

## Adsorption and desorption of the flavonoids on activated carbon impregnated with different metal ions

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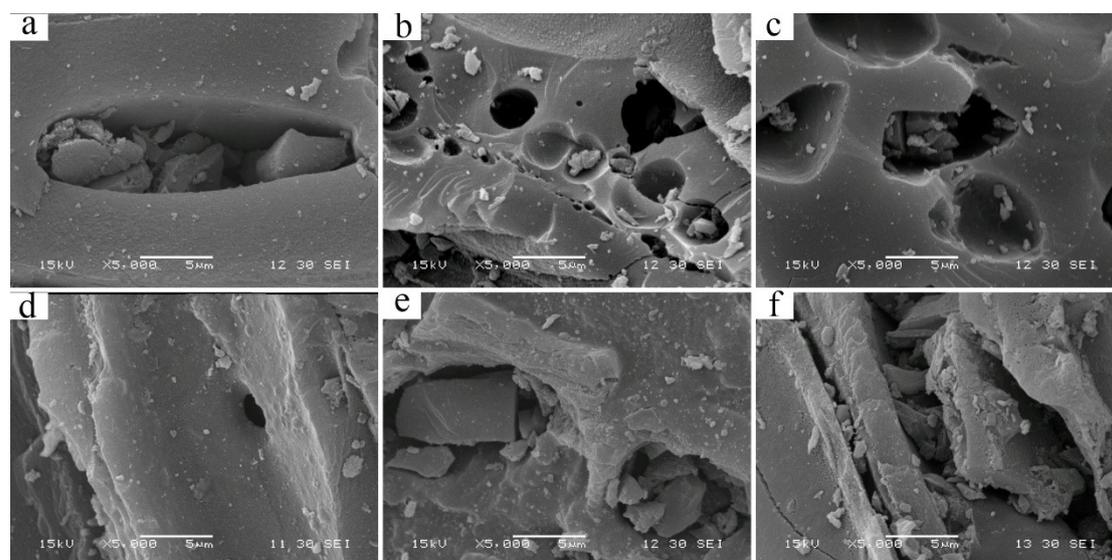
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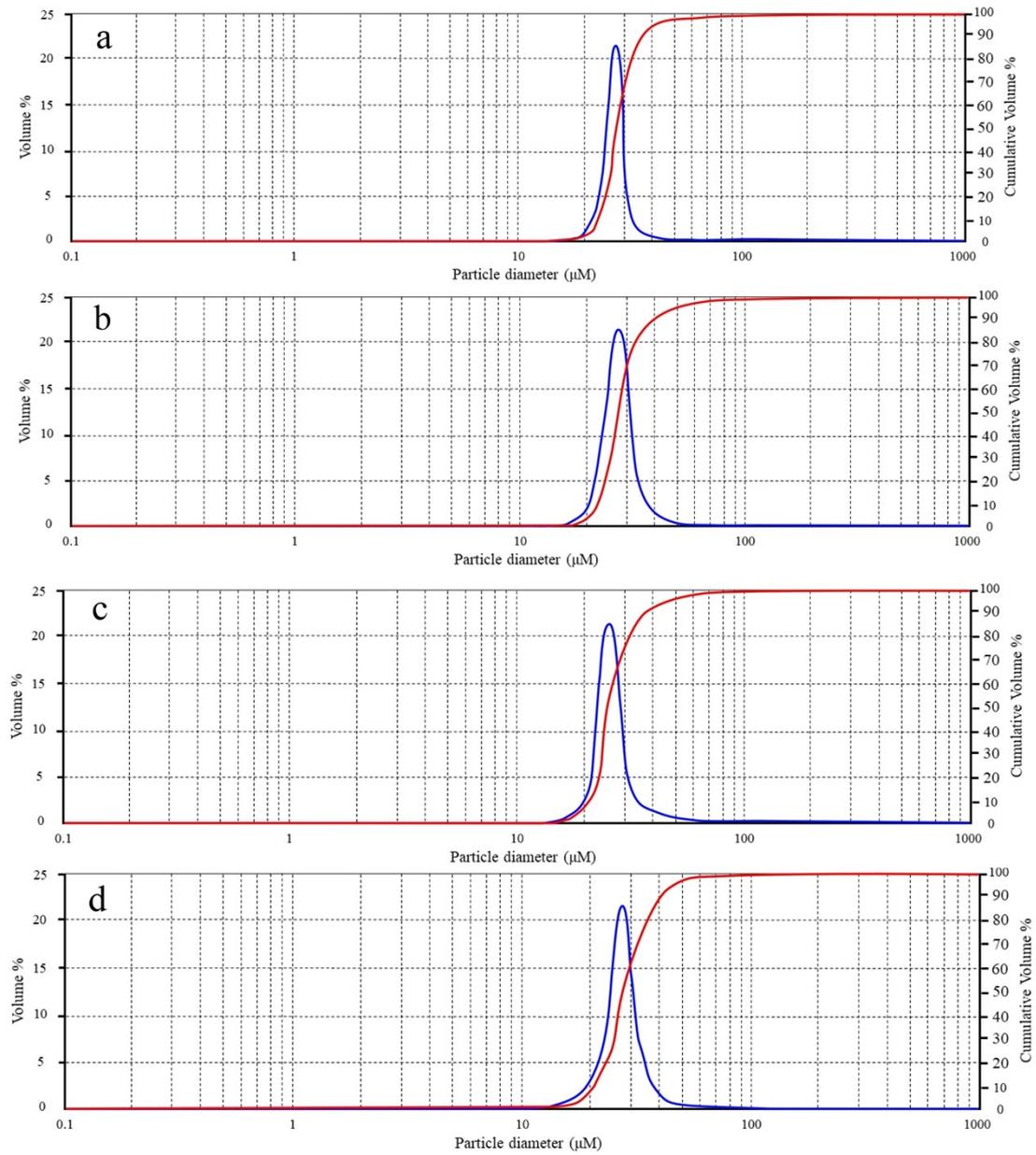
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### Morphological and structural characterization of AC



