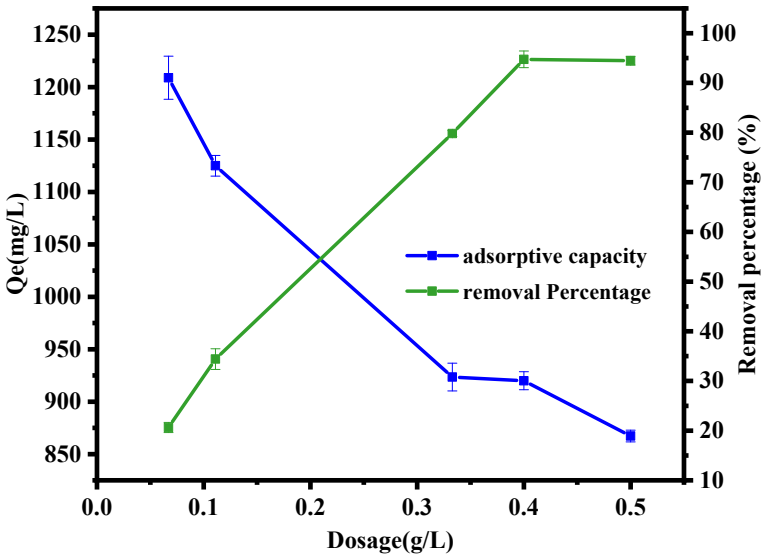
supplementary materials

Experimental data of adsorption kinetics

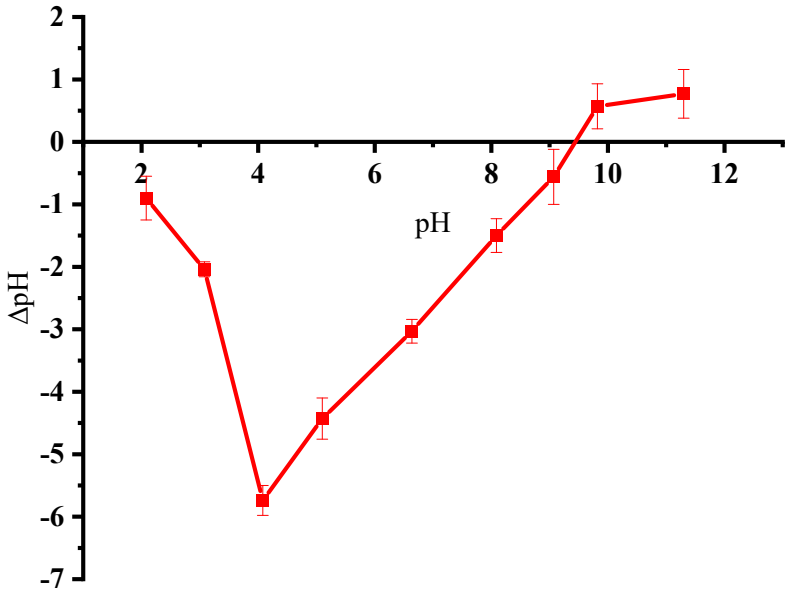
time(min)	m(mg)	V(mL)	Ct(mg/L)	N*Ct(n=5)	N*C0	Qt(mg/g)
10	9.1	90	72.0336	360.168	381.0263	206.2908791
30	9	90	67.9821	339.9105	381.0263	411.158
50	9.1	90	64.5052	322.526	381.0263	578.5743956
70	9.1	90	63.38	316.9	381.0263	634.2161538
100	9.6	90	58.1378	290.689	381.0263	846.9121875
200	9.5	90	53.9894	269.947	381.0263	1052.330211
300	9.2	90	52.74	263.7	381.0263	1147.757283
496	9.3	90	49.9936	249.968	381.0263	1268.306129
960	9.8	90	46.7368	233.684	381.0263	1353.143571
1210	10	90	45.7584	228.792	381.0263	1370.1087
1500	10.1	90	44.7326	223.663	381.0263	1402.247228
2160	9.2	90	49.947	249.735	397.368	1444.2178
2880	10.3	90	46.4210526	232.105263	397.368	1444.2755



Adsorption Capacity and Removal Rate of Different Adsorbents

When the adsorbent dose was 0.06 – 0.5 g / L, with the decrease of CR solution volume, the adsorption capacity decreased from 1208.873 mg / g to 867.241 mg / g, and the removal rate increased from 20.642 % to 94.475 %. When the adsorbent mass is constant, the increase of dosage represents the decrease of dye solution volume, and the number of active sites of the adsorbent remains unchanged. However, the number of dye molecules in the solution is decreasing, and the active sites of the adsorbent cannot be fully occupied. Therefore, with the increase of dosage, the removal rate of CR increases, but the adsorption capacity decreases. When the dosage is less than 0.333 g / L, the adsorption capacity decreases sharply with the decrease of CR solution volume. Although the removal rate of CR is still increasing, the increase is small. This is because when the volume of CR solution is small, at the initial stage of adsorption, the dye molecules in the solution quickly occupy the adsorbent site. At the later stage of adsorption, due to

the low concentration of the remaining dye molecules in the solution, the binding efficiency with the adsorbent site decreases, resulting in a decrease in the adsorption amount.



20 mL of 0.01 mol / L sodium chloride solution was taken and put into a series of conical flasks. The pH (denoted as pHi) was adjusted to be between 2 and 11, and 10 mg of CEHP-2 was added to oscillated at constant temperature of 313 K for 12 h. The pH (denoted as pHf) of the solution at this time was determined, and the pHi was plotted with ΔpH (pHi − pHf). The intersection of the two was the zero charge point of the adsorbent. Under ΔpH, the adsorbent surface has positive charge, while above ΔpH, the adsorbent surface has negative charge. However, the adsorption mechanism depends not only on ΔpH, but also other factors that affect the adsorption of species on adsorbents. pH = 9.39 is zero charge point.