SUPORTING INFORMATION

Machine Learning Implemented Exploration of the Adsorption Mechanism of Carbon Dioxide onto Porous Carbons

Sarvesh Namdeo[1], Vimal Chandra Srivastava*[,1], Paritosh Mohanty[2]

[1]Department of Chemical Engineering, Indian Institute of Technology Roorkee, Roorkee 247667, Uttarakhand, India.

[2]Department of Chemistry, Indian Institute of Technology Roorkee, Roorkee 247667, Uttarakhand, India.

*Corresponding author: Tel.: +91-1332-285889; Fax: +91-1332-27635

Emails: vimalcsr@yahoo.co.in, vimal.srivastava@ch.iitr.ac.in (VCS), snamdeo@ch.iitr.ac.in (SN), pm@cy.iitr.ac.in (PM)

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Table S1. Parameters of the machine learning (ML) model: gradient boosting decision tree (GBDT) [3].

Parameters	Value
alpha	0.9
ccp_alpha	0.0
criterion	friedman_mse
init	None
learning_rate	0.05
loss	squared_error
max_depth	5
max_features	None
max_leaf_nodes	None
min_impurity_decrease	0.0
min_samples_leaf	1
min_samples_split	2
min_weight_fraction_leaf	0.0
n_estimators	600
n_iter_no_change	None
random_state	42
subsample	0.5
tol	0.0001
validation_fraction	0.1
verbose	0
warm_start	False

Table S2. Parameters of the machine learning (ML) model: light boost gradient machine (LBGM) [3].

Parameters	Value
boosting_type	gbdt
class_weight	none
colsample_bytree	1.0
importance_type	split
learning_rate	0.05
max_depth	10
min_child_samples	20
min_child_weight	0.001
min_split_gain	0.0
n_estimators	600
n_jobs	-1
num_leaves	5
objective	none
random_state	none
reg_alpha	0.0
reg_lambda	0.8
silent	warn
subsample	0.1
subsample_for_bin	200000
subsample_freq	0

Table S3. Parameters of the machine learning (ML) model: extreme gradient boosting (XGB) [3].

Parameters	Value
objective	reg:squarederror
base_score	0.5
booster	gbtree
callbacks	none
colsample_bylevel	1
colsample_bynode	1
colsample_bytree	1
early_stopping_rounds	none
enable_categorical	false
eval_metric	rmse
gamma	0
gpu_id	-1
grow_policy	depthwise
importance_type	none
learning_rate	0.3
max_bin	256
max_cat_to_onehot	4
max_delta_step	0
max_depth	4
max_leaves	0
min_child_weight	1
missing	nan
monotone_constraints	()
n_estimators	300
n_jobs	0
num_parallel_tree	1
predictor	auto
random_state	60
reg_alpha	0
reg_lambda	1
sampling_method	uniform
scale_pos_weight	1
subsample	0.5
tree_method	exact
validate_parameters	1
verbosity	none
seed	60

Table S4. Parameters of the machine learning (ML) model: random forest (RF) [3].

Parameters	Value
bootstrap	true
ccp_alpha	0.0
criterion	squared_error
max_depth	none
max_features	sqrt
max_leaf_nodes	none
max_samples	none
min_impurity_decrease	0.0
min_samples_leaf	1
min_samples_split	2
min_weight_fraction_leaf	0.0
n_estimators	300
n_jobs	none
oob_score	false
random_state	none
verbose	0
warm_start	false

Table S5. Parameters of the machine learning (ML) model: categorical boosting (Catboost) and adaptive boosting (Adaboost) [3].

Catboost	
loss_function	RMSE
Adaboost	
base_estimator	none
learning_rate	0.01
loss	exponential
n_estimators	200
random_state	none

Table S6. Data used for during machine learning (ML) implemented exploration of adsorption mechanism of carbon dioxide (CO_2) onto porous carbons. This data is represented on the basis of porous carbon's properties (surface area (SA) (m^2/g), TPV (total pore volume) (cm^3/g), MPV (micro-pore volume) (cm^3/g), C%, H%, N%, O%), CO_2 adsorption conditions (T (℃), P (bar)), and CO_2 uptake (mmol/g). Porous carbon's properties and adsorption conditions are the input features, and CO_2 uptake is the predicted variable.

				Porous carbon's properties								Adsorption conditions			
S. No.	**Feedstock**	**Heat treatment (℃)**	**Activation**	**Material type**	**SA (m^2/g)**	**TPV (cm^3/g)**	**MPV (cm^3/g)**	**C%**	**H%**	**N%**	**O%**	**T (℃)**	**P (bar)**	**CO_2 uptake (mmol/g)**	**Ref.**
1	Wood chip	800- 1000	KOH	Hierarchical	1281.6	0.71	0.32	69.22	3.99	0.08	26.3	25	1	2.63	[4]
			KOH and CO_2		1012.6	0.56	0.22	64.83	3.64	0.38	30.77	25	1	2.59	
	Wood chip and chicken manure		KOH		1408.8	0.83	0.36	72.41	3.63	0.01	23.59	25	1	2.92	
			KOH and CO_2		1403.9	0.85	0.33	69.51	4.35	0.76	24.94	25	1	2.44	
2	Food waste and wood		KOH	Hierarchical	841.3	0.36		68.43	0	31.09	0.48	25	1	3.23	[5]
			KOH and CO_2		667.4	0.29		61.32	0	38.15	0.53	25	1	2.73	
3	Spent coffee		K_2CO_3	Microporous	645	0.26	0.25	70.86	1.71	3.19	14.72	25	1	3.45	[6]
					750	0.3	0.29	83.88	1.63	3.27	5.3	25	1	3.65	
					1259	0.52	0.49	87.56	1.06	1.87	0.23	25	1	4.33	
					1476	0.61	0.6	91.62	0.8	1.67	0	25	1	4.54	
					1692	0.71	0.68	94.51	0.58	1.51	0	25	1	4.46	
					2337	1.15	0.85	82.66	0.59	1.55	0	25	1	3.78	
					645	0.26	0.25	70.86	1.71	3.19	14.72	25	0.15	1.43	
					750	0.3	0.29	83.88	1.63	3.27	5.3	25	0.15	1.46	
					1259	0.52	0.49	87.56	1.06	1.87	0.23	25	0.15	1.36	
					1476	0.61	0.6	91.62	0.8	1.67	0	25	0.15	1.3	
					1692	0.71	0.68	94.51	0.58	1.51	0	25	0.15	1.2	
					2337	1.15	0.85	82.66	0.59	1.55	0	25	0.15	0.92	
4	Pine sawdust	700	KOH	Hierarchical	1728.66	0.7	0.67	93.4	0.73	0.89	6.79	25	1	4.21	[7]

