Electronic Supplementary Material (ESI) for Reaction Chemistry & Engineering.

Advances in Dynamically Controled Catalytic Reaction Engineering

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Electronic Supplementary Information

Table S1 summarizes a comprehensive literature review of natural and forced catalytic oscillations. When reported, turnover frequencies (TOFs) at reaction temperatures are directly tabulated. In instances where no TOF was reported, a secondary source was identified at comparable conditions and denoted by superscripts in the respective columns. The effective Damkholer number ($Da_{eff} = TOF/f$) was then calculated as the ratio TOF to forced oscillation frequency. The full data set is visualized in Figure 7 of the manuscript.

Table S1: Tabulated natural and forced oscillations observed in catalytic systems.

#	*Reference*	*Reaction*	*Condition*	*Oscillation Type*	*Low Frequency (Hz)*	*High Frequency (hz)*	*Reaction specific TOF (hz)*	*Low Da (TOF/ Frequency)*	*High Da (TOF/ Frequency)*
1	Brandner et al, 2004[1]	CO Oxidation	Temperature	Forced	-	0.0166	0.033[2]	-	2
2	Luther et al, 2008[3]	CO Oxidation	Temperature	Forced	-	0.1	0.033[2]	-	0.333
3	Stolte et al, 2013[4]	CO Oxidation	Temperature	Forced	-	20	2[5]	-	0.1
4	Jensen et al, 2007[6]	CO Oxidation	Temperature	Forced	0.02	1	0.033[2]	1.67	0.0333
5	Xu et al, 2018[7]	Rhodamine B Decomposition	Vibration	Forced	-	40000	2.5	-	0.0000625
6	Yukawa et al, 2002[8]	Ethanol Decomposition	Vibration	Forced	3500000	17400000	0.000033[9]	9.5E-12	1.92E-12
7	Muraki et al, 1985[10]	CO Oxidation	Concentration	Forced	0.05	10	0.0533[11]	1.067	0.00533
8	Zhou et al, 1986[12]	CO Oxidation	Concentration	Forced	-	2	0.0133[11]	-	0.00667
9	Graham and Lynch, 1990[13]	CO Oxidation	Concentration	Forced	0.0005	0.017	0.25	500	14.71
10	Zhou and Gulari, 1986[14]	CO Oxidation	Concentration	Forced	0.02	0.1	0.1[15]	5	1
11	Hu et al, 1998[16]	Methane Oxidation	Reaction Induced	Natural	0.0001	0.01	0.00667[17]	66.67	0.667
12	Slavinskaya et al, 2011[18]	CO Oxidation	Reaction Induced	Natural	0.00416	0.033	0.0533[11]	12.8	1.6
13	Hendriksen et al, 2010[19]	CO Oxidation	Reaction Induced	Natural	-	0.00066	0.000667[5]	-	75000
14	Kaichev et al, 2016[20]	Propane Oxidation	Reaction Induced	Natural	-	0.00104	5.4	-	5184
15	Delikonstantis et al, 2020[21]	Non-Oxidative Methane Coupling	Plasma	Forced	3000	100000	0.00001[22]	3.3E-9	1.0E-10
16	Yao et al, 2001[23]	Methane to Acetylene	Plasma	Forced	1000	8000	0.045[24]	4.5E-5	5.63E-6
17	Kado et al, 2003[25]	Methane to Acetylene	Plasma	Forced	45	225	0.045[24]	0.0001	0.0002
18	Deng et al, 2014[26]	Hydrogen Evolution Reaction	Voltage	Forced	20	70	3.93[27]	0.196	0.0561
19	Ohkawara et al, 1996[28]	Ethanol Oxidation	Voltage	Forced	-	84000	0.00317[29]	-	3.77E-8
20	Fu et al, 1984[30]	Alkene Isomerization	Light	Forced	5	25	10000	2000	400
21	Pschenitza et al, 2016[31]	CO2 Reduction	Light	Forced	500	10000	0.003055	6.1E-6	3.06E-7

22	Yamani, 2018[32]	Methylene Blue Decomposition	Light	Forced	-	10	1.11[33]	-	0.111
23	Kolbitsch et al, 2010[34]	Combustion	Chemical Looping	Forced	0.0056	0.0415	11.9	2117.01	286.79
24	Naqvi et al, 2005[35]	Combustion	Chemical Looping	Forced	-	0.00493	11.9	-	2415.7
25	Ryden et al, 2011[36]	Combustion	Chemical Looping	Forced	0.00625	0.0175	11.9	1904	680
26	De Diego et al, 2008[37]	Methane Combustion	Chemical Looping	Forced	0.000185	0.00204	11.9	64260	5841.8
27	Escudero et al, 2007[38]	Oxygen Reduction	Impedance Spectroscopy	Forced	0.01	1000000	100	10000	0.0001
28	Wang and Rick, 2014[39]	Lithium Ion Battery	Impedance Spectroscopy	Forced	0.01	1000	0.5	50	0.0005
29	Liang et al, 2015[40]	$LiNi_{0.5}CO_{0.2}$-$Mn_{0.3}O_2$ Capacitance	Impedance Spectroscopy	Forced	0.01	100000	20	2000	0.0002
30	Yoon et al, 2002[41]	PCR	PCR	Forced	0.00833	0.166	1.25	150	7.5
31	Woolley et al, 1996[42]	PCR	PCR	Forced	-	0.033	1.25	-	37.5
32	Farrar and Wittwer, 2015[43]	PCR	PCR	Forced	0.0485	1.25	1.25	25.75	1
33	Abulesz and Lyberatos, 1988[44]	Yeast biomass production	Bioreactor	Forced	0.0000694	0.000138	0.0000842	1.21	0.606
34	Pickett and Bazin, 1979[45]	E. Coli growth and composition	Bioreactor	Forced	0.0000463	0.00111	0.0000463	1	0.0417
35	Panic et al, 2011[46]	Ferrocyanide electrooxidation	Frequency Response	Forced	0.01	10000	10	1000	0.001
36	Petkovska and Do, 1998[47]	Langmuir kinetic simulation	Frequency Response	Forced	0.0000138	13.8	0.0138	1000	0.001

Supplemental Citations

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