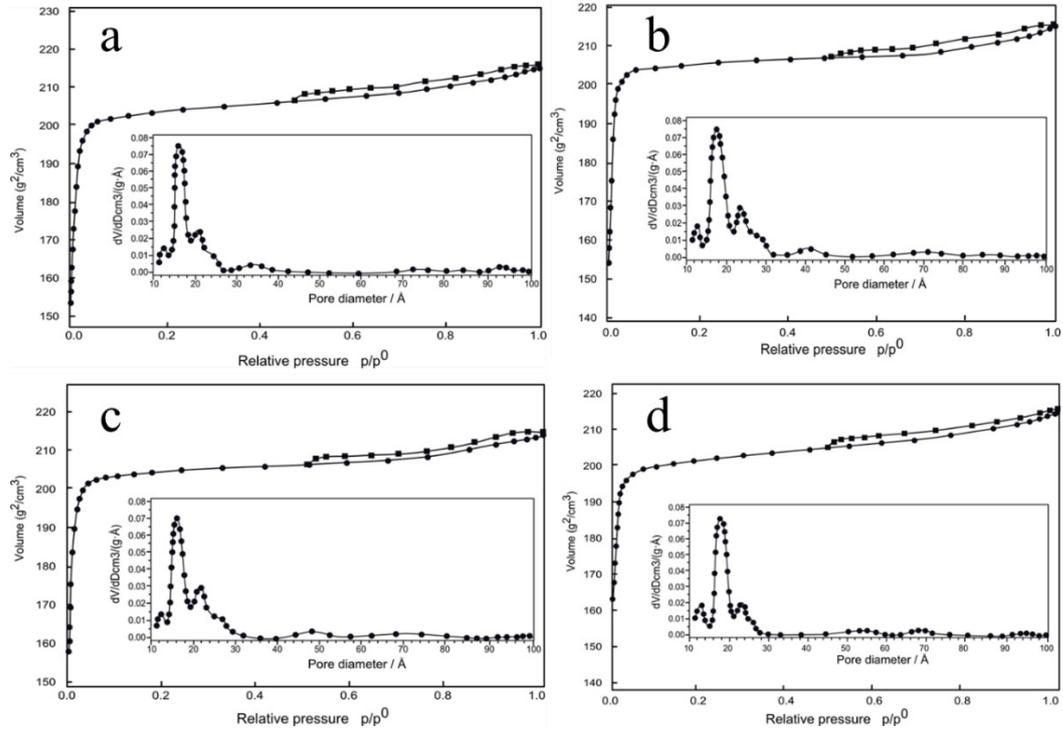
**Fig. S1** SEM images of modified and unmodified activated carbon ( $\times 5000$ ). a. SEM image of Untreated blank activated carbon. b. SEM image of activated carbon calcined but not impregnated with metal ions. c-f. SEM images of activated carbon calcined and impregnated with Mg, Al, Fe, and Zn metal ions.