					2279.52	0.99	0.91	96.96	0.18	0.99	4.51	25	1	3.46	
					2330.89	1.91	0.98	87.57	0.17	1.3	7.35	25	1	2.45	
5	Date	500	KOH	Hierarchical	2112	0.94	0.86	82.84	2.06	0.75	14.35	25	1	4.18	[8]
					3255	1.65	1.29	79.46	1.7	0.04	18.8	25	1	3.35	
					3337	2.05	0.54	89.4	1.41	0.16	9.03	25	1	2.9	
		800			1634	0.76	0.56	82.49	2.02	0.82	14.67	25	1	4.14	
					2367	1.15	0.83	74.01	1.93	0.67	13	25	1	4.36	
					2844	1.63	0.89	73.43	2.03	0.67	23.88	25	1	3.65	
6	Bee collected pollen	800	KOH	Microporous	232	0.11	0.09	80.82	1.48	2.34	15.36	25	1	1.77	[9]
					332	0.16	0.12	76.25	0	1.89	21.86	25	1	2.1	
					937	0.4	0.38	77.57	0	1.54	20.89	25	1	3.38	
					1214	0.53	0.48	79.37	0	1.18	19.45	25	1	3.4	
					1460	0.63	0.53	93.1	0	0.31	6.59	25	1	3.42	
					232	0.11	0.09	80.82	1.48	2.34	15.36	25	0.15	0.98	
					332	0.16	0.12	76.25	0	1.89	21.86	25	0.15	1.04	
					937	0.4	0.38	77.57	0	1.54	20.89	25	0.15	1.18	
					1214	0.53	0.48	79.37	0	1.18	19.45	25	0.15	0.85	
					1460	0.63	0.53	93.1	0	0.31	6.59	25	0.15	0.69	
7	Biomass tar		Cao/KOH	Hierarchical	1898	1.52	0.43	82.85	0	0	17.15	25	1	2.44	[10]
					1790	1.21	0.48	93.76	0	0	6.24	25	1	2.71	
					2424	1.38	0.51	95.01	0	0	4.99	25	1	2.67	
					2358	1.85	0.49	95.14	0	0	4.86	25	1	2.92	
					1829	1.25	0.49	96.75	0	0	3.25	25	1	3.13	
					1684	1.43	0.48	95.25	0	0	4.75	25	1	2.75	
					1898	1.52	0.43	82.85	0	0	17.15	25	0.15	0.8	
					1790	1.21	0.48	93.76	0	0	6.24	25	0.15	0.74	
					2424	1.38	0.51	95.01	0	0	4.99	25	0.15	0.7	
					2358	1.85	0.49	95.14	0	0	4.86	25	0.15	1.01	
					1829	1.25	0.49	96.75	0	0	3.25	25	0.15	1.2	

					1684	1.43	0.48	95.25	0	0	4.75	25	0.15	0.68	
					1898	1.52	0.43	82.85	0	0	17.15	0	1	3.81	
					1790	1.21	0.48	93.76	0	0	6.24	0	1	4.4	
					2424	1.38	0.51	95.01	0	0	4.99	0	1	4.1	
					2358	1.85	0.49	95.14	0	0	4.86	0	1	4.77	
					1829	1.25	0.49	96.75	0	0	3.25	0	1	5.03	
					1684	1.43	0.48	95.25	0	0	4.75	0	1	4.62	
8	Flesh by sunflower receptacle and sunflower stalk	500	KOH	Hierarchical	3072	1.77	0.78	91.02	2.71	0.4	5.87	25	1	2.78	[11]
					2730	1.84	1.12	94.5	0.95	0.8	3.75	25	1	2.34	
		1000			654	0.46	0.36	77.12	1.08	0.75	21.05	25	1	3.08	
		500			3072	1.77	0.78	91.02	2.71	0.4	5.87	0	1	4.09	
					2730	1.84	1.12	94.5	0.95	0.8	3.75	0	1	4.08	
		1000			654	0.46	0.36	77.12	1.08	0.75	21.05	0	1	4.52	
9	Biomass tar		KOH	Microporous	660	0.28	0.24	83.48	0.01	3.53	12.98	25	1	2.94	[12]
					1076	0.44	0.38	84.57	2.94	3.03	9.46	25	1	4.11	
					1268	0.55	0.5	90.49	0	2.12	7.39	25	1	3.64	
					1480	0.71	0.48	89.42	1.46	2.08	7.04	25	1	3.31	
					1161	0.38	0.35	88.44	0.01	3.02	8.53	25	1	3.69	
					1804	0.85	0.66	89.93	0	2	8.07	25	1	3.16	
					1857	0.87	0.48	92.01	0	1.32	6.67	25	1	3.06	
					660	0.28	0.24	83.48	0.01	3.53	12.98	25	0.15	0.74	
					1076	0.44	0.38	84.57	2.94	3.03	9.46	25	0.15	1.64	
					1268	0.55	0.5	90.49	0	2.12	7.39	25	0.15	1.22	
					1480	0.71	0.48	89.42	1.46	2.08	7.04	25	0.15	1.52	
					1161	0.38	0.35	88.44	0.01	3.02	8.53	25	0.15	1.38	
					1804	0.85	0.66	89.93	0	2	8.07	25	0.15	0.96	
					1857	0.87	0.48	92.01	0	1.32	6.67	25	0.15	0.92	
					660	0.28	0.24	83.48	0.01	3.53	12.98	0	1	4.22	
					1076	0.44	0.38	84.57	2.94	3.03	9.46	0	1	6.02	

					1268	0.55	0.5	90.49	0	2.12	7.39	0	1	5.43	
					1480	0.71	0.48	89.42	1.46	2.08	7.04	0	1	5.41	
					1161	0.38	0.35	88.44	0.01	3.02	8.53	0	1	5.82	
					1804	0.85	0.66	89.93	0	2	8.07	0	1	5.2	
					1857	0.87	0.48	92.01	0	1.32	6.67	0	1	5.04	
10	Banana stems and fiber	700		Microporous	909	0.44	0.32	79.5	1.5	0	19	25	1	3.2	[13]
					1260	0.81	0.56	84	2	0	14	25	1	5	
					909	0.44	0.32	79.5	1.5	0	19	0	1	5.3	
					1260	0.81	0.56	84	2	0	14	0	1	7.1	
11	Cellulose fiber and wood		Steam	Microporous	473	0.2	0.17	88.4	2.2	0	9.4	25	1.01	1.72	[14]
					593	0.25	0.21	83.7	0.6	0	15.7	25	1.01	2.33	
					217	0.12	0.13	89.6	2.6	1	6.8	25	1.01	1.12	
					473	0.2	0.17	88.4	2.2	0	9.4	25	0.15	0.7	
					593	0.25	0.21	83.7	0.6	0	15.7	25	0.15	0.9	
					217	0.12	0.13	89.6	2.6	1	6.8	25	0.15	0.5	
12	Corn stover	250	KOH	Microporous	955	0.43	0.31	57.46	3.37	0.66	38.51	0	1	4.93	[15]
					1539	0.72	0.48	59.2	3.7	0.34	36.76	0	1	6.8	
					2442	1.56	0.86	60.41	3.91	0.24	35.44	0	1	7.14	
					2225	1.11	0.49	64.9	3.12	0.24	31.74	0	1	5.79	
					1543	0.71	0.61	66.56	2.99	0.86	29.59	0	1	5.06	
					2201	1.31	0.69	56.55	3.03	0.31	40.11	0	1	6.22	
					2170	1.27	0.66	54.94	2.19	0.32	42.55	0	1	4.86	
					1630	0.69	0.6	76.91	2.73	0.2	20.16	0	1	6.47	
					2132	1.13	0.7	59.22	3.88	0.23	36.67	0	1	6.85	
					1862	0.81	0.69	58.22	3.79	0.22	37.77	0	1	6.32	
13	Lotus stem	180	KOH	Hierarchical	2091	0.87	0.65	90.49	0	0	9.51	25	1	3.85	[16]
					2893	1.59	0.7	88.8	0	0	11.2	25	1	2.84	
					2091	0.87	0.65	90.49	0	0	9.51	0	1	6.17	
					2893	1.59	0.7	88.8	0	0	11.2	0	1	4.61	

