

Supplementary Materials

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1. Density Models

1.1. MEA + H₂O + CO₂ Mixtures

ANN with 3 inputs, 6 neurons and one output

Table S1. Weight matrix (hidden layer) for density model of MEA + H₂O + CO₂ mixtures.

Neurons (Hidden Layer)	Inputs			Layer Bias
	X _{MEA}	X _{CO2}	T	
1	0.16252	0.67350	−0.06553	1.03080
2	−0.02404	−0.24566	0.05830	0.08016
3	0.13569	−0.72070	0.03367	0.64537
4	0.02403	0.24566	−0.05831	−0.08014
5	−0.35575	0.26859	0.29186	−0.13775
6	0.05391	0.12973	0.41363	−0.28169

Table S2. Weight matrix (output layer) for density model of MEA + H₂O + CO₂ mixtures.

Neurons (Output Layer)	Neurons (Hidden Layer)	Outputs	Output Bias
1	1	0.94120	−0.23771
	2	−0.43595	
	3	−0.73878	
	4	0.43592	
	5	0.25741	
	6	−0.41248	

1.2. AMP + MEA + H₂O + CO₂ Mixtures

ANN with 4 inputs, 9 neurons and one output

Table S3. Weights matrix (hidden layer) for density model of AMP + MEA + H₂O + CO₂ mixtures.

Neurons (Hidden Layer)	Inputs				Layer Bias
	X _{AMP}	X _{MEA}	X _{CO2}	T	
1	0.11471	−0.06757	−0.43337	0.30929	0.67369
2	0.20136	0.18264	−1.74341	0.00096	−0.84629
3	0.15516	−0.25587	0.46990	−0.28619	−0.42140
4	0.89873	−0.67214	−1.83587	−0.03158	1.10234
5	0.08751	−0.21198	0.70493	−0.13432	−0.81144
6	0.32330	0.06475	−1.90132	0.00065	−0.53636
7	−0.15385	0.07906	0.49937	0.00580	−0.26394
8	0.10570	−0.04545	−0.19315	0.27357	−0.71835
9	−0.50826	0.33165	1.28594	0.02352	−0.71788

Table S4. Weight matrix (output layer) for density model of AMP + MEA + H₂O + CO₂ mixtures.

Neurons (Output Layer)	Neurons (Hidden Layer)	Outputs	Output Bias
1	1	-0.42302	-0.82061
	2	-0.94195	
	3	-0.37683	
	4	0.56404	
	5	0.96958	
	6	0.59968	
	7	-1.52652	
	8	-1.15283	
	9	1.43738	

2. Viscosity Models

2.1. MEA + H₂O Mixtures

ANN with 3 inputs, 14 neurons and one output

Table S5. Weight matrix (hidden layer) for viscosity model of MEA + H₂O mixtures.

Neurons (Hidden Layer)	Inputs			Layer Bias
	X _{MEA}	X _{H₂O}	T	
1	-0.76915	0.76915	-1.09050	-0.72465
2	-0.49352	0.49352	0.41019	0.33087
3	0.12846	-0.12846	0.55010	-0.12334
4	-0.26278	0.26278	1.58966	0.11269
5	-0.50341	0.50341	-0.45732	0.15690
6	-1.08096	1.08096	-0.42398	-1.31339
7	0.69293	-0.69293	-1.48678	0.09698
8	-0.73589	0.73589	-0.71061	-0.79764
9	-0.60857	0.60857	2.81335	3.41294
10	0.53967	-0.53967	-0.99766	-0.02319
11	-0.81043	0.81043	0.01054	1.12410
12	-0.48113	0.48113	0.26354	-0.81779
13	1.48104	-1.48104	0.38906	1.80117
14	-0.21792	0.21792	1.08745	0.19337

Table S6. Weight matrix (output layer) for viscosity model of MEA + H₂O mixtures.

Neurons (Output Layer)	Neurons (Hidden Layer)	Outputs	Output Bias
1	1	-0.52694	0.56499
	2	-3.07685	
	3	1.10345	
	4	0.29264	
	5	0.42700	
	6	-2.02407	
	7	0.37568	
	8	2.17898	
	9	-0.68619	
	10	-1.67116	
	11	1.12690	
	12	0.49069	
	13	-0.61944	
	14	-0.99348	

2.2. MEA + H₂O + CO₂ Mixtures

ANN with 3 inputs, 12 neurons and one output

Table S7. Weight matrix (hidden layer) for viscosity model of MEA + H₂O + CO₂ mixtures.

