing with citric acid	Fixed-bed	3 [-]	8.0	220	180 - 250	3300*	10% H_2/N_2	200	15.0	-	-	-	41	[7],[67]
138	$CuO/ZnO/ZrO_2$-Ga_2O_3 (65/23/9/3 wt%)	2.0	Co-precipitation	Fixed-bed	3 [-]	8.0	220	180 - 250	3300*	10% H_2/N_2	200	15.0	-	-	-	42	[7],[67]
139	$CuO/ZnO/ZrO_2/Ga_2O_3$ (65.3/26.3/4.5/3.9 wt%)	2.0	Decomposition	Fixed-bed	3 [12% N_2]	8.0	240	160 - 240	-	7% H_2/N_2	-	-	71	-	17	12	[64]
140	$CuO/Ga_2O_3/ZnO$ (6.8 Cu/2.5 Ga_2O_3 wt%)	0.5	Impregnation	Fixed-bed	3 [-]	2.0	270	250 - 270	18000	10% H_2/He	300	2.0	55.5	44.4	2.0	1.1	[7],[84]
141	$CuO/Ga_2O_3/ZnO$ (5.6 Cu/91.7 ZnO/2.7 Ga_2O_3 wt%)	0.5	Co-impregnation of methoxide	Fixed-bed	3 [-]	2.0	270	250 - 270	18000	H2, 10% H2/He	300	8.0	88	12	6.0	5.3	[7],[8]
142	$CuO/Ga_2O_3/ZnO$ (5.6 Cu/2.7 Ga_2O_3 wt%)	0.5	Progressive impregnation	Fixed-bed	3 [-]	2.0	250	250 - 270	18000	10 % H_2/He	300	2.0	88.1	11.1	4.6	4.0	[103],[104]
143	$CuO/ZnO/Ga_2O_3$ (50 Cu/25 ZnO/25 Ga_2O_3 wt%)	1.0	Co-precipitation	Fixed-bed	3 [-]	5.0	250	220 - 280	18000	10% H_2/He	250	-	53.2	46.8	-	11.5	[11],[12]
144	$CuO/ZnO/Ga_2O_3$ (16.6 Cu/4.9 Ga wt%)	0.15	Microwave-assisted	Fixed-bed	3 [-]	3.0	270	250 - 270	3000*	10 % H_2/Ar	300	3.0	-	-	15.8	29.3	[9],[105]
145	$CuO/ZnO/Ga_2O_3/SiO_2$ (4.7 Cu/ 2.3 ZnO/1.5 Ga_2O_3 wt%)	0.5	Impregnation	Fixed-bed	3 [-]	2.0	270	250 - 270	18000	10% H_2/He	300	2.0	99.5	-	5.6	5.6	[84]
146	$CuO/ZnO/Ga_2O_3/SiO_2$ (4.5 Cu/2.0 ZnO/1.6 Ga_2O_3 wt%)	0.5	Co-impregnation of methoxide	Fixed-bed	3 [-]	2.0	270	250 - 270	18000	H2, 10% H2/He	300	8.0	76	24	3.4	2.6	[7],[8]
147	$CuO/ZnO/Ga_2O_3/SiO_2$ (4.7 Cu/2.3 ZnO/1.5 Ga_2O_3 wt%)	0.5	Incipient wetness impregnation	Fixed-bed	3 [-]	2.0	250	250 - 270	18000	10 % H_2/He	300	2.0	97.1	-	2.8	2.7	[103],[104]
148	$Ga_2O_3/CuO/ZrO_2$ (Ga_2O_3= 7.7 wt%, atomic ratio: Ga/Cu= 2/1)	0.1	ion exchange (IE)	Plug-flow microreactor	3.4 [3% He]	3.0	250	250 - 280	12000*	H_2	280	2.0	70	-	1.85	1.3	[106]

149	$CuO/Ga_2O_3/ZrO_2$ [37.5 Cu/12.8 Zr/43.8 O/ (5.9 Ga/B) wt%]	3.0	Deposition–coprecipitation	Fixed-bed	3 [-]	2.0	250	250	2500*	H_2	250	3.0	75.59	24.41	13.71	10.3	[107]
150	PdO-$CuO/ZnO/Al_2O_3$ (9.2 Pd/40 Cu/21.6 Zn/4 Al wt%)	-	Impregnation	Fixed-bed	3 [-]	4.0	200	160 - 200	23809	10% H_2/N_2	280	2.0	92	-	2.3	2.1	[24], [108]
151	PdO/CuO/ZnO (2/28/70 wt%)	-	Sequential precipitation	Fixed-bed	3 [-]	6.0	240	180 - 240	14800	10% H_2/N_2	240	2.0	66.2	-	9.19	6.0	[24],[109],[110]