14	Sawdust	400	KOH	Microporous	1511	0.65	0.54	78.2	1.9	0	19.9	25	1	4.3	[17]
					1830	0.78	0.67	83.4	0.9	0	15.7	25	1	4.9	
					2163	0.93	0.74	88.1	0.4	0	11.5	25	1	4.7	
					2610	1.15	0.74	88.7	0.4	0	10.9	25	1	4	
					1511	0.65	0.54	78.2	1.9	0	19.9	25	0.15	1.2	
					1830	0.78	0.67	83.4	0.9	0	15.7	25	0.15	1.1	
					2163	0.93	0.74	88.1	0.4	0	11.5	25	0.15	1.1	
					2610	1.15	0.74	88.7	0.4	0	10.9	25	0.15	0.9	
15	Vine shoot	600	CO_2 and KOH	Microporous	2.48			47.1	5.29	0.66	46.39	0	1.01	2.18	[18]
					46.3			47.1	5.29	0.66	46.39	0	1.01	2.21	
					374	0.19	0.11	47.1	5.29	0.66	46.39	0	1.01	3.45	
					538	0.24	0.18	47.1	5.29	0.66	46.39	0	1.01	3.19	
					1032	0.49	0.35	47.1	5.29	0.66	46.39	0	1.01	4.38	
					864	0.41	0.28	47.1	5.29	0.66	46.39	0	1.01	3.74	
					1439	0.67	0.49	47.1	5.29	0.66	46.39	0	1.01	6.08	
					704	0.29	0.24	47.1	5.29	0.66	46.39	0	1.01	4.16	
					1101	0.54	0.38	47.1	5.29	0.66	46.39	0	1.01	5.36	
					1305	0.53	0.45	47.1	5.29	0.66	46.39	0	1.01	6.04	
					1671	0.67	0.59	47.1	5.29	0.66	46.39	0	1.01	5.4	
					2.48			47.1	5.29	0.66	46.39	0	0.15	1.18	
					46.3			47.1	5.29	0.66	46.39	0	0.15	1.2	
					374	0.19	0.11	47.1	5.29	0.66	46.39	0	0.15	1.68	
					538	0.24	0.18	47.1	5.29	0.66	46.39	0	0.15	1.76	
					1032	0.49	0.35	47.1	5.29	0.66	46.39	0	0.15	1.92	
					864	0.41	0.28	47.1	5.29	0.66	46.39	0	0.15	1.78	
					1439	0.67	0.49	47.1	5.29	0.66	46.39	0	0.15	2.27	
					704	0.29	0.24	47.1	5.29	0.66	46.39	0	0.15	2.16	
					1101	0.54	0.38	47.1	5.29	0.66	46.39	0	0.15	2.42	
					1305	0.53	0.45	47.1	5.29	0.66	46.39	0	0.15	2.25	

					1671	0.67	0.59	47.1	5.29	0.66	46.39	0	0.15	2.25	
16	Arundo donax stem		KOH	Microporous	637	0.35	0.25	84.2	0	0.76	15.04	0	1	4	[19]
					1122	0.59	0.5	84.7	0	0.87	14.43	0	1	6.3	
					849	0.5	0.31	54.9	0	0.53	44.57	0	1	3.7	
17	Black locust	650	Steam and KOH	Hierarchical	1175	0.55	0.49	83.43	1.52	0	15.05	25	1	1.85	[20]
					2064	0.98	0.87	74.36	1.15	0	24.49	25	1	3.75	
					1175	0.55	0.49	83.43	1.52	0	15.05	0	1	2.79	
					2064	0.98	0.87	74.36	1.15	0	24.49	0	1	5.86	
					1175	0.55	0.49	83.43	1.52	0	15.05	25	0.15	0.75	
					2064	0.98	0.87	74.36	1.15	0	24.49	25	0.15	1.21	
					1175	0.55	0.49	83.43	1.52	0	15.05	0	0.15	1.42	
					2064	0.98	0.87	74.36	1.15	0	24.49	0	0.15	2.43	
18	Empty fruit bunch	150-350	KOH	Microporous	1163	0.23	0.1	77.3	3.5	2	13.3	25	1.01	0.66	[21]
					2239	0.88	0.19	83.5	2.6	2.7	11.3	25	1.01	0.85	
					1720	0.56	0.15	85.9	2.2	3.1	8.8	25	1.01	2.81	
					1322	0.78	0.23	80.9	2.9	2.4	13.3	25	1.01	3.4	
					2510	1.05	0.55	84.6	1.9	2.4	11.1	25	1.01	3.71	
					2100	0.78	0.29	87.8	1.7	3.5	7	25	1.01	2.18	
19	Gelatin and starch	450	KOH	Hierarchical	1714	0.83		75.9	2.17	0.65	12.76	25	1	3.28	[22]
					1636	0.51		71.4	3.75	3	21.12	25	1	3.84	
					1957	0.79		71.2	1.97	1.97	19.57	25	1	3.45	
					1294	0.63		74.48	2.24	2.42	16.6	25	1	3.3	
					714	0.4		70.85	2.43	2.43	18.9	25	1	2.81	
20	Rice husk	520	KOH	Microporous	774	0.41	0.3	74.2	2.2	0.75	22.85	25	1	3.53	[23]
					1041	0.53	0.42	76.1	1.9	0.48	21.52	25	1	4.16	
					1199	0.6	0.48	72	1.5	0.36	26.14	25	1	3.87	
					2695	1.14	1.11	82.7	1.8	0.45	15.05	25	1	3.71	
					774	0.41	0.3	74.2	2.2	0.75	22.85	25	0.15	1.51	
					1041	0.53	0.42	76.1	1.9	0.48	21.52	25	0.15	1.55	