Neurons (Hidden Layer)	Inputs			Layer bias
	X _{MEA}	X _{CO2}	T	
1	0.49454	0.47502	-0.76896	-1.59551
2	-0.91683	1.01092	0.08643	0.64852
3	-1.11482	-1.47741	1.39197	4.36000
4	-0.78335	1.36797	0.06727	-0.56732
5	0.19809	-0.16894	0.78889	0.76927
6	0.30028	0.40056	-2.15641	-3.35332
7	-0.76630	-0.07789	-0.31947	0.71814
8	-0.31123	0.18358	-0.32668	0.53690
9	0.00856	-0.30418	0.02425	-0.14404
10	0.44867	0.16758	0.25755	0.84786
11	-0.82352	0.93306	0.06158	0.08351
12	-1.34763	1.40125	0.10361	1.07265

Table S8. Weight matrix (output layer) for viscosity model of MEA + H₂O + CO₂ mixtures.

Neurons (Output Layer)	Neurons (Hidden Layer)	Outputs	Output Bias
1	1	0.82332	1.43802
	2	1.22499	
	3	-1.33084	
	4	0.24799	
	5	-0.35671	
	6	0.56196	
	7	-0.49393	
	8	0.92652	
	9	1.43806	
	10	0.86887	
	11	-0.58310	
	12	-0.50249	

2.3. AMP + MEA + H₂O + CO₂ Mixtures

ANN with 4 inputs, 14 neurons and one output

Table S9. Weight matrix (hidden layer) for viscosity model of AMP + MEA + H₂O + CO₂ mixtures.

Neurons (Hidden Layer)	Inputs				Layer Bias
	X _{AMP}	X _{MEA}	X _{CO2}	T	
1	-0.76996	0.53788	1.41769	0.06809	0.62146
2	-0.43692	0.19090	1.39958	0.75875	0.07948
3	0.82936	-1.17285	0.85870	0.09499	1.21493
4	0.42440	-0.57775	0.30439	0.17220	0.76099
5	-0.07504	0.03099	-0.33552	1.82444	2.75853
6	0.25266	0.12668	-1.76785	0.37892	-0.77305
7	-0.42248	0.11173	1.62521	0.17044	0.40706
8	-0.04115	-0.03234	0.27271	-0.36995	0.45608
9	-0.31318	-0.07540	1.87368	-0.14383	0.64908
10	-0.21224	0.26841	-0.09851	0.39591	-0.18050
11	0.02339	-0.00623	-0.27034	0.81739	0.82706
12	0.33190	-0.40371	0.44557	-0.68657	-1.44072
13	-0.42263	0.37872	0.42564	0.19740	0.15628
14	0.42351	-0.16292	-1.43508	-0.49658	-0.19541

Table S10. Weight matrix (output layer) for viscosity model of AMP + MEA + H₂O + CO₂ mixtures.

Neurons (Output Layer)	Neurons (Hidden Layer)	Outputs	Output Bias
1	1	0.39467	1.0660
	2	-0.48338	
	3	-0.52017	
	4	1.05812	
	5	-2.01151	
	6	0.30930	
	7	-1.62633	
	8	1.05997	
	9	0.80506	
	10	0.90080	
	11	-1.12903	
	12	-0.46661	
	13	-0.71276	
	14	-1.36455	

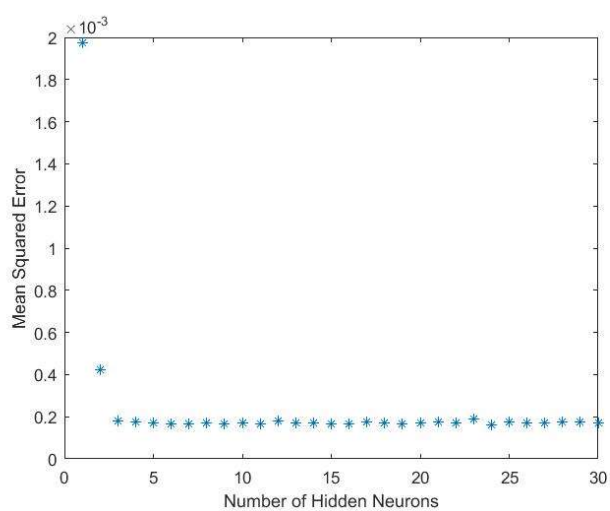


Figure S1. Mean squared error of neurons in the hidden layer for density of MEA + H₂O + CO₂ mixtures.

