

## Supporting Information

### Thermodynamic characteristics of cotton dyeing with reactive dyes in non-aqueous media

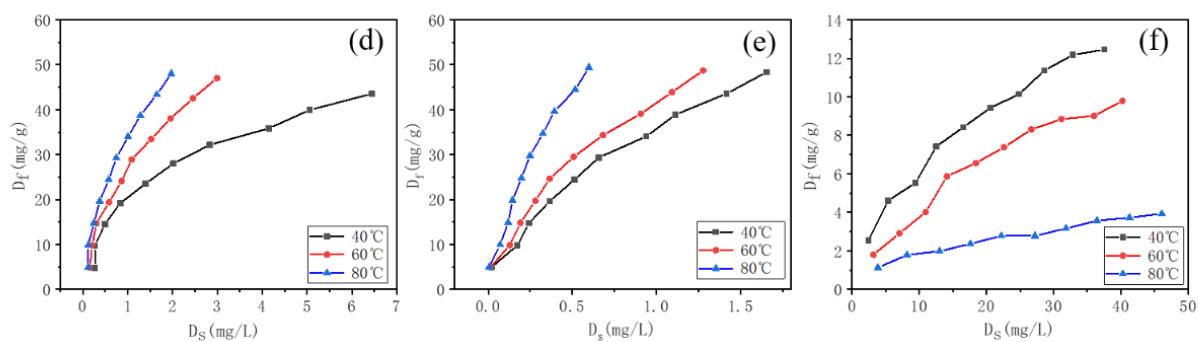


Fig S1 Adsorption isotherms of C.I. Reactive Yellow 176 onto cotton in various media : (d) LP, (e) D5, and (f) water

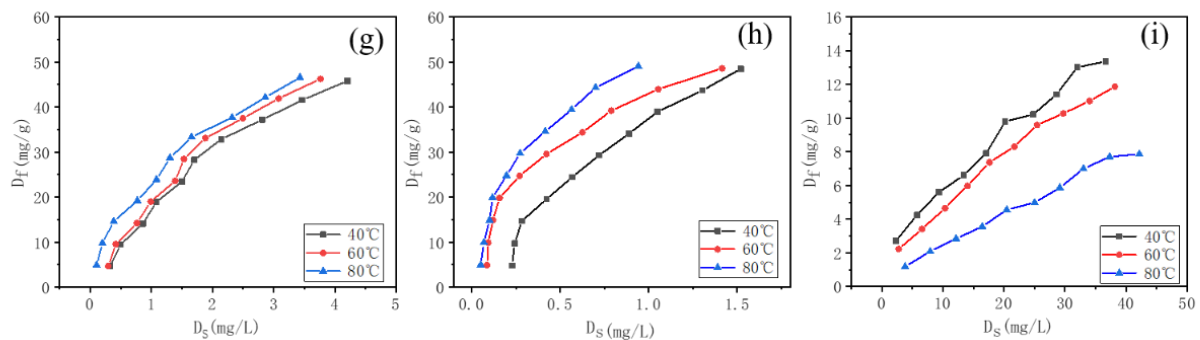


Fig S2 Adsorption isotherms of C.I. Reactive Blue 194 onto cotton in various media: (g) LP, (h) D5, and (i) water

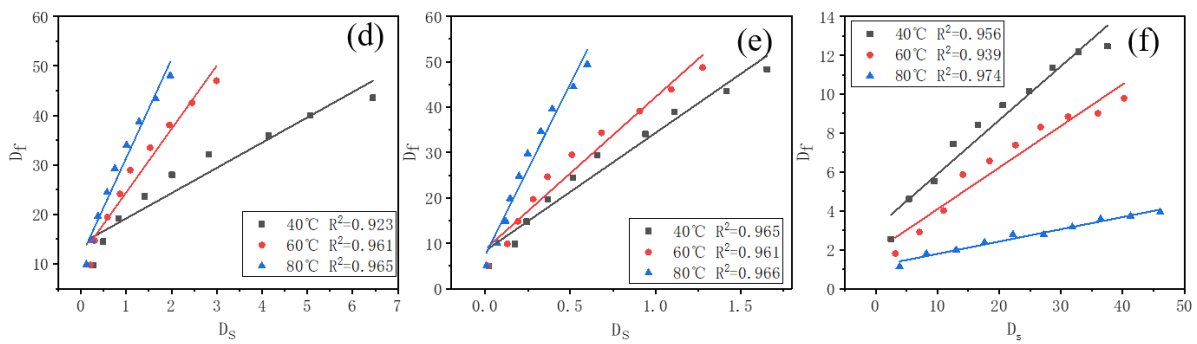


Fig. S3 Nernst adsorption fitting curves of C.I. Reactive Yellow 176 onto cotton in various media:(d) LP, (e) D5, and (f) water