					1199	0.6	0.48	72	1.5	0.36	26.14	25	0.15	1.28	
					2695	1.14	1.11	82.7	1.8	0.45	15.05	25	0.15	0.92	
					774	0.41	0.3	74.2	2.2	0.75	22.85	25	0.1	1.24	
					1041	0.53	0.42	76.1	1.9	0.48	21.52	25	0.1	1.21	
					1199	0.6	0.48	72	1.5	0.36	26.14	25	0.1	1.01	
					2695	1.14	1.11	82.7	1.8	0.45	15.05	25	0.1	0.69	
					774	0.41	0.3	74.2	2.2	0.75	22.85	0	1	4.88	
					1041	0.53	0.42	76.1	1.9	0.48	21.52	0	1	5.63	
					1199	0.6	0.48	72	1.5	0.36	26.14	0	1	6.02	
					2695	1.14	1.11	82.7	1.8	0.45	15.05	0	1	6.24	
21	Peanut shell	550	KOH	Hierarchical	1713	0.73	0.73	88	1.1	0.98	9.92	25	1	4.41	[24]
					1893	0.79	0.78	89.7	0.8	0.79	8.71	25	1	4.22	
					1871	0.8	0.79	90.5	0.6	0.6	8.3	25	1	3.92	
					1713	0.73	0.73	88	1.1	0.98	9.92	0	1	7.25	
					1893	0.79	0.78	89.7	0.8	0.79	8.71	0	1	7.12	
					1871	0.8	0.79	90.5	0.6	0.6	8.3	0	1	6.79	
22	Pine nut shell	500	KOH	Microporous	1486	0.64		66.2	2.6	0.1	22.6	25	1	5	[25]
23	Macadamia nut shell	400-700	CO_2	Microporous	469			57.5	5.95	0.33	36.2	25	1.01	3.07	[26]
					489			57.5	5.95	0.33	36.2	25	1.01	3.3	
					606			57.5	5.95	0.33	36.2	25	1.01	3.4	
					425			57.5	5.95	0.33	36.2	25	1.01	2.8	
					514			57.5	5.95	0.33	36.2	25	1.01	3.25	
					605			57.5	5.95	0.33	36.2	25	1.01	3.45	
					441			57.5	5.95	0.33	36.2	25	1.01	2.99	
					512			57.5	5.95	0.33	36.2	25	1.01	3.37	
					573			57.5	5.95	0.33	36.2	25	1.01	3.48	
					434			57.5	5.95	0.33	36.2	25	1.01	3.01	
					524			57.5	5.95	0.33	36.2	25	1.01	3.42	
					633			57.5	5.95	0.33	36.2	25	1.01	3.73	

24	Agar	500	$Zn(NO_3)_2$	Hierarchical	671	0.43		86.73	0	2.72	10.55	25	1	2.3	[27]
					886	0.57		87.7	0	2.28	10.02	25	1	2.6	
					1033	0.69		87.71	0	2.58	9.71	25	1	2.4	
					858	0.57		90.01	0	2.7	7.29	25	1	2.5	
					1142	0.85		92.5	0	0.85	6.65	25	1	2.5	
					1316	1.14		93.18	0	1.14	5.68	25	1	2.5	
25	Hazelnut shell	500	$NaNH_2$	Microporous	502	0.22		85.21	5.87	2.74	6.18	25	1	2.24	[28]
					1991	0.88		87.21	5.03	2.94	4.82	25	1	3.72	
					1833	0.8		86.24	5.31	3.21	5.24	25	1	3.39	
					1099	0.45		86.32	5.99	2.53	5.16	25	1	4.32	
					1821	0.79		86.74	5.87	2.75	4.64	25	1	3.5	
					2185	0.99		87.02	6.01	2.97	4	25	1	3.48	
					1343	0.55		87.65	5.24	1.98	5.13	25	1	3.94	
					2318	1.03		88.34	5.87	2.14	3.65	25	1	3.52	
					2321	1.11		88.21	5.21	2.3	4.28	25	1	3.38	
26	Walnut shell powder		KOH	Hierarchical	1636	0.74	0.68	54	3.75	2.69	39.56	25	1	2.86	[29]
					2354	1.26	0.97	75.38	1.3	0.86	22.46	25	1	3.08	
					759	0.44	0.33	51.21	1.96	4.45	42.38	25	1	2.32	
					1606	0.97	0.78	71.19	2.88	4.02	21.91	25	1	1.92	
					1741	0.86	0.8	64.43	3.21	2.2	30.16	25	1	2.74	
					1636	0.74	0.68	54	3.75	2.69	39.56	25	1	2.86	
					2251	1.21	1.03	70.44	1.62	0.94	27	25	1	2.54	
					3079	1.84	1.18	80.49	1.2	2.08	16.23	25	1	2.53	
					2354	1.26	0.97	75.38	1.3	0.86	22.46	25	1	3.04	
					2556	1.9	0.96	81.84	1.75	0.76	15.65	25	1	2.27	
					1000	0.68	0.53	51.67	1.75	1.57	45.01	25	1	2.37	
					759	0.44	0.33	51.21	1.96	4.45	42.38	0	1	3.3	
					1606	0.97	0.78	71.19	2.88	4.02	21.91	0	1	2.9	

					1741	0.86	0.8	64.43	3.21	2.2	30.16	0	1	4.73	
					1636	0.74	0.68	54	3.75	2.69	39.56	0	1	5	
					2251	1.21	1.03	70.44	1.62	0.94	27	0	1	4.2	
					3079	1.84	1.18	80.49	1.2	2.08	16.23	0	1	3.35	
					2354	1.26	0.97	75.38	1.3	0.86	22.46	0	1	5.13	
					2556	1.9	0.96	81.84	1.75	0.76	15.65	0	1	3.35	
					1000	0.68	0.53	51.67	1.75	1.57	45.01	0	1	2.57	
27	Walnut shell		KOH	Hierarchical	1636	0.74	0.68	54	3.75	2.69	39.56	25	0.15	0.67	[30]
					2354	1.26	0.97	75.38	1.3	0.86	22.46	25	0.15	0.64	
					1144	0.64	0.48	68.18	1.57	4.8	25.45	25	1	2.1	
					1813	1.05	0.7	80.95	0.79	1	17.26	25	1	2.14	
					273	0.19	0.13	46.52	1.55	9.32	42.61	25	1	1.78	
					481	0.27	0.24	52.01	1.92	8.75	37.32	25	1	1.83	
					1144	0.64	0.48	68.18	1.57	4.8	25.45	25	0.15	0.36	
					1813	1.05	0.7	80.95	0.79	1	17.26	25	0.15	0.38	
					273	0.19	0.13	46.52	1.55	9.32	42.61	25	0.15	0.69	
					481	0.27	0.24	52.01	1.92	8.75	37.32	25	0.15	0.67	
28	Oil residue	500	$NaNH_2$	Hierarchical	660	0.42	0.33	57.89	2.71	4.31	35.09	25	1	2.04	[31]
					846	0.94	0.4	56.5	2.52	4.59	36.39	25	1	2.11	
					1176	0.72	0.57	60.87	3.01	5.83	30.29	25	1	2.19	
					2113	1.24	0.94	61.07	1.98	6.9	30.05	25	1	3.51	
					1508	0.94	0.68	62.98	2.1	6.02	28.9	25	1	3.42	
					2148	1.32	0.94	64.49	1.7	5.57	28.24	25	1	2.98	
29	Glucose biomass	80	CO_2	Microporous	748	0.47	0.27	83.84	0.04	1.1	15.02	25	1	2.55	[32]
					697	0.46	0.25	75.15	0.05	6.5	18.3	25	1	2.92	
					581	0.35	0.21	67.78	1.14	11.48	19.5	25	1	3.03	
30	Shell of tea seed	700	KOH	Microporous	1065	0.47	0.39	59.43	1.24	2.43	36.9	25	1	2.69	[33]
					1188	0.52	0.44	66.21	0.94	3.41	29.44	25	1	2.75	

