Electronic Supplementary Material (ESI) for Analytical Methods.

Supplementary material

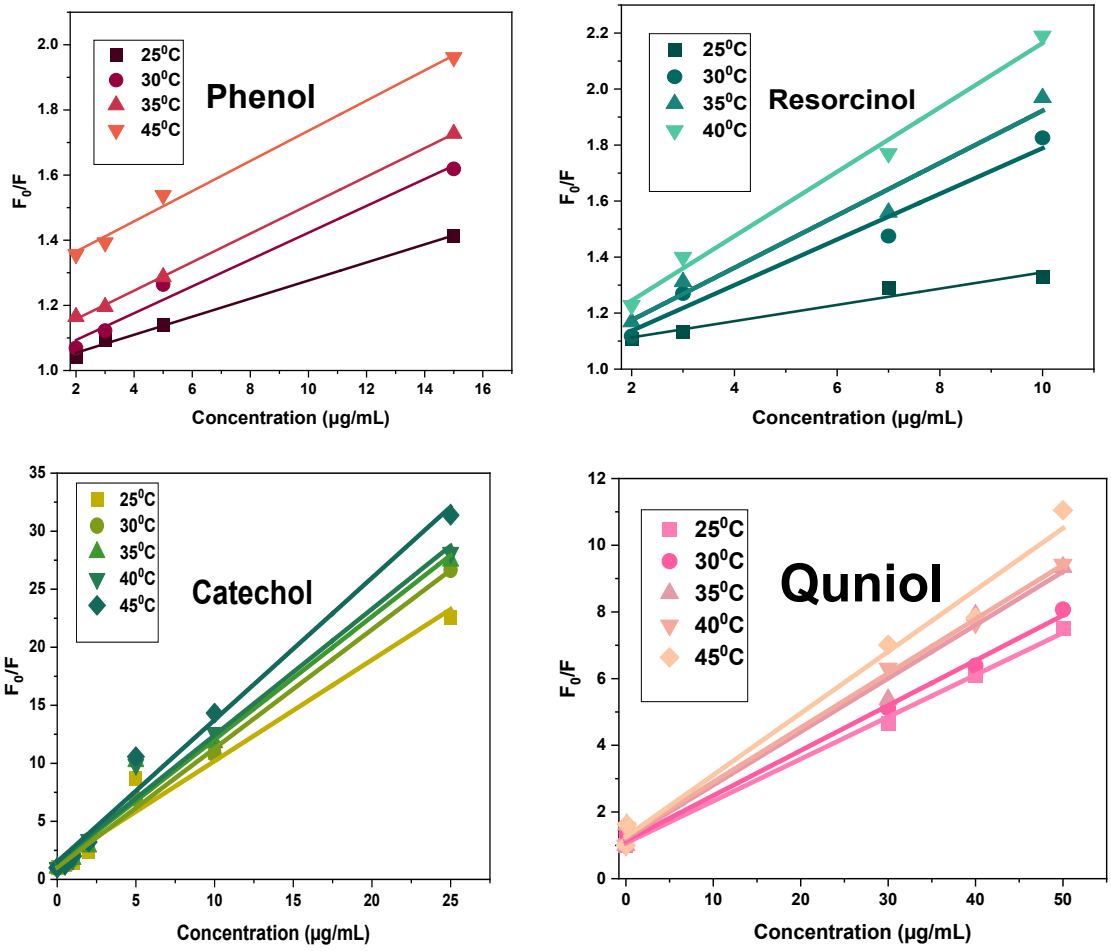
to

Development of Optical Sensor for Determination of Phenolic Compounds in Environmental Samples

Gasser M. Khairy [1*], Esraa I. Ali [1], Eman M. Saad [2]

[1] *Chemistry Department, Faculty of Science, Suez Canal University, Ismailia 41522, Egypt.*
[2] *Chemistry Department, Faculty of Science, Suez University, Suez, Egypt.*

Corresponding Authors
Gasser M. Khairy: gasser_mostafa@science.suez.edu.eg, Tel: 00201022823954