152	PdO/ZnO/Al_2O_3 (Molar ratio: $Pd/M^{2+}/M^{3+}$= 1.0/69.5/29.5)	0.4	Co-precipitation	Fixed-bed	3 [4% Ar]	3.0	250	190 - 275	0.6**	20% H_2/He	250	2.0	60	-	0.6	0.4	[104],[111]
153	PdO-$CuO/ZnO/Al_2O_3$ (3.7 Pd/42.2 Cu/23.3 Zn/4.8 Al wt%)	-	Impregnation	Fixed-bed	3 [-]	4.0	200	160 - 200	23809	10% H_2/N_2	280	2.0	91	-	3.1	2.8	[108]
154	$CuO/B_2O_3/ZrO_2$ (24.1 Cu/11 Zr/64.9 O wt%)	3.0	Deposition–coprecipitation	Fixed-bed	3 [-]	2.0	250	250	2500*	H_2	250	3.0	67.26	32.74	15.83	10.6	[107]
155	Na_2O/ PdO-$CuO/ZnO/Cr_2O_3$ (Na= 0.1, Pd= 2.8 wt%)	0.2-0.6 (cm^3)	Impregnation	Fixed-bed	2.7 [-]	2.0	265	220 - 320	6000*	diluted syngas	350	-	12.2	87.3	18.4	2.2	[2],[79]
156	$CuO/ZnO/ZrO_2$/PdO (65.2 Cu/26.3 ZnO/4.5 ZrO_2/3.9 PdO wt%)	2.0	Decomposition	Fixed-bed	3 [12% N_2]	8.0	240	160 - 240	-	7% H_2/N_2	-	-	73	-	17	12.4	[64]
157	PdO(0.34)-CuO/SiO_2 (0.92 Cu/0.44 Pd/31.22 Si/3.27 C/64.15 O atom %)	0.2	Co-impregnation	Fixed-bed	3 [4% Ar]	4.1	250	180 - 280	3600	H_2	300	2.0	31	69	6.7	2.1	[104],[112]
158	PdO/ZnO (Pd= 5 wt%)	1.0	Deposition–precipitation	Fixed-bed	3 [-]	3.9	300	250 - 400	-	50% H_2/He	300	2.0	-	-	13.7	7.8	[113],[114]
159	PdO/ZnO (Pd= 5 wt%)	0.5	Sol-immobilisation	Fixed-bed	3 [-]	2.0	250	150 - 350	-	5% H_2/Ar	400	1.0	59	40	11.1	6.5	[113]
160	PdO/ZnO (Pd= 10 wt%)	1.0	Co-precipitation	Fixed-bed	3 [-]	5.0	250	250	18000	10 % H_2/He	250	-	37.5	62.3	13.8	5.2	[103],[115]
161	PdO/ZnO (Pd= 19 wt%)	-	Inverse co-precipitation	Fixed-bed	9 [-]	0.1	190	190	3000	H_2	210 to 250	-	13.5	86.5	-	0.14	[11],[116]
162	PdO/ZnO-CNTs (Pd= 16 mass %, molar ratio: Pd/Zn= 0.1/1)	0.5	Incipient wetness	Fixed-bed	3 [8% N_2]	3.0	250	230 - 270	1800	5% H_2/N_2	500	6.0	99.6	-	6.3	6.3	[20],[21],[117]
163	PdO/γ-alumina (Pd= 1 wt%)	-	Incipient impregnation	Fixed-bed	3 [(3% CO)]	8.0	250	250 - 290	18800*	1% H_2 in N_2	250	4.0	84.3	14.9	-	22	[11],[101]
164	$LaMn_{0.4}Cu_{0.5}Zn_{0.3}O$	1.5	Sol-gel	Fixed-bed	3 [-]	5.0	270	270	3800*	H_2	350	8.0	50.43	47.93	9.09	4.6	[118]

165	$LaMn_{0.3}Zn_{0.1}Cu_{0.6}O_y$	1.5	Sol-gel	Fixed-bed	3 [-]	5.0	270	270	3800*	H_2	330	8.0	54.5	44.5	13.1	7.1	[119]
166	$LaCu_{0.7}Zn_{0.3}O_x$	2.0	Sol-gel	Fixed-bed	3 [-]	5.0	250	250	3600*	H_2	350	8.0	57.9	39.5	6.4	3.7	[120]
167	$La_{0.8}Ce_{0.2}Cu_{0.7}Zn_{0.3}O_x$	2.0	Sol-gel	Fixed-bed	3 [-]	5.0	250	250	3600*	H_2	350	8.0	63.3	34.9	8.1	5.1	[120]
168	$La_{0.8}Mg_{0.2}Cu_{0.7}Zn_{0.3}O_x$	2.0	Sol-gel	Fixed-bed	3 [-]	5.0	250	250	3600*	H_2	350	8.0	65.2	33	9.1	5.9	[120]