					1055	0.46	0.39	61.47	1.16	3.45	33.92	25	1	2.44	
					706	0.33	0.25	48.26	1.77	3.39	46.58	25	1	1.95	
31	Water chestnut shell	500		Hierarchical	669	0.31		71.42	3.06	3.05	22.47	25	1	3.29	[34]
					1450	0.61		73.24	2.99	3.26	20.51	25	1	3.63	
					1310	0.65		74.25	3.01	3.58	19.16	25	1	3.18	
					1036	0.44		76.21	3.01	2.73	18.05	25	1	4.06	
					2412	1.14		75.2	2.75	3.14	18.91	25	1	4.04	
					2596	1.42		73.58	2.8	3.35	20.27	25	1	3.59	
					1416	0.58		77.43	2.42	2.42	17.73	25	1	4.5	
					2615	1.38		76.52	2.53	2.68	18.27	25	1	3.6	
					2446	1.59		76.03	2.86	3.12	17.99	25	1	3.39	
32	Poplar catkins	400	$ZnCl_2$	Hierarchical	1361.9	0.58	0.46	87.23	1.62	1.89	9.26	25	1	3.55	[35]
					1005.4	0.41	0.34	87.42	1.32	2.37	8.89	25	1	3.75	
					1455.1	0.68	0.47	88.57	0.89	2.89	7.65	25	1	4.05	
					1248.7	0.5	0.41	89.74	0.78	2.16	7.32	25	1	2.62	
					1272.4	0.55	0.43	89.23	0.82	2.09	7.86	25	1	3.35	
33	Walnut shell	500	$NaNH_2$	Hierarchical	419	0.25	0.19	54.24	3.37	3.79	38.6	25	1	1.93	[36]
					589	0.34	0.27	63.53	4.38	7.24	24.85	25	1	2.53	
					802	0.47	0.37	57.6	3.45	1.52	37.43	25	1	1.96	
					516	0.28	0.2	52.55	3.35	3.52	40.58	25	1	1.7	
					1687	0.94	0.77	72.63	3.18	1.89	22.3	25	1	3.06	
					1721	0.92	0.75	61.53	1.45	2.54	34.48	25	1	2.15	
					419	0.25	0.19	54.24	3.37	3.79	38.6	0	1	2.6	
					589	0.34	0.27	63.53	4.38	7.24	24.85	0	1	4.17	
					802	0.47	0.37	57.6	3.45	1.52	37.43	0	1	3.88	
					516	0.28	0.2	52.55	3.35	3.52	40.58	0	1	2.67	
					1687	0.94	0.77	72.63	3.18	1.89	22.3	0	1	5.22	
					1721	0.92	0.75	61.53	1.45	2.54	34.48	0	1	3.17	

34	Glucose-d	180	KOH	Hierarchical	821	0.42		65.54	2.14	12.17	20.15	25	1	3.99	[37]
					1267	0.54		64.89	2.15	11.93	21.03	25	1	4.24	
					1398	0.6		63.54	2.16	11.67	22.63	25	1	4.02	
					1412	0.63		62.21	2.12	11.23	24.44	25	1	3.93	
					1734	0.78		75.01	1.41	9.24	14.34	25	1	4.26	
					1960	0.9		74.32	1.35	8.56	15.77	25	1	4.23	
					2167	0.96		72.68	1.37	7.23	18.72	25	1	4.21	
					2016	0.94		75.35	1.17	6.85	16.63	25	1	4.07	
					2394	1.13		81.51	0.89	6.94	10.66	25	1	3.92	
					2659	1.32		79.12	0.75	6.72	13.41	25	1	3.71	
					2655	1.4		77.05	0.85	6.43	15.67	25	1	3.51	
					2470	1.3		76.92	0.96	6.2	15.92	25	1	3.42	
					821	0.42		65.54	2.14	12.17	20.15	0	1	5.33	
					1267	0.54		64.89	2.15	11.93	21.03	0	1	6.23	
					1398	0.6		63.54	2.16	11.67	22.63	0	1	6.11	
					1412	0.63		62.21	2.12	11.23	24.44	0	1	5.9	
					1734	0.78		75.01	1.41	9.24	14.34	0	1	6.7	
					1960	0.9		74.32	1.35	8.56	15.77	0	1	6.14	
					2167	0.96		72.68	1.37	7.23	18.72	0	1	6.28	
					2016	0.94		75.35	1.17	6.85	16.63	0	1	6.11	
					2394	1.13		81.51	0.89	6.94	10.66	0	1	6.46	
					2659	1.32		79.12	0.75	6.72	13.41	0	1	5.73	
					2655	1.4		77.05	0.85	6.43	15.67	0	1	5.36	
					2470	1.3		76.92	0.96	6.2	15.92	0	1	5.24	
35	Palm kernel shell	500		Microporous	195	0.11	0.08	90.23	0	1.77	7.76	25	1	1.43	[38]
					852	0.38	0.31	85.9	0	3.03	10.87	25	1	4.39	
					1185	0.52	0.43	90.97	0	3.35	5.54	25	1	4.8	
					694	0.37	0.25	88.31	0	1.95	9.53	25	1	3.39	

					699	0.49	0.16	92.63	0	1.73	5.45	25	1	2.56	
					586	0.31	0.19	88.52	0	2.94	8.24	25	1	2.84	
					1700	0.89	0.56	86.45	0	3.3	9.97	25	1	5.29	
36	Lignin	200	KOH	Hierarchical	3172	1.6		87.72	0	0	12.08	25	1	2.3	[39]
					3020	1.89		80.03	0	0.62	19.34	25	1	2.2	
					3064	1.56		87.1	0	0.64	12.26	25	1	2.5	
					3021	1.58		89.55	0	1.1	9.35	25	1	2.6	
					2473	1.26		87.81	0	1.17	11.02	25	1	2.7	
37	Pineapple waste	210		Hierarchical	124			84.82	1.56	1.3	12.32	25	1	1.16	[40]
					224.1			86.06	1.55	1.69	10.7	25	1	1.18	
					422.8			80.01	1.16	1.52	17.31	25	1	2.22	
					302.7			81.12	0.75	1.3	16.83	25	1	1.59	
					328.2			84.98	0.2	1.59	13.23	25	1	1.33	
					644.9			73.52	1.09	1.49	23.9	25	1	3.16	
					186			85.04	0.48	1.12	13.36	25	1	1.35	
					397.3			83.29	0.17	1.58	14.96	25	1	1.59	
					1076.3			86.31	0.14	0.33	13.22	25	1	4.25	
38	Glucose	180	KOH	Hierarchical	1082	0.58	0.44	77.91	0	9.44	12.65	25	1	3.78	[41]
					1793	0.87	0.73	81.12	0	8.02	10.86	25	1	5.01	
					2328	1.11	0.94	84.91	0	5.05	10.04	25	1	4.32	
					2958	1.61	1.16	92.8	0	2.73	4.47	25	1	3.36	
					1082	0.58	0.44	77.91	0	9.44	12.65	25	0.15	1.29	
					1793	0.87	0.73	81.12	0	8.02	10.86	25	0.15	1.38	
					2328	1.11	0.94	84.91	0	5.05	10.04	25	0.15	0.93	
					2958	1.61	1.16	92.8	0	2.73	4.47	25	0.15	0.65	
					1082	0.58	0.44	77.91	0	9.44	12.65	0	1	5.36	
					1793	0.87	0.73	81.12	0	8.02	10.86	0	1	7.6	
					2328	1.11	0.94	84.91	0	5.05	10.04	0	1	7.18	
					2958	1.61	1.16	92.8	0	2.73	4.47	0	1	6.24	

