

The original experimental data in the literatures

1. The K/S value data of dyed PET fabrics with disperse blue 79 at 20Mpa in Table 1 of reference [29] are shown in Table S1. The data with * was the testing and prediction data.

Table S1 Effect of dyeing time and temperature on K/S of dyed PET fabrics.

Dyeing time /min	Temperature /°C					
	80	90	100	110	120	130
10	1.06	1.45	2.09	4.08	7.12	18.57
20	1.42	2.15*	3.11	4.99	10.04	20.54
30	1.68	2.42	3.24	5.93	11.18	21.25
40	1.67	2.64	4.38	6.84*	12.2	21.45
50	1.69	2.76	4.92	7.54	12.3*	21.56
60	1.7	2.75	5.6	8.02	12.32	21.55*
90	1.72	2.75	5.62	8.03	12.33	21.56

2. The K/S value data after acetone wash for fiber dyed for 90 min at 70, 90, 110, and 130 °C in Figure 9 of reference [30] are shown in Table S2. The data with * was the testing and prediction data.

Table S2 Effect of pressure and temperature on K/S value of dyed fiber

Pressure /MPa	Temperature /°C			
	70	90	110	130
12	2.81	9.81	11.07	12.22
13	3.44*	11.02	12.22	13.72
14	4.19	12.34*	13.49	15.55
15	5.05	13.14	15.15	18.25
16	5.91	14.17	17.10*	21.41
17	6.77	14.35	17.85	21.75
18	7.63	14.80	18.94	22.27*
19	8.21	16.01	20.43	23.59
20	8.84	17.21	21.86	24.85

3. The K/S value data of modified ramie fiber at various temperatures and dyeing time at 20 Mpa in Figure 10 of reference [30] are shown in Table S3. The data with * was the testing and prediction data.

Table S3 Effect of dyeing time and temperature on K/S value

Dyeing time /min	Temperature /K			
	70	90	110	130
15	5.85	11.43	13.76	17.69
30	7.72*	13.16	15.63	17.97
60	8.50	14.13	19.52	21.67
90	9.19	17.42*	21.99	25.42
120	12.11	17.82	23.36*	25.65
150	13.26	18.24	24.05	26.29

4. The K/S value data of meta-aramid fibers with the action of CINDYE DNK at various temperatures and dye stuff types with a pressure 30 MPa, and a dyeing time 70 min, a dye concentration 4.5 %, a CO₂ flow 50 g/min, and a carrier concentration 80 %. in Figure 2 of reference [31] are shown in Table S4. The data with * was the testing and prediction data.

Table S4 Effect of dye stuff types and temperature on K/S value

Dye stuff types	Temperature /°C								
	80	90	100	110	120	130	140	150	160
Disperse blue 79	0.91	1.31*	1.69	2.29	2.90	3.70	4.32	4.72	4.86
Disperse red 60	1.47	1.89	2.27	3.07*	3.76	4.22	4.74	4.83	4.93
Disperse yellow 114	1.10	1.81	2.49	2.96	3.33	4.30*	4.15	5.29	5.37

5. The K/S value data of meta-aramid fibers with the action of CINDYE DNK at various pressures and dye stuff types with a temperature 140°C, a dyeing time 70 min, a dye concentration 4.5 %, a CO₂ flow 50 g/min and a carrier concentration 80 % in Figure 3 of reference [31] are shown in Table S5. The data with * was the testing and prediction data.

Table S5 Effect of dye stuff types and pressure on K/S value

Dye stuff types	Pressure /MPa								
	18	20	22	24	26	28	30	32	34
Disperse blue 79	3.26	3.60*	3.86	4.12	4.35	4.46	4.54	4.61	4.70
Disperse red 60	3.68	3.86	3.99	4.25*	4.50	4.60	4.70	4.76	4.81
Disperse yellow 114	3.15	3.82	4.13	4.48	4.85	5.03*	5.21	5.30	5.40

6. The K/S value data of meta-aramid fibers with the action of CINDYE DNK at various dyeing time and dye stuff types with a temperature 140°C, a pressure 30 MPa, a dye concentration 4.5 %, a CO₂ flow 50 g/min, and a carrier concentration 80 %. in Figure 4 of reference [31] are shown in Table S6. The data with * was the testing and prediction data.

Table S6 The effect of dye stuff types and dyeing time on K/S value

Dye stuff types	Dyeing time /min								
	10	20	30	40	50	60	70	80	90
Disperse blue 79	1.77	2.21	2.59*	3.27	3.85	4.20	4.52	4.57	4.62
Disperse red 60	2.06	2.62	3.24	3.66	4.07*	4.38	4.75	4.80	4.87
Disperse yellow 114	1.93	2.51	3.12	3.76	4.35	4.80	5.19*	5.27	5.29

7. The K/S value data of polypropylene fibers at various pressures and temperatures in Figure 3 of reference [32] are shown in Table S7. The data with * was the testing and prediction data.

Table S7 The effect of pressure and temperature on K/S value of polypropylene fibers

Pressure /MPa	Temperature /°C				
	90	100	110	120	130
20	0.70	0.72	0.74	0.77	0.79
22	0.93	0.99	1.19	1.25	1.31
24	1.07	1.19	1.28*	1.36	1.45
26	1.14	1.27	1.38	1.49	1.52
28	1.20	1.33	1.46	1.55*	1.61
30	1.18	1.31	1.42	1.52	1.56*

8. The K/S value data of polypropylene fibers at various pressures and dyeing time in Figure 5 of reference [32] are shown in Table S8. The data with * was the testing and prediction data.