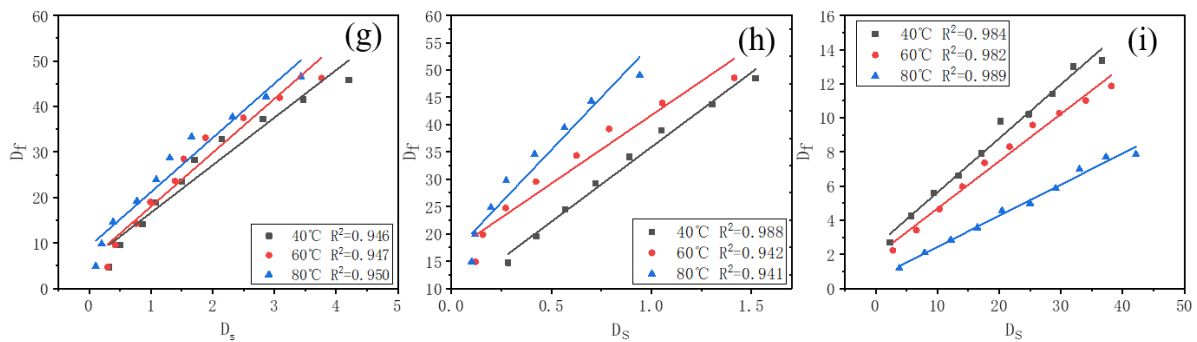


Fig. S4 Nernst adsorption fitting curves of C.I. Reactive Blue 194 onto cotton in various media : (g) LP, (h) D5, and (i) water

Table S1 Fitting parameters of Nernst adsorption isotherms of C.I. Reactive Yellow 176 onto cotton in various media

Dye	Medium	Temperature/°C	Adsorption equation	R <sup>2</sup>
C.I. Reactive Yellow 176	LP	40	Y=5.102x+14.074	0.923
		60	Y=12.804x+11.636	0.961
		80	Y=19.966x+11.429	0.965
	D5	40	Y=25.951x+8.353	0.965
		60	Y=33.496x+8.688	0.961
		80	Y=75.514x+7.412	0.966
	Water	40	Y=0.277x+3.117	0.956
		60	Y=0.214x+1.942	0.939
		80	Y=0.063x+1.156	0.974

Table S2 Fitting parameters of Nernst adsorption isotherms of C.I. Reactive Blue 194 onto cotton in various media

Dye	Medium	Temperature/°C	Adsorption equation	R <sup>2</sup>
C.I. Reactive Blue 194	LP	40	Y=10.455x+6.185	0.946
		60	Y=11.847x+6.140	0.947
		80	Y=11.934x+9.228	0.950
	D5	40	Y=27.336x+8.559	0.988
		60	Y=25.018x+16.704	0.971
		80	Y=38.545x+16.112	0.941
	Water	40	Y=0.316x+2.467	0.984
		60	Y=0.277x+1.909	0.982
		80	Y=0.182x+0.610	0.989

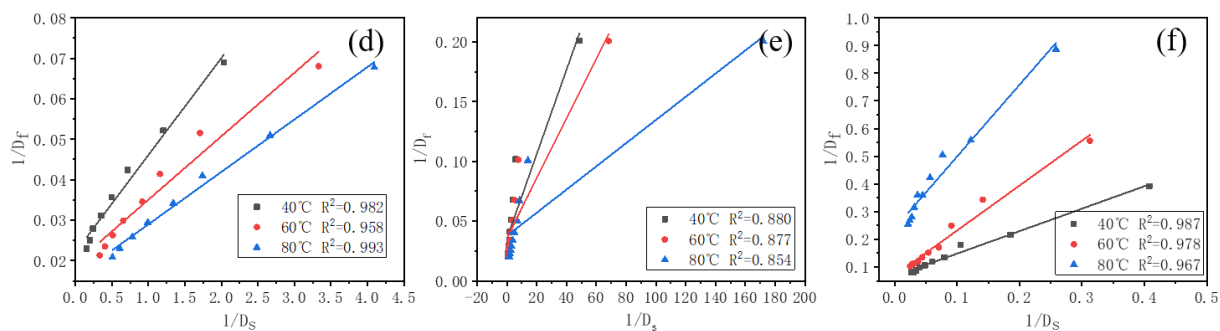


Fig S5 Langmuir adsorption fitting curves of C.I. Reactive Yellow 176 onto cotton in various media: (d) LP, (e) D5, and (f) water