39	Glucose-d		KOH	Microporous	1210	0.69		74.3	0	9.8	15.9	25	1	4.18	[42]
					1780	1.35		82.5	0	6.94	10.56	25	1	4.66	
					2136	1.43		80.8	0	6.84	12.36	25	1	3.89	
					3247	3.09		86.9	0	2.07	11.03	25	1	4.95	
					1210	0.69		74.3	0	9.8	15.9	0	1	6.11	
					1780	1.35		82.5	0	6.94	10.56	0	1	7.77	
					2136	1.43		80.8	0	6.84	12.36	0	1	7.43	
					3247	3.09		86.9	0	2.07	11.03	0	1	8.07	
40	Sugarcane bagasse			Microporous	32	0.02		83.16	1.74	3.81	11.29	25	1	1.94	[43]
					851	0.44		87	0.97	0.83	11.2	25	1	4.52	
					927	0.48		83.26	1.17	1.76	13.81	25	1	4.6	
					1113	0.57		83.59	1.18	1.98	13.25	25	1	4.8	
					1024	0.53		83.02	1.16	1.98	13.84	25	1	4.76	
					945	0.49		84.19	1.12	1.99	12.7	25	1	4.71	
41	Lotus stalks	500	$NaNH_2$	Hierarchical	848	0.38		67.03	2.34	3.77	26.86	25	1	3.39	[44]
					1164	0.54		68.32	2.55	4.01	25.12	25	1	3.67	
					1087	0.52		67.65	2.25	4.5	25.6	25	1	3.22	
					1105	0.49		70.25	2.12	3.21	24.42	25	1	3.69	
					2053	0.97		71.37	2.04	3.64	22.95	25	1	3.47	
					1921	1.04		70.98	2.06	4.03	22.93	25	1	3.12	
					1113	0.48		73.56	2.09	2.61	21.74	25	1	3.88	
					2264	1.34		74.32	1.97	3.08	20.63	25	1	3.51	
					1824	1.03		74.98	1.88	3.45	19.69	25	1	3.45	
42	Phenolic resins	500	$NaNH_2$	Microporous	735	0.31		77.7	2.58	2.72	17	25	1	3.32	[45]
					936	0.39		78.36	2.29	4.56	14.79	25	1	4.12	
					1115	0.46		79.36	2.43	5.36	12.85	25	1	4.14	
					1003	0.41		79.11	2.16	6.05	12.68	25	1	3.83	
					787	0.33		80.6	2.42	1.56	15.42	25	1	3.86	

					1088	0.45		79.32	2.36	3.9	14.42	25	1	4.06	
					1432	0.59		78.62	1.76	4.25	15.37	25	1	4.64	
					1569	0.64		77.65	2.24	5.94	14.17	25	1	4.4	
					932	0.39		85.36	1.95	1.39	11.3	25	1	4.03	
					1288	0.54		83.69	1.7	3.85	10.76	25	1	4.61	
					1924	0.79		81.34	1.64	4.09	12.93	25	1	4.57	
					2155	0.94		76.96	1.29	5.74	16.01	25	1	4.38	
43	Coconut shell	500	K_2CO_3	Hierarchical	947	0.35		86.59	0.94	2.76	9.71	25	1	3.45	[46]
					1082	0.39		87.48	0.88	2.74	8.9	25	1	3.71	
					1324	0.51		91.35	0.82	1.52	6.31	25	1	3.49	
					1199	0.47		91.08	0.52	1.42	6.98	25	1	3.07	
					1354	0.58		88.71	0.55	1.34	9.4	25	1	3.03	
					1329	0.56		91.35	0.56	1.13	6.96	25	1	2.86	
					1430	0.65		93.24	0.65	0.86	5.25	25	1	2.78	
44	Argan hard shell	700	KOH and NaOH	Hierarchical	2251	1.04	0.93	85.08	0	9.49	5.43	25	1	5.51	[47]
					1890	0.87	0.8	82.68	0	13.9	3.42	25	1	5.63	
					1463	0.74	0.58	67.74	0	9.07	23.19	25	1	3.64	
					1827	0.96	0.73	82.14	0	12.61	5.25	25	1	3.73	
45	Olive stone, coffee, almond shell, grape seed		CO_2	Microporous	514	0.21		92.2	0	0.4	7.4	25	0.15	0.88	[48]
					1248	0.44		88	0	0.7	11.3	25	0.15	0.99	
					534	0.25		83.7	0	4.1	12.2	25	0.15	1.11	
					847	0.34		81.9	0	1.3	16.8	25	0.15	0.98	
					535	0.23		85.3	0	1.8	12.9	25	0.15	0.91	
					362	0.27		90	0	2.2	7.8	25	0.15	0.91	
					840	0.34		82.6	0	2.1	15.3	25	0.15	0.75	
46	Black gram	300	KOH	Microporous	956	0.48	0.31	76.95	2.39	4.82	15.84	25	1	3.34	[49]
					1258	0.61	0.4	83.63	2.9	4.21	9.26	25	1	3.46	

					1697	0.82	0.37	84.08	2.06	3.86	10	25	1	3.46	
					1987	1.02	0.26	89.43	1.41	1.78	7.38	25	1	2.76	
					990	0.42	0.31	79.99	2.9	4.76	12.35	25	1	3.25	
					1428	0.65	0.29	78.36	2.58	4.38	14.68	25	1	3.06	
					1675	0.96	0.06	75.76	2.51	3.67	18.06	25	1	2.28	
					2086	1.08	0.16	91.38	1.06	2.52	5.04	25	1	2.59	
					1216	0.53	0.35	78.46	2.21	5.34	13.99	25	1	3.16	
					1446	0.63	0.37	81.6	2.41	4.15	11.84	25	1	3.21	
					1952	1.11	0.04	71.34	3.4	3.15	22.11	25	1	2.14	
					2305	1.23	0.13	79.17	2.13	1.81	16.89	25	1	2.34	
					956	0.48	0.31	76.95	2.39	4.82	15.84	0	1	4.61	
					1258	0.61	0.4	83.63	2.9	4.21	9.26	0	1	5.3	
					1697	0.82	0.37	84.08	2.06	3.86	10	0	1	5.25	
					1987	1.02	0.26	89.43	1.41	1.78	7.38	0	1	5.1	
					990	0.42	0.31	79.99	2.9	4.76	12.35	0	1	4.65	
					1428	0.65	0.29	78.36	2.58	4.38	14.68	0	1	4.97	
					1675	0.96	0.06	75.76	2.51	3.67	18.06	0	1	3.9	
					2086	1.08	0.16	91.38	1.06	2.52	5.04	0	1	4.69	
					1216	0.53	0.35	78.46	2.21	5.34	13.99	0	1	4.82	
					1446	0.63	0.37	81.6	2.41	4.15	11.84	0	1	5.15	
					1952	1.11	0.04	71.34	3.4	3.15	22.11	0	1	3.73	
					2305	1.23	0.13	79.17	2.13	1.81	16.89	0	1	4.79	
47	Glucose-d	180	K_2CO_3	Hierarchical	933	0.45		66.51	2.33	12.27	18.89	25	1	3.43	[50]
					1005	0.46		65.31	2.38	12.21	20.1	25	1	3.46	
					1170	0.53		63.67	2.42	11.81	22.1	25	1	3.74	
					1754	0.83		69.83	2.14	10.51	17.52	25	1	3.69	
					1699	0.89		70.32	1.98	9.54	18.16	25	1	3.65	
					1824	0.92		71.66	1.97	7.74	18.63	25	1	3.92	
					2572	1.43		77.7	1.56	6.57	14.17	25	1	3.75	