## Particle size analysis of AC

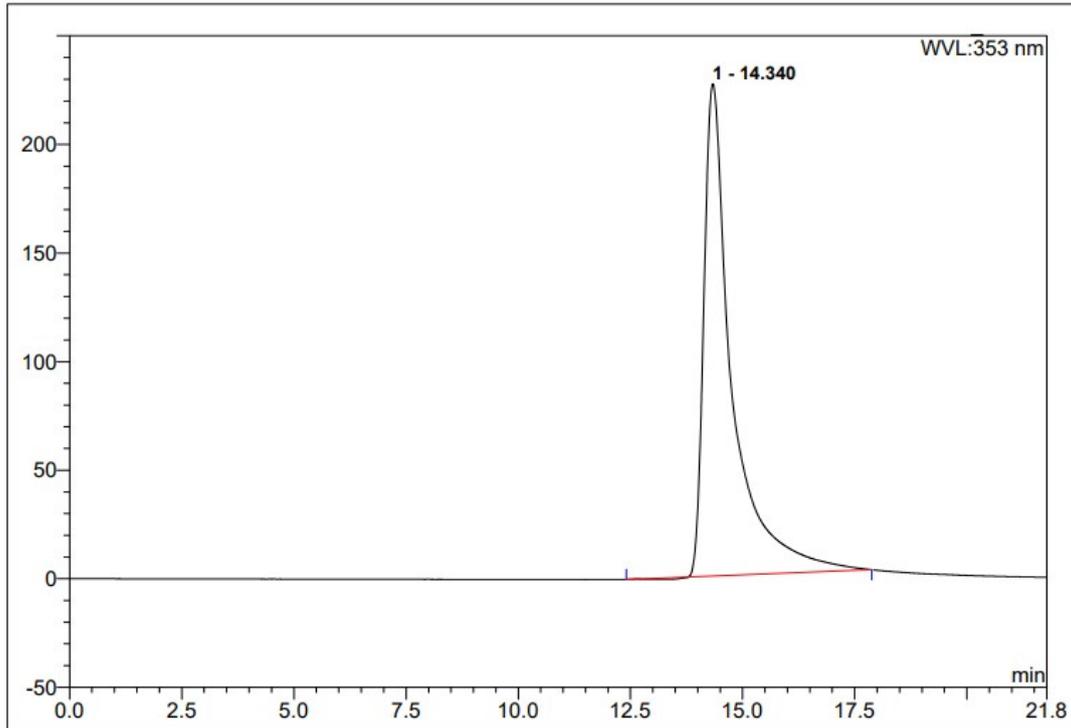


**Fig. S2** a, b, c, d. Particle size analysis of activated carbon calcined and impregnated with Mg Al Fe Zn ions.

### Specific surface area and pore size distribution of AC



**Fig. S3** BET Analysis and Pore Size Distribution of four impregnated metal ions. a, b, c, d. BET Analysis and Pore Size Distribution of activated carbon calcined and impregnated with Mg Al Fe Zn ions.



No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount n.a.	Type
1	14.34	n.a.	226.743	165.027	100.00	n.a.	BMB*
<b>Total:</b>			226.743	165.027	100.00	0.000	

Fig. S4 Quantitative determination of luteolin content by HPLC.