169	$La_{0.8}Zr_{0.2}Cu_{0.7}Zn_{0.3}O_x$	2.0	Sol-gel	Fixed-bed	3 [-]	5.0	250	250	3600*	H_2	350	8.0	52.5	46	12.6	6.6	[120]
170	$La_{0.8}Y_{0.2}Cu_{0.7}Zn_{0.3}O_x$	2.0	Sol-gel	Fixed-bed	3 [-]	5.0	250	250	3600*	H_2	350	8.0	59.6	37	5.0	3.0	[120]
171	La_2O_3/CuO/ZnO (La/Cu/Zn: atomic ratio= 1/1/0.5)	1.5	Co-precipitation	Fixed-bed	3 [-]	5.0	270	270	4000*	H_2	350	8.0	39.5	59.5	15.6	6.1	[121]
172	$LaCr_{0.5}Cu_{0.5}O_3$	0.5	Sol-gel	Fixed-bed	3 [-]	2.0	250	250 - 300	9000	H_2	350	2.0	90.8	5.5	10.4	9.4	[122]
173	$Ag_2O/ZnO/Al_2O_3$ (Ag = 10 wt%, atomic ratio: Ag/ZnO= 1)	1.0	Impregnation	Fixed-bed	3 [-]	5.0	250	250	6000	H_2	350	-	75	25	-	3.8	[11],[123]
174	$Ag_2O/ZnO/Ga_2O_3/Al_2O_3$ (10 Ag/2 Ga wt%)	1.0	Impregnation	Fixed-bed	3 [-]	5.0	250	250	6000	H_2	350	-	82.6	17.4	-	5.9	[11],[123]
175	Ag_2O /ZnO/ZrO_2 (5.4 Ag/24.5 Zn/9.9 Zr/60.2 O_2 atom %)	2.0	Co-precipitation	Fixed-bed	3 [-]	8.0	220	180 - 250	3300*	10% H_2/N_2	200 to 350	15	97	-	2.0	1.9	[7],[68]
176	Au_2O_3/ZnO (Au= 5 atom %)	-	Co-precipitation	Fixed-bed	3 [10% Ar]	5.0	250	150 - 400	3000	-	-	-	48.8	-	8.2	4.0	[124]
177	$Au_2O_3/CuO/ZnO/Al_2O_3$ (Au= 1 wt%, mole ratio: Cu/Zn/Al = 4/1/1)	0.2	Rapid precipitation	Fixed-bed	6 [-]	6.0	260	200 - 260	7000*	H_2	300	2.0	-	-	28	16.6	[125]
178	Au_2O_3/Fe_2O_3 (Au= 5 atom %)	1.0	Co-precipitation	Fixed-bed	3 [10% Ar]	5.0	250	150 - 400	3000	1 vol% H_2/N_2	250	8.0 to 12	29.3	69.6	18.4	5.4	[126]
179	Au_2O_3/TiO_2 (Au= 2 atom %)	1.0	Deposition-precipitation	Fixed-bed	3 [10% Ar]	5.0	250	150 - 400	3000	1 vol% H_2/N_2	250	8.0 to 12	6.5	75.3	18.6	1.2	[126]
180	$Au_2O_3/ZnFe_2O_4$ (Au= 5 atom %)	1.0	Co-precipitation	Fixed-bed	3 [10% Ar]	5.0	300	150 - 400	3000	1 vol% H_2/N_2	250	8.0 to 12	24.4	74.6	20.1	4.9	[126]
181	PtO_2/MgO (Pt= 2 wt%)	-	Impregnation	Fixed-bed	1 [-]	1.0	260	260 - 300	-	H_2	400	2.0	78.5	-	-	-	[103],[127]
182	[PtO2–W]/SiO_2 (2.0 Pt/1.9 W wt%)	0.2	Impregnation	Fixed-bed	3 [-]	3.0	240	200-300	2240	H_2	400	2.0	86.6	13.4	4.0	3.4	[24],[128]
183	[PtO_2–Cr_2O_3]/SiO_2 (2.4 Pt/0.6 Cr wt%)	0.2	Impregnation	Fixed-bed	3 [-]	3.0	200	200-300	2240	H_2	400	2.0	51.1	48.9	2.2	1.1	[24],[128]

184	PdO/Ga_2O_3 (10/90 wt%)	1.0	Co-precipitation	Fixed-bed	3 [-]	5.0	250	250	18000	10 % H_2/He	250	-	51.5	47.9	19.6	10.1	[104],[115]
185	Ga_2O_3-PdO/SiO_2 (2.6 Ga/2 Pd wt%, atomic ratio: Ga/Pd= 2)	0.5	Incipient wetness impregnation	Fixed-bed	3 [-]	3.0	250	250	7800*	5 % H_2/Ar	450	2.0	70	28.2	-	-	[129]