					2510	1.54		80.32	1.73	5.03	12.92	25	1	3.56	
					2827	1.55		84.24	1.65	4.69	9.42	25	1	3.61	
					1020	0.52		73.65	2.15	0.32	23.88	25	1	3.66	
					933	0.45		66.51	2.33	12.27	18.89	0	1	4.8	
					1005	0.46		65.31	2.38	12.21	20.1	0	1	4.84	
					1170	0.53		63.67	2.42	11.81	22.1	0	1	5.32	
					1754	0.83		69.83	2.14	10.51	17.52	0	1	5.45	
					1699	0.89		70.32	1.98	9.54	18.16	0	1	5.87	
					1824	0.92		71.66	1.97	7.74	18.63	0	1	6.23	
					2572	1.43		77.7	1.56	6.57	14.17	0	1	6.23	
					2510	1.54		80.32	1.73	5.03	12.92	0	1	6.16	
					2827	1.55		84.24	1.65	4.69	9.42	0	1	6.05	
					1020	0.52		73.65	2.15	0.32	23.88	0	1	5.74	
48	Lignin	300	KOH	Hierarchical	1788	0.91	0.49	40.4	0	5.6	54	25	1	4.8	[51]
					2957	1.79	0.56	59.5	0	2.5	38	25	1	4.4	
					1075	0.75	0.21	64	0	2.2	33.8	25	1	4	
					1788	0.91	0.49	40.4	0	5.6	54	0	1	8.2	
					2957	1.79	0.56	59.5	0	2.5	38	0	1	7.6	
					1075	0.75	0.21	64	0	2.2	33.8	0	1	6.5	
49	Canes biomass			Hierarchical	18	0.02		80.03	0	13.53	5.76	25	1	1.5	[52]
					982	0.62		79.26	0	8.12	11.89	25	1	2.2	
					582	0.29		74.73	0	15.88	7.28	25	1	2.1	
					18	0.02		80.03	0	13.53	5.76	0	1	1.7	
					982	0.62		79.26	0	8.12	11.89	0	1	4.8	
					582	0.29		74.73	0	15.88	7.28	0	1	3	
50	Pigskin			Hierarchical	1165	1.03		64.7	1.5	10.4	23.25	25	1	4.4	[53]
					2693	1.68		84.8	0.5	6.2	8.21	25	1	3.1	
					2731	1.89		86.8	1.8	2.6	7.9	25	1	2.5	
					2799	1.91		91.9	1.2	1.6	4.45	25	1	2.2	

					1165	1.03		64.7	1.5	10.4	23.25	0	1	5.3	
					2693	1.68		84.8	0.5	6.2	8.21	0	1	4.7	
					2731	1.89		86.8	1.8	2.6	7.9	0	1	4.1	
					2799	1.91		91.9	1.2	1.6	4.45	0	1	4	
51	Chitosan	550	KOH	Microporous	667	0.29	0.28	63.3	2.4	6.5	27.8	25	1	3.74	[54]
					716	0.32	0.31	61.5	2.5	6.6	29.4	25	1	4.04	
					718	0.33	0.31	59.1	2.3	6.8	31.8	25	1	4.17	
					907	0.4	0.39	57.9	2.6	6.7	32.8	25	1	4.26	
					667	0.29	0.28	63.3	2.4	6.5	27.8	25	0.15	1.46	
					716	0.32	0.31	61.5	2.5	6.6	29.4	25	0.15	1.57	
					718	0.33	0.31	59.1	2.3	6.8	31.8	25	0.15	1.86	
					907	0.4	0.39	57.9	2.6	6.7	32.8	25	0.15	1.77	
52	Rotten strawberries	180	KOH	Hierarchical	935	0.42		72.21	2.55	3.68	21.56	25	1	3.63	[55]
					1441	0.6		68.99	2.21	5.16	23.64	25	1	4.04	
					1117	0.52		78.02	2.44	5.38	14.16	25	1	4.49	
					1482	0.64		70.16	3.06	5.06	21.72	25	1	3.87	
					1408	0.67		76.23	2.39	3.81	17.57	25	1	3.73	
					1577	0.68		79.18	2.11	2.6	16.11	25	1	3.99	
53	Lignin		KOH	Hierarchical	2922	1.36	1.22	84.6	0	5.6	7.2	25	1	5.12	[56]
					2779	1.39	1.1	79.1	0	7.1	11.8	25	1	5.48	
					1631	0.83	0.6	76.3	0	5.9	17.1	25	1	4.23	
54	Soya chunks	180	NaOH	Microporous	607			80.2	0	4.3	15.5	25	1	2.7	[57]
					1072			84	0	5.3	10.7	25	1	3.2	
55	Arundo donax		$ZnCl_2$	Hierarchical	1863	1		75	0	5.4	19.6	25	1	2.1	[58]
					1340	0.68		81	0	4.1	14.9	25	1	1.7	
					1420	0.76		82	0	3.5	14.5	25	1	2	
56	Coca cola			Hierarchical	1082	0.43		69.6	0	3.3	13.8	25	1.01	3.2	[59]
					1994	0.87		73.1	0	4.2	10.3	25	1.01	3.08	

					1405	0.8		74	0	3.5	12.5	25	1.01	5.22	
57	Waste wool	300	KOH	Hierarchical	447	0.22	0.18	71.9	1.37	11.25	15.48	25	1	1.48	[60]
					1010	0.57	0.37	70.73	1.64	4.57	23.06	25	1	2.33	
					1352	0.78	0.54	69.65	1.42	4.14	24.79	25	1	2.78	
					1420	0.86	0.52	67.47	1.68	3.7	27.15	25	1	2.35	
58	Coconut shell	500	KOH	Microporous	1023	0.38		84.2	1.52	1.35	12.93	25	1	4.1	[61]
					1383	0.56		83.3	1.32	1.08	14.3	25	1	4	
					1604	0.65		84.2	1.53	0.81	13.46	25	1	4.3	
					1178	0.49		82	1.34	1.23	15.43	25	1	4.1	
					1535	0.6		81.3	1.22	0.91	16.57	25	1	4.8	
					1687	0.67		83	1.29	0.7	15.01	25	1	4.3	
					1550	0.62		84.2	1.03	0.86	13.91	25	1	4.1	
					1596	0.64		86.3	0.92	0.73	12.05	25	1	4.7	
					1937	0.78		86.5	0.84	0.61	12.05	25	1	4.44	
					1513	0.58		80.8	2.4	0.23	16.57	25	1	3.7	
					1012	0.44		75.5	0.95	8.01	15.54	25	1	3	
59	Banana peel	800	CO_2	Hierarchical	1426.1	0.83	0.56	43.5	2.2	4.2	50.1	25	1	2.7	[62]
					764			62.51	0	5	32.49	30	1	1.90	
60	Black locust	650	KOH	Hierarchical	2511	1.35	1.16	76.38	1.48	7.21	0	25	1	5.05	[63]
					2511	1.35	1.16	76.38	1.48	7.21	0	0	1	7.19	
					2511	1.35	1.16	76.38	1.48	7.21	0	25	0.15	1.59	
					2511	1.35	1.16	76.38	1.48	7.21	0	0	0.15	3.26	
61	Bark stem	170	KOH	Hierarchical	1393	0.63	0.49	87.48	0	1.61	10.91	25	1	3.92	[64]
					1759	0.92	0.6	89.48	0	1.43	9.09	25	1	4.45	
					1229	0.89	0.15	92.59	0	0.99	6.42	25	1	3.76	
62	Coconut shell	500	KOH	Hierarchical	879	0.38		64.2	4.02	6.16	25.62	25	1	3.68	[65]
					1135	0.62		70.5	3.38	4.83	21.29	25	1	4.04	
					1850	0.87		69.8	3	4.31	22.89	25	1	4.16	
					1562	0.75		69	2.69	3.84	24.47	25	1	3.79	