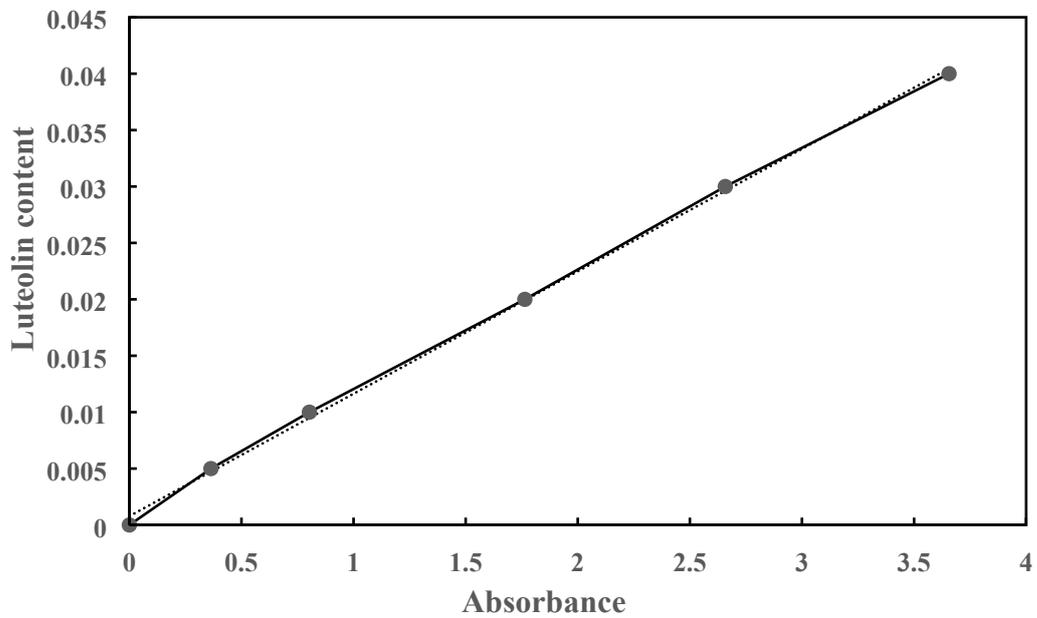
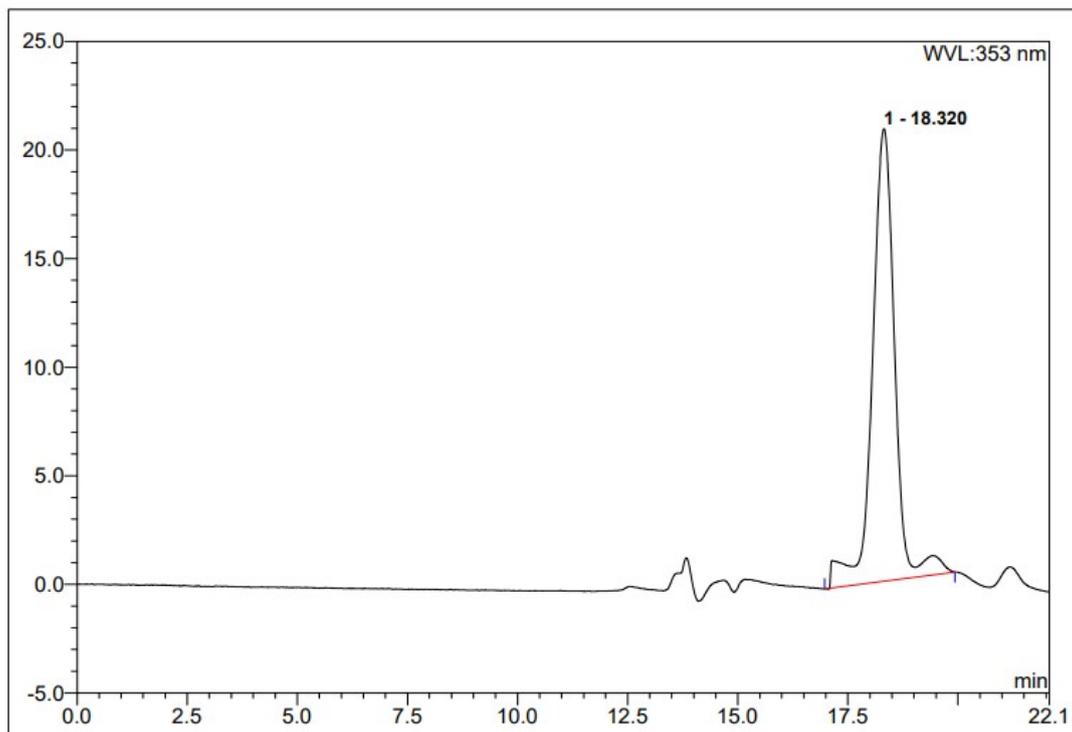


Fig. S5 Standard curve of luteolin.



No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount n.a.	Type
1	18.32	n.a.	20.831	12.327	100.00	n.a.	BMB*
<b>Total:</b>			20.831	12.327	100.00	0.000	

Fig. S6 Quantitative determination of quercetin content by HPLC.

