Simple colorimetric detection of Cr (III) in the aqueous solutions by the as synthesized citrate capped gold nanoparticles and development of a paper based assay

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Supplementary information

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Results:

Table S1. The effect of pH on UV-visible intensity measured at a range of Cr (III) concentrations [range: 10^{-3} M - 10^{-6} M], with a mixing ratio of 700 µl of AuNP: 500µl of Cr (III)

pH	Different Cr (III) concentrations			
	10^{-3} M	10^{-4}M	10^{-5}M	10^{-6}M
3	0.716± 0.006	0.578±0 .004	0.432± 0.012	0.32± 0.004
4	0.317±0.002	0.382±0.007	0.192±0.005	0.062± 0.002
5	0.467±0.008	0.412±0.005	0.451±0.007	0.129±0.012

Table S2. Selectivity of the analytical process measured using UV-vis spectrophotometer: The AuNPs at pH 4 interacted with different metal ions Cr (III), Cr (VI), Cd (II), Co (II), Hg (II), Mg (II), Mn (II), Ni (II), Fe (III), Zn (II), Cu (II), Al (II), Pb (II) of 10^{-3}M concentrations at pH 3 with a mixing ratio of 700 µl of AuNP: 500µl of metal ion.

Heavy metals	A_{714}/A_{526}			Mean	Std Deviation	Standard Error
	R1	R2	R3			
Cr (III)	0.716	0.714	0.718	0.716	0.002	0.001
Cr (VI)	0.053	0.054	0.056	0.054	0.001	0.0007
Cd (II)	0.052	0.059	0.051	0.054	0.004	0.002
Co (II)	0.081	0.08	0.085	0.082	0.002	0.001
Hg (II)	0.072	0.075	0.072	0.073	0.001	0.000
Mg (II)	0.081	0.082	0.084	0.082	0.001	0.000
Mn (II)	0.051	0.051	0.053	0.051	0.0015	0.0005
Ni (II)	0.059	0.054	0.054	0.055	0.002	0.001
Fe (II)	0.074	0.07	0.071	0.071	0.002	0.001
Al (II)	0.058	0.059	0.057	0.058	0.001	0.0005
Cu (II)	0.06	0.062	0.06	0.060	0.001	0.0006
Pb (II)	0.184	0.183	0.185	0.184	0.001	0.0005
Zn (II)	0.021	0.02	0.024	0.021	0.002	0.001

Table S3. Interfering effect of Pb (II) on the analytical process measured using UV-vis spectrophotometer: The AuNPs at pH 4 interacted with Pb (II) of 10^{-3}M concentrations at pH 3 with a mixing ratio of 700 µl of AuNP: 500µl of metal ions.

Heavy metal	A_{714}/A_{526}										Mean	SD	SE
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10			
Pb (II)	0.184	0.187	0.178	0.18	0.189	0.178	0.182	0.188	0.185	0.187	0.183	0.004	0.001

Table S4. Selectivity of the analytical process measured using UV-vis spectrophotometer: The AuNPs at pH 4 interacted with Cr (III) in the artificial mixture of heavy metals [Cr (VI), Cd (II), Co (II), Hg (II), Mg (II), Mn (II), Ni (II), Fe (III), Zn (II),Cu (II),Al (II), Pb (II)] at10^{-3} M concentrations with a mixing ratio of 700 µl AuNP to 500µl metal ions.

Artificial mixture of Heavy metals	A_{714}/A_{526}					Mean	SD	SE
	R1	R2	R3	R4	R5			
	0.637	0.655	0.667	0.642	0.648	0.649	0.011	0.005

Table S5. Color intensity in the Paper based assay measured using Adobe photoshop CS6: Cr (III) response in the artificial mixture of heavy metals [Cr (VI), Cd (II), Co (II), Hg (II), Mg (II), Mn (II), Ni (II), Fe (III), Zn (II),Cu (II),Al (II), Pb (II)] at10^{-3} M concentrations, with a mixing ratio of 7 µl AuNP to 3µl metal ions

Artificial mixture of Heavy metals	R1	R2	R3	R4	R5	Mean	SD	SE
	43	40	48	36	45	42	4.61	2.06

Figure S1. Selectivity of the process in mixture of Cr (III) and Cr (VI): The AuNPs at pH 4 interacted with the mixture of Cr(III) and Cr (VI) of 10^{-3}M concentrations at pH 3 with a mixing ratio of 700 µl of AuNP: 500µl of metal ions.