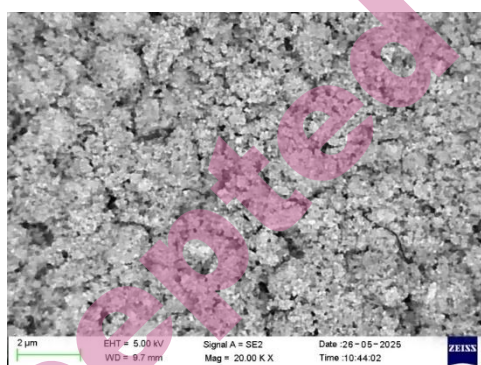


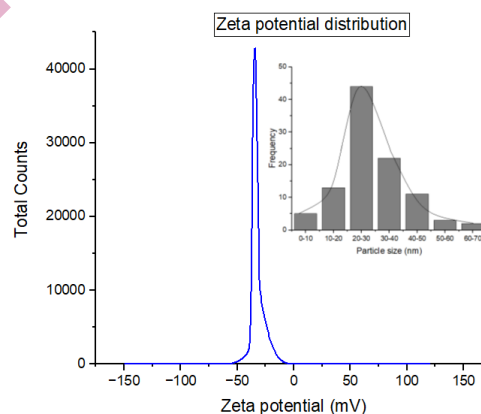
SUPPLEMENTARY MATERIAL TO
**Engineered cobalt-doped magnetic MOF@Ag₂O nanocomposites for
adsorptive removal of polycyclic musk pollutants**

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(a)



(b)

Fig. S1. SEM (a) and TGA (b) analysis results of synthesized nanocomposite

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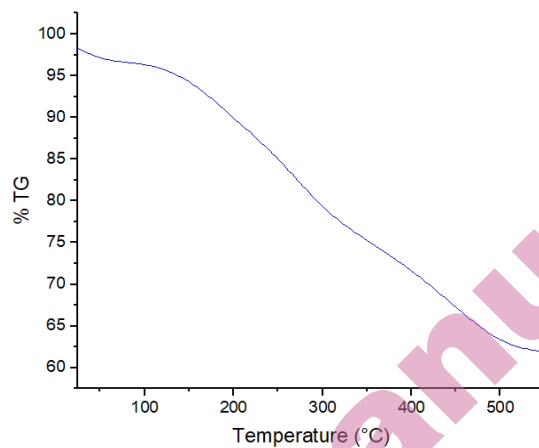


Fig. S2. Thermogram observed during thermogravimetric analysis of synthesized nanocomposite

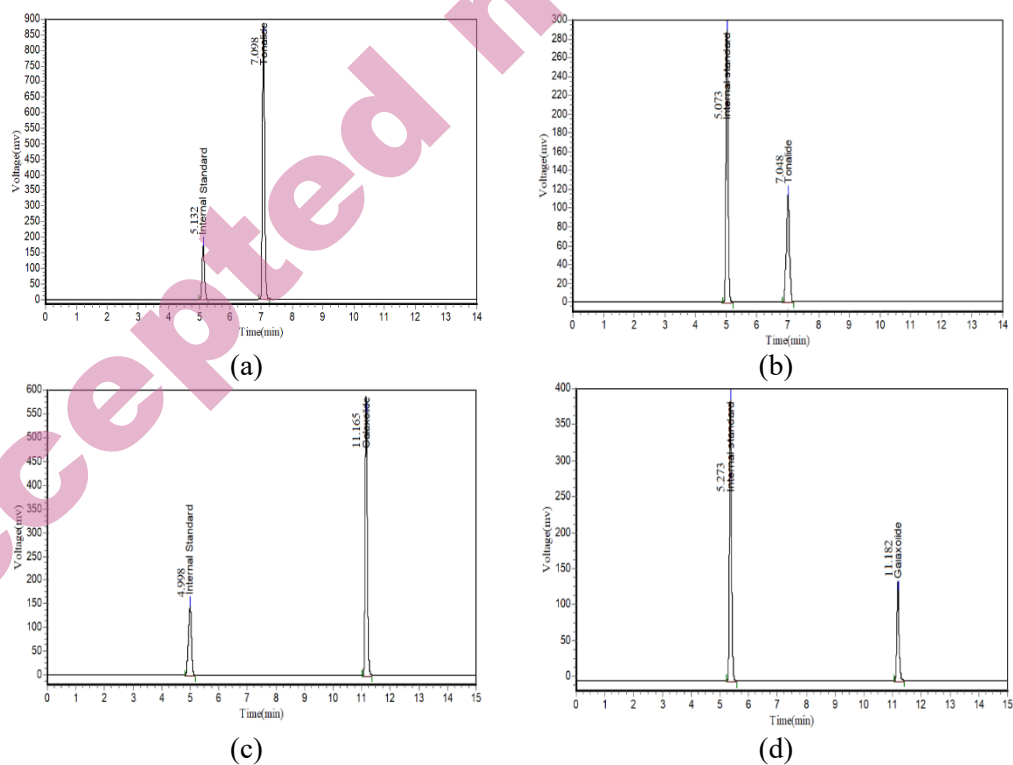
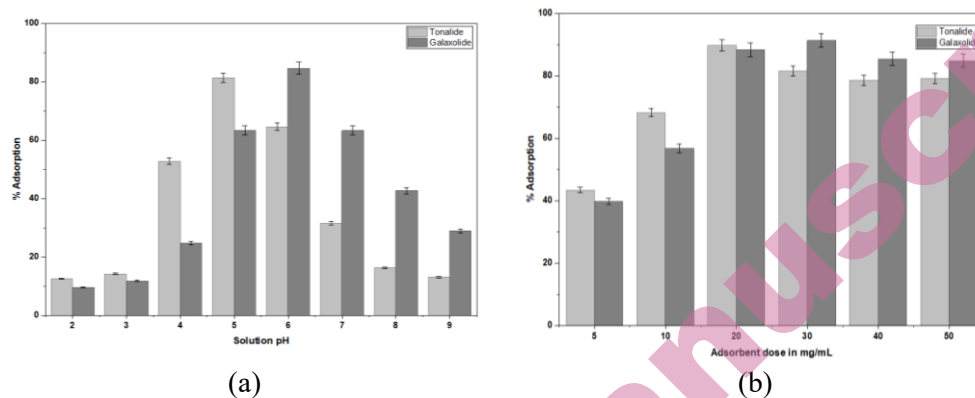


Fig. S3. GC chromatograms observed during the adsorptive removal study of musk compounds using nanocomposite synthesized in this study. a and b represent the before and after treatment chromatograms observed in the removal study of Tonalide whereas c and d observed for Galaxolide.



Data are presented as mean $\pm$ SD ($n = 3$). Error bars represent one SD ($p < 0.05$)

Fig. S4. Optimization study results observed during the adsorptive removal study of musk compounds using nanocomposite synthesized in this study. The influence of solution pH (a) and adsorbent dose (b) on adsorption of musk compounds

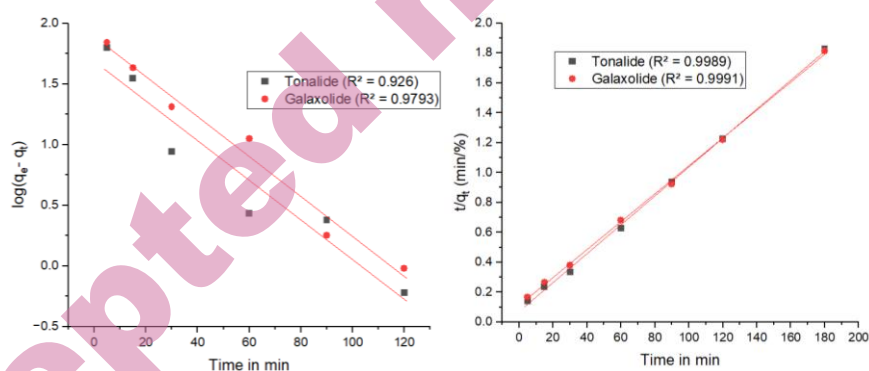
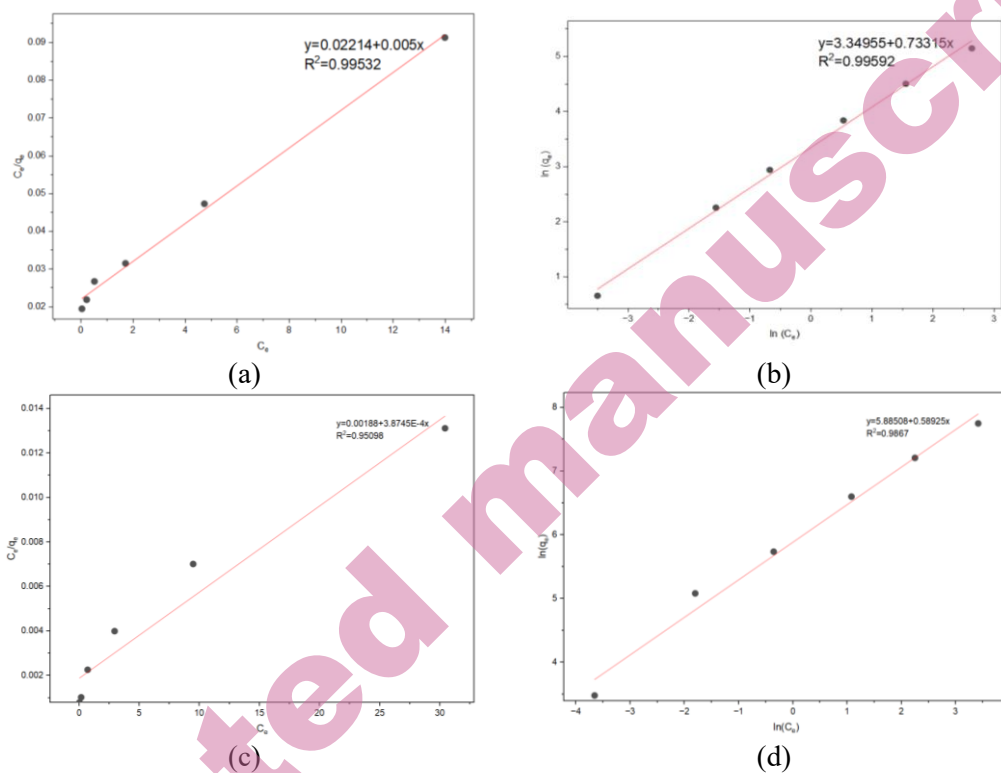


Fig. S5. Adsorption kinetics noticed for the removal study of musk compounds using nanocomposite synthesized in this study. Pseudo-first-order (a) and pseudo-second-order (b) kinetic models.



Langmuir (a) and Freundlich (b) isotherm plots observed for the adsorption of Galaxolide;
Langmuir (c) and Freundlich (d) isotherm plots observed for the adsorption of Tonalide

Fig. S6. Isotherm plots observed for the adsorption of Galaxolide and Tonalide using synthesized Co-MOF@Ag₂O. Langmuir (a) and Freundlich (b) isotherm plots observed for the adsorption of Galaxolide; Langmuir (c) and Freundlich (d) isotherm plots observed for the adsorption of Tonalide

TABLE S1. Comparative summary of previously reported adsorbents and removal strategies for polycyclic musk compounds that highlights the advantages of N-CQDs synthesized in the study.

S No	Pollutant reported	Type of Adsorbent	% Removal / Uptake (reported)		Ref.
1	Galaxolide & Tonalide	Ozonation & photocatalytic ozonation (Ce-TiO ₂ / visible light + O ₃)	Galaxolide: >75 % removal after 5 min (ozonation); Tonalide: >90 % removal by UV (15 min) in some experiments; Unmilled adsorb 330–746 mg/kg ⁻¹ ;	May generate transformation by-products (some potentially toxic); Study involves high energy consumption and thus higher operational costs. Costly to purchase and maintain the synthesis machinery; formation of Fe, Cr, Ni contamination in the final biochar; Less green (requires high energy input, Produces mechanical dust	15
2	Galaxolide	Ball-milled (BM) biochar prepared using wheat straw and rice husk	BM-biochars reported 609–2098 mg/kg of adoption. The % removal reported in the range of 77.9 % to 96.7 %		16
3	Tonalide	UV / Free-chlorine photolysis (UV/FC) — AOP (no solid nanocatalyst)	tonalide: rapid degradation under UV/FC; Reported ≥~90 % degradation under optimized lab UV/FC conditions	This requires UV irradiation and chemical dosing simultaneously; Potential risks associated with chlorinated byproduct; Not a green or chemical-free method	17
4	Galaxolide & Tonalide along with Four parabens and others	Powdered / Granular Activated Carbon (including magnetic activated carbon composites)	removal often >90 % for both the compounds Magnetic activated carbon reported tonalide 95 % and 79 % removal of Galaxolide.	Ozonation is an energy-intensive and requires specialized ozone generators; Ozonation often generates transformation products and possible toxic by-products; Reusability was not reported	18
5	Galaxolide and Celestolide	GQD-functionalized melamine sponge	Reported as effective sorptive recovery and not reported the % removal in water treatment trials	Sponge-based solid-phase extraction (SPE) requires multiple operational steps that makes labor-intensive and costly. melamine sponges are petroleum-derived and non-biodegradable, limiting sustainability	19