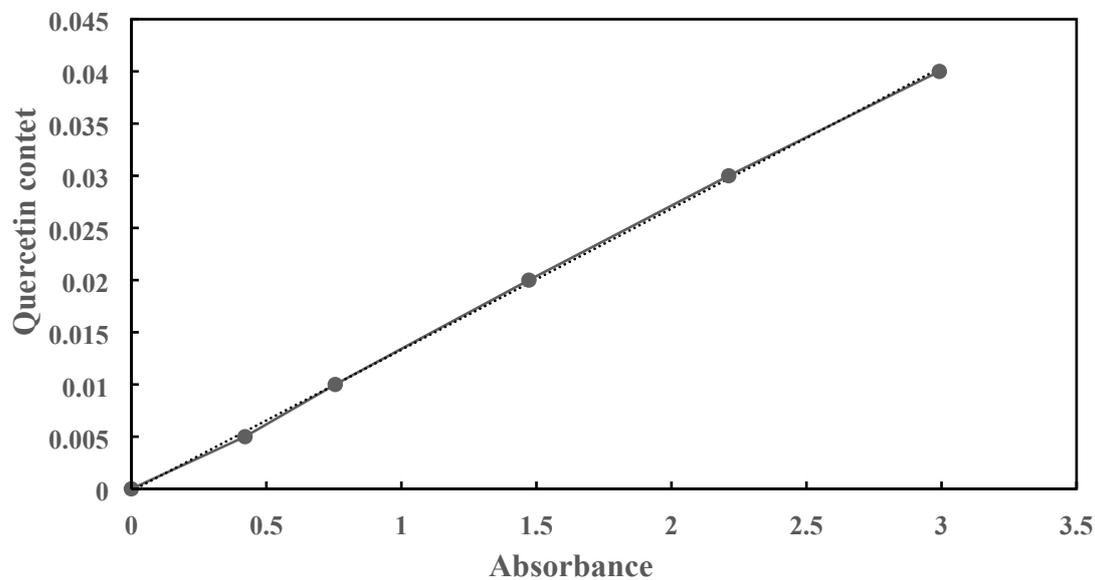
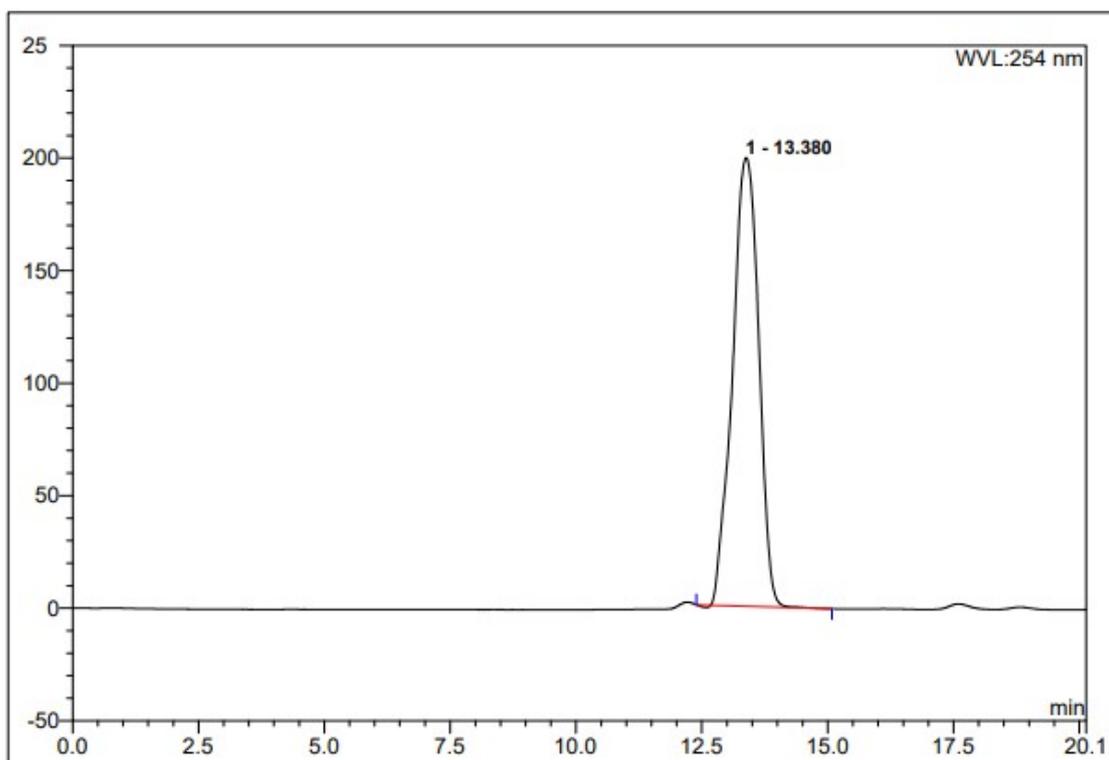


Fig. S7 Standard curve of quercetin.



No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount n.a.	Type
1	13.38	n.a.	199.295	120.303	100.00	n.a.	BMB*
<b>Total:</b>			199.295	120.303	100.00	0.000	

Fig. S8 Quantitative determination of naringenin content by HPLC.