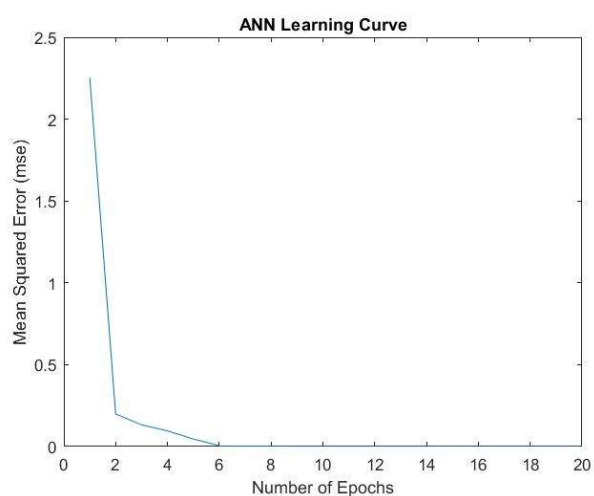


Figure S2. Learning curve of ANN with 6 neurons for density of MEA + H₂O + CO₂ mixtures.

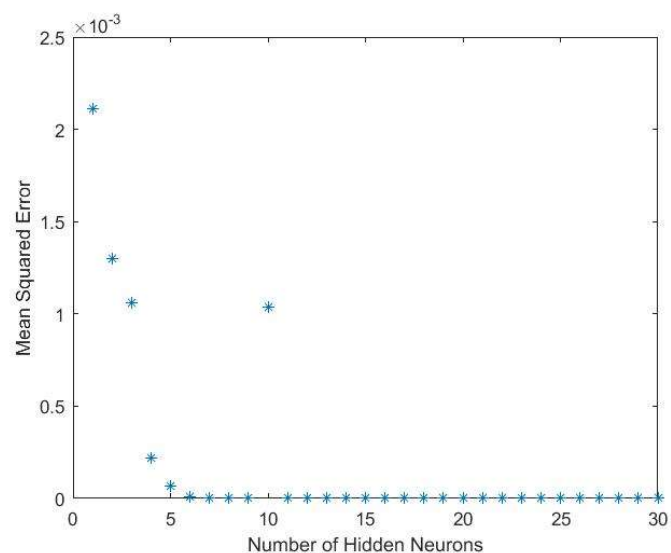


Figure S3. Mean squared error of neurons in the hidden layer for density of AMP + MEA + H₂O + CO₂ mixtures.

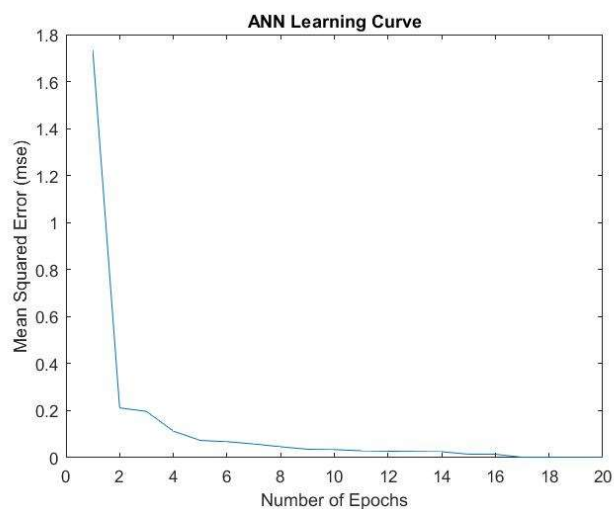


Figure S4. Learning curve of ANN with 9 neurons for density of AMP + MEA + H₂O + CO₂ mixtures.