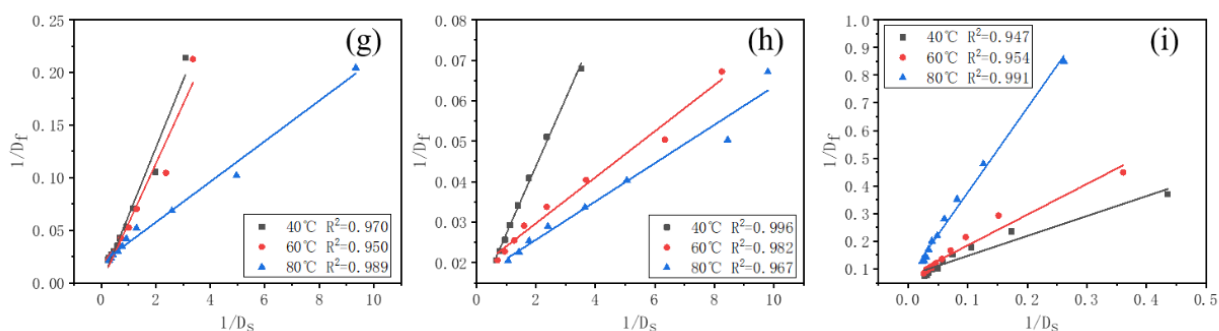


Fig S6 Langmuir adsorption fitting curves of C.I. Reactive Blue 194 onto cotton in various media:(g) LP, (h) D5, and (i) water

Table S3 Fitting parameters of Langmuir adsorption isotherms of C.I. Reactive Yellow 176 onto cotton in various media

Dye	Medium	Temperature /°C	Adsorption equation	R <sup>2</sup>
C.I. Reactive Yellow 176	LP	40	$Y=0.023x+0.022$	0.982
		60	$Y=0.015x+0.019$	0.958
		80	$Y=0.012x+0.016$	0.993
	D5	40	$Y=0.003x+0.035$	0.880
		60	$Y=0.002x+0.035$	0.877
		80	$Y=0.177x+0.037$	0.854
	Water	40	$Y=0.812x+0.067$	0.987
		60	$Y=1.162x+0.069$	0.978
		80	$Y=2.594x+0.239$	0.967

Table S4 Fitting parameters of Langmuir adsorption isotherms of C.I. Reactive Blue 194 onto cotton in various media

Dye	Medium	Temperature/°C	Adsorption equation	R <sup>2</sup>
C.I. Reactive Blue 194	LP	40	$Y=0.064x-2.240$	0.970
		60	$Y=0.056x+1.141$	0.950
		80	$Y=0.019x+0.018$	0.989
	D5	40	$Y=0.016x+0.010$	0.996
		60	$Y=0.005x+0.018$	0.982
		80	$Y=0.004x+0.016$	0.967
	Water	40	$Y=0.718x+0.075$	0.947
		60	$Y=1.108x+0.074$	0.954
		80	$Y=3.056x+0.070$	0.991

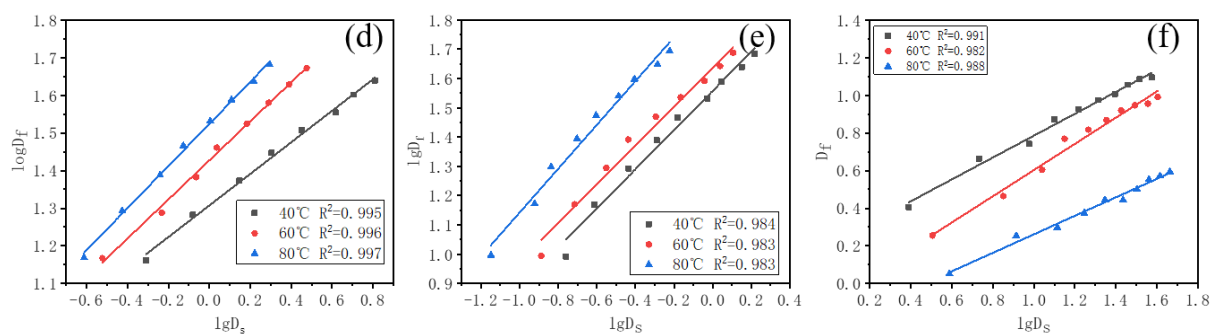


Fig. S7 Freundlich adsorption fitting curves of C.I. Reactive Yellow 176 onto cotton in various media : (d) LP, (e) D5, and (f) water