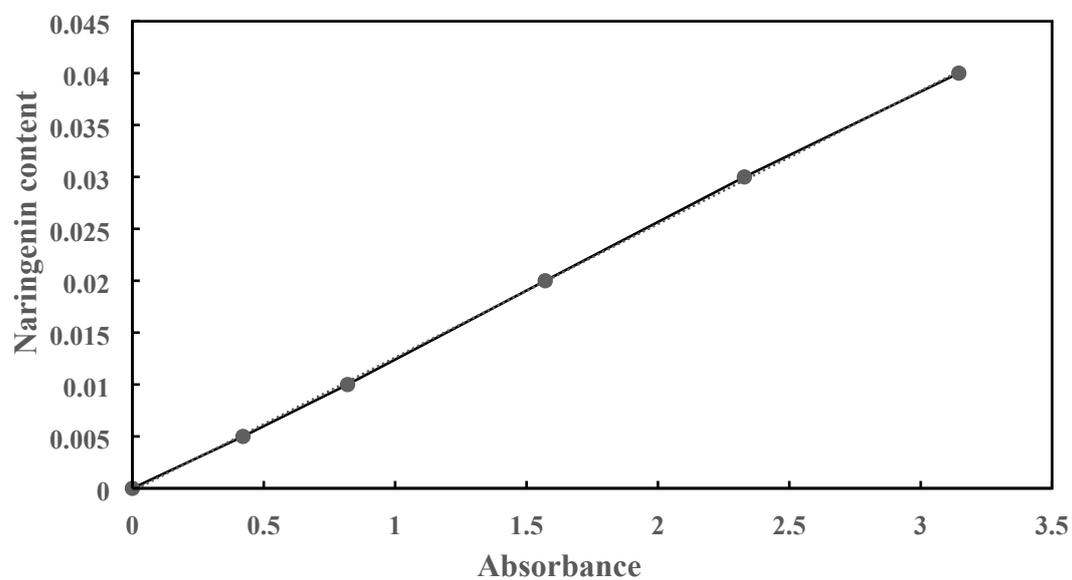
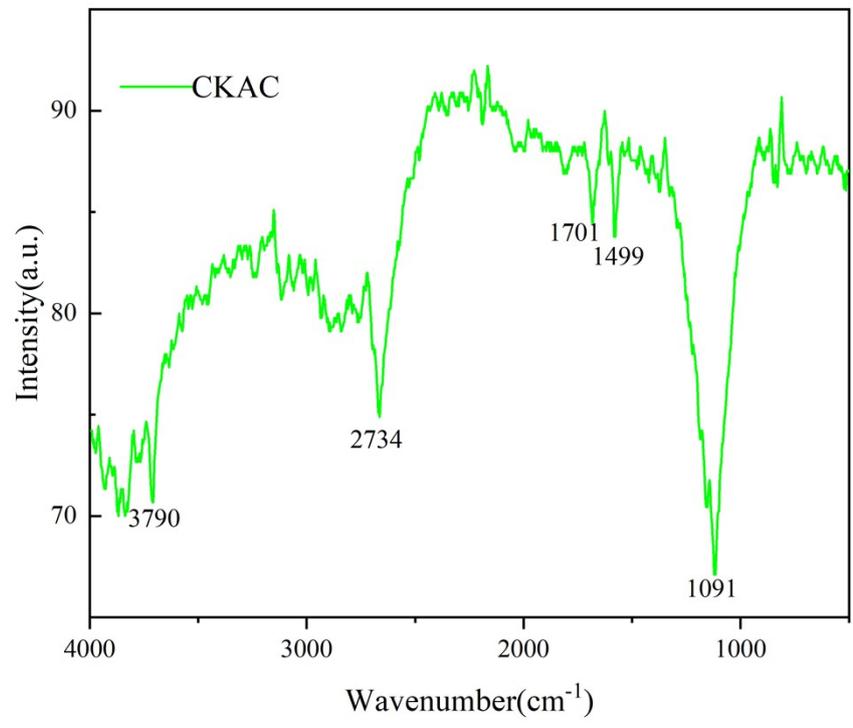
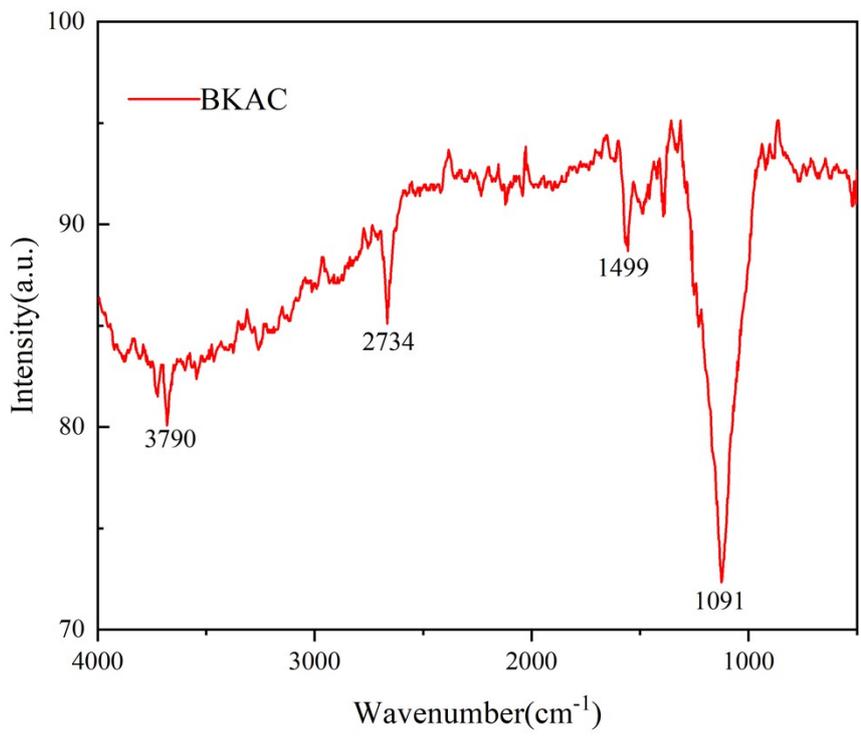