					1483	0.66		70	2.67	4.56	22.77	25	1	4.26	
					1487	0.79		71.2	2.45	3.59	22.76	25	1	4.22	
					2322	1.06		74.1	2.8	3.19	19.91	25	1	4.1	
					2521	1.34		75.8	2.48	2.4	19.32	25	1	3.72	
					2349	0.99		77.3	2.03	2.22	18.45	25	1	4.22	
					1967	0.94		79.2	2.22	1.81	16.77	25	1	4.09	
					2690	1.19		78.3	2.46	1.7	17.54	25	1	3.96	
					2599	1.33		80.7	2.11	1.21	15.98	25	1	3.44	
63	Fallen leaves	600	KOH	Hierarchical	1210	0.48	0.39	78.6	0	1.7	17.6	25	1	3.39	[66]
					1360	0.51	0.4	81.3	0	1	15.3	25	1	4.09	
					1600	0.65	0.54	84.4	0	1.3	12.6	25	1	4.41	
					1630	0.66	0.56	85.5	0	2.5	12	25	1	4.2	
					2230	1.03	0.89	86.5	0	0.4	11.9	25	1	3.93	
					1950	0.88	0.72	84.8	0	0.4	11.9	25	1	4.23	
					1210	0.48	0.39	78.6	0	1.7	17.6	25	0.15	1.2	
					1360	0.51	0.4	81.3	0	1	15.3	25	0.15	1.55	
					1600	0.65	0.54	84.4	0	1.3	12.6	25	0.15	1.41	
					1630	0.66	0.56	85.5	0	2.5	12	25	0.15	1.14	
					2230	1.03	0.89	86.5	0	0.4	11.9	25	0.15	0.98	
					1950	0.88	0.72	84.8	0	0.4	11.9	25	0.15	1.14	
64	Human hair		KOH	Hierarchical	1230	0.9		66.41	0	8.33	25.26	0	1	5.14	[67]
					2380	1.64		77.93	0	4.94	17.13	0	1	5.45	
					2700	1.33		80.95	0	3.45	15.6	0	1	4.27	
65	Polyacrylonitrile fiber	300	KOH	Hierarchical	855	0.45	0.31	64.76	3.87	13.05	18.32	25	1	3.33	[68]
					1338	0.68	0.49	66.54	4.01	11.32	18.13	25	1	3.57	
					1655	0.78	0.63	68.54	4.92	9.84	16.7	25	1	3.77	
					1980	0.92	0.76	73.15	4.82	7.38	14.65	25	1	3.95	
					2362	1.22	1.02	75.36	4.35	6.21	14.08	25	1	3.74	

					2430	1.37	1.16	74.98	3.98	5.36	15.68	25	1	3.51	
					2406	1.38	1.08	87.07	3.16	3.89	5.88	25	1	3.54	
					2672	1.58	1.31	88.06	3.87	3.04	5.03	25	1	3.16	
					2644	1.62	1.32	87.68	3.24	2.65	6.43	25	1	3.15	
					2112	1.26	0.92	92.23	3.56	2.83	1.38	25	1	3.02	
					2747	1.62	1.19	91.56	2.45	2.36	3.63	25	1	3.46	
					2436	1.57	1.15	94.33	1.78	1.84	2.05	25	1	3.23	
					855	0.45	0.31	64.76	3.87	13.05	18.32	0	1	4.19	
					1338	0.68	0.49	66.54	4.01	11.32	18.13	0	1	5.03	
					1655	0.78	0.63	68.54	4.92	9.84	16.7	0	1	5.61	
					1980	0.92	0.76	73.15	4.82	7.38	14.65	0	1	6.01	
					2362	1.22	1.02	75.36	4.35	6.21	14.08	0	1	6.37	
					2430	1.37	1.16	74.98	3.98	5.36	15.68	0	1	5.23	
					2406	1.38	1.08	87.07	3.16	3.89	5.88	0	1	5.76	
					2672	1.58	1.31	88.06	3.87	3.04	5.03	0	1	5.1	
					2644	1.62	1.32	87.68	3.24	2.65	6.43	0	1	5.47	
					2112	1.26	0.92	92.23	3.56	2.83	1.38	0	1	5.72	
					2747	1.62	1.19	91.56	2.45	2.36	3.63	0	1	4.94	
					2436	1.57	1.15	94.33	1.78	1.84	2.05	0	1	4.52	
66	Potassium bitartrate	600-800	self	Hierarchical	557	0.24	0.21	73.05	2.2	0.6	24.15	25	1	2.68	[69]
					744	0.31	0.27	74.89	2.35	0.64	22.12	25	1	3.29	
					947	0.4	0.36	76.74	2.5	0.66	20.1	25	1	3.55	
					1156	0.56	0.46	78.87	1.92	0.78	18.43	25	1	3.38	
					1217	0.81	0.31	83.69	2.01	0.82	13.48	25	1	2.75	
					557	0.24	0.21	73.05	2.2	0.6	24.15	0	1	3.58	
					744	0.31	0.27	74.89	2.35	0.64	22.12	0	1	4.5	
					947	0.4	0.36	76.74	2.5	0.66	20.1	0	1	5	
					1156	0.56	0.46	78.87	1.92	0.78	18.43	0	1	5.16	

					1217	0.81	0.31	83.69	2.01	0.82	13.48	0	1	4.35	
67	Cotton stalk crop-residue		KOH	Microporous	1897	0.744	0.706	65.56	3.37	1.87	26.32	25	1	3.49	[70]
					1787	0.806	0.622	73	2.27	2.04	20.47	25	1	2.88	
					1706	0.777	0.598	66.16	1.98	1.33	29.05	25	1	3.47	
					1853	0.785	0.646	61.64	2.61	2.74	30.29	25	1	3.74	
					2087	0.872	0.768	59.55	1.53	2.27	34	25	1	3.85	
					2438	1.212	0.727	64.74	2.47	0.31	31.97	25	1	3.22	
					1897	0.744	0.706	65.56	3.37	1.87	26.32	0	1	4.88	
					1787	0.806	0.622	73	2.27	2.04	20.47	0	1	5.96	
					1706	0.777	0.598	66.16	1.98	1.33	29.05	0	1	5.85	
					1853	0.785	0.646	61.64	2.61	2.74	30.29	0	1	5.8	
					2087	0.872	0.768	59.55	1.53	2.27	34	0	1	6.23	
					2438	1.212	0.727	64.74	2.47	0.31	31.97	0	1	5.22	

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