Table S8 The influence of dyeing time and pressure on K/S value of polypropylene fibers

Pressure /MPa	Dyeing time/ min				
	10	15	20	25	30
20	0.65*	0.81	1.12	1.19	1.20
22	0.69	1.19	1.28	1.36	1.40
24	0.75	1.28	1.41*	1.43	1.48

26	0.79	1.38	1.47	1.51	1.52
28	0.79	1.40	1.52	1.55	1.58*

9. The K/S value data of meta-aramid fabric with the action of Disperse Blue Black 79 at a constant pressure of 30 MPa, a dyeing time of 70 min, a dye concentration of 4.5% o.m.f. (on the mass of fabric), a carrier concentration of 3% o.m.f. (on the mass of carbon dioxide) for liquid and 3% o.m.f. (on the mass of fabric) for solid, as well as a carbon dioxide flow of 40 g/min in Figure 2 of reference [33] are shown in Table S9. The data with * was the testing and prediction data.

Table S9 The influence of carriers and temperature on K/S value of meta-aramid fabric

Carriers	Temperature /°C				
	80	100	120	140	160
Control sample	1.20	1.23	1.47	1.92	2.04
DMT	1.16	1.40*	1.84	2.23	2.50
Ethly alcohol	1.26	1.52	2.07*	2.46	2.49
CINDYE DNK	1.42	2.42	3.74	4.37*	4.45

10. The K/S value data of meta-aramid fabric with the action of Disperse Blue Black 79 at a constant temperature of 140°C, a dyeing time of 70 min, a dye concentration of 4.5 % o.m.f.(onthemassoffabric), a carrier concentration of 3% o.m.f. (on the mass of carbon dioxide) for liquid and 3% o.m.f. (on the mass of fabric) for solid, as well as a carbon dioxide flow of 40 g/min in Figure 3 of reference [33] are shown in Table S10. The data with * was the testing and prediction data.

Table S10 The influence of carriers and pressure on K/S value of meta-aramid fabric

Carriers	Pressure /MPa				
	18	22	26	30	34
Control sample	0.82	0.8	1.35	1.95	2.11
DMT	0.90	1.17	1.83*	2.27	2.50
Ethly alcohol	1.40	1.80	2.29	2.50*	2.64
CINDYE DNK	2.06	2.81	3.68	4.36	4.38*

11. The K/S value data of meta-aramid fabric with the action of Disperse Blue Black 79 meta-aramid fabrics was investigated in supercritical carbon dioxide at a constant temperature of 140°C, a dyeing pressure of 30 MPa, a dye concentration of 4.5% o.m.f. (on the mass of fabric), a carrier concentration of 3% o.m.f. (on the mass of carbon dioxide) for liquid and 3% o.m.f. (on the mass of fabric) for solid, as well as a carbon dioxide flow of 40 g/min in Figure 4 of reference [33] are shown in Table S11. The data with * was the testing and prediction data.

Table S11 The influence of dyeing time and carriers on K/S value of meta-aramid fabric

Carriers	Dyeing time/min				
	10	30	50	70	90
Control sample	0.65	1.10	1.42	1.97	1.99
DMT	1.08	1.56	1.93*	2.27	2.34
Ethly alcohol	1.23	1.75	2.37	2.47*	2.52
CINDYE DNK	1.49	2.50	3.09	4.35	4.46*

12. The dye uptake data of polyester fabric with the action of C. I. Disperse Blue 79 at constant pressure 20 MPa in Figure 1 of reference [34] are shown in Table S12. The data with * was the testing and prediction data.

Table S12 The influence of dyeing time and temperature on dye uptake of polyester fabric

Dyeing time /min	Temperature /°C					
	80	90	100	110	120	130
5	0.2541	0.3462	0.8277	1.1755	2.2836	4.4031

10	0.3499	0.5418	1.0071	1.6659	3.2744	6.8232
15	0.4278	0.6011*	1.1423	2.1402	3.9331	7.3911
20	0.5381	0.7213	1.3102*	2.3565	4.5776	10.6401
30	0.6129	0.8382	1.5671	2.9022*	5.5899	11.2103
40	0.7611	0.9478	1.9735	3.3208	6.4723*	11.5848
60	0.7631	0.9503	1.9856	3.3215	6.4823	11.7302
90	0.763	0.9506	1.9853	3.3217	6.4834	11.7401

13. The dye uptake data of polyester film with the action of C. I. Disperse Blue 79 at constant temperature 393.2 K in Table 2 of reference [35] are shown in Table S13. The data with * was the testing and prediction data.

Table S13 The influence of dyeing time and pressure on dye uptake of polyester film

Pressure /MPa	Dyeing time/min				
	60	120	180	240	300
15.19	0.74	1.27	1.71	2.21	2.52
17.74	2.95	5.39*	7.4	10.69	11.04
20.29	8.76	13.2	16.39*	18.68	20.41
22.91	13.34	20.91	21.97	26.48	28
25.39	15.32	22	26.75	28.34*	30.43

14. The dye uptake data of polyester textile fibers with the action of C. I. Disperse Blue 79 in Figure 6 of reference [35] are shown in Table S14. The data with * was the testing and prediction data.

Table S14 The influence of dyeing time and temperature on dye uptake

Temperature/°C	Dyeing time/min				
	10	30	60	80	100
60	0.50	0.65	0.75*	0.83	0.83
90	1.52	2.02	2.39*	2.46	2.46
120	9.95	10.68	11.84*	11.90	11.84

Reference:

- [29]. A Q Hou, B Chen, J J Dai, K Zhang. Using supercritical carbon dioxide as solvent to replace water in polyethylene terephthalate (PET) fabric dyeing procedures. *J. Clean. Prod.* (2010) 18:1009-1014.
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