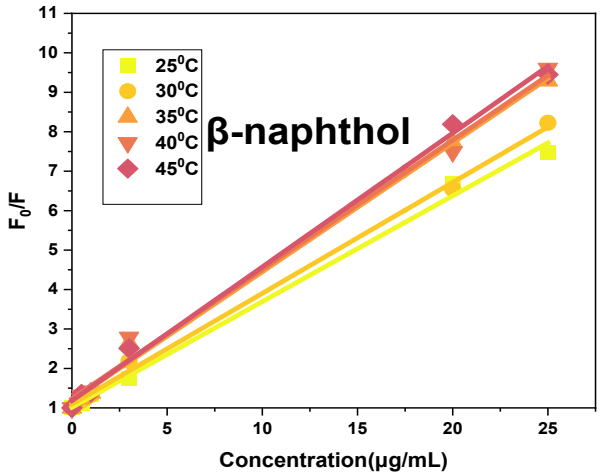
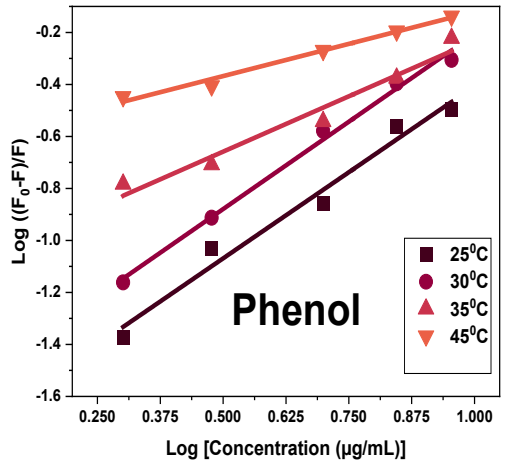
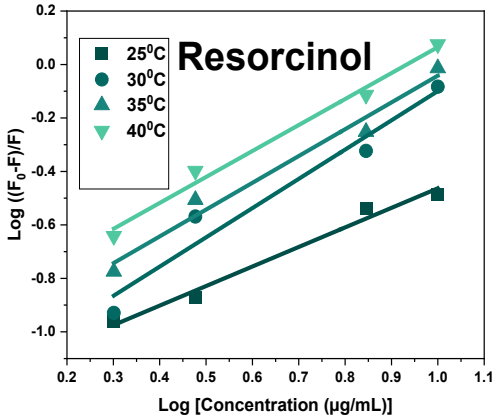
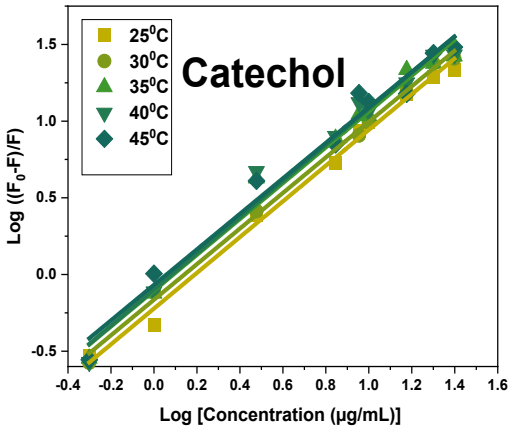
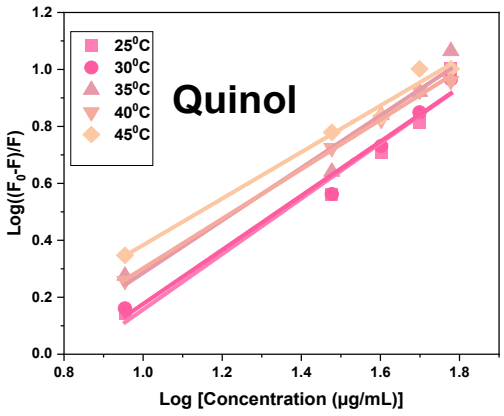


Figure 1S. Stern–Volmer plots for the reaction of Eu(III)-complex and phenolic compounds in PIPES buffer (pH=7.5) at different temperatures









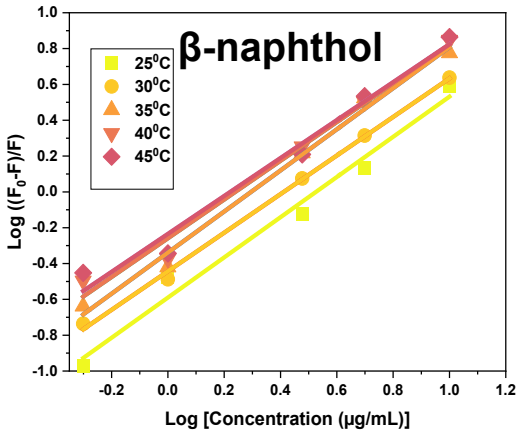


Figure 2S. The modified Stern–Volmer plots between log (F_0 -F)/F and log of the concentration of phenolic compounds at different temperatures.