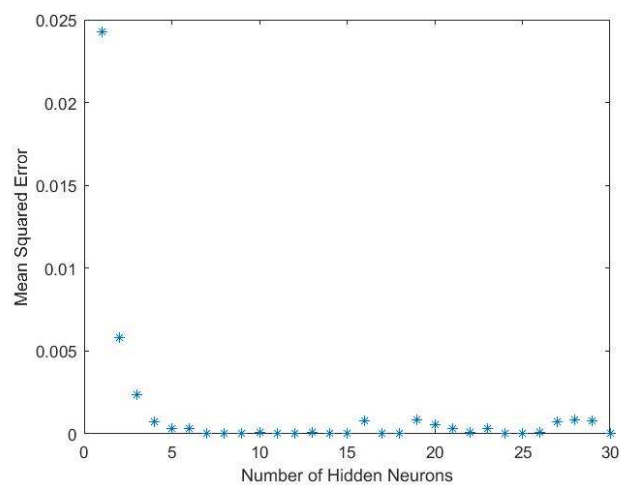


Figure S5. Mean squared error of neurons in the hidden layer for viscosity of MEA + H₂O mixtures.

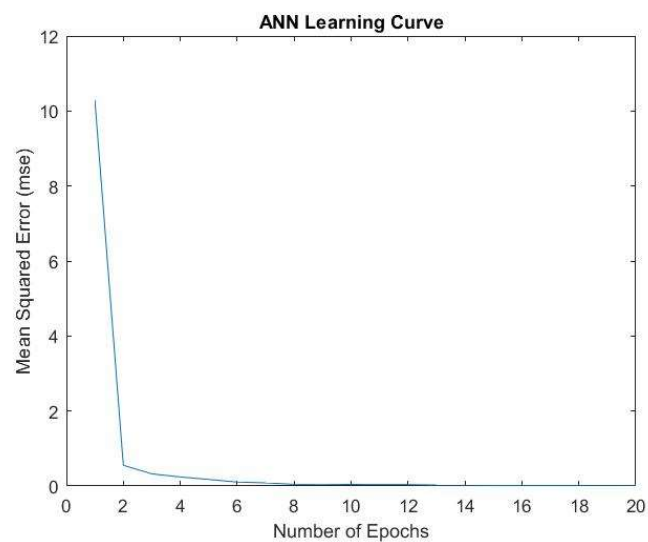


Figure S6. Learning curve of ANN with 14 neurons for viscosity of MEA + H₂O mixtures.

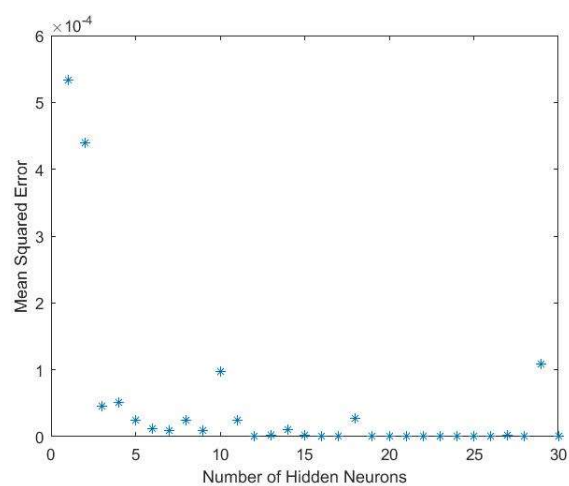


Figure S7. Mean squared error of neurons in the hidden layer for viscosity of MEA + H₂O + CO₂ mixtures.