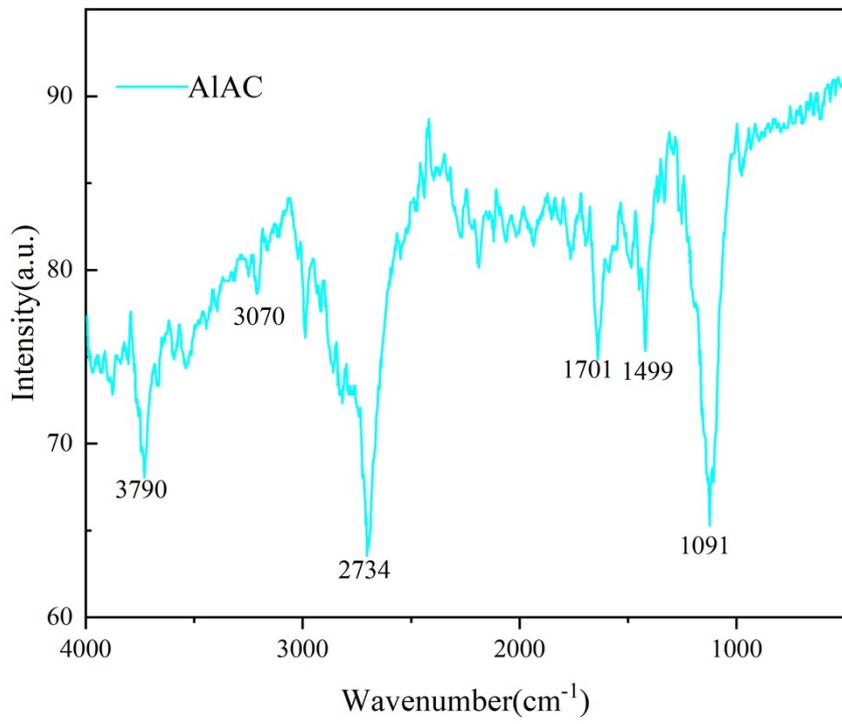
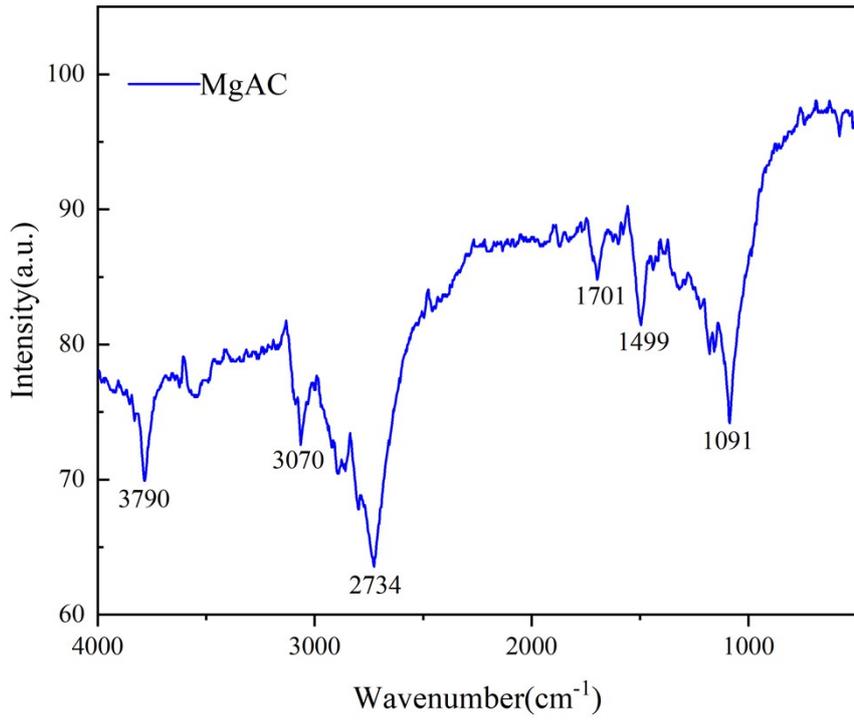
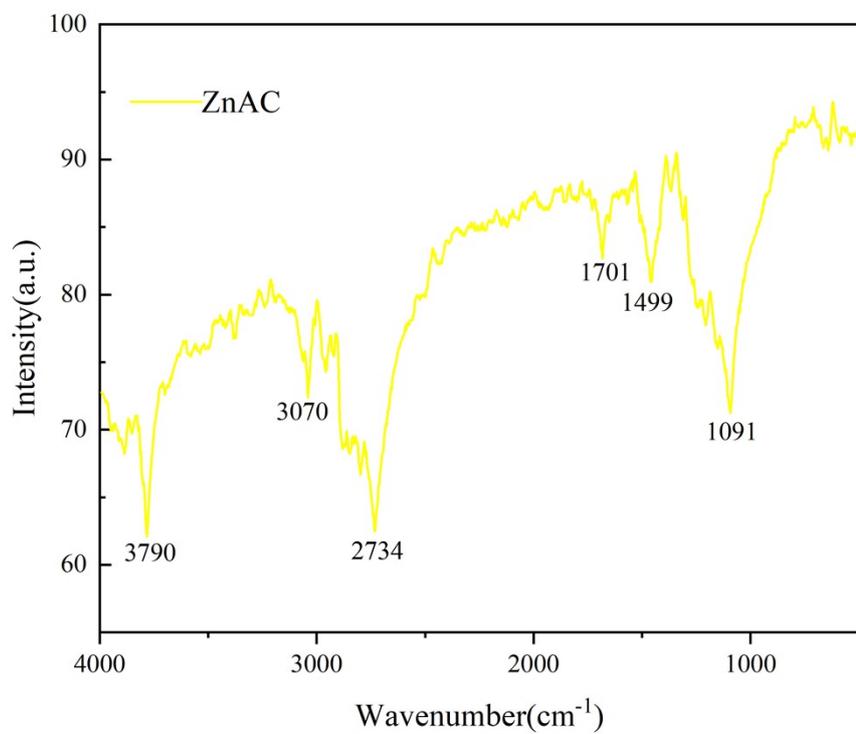