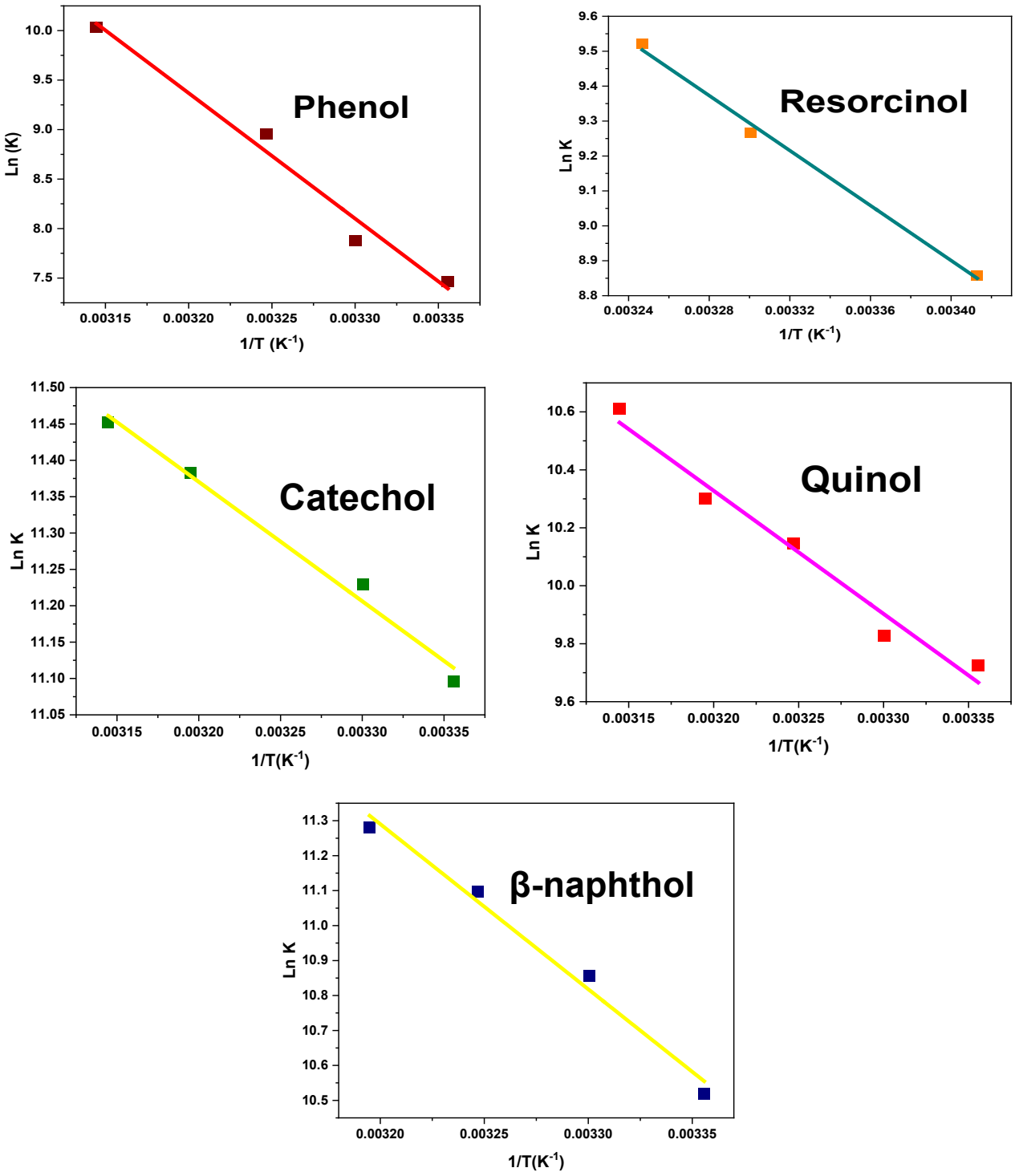


Figure 3S. The plot of Van't Hoff of Eu(III)-complex and phenolic compounds

Table 1S. Thermodynamic parameters for the interaction of Eu(III)-complex with the phenolic compounds understudy

	Temperature (T)	ΔH^0 (KJ/mol)	ΔS^0 (J/mol K)	ΔG^0 (KJ/mol)
Phenol	**298^0K** **303^0K** **308^0K** **318^0K**	**10.548**	**415.430**	**-18.496** **-19.853** **-22.933** **-26.531**
Resorcinol	**298^0K** **303^0K** **308^0K** **313^0K**	**32.703**	**185.198**	**-21.579** **-21.951** **-23.347** **-24.381**
Catechol	**298^0K** **303^0K** **308^0K** **313^0K** **318^0K**	**13.647**	**138.211**	**-27.493** **-28.290** **-29.106** **-29.622** **-30.278**
Quinol	**298^0K** **303^0K** **308^0K** **313^0K** **318^0K**	**35.325**	**198.912**	**-24.097** **-24.755** **-25.980** **-26.806** **-28.057**
β-naphthol	**298^0K** **303^0K** **308^0K** **313^0K** **318^0K**	**39.264**	**219.520**	**-26.063** **-27.352** **-28.418** **-29.359** **-29.975**

Table 2S. Tolerance limit of interfering species affecting on detection of phenolic compounds using Eu(III)-complex.