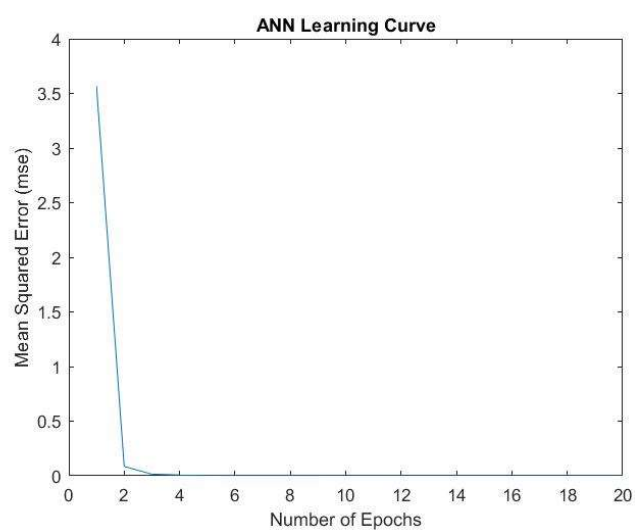


Figure S8. Learning curve of ANN with 12 neurons for viscosity of MEA + H₂O + CO₂ mixtures.

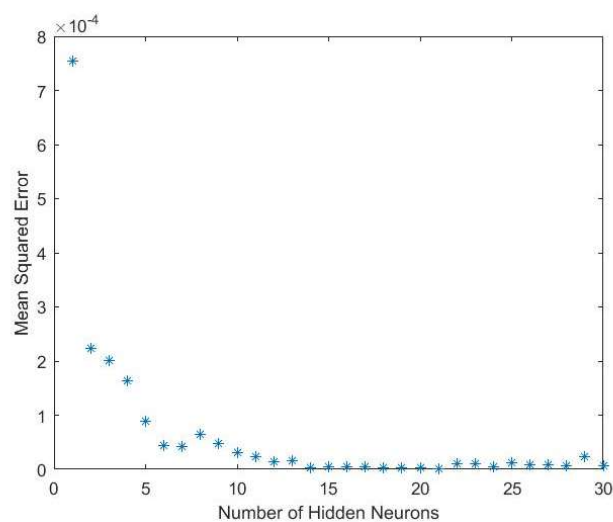


Figure S9. Mean squared error of neurons in the hidden layer for viscosity of AMP + MEA + H₂O + CO₂ mixtures.

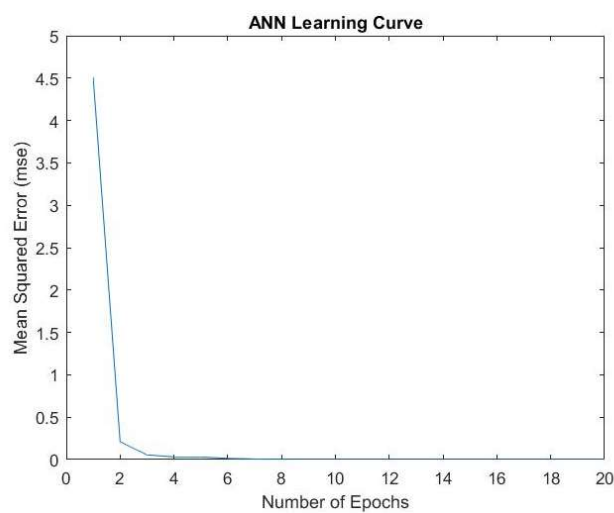


Figure S10. Learning curve of ANN with 14 neurons for viscosity of AMP + MEA + H₂O + CO₂ mixtures.

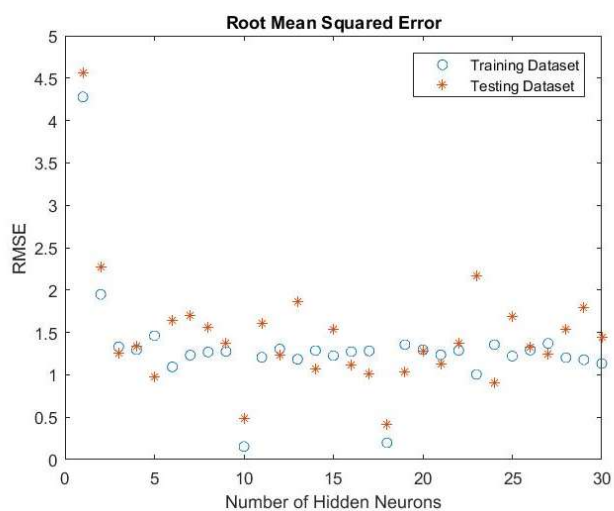


Figure S11. Root mean squared error of neurons in the hidden layer for density of MEA + H₂O + CO₂ mixtures.