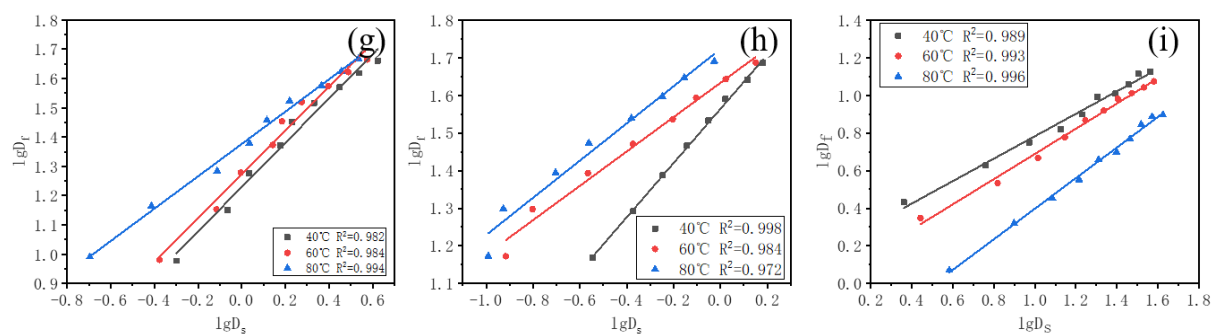


Fig. S8 Freundlich adsorption fitting curves of C.I. Reactive Blue 194 onto cotton in various media : (g) LP, (h) D5, and (i) water

Table S5 Fitting parameters of Freundlich adsorption isotherms of C.I. Reactive Yellow 176 onto cotton in various media

Dye	Medium	Temperature/°C	Adsorption equation	R <sup>2</sup>
C.I. Reactive Yellow 176	LP	40	Y=0.418x+1.307	0.995
		60	Y=0.518x+1.426	0.996
		80	Y=0.558x+1.523	0.997
	D5	40	Y=0.667x+1.557	0.984
		60	Y=0.661x+1.636	0.983
		80	Y=0.747x+1.890	0.983
	Water	40	Y=0.580x+0.205	0.991
		60	Y=0.695x-0.092	0.982
		80	Y=0.491x-0.229	0.988

Table S6 Fitting parameters of Freundlich adsorption isotherms of CII Reactive Blue 194 onto cotton in various media

Dye	Medium	Temperature /°C	Adsorption equation	R <sup>2</sup>
C.I. Reactive Blue 194	LP	40	Y=0.756x+1.229	0.982
		60	Y=0.746x+1.272	0.984
		80	Y=0.551x+1.376	0.994
	D5	40	Y=0.719x+1.563	0.998
		60	Y=0.455x+1.633	0.984
		80	Y=0.493x+1.722	0.972
	Water	40	Y=0.595x+0.187	0.989
		60	Y=0.669x+0.019	0.993
		80	Y=0.812x-0.414	0.996

Table S7 Thermodynamic parameters of cotton dyed with C.I. Reactive Yellow 176 in various media

Medium	Temperature (°C)	Dyeing affinity (kJ/mol)	Dyeing heat (kJ/mol)	Dyeing entropy (kJ/K.mol)
LP	40	25.014	22.934	0.153
	60	28.271		
	80	31.146		
D5	40	28.192	23.181	0.163
	60	30.778		
	80	34.725		
Water	40	16.278	-32.367	-0.050
	60	16.162		
	80	14.261		

Table S8 Thermodynamic parameters of cotton dyed with C.I. Reactive Blue 194 in various media

Medium	Temperature (°C)	Dyeing affinity (kJ/mol)	Dyeing hot (kJ/mol)	Dyeing entropy (kJ/K·mol)
LP	40	25.016		
	60	26.947	11.197	0.115
	80	29.625		
D5	40	27.411		
	60	30.837	22.202	0.158
	80	33.759		
Water	40	16.273		
	60	16.725	-19.644	-0.010
	80	15.870		