186	PdO/β-Ga_2O_3 (Pd= 1 wt%)	-	Impregnation	Glass-lined-S microreactor	3 [-]	3.0	250	250	8200*	5% H_2/Ar	450	2.0	52	48	0.86	0.4	[130]
187	PdO/CeO_2 (Pd= 3 wt%)	-	Conventional impregnation	Fixed-bed	3 [-]	2.0	250	250 - 300	3600*	10% H_2/N_2	300	1.0	27.7	67	4.03	1.1	[131]
188	PdO/CeO_2 (Pd= 4 wt%)	0.5	Impregnation	Fixed-bed	9 [-]	3.0	230	200 - 260	0.1**	H_2	500	1.0	92.1	7.0	7.9	7.3	[132]
189	PdO/TiO_2 (Pd= 4 wt%)	0.5	Impregnation	Fixed-bed	3 [-]	3.0	230	200 - 260	0.1**	H_2	500	1.0	84.9	7.7	4.7	4.0	[133]
190	Pd- peptide/In_2O_3 (Pd= 45 wt %)	0.1	Incipient wetness impregnation	Fixed-bed	4 [-]	5.0	300	200 - 300	21000	10% H_2/N_2	200	1.0	70	-	20	14	[134]
191	PdO/In_2O_3 (molar ratio: 1/1)	1.0	Thermal decomposition	CSTR	3 [4% Ar]	5.0	190	190 - 270	18900***	5% H_2/N_2	210	2.0	96	-	36.9	35.4	[135]
192	PdO/CaO/SBA-15 (4 Pd/0.5 Ca wt%)	-	Incipient wetness impregnation	Fixed-bed	3 [4% Ar]	4.1	250	-	0.16**	H_2	300	2.0	39	61	6.0	2.3	[113],[33]
193	CuO/Mo_2C	0.2	Co-precipitation	Fixed-bed	5 [10% Ar]	2.0	300	200 - 300	-	10% $CH4/H_2$	700	-	17	38	19	3.2	[136],[137]
194	NiO/Mo_2C	0.2	Co-precipitation	Fixed-bed	5 [10% Ar]	2.0	250	200 - 300	-	10% $CH4/H_2$	850	-	6.0	29	21	1.2	[136],[137]
195	Co/Mo_2C	0.2	Co-precipitation	Fixed-bed	5 [10% Ar]	2.0	250	200 - 300	-	10% $CH4/H_2$	850	-	5.0	24	23	1.1	[136],[137]
196	N,P,S-dC@Mo_2C-1073K	0.25	Temperature-programmed carbonization	Fixed-bed	3 [5% Ar]	3.0	200	220 - 240	3600	H_2	400	3.0	91	-	19	17.3	[138]
197	In_2O_3	0.2	Co-precipitation	Microreactor	3 [10% N_2]	4.0	330	250 - 350	15000	-	-	-	39.7	-	7.1	2.8	[104]
198	$YBa_2Cu_3O_7$	0.2 (cm^3)	-	Microreactor	3 [-]	3.0	240	200 - 280	3600*	25% H_2/He	250	8.0	50.7	45.9	3.4	1.7	[139]
199	ReO_2/ZrO_2 (7 Re/93 ZrO_2 wt%)	-	Conventional impregnation	Flow reactor	4 [-]	1.0	160	160 - 220	-	-	-	-	73.2	-	-	-	[140]
200	ReO_2/Nb_2O_5 (7 Re/93 Nb_2O_5 wt%)	-	Conventional impregnation	Flow reactor	1 [-]	1.0	220	220 - 260	-	-	-	-	52	-	-	-	[140]
201	Rh_2O_3/Nb_2O_5 (Rh = 3 wt%)	1.0	Co-Impregnation	Flow reactor	1 [-]	1.0	145	145 - 220	2400	H_2	400	2.0	42.2	-	-	-	[141]
202	$Rh_2O_3/TiO2$ (Rh= 3 wt%)	1.0	Impregnation	Flow reactor	3 [-]	1.0	240	240 - 300	2400	H_2	400	2.0	60.7	-	-	-	[141]

(*) SV= (1/h), (**) F/W=(mol/g-cat.h), (***)F/W= (mL/mmol-cat.h)

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