Electronic Supplementary Material (ESI) for Dalton Transactions.
This journal is © The Royal Society of Chemistry 2016

Supporting Information

A postsynthetically modified MOFs hybrid as a ratiometric fluorescent sensor for anions recognition and detection

Xiao Lian, Bing Yan*

Shanghai Key Lab of Chemical Assessment and Sustainability, School of Chemical Science and Engineering, Tongji University, Siping Road 1239, Shanghai 200092, China

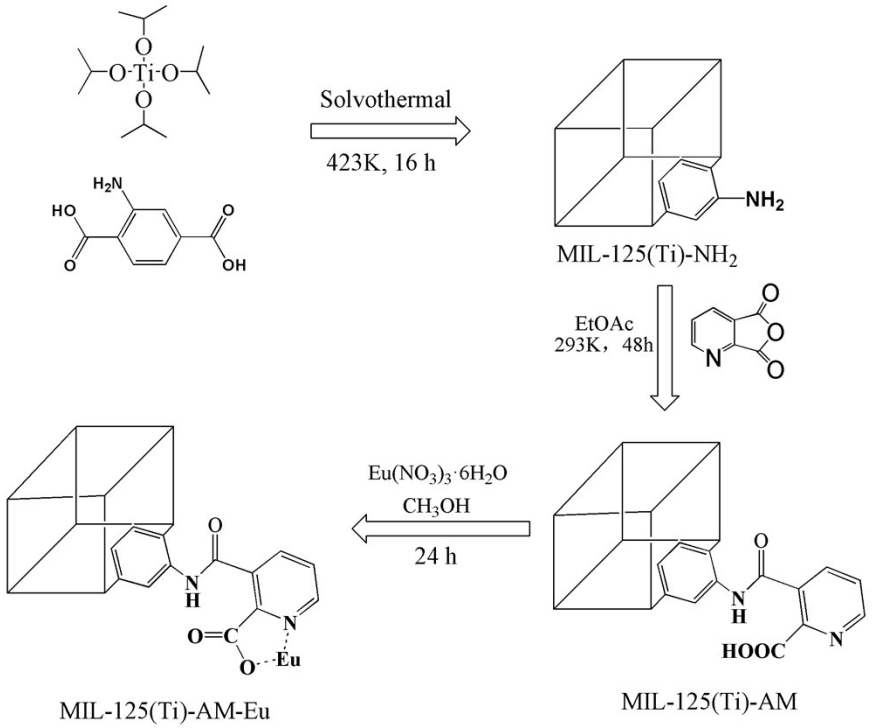
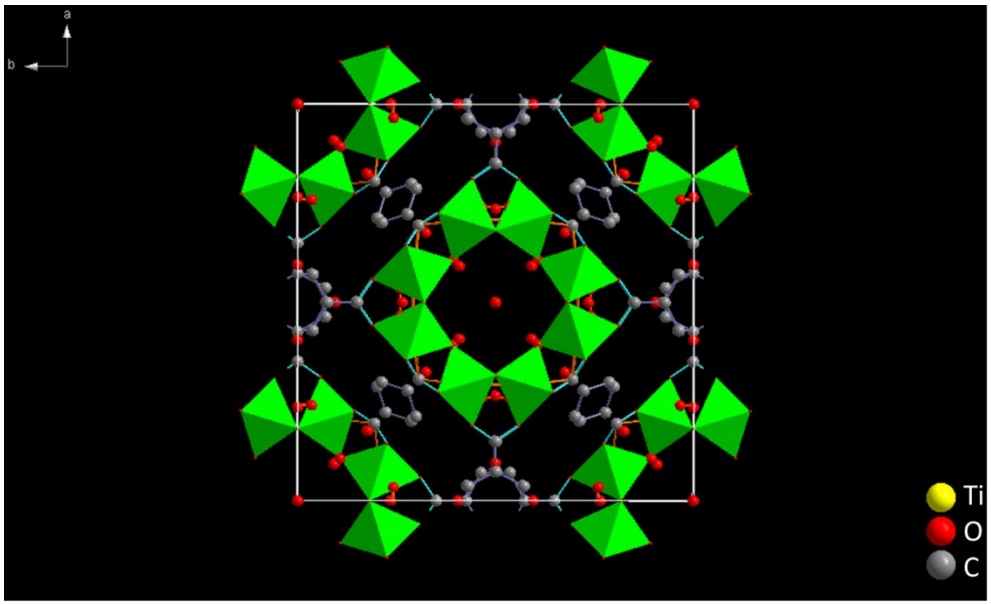


Fig. S1 Schematic of synthesis of MIL-125(Ti)-AM-Eu. The solvent molecules (include DMF and H_2O) and three nitrates for balance charge which could coordinate with Eu(Ⅲ) were omitted for simplicity.



Scheme S1 The structure and typical coordination environment of MIL-125(Ti)-NH_2.

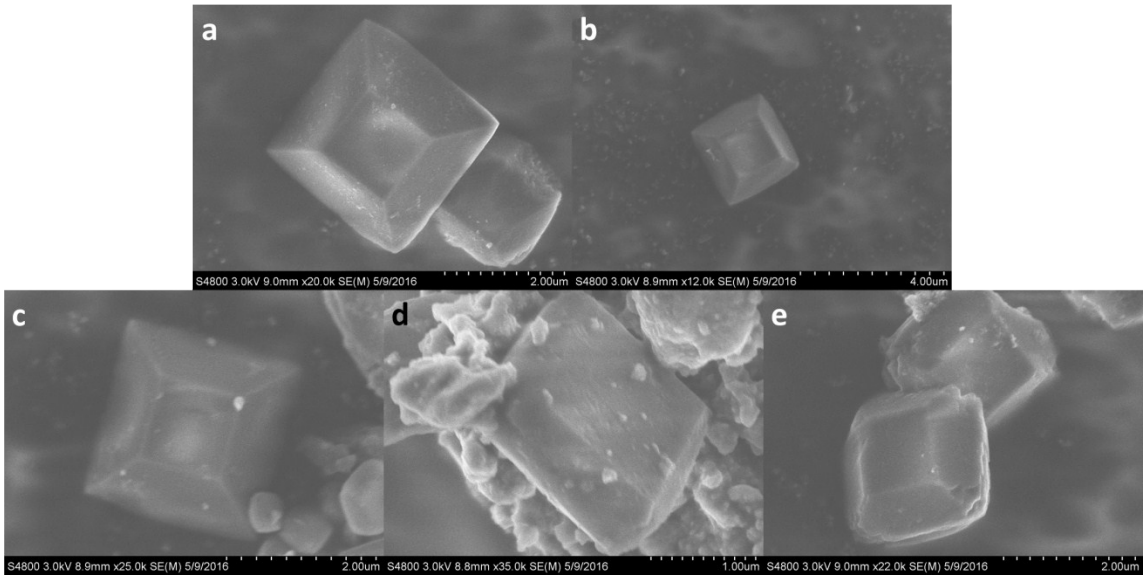


Fig. S2 Selected SEM images of as-prepared MIL-125(Ti)-NH2 (a-b), MIL-125(Ti)-AM (c-d) and MIL-125(Ti)-AM-Eu (e).

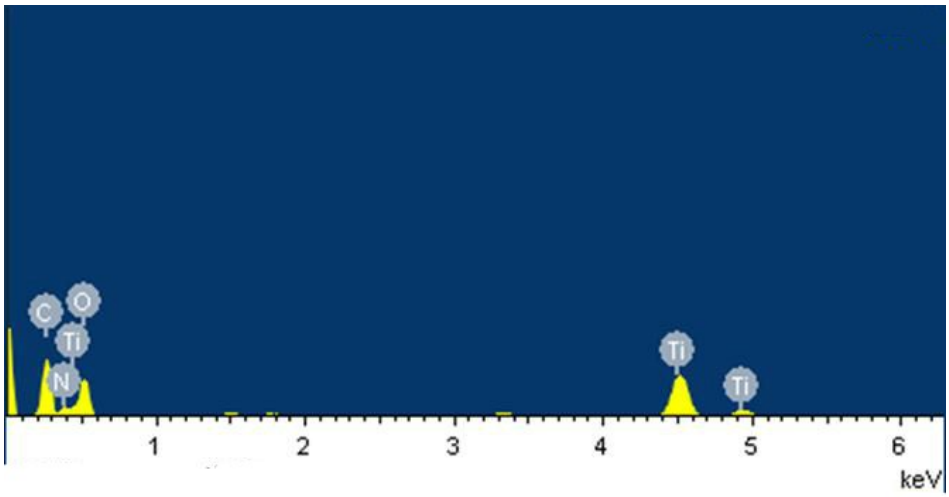


Fig. S3 Energy dispersive analysis by X-rays (EDX) spectroscopy of MIL-125(Ti)-NH_2.

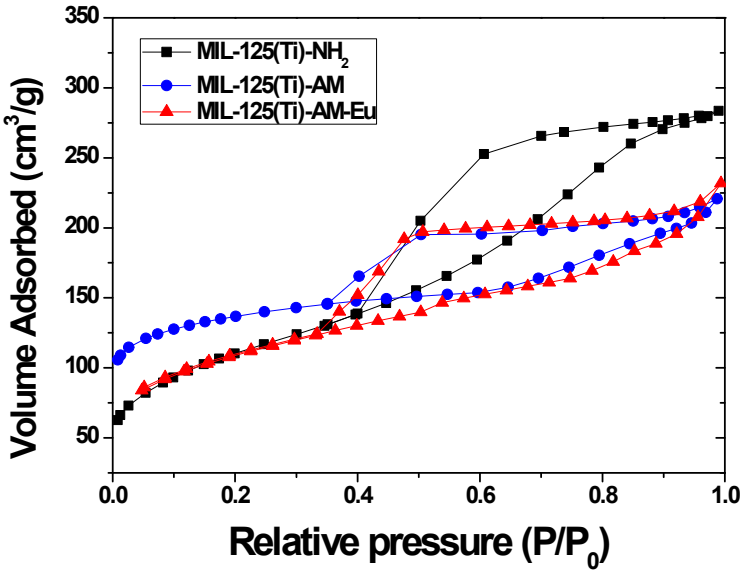