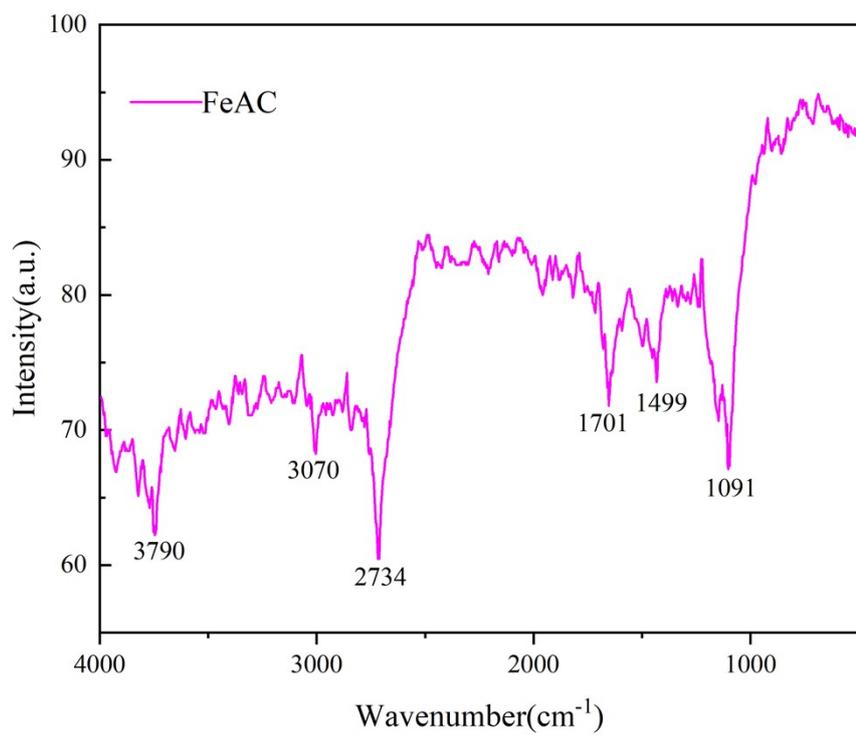


Fig. S9 Standard curve of naringenin.







**Fig. S10** FTIR spectrum of modified activated carbon.