	Tolerance				
Interfering species	**Phenol**	**Resorcinol**	**Catechol**	**Quinol**	**β-naphthol**
Na^+	**0.68 ^{Q} µg/mL**	**0.84 ^{Q} µg/mL**	**1.41 ^{Q} µg/mL**	**1.41 ^{Q} µg/mL**	**1.69 ^{Q} µg/mL**
K^+	**1.49 ^{Q} µg/mL**	**1.22 ^{Q} µg/mL**	**2.25 ^{Q} µg/mL**	**2.25 ^{Q} µg/mL**	**1.12 ^{Q} µg/mL**
Ca^{2+}	**0.78 ^{Q} µg/mL**	**0.58 ^{Q} µg/mL**	**1.55 ^{Q} µg/mL**	**0.78 ^{Q} µg/mL**	**2.33 ^{Q} µg/mL**
Cu^{2+}	**1.12 ^{Q} µg/mL**	**0.80 ^{Q} µg/mL**	**1.06 ^{Q} µg/mL**	**0.80 ^{Q} µg/mL**	**1.59 ^{Q} µg/mL**
Pb^{2+}	**1.79 ^{Q} µg/mL**	**1.79 ^{Q} µg/mL**	**1.34 ^{Q} µg/mL**	**2.68 ^{Q} µg/mL**	**8.05 ^{Q} µg/mL**
Ni^{2+}	**0.48 ^{Q} µg/mL**	**0.75 ^{Q} µg/mL**	**1.28 ^{Q} µg/mL**	**0.32 ^{Q} µg/mL**	**1.12 ^{Q} µg/mL**
Mg^{2+}	**0.14 ^{Q} µg/mL**	**0.21 ^{Q} µg/mL**	**0.21 ^{Q} µg/mL**	**0.21 ^{Q} µg/mL**	**0.56 ^{Q} µg/mL**
Cl^-	**1.36 ^{Q} µg/mL**	**1.30 ^{Q} µg/mL**	**2.17 ^{Q} µg/mL**	**2.14 ^{Q} µg/mL**	**2.61 ^{Q} µg/mL**
SO_4^{2-}	**0.78 ^{Q} µg/mL**	**1.22 ^{Q} µg/mL**	**2.09 ^{Q} µg/mL**	**0.81 ^{Q} µg/mL**	**2.17 ^{Q} µg/mL**
NO_3^-	**0.54 ^{Q} µg/mL**	**0.54 ^{Q} µg/mL**	**0.40 ^{Q} µg/mL**	**0.81 ^{Q} µg/mL**	**2.42 ^{Q} µg/mL**
PO_4^{3-}	**2.83 ^{Q} µg/mL**	**1.13 ^{Q} µg/mL**	**1.70 ^{Q} µg/mL**	**2.83 ^{Q} µg/mL**	**2.11 ^{Q} µg/mL**
CO_3^{2-}	**1.21 ^{Q} µg/mL**	**0.81 ^{Q} µg/mL**	**1.62 ^{Q} µg/mL**	**2.02 ^{Q} µg/mL**	**4.04 ^{Q} mg/L**
p.Cresol	**1.50 ^{Q} µg/mL**	**2.50 ^{Q} µg/mL**	**1.50 ^{Q} µg/mL**	**2.5 ^{Q} µg/mL**	**5 ^{Q} µg/mL**
m.Cresol	**2 ^{Q} µg/mL**	**3.50 ^{Q} µg/mL**	**2 ^{Q} µg/mL**	**2.5 ^{Q} µg/mL**	**3 ^{Q} µg/mL**
α-naphthol	**1 ^{Q} µg/mL**	**1.50 ^{Q} µg/mL**	**1.5 ^{Q} µg/mL**	**1.5 ^{Q} µg/mL**	**2 ^{Q} µg/mL**
Pyrogallol	**0.5 ^{Q} µg/mL**	**0.50 ^{Q} µg/mL**	**1 ^{Q} µg/mL**	**1 ^{Q} µg/mL**	**1 ^{Q} µg/mL**

^{Q} : quenching effect

Table 3S. Determination of Phenolic Compounds in different types of wastewater samples using Standard Addition method.

	Added (µg/mL)	Found (µg/mL)	Recovery (%)	RSD (n=3) %
Sample (I)	**10**	**10.8**	**108%**	**1.73%**
	15	**15.2**	**102%**	**1.10%**
	20	**18.9**	**95%**	**0.35%**
Sample (II)	**10**	**9.5**	**95%**	**1.82%**
	15	**13.7**	**91%**	**2.96%**
	20	**21.1**	**105%**	**1.92%**
Sample (III)	**10**	**10.4**	**104%**	**1.91%**
	15	**14.9**	**99.9%**	**2.51%**
	20	**19.6**	**98.0%**	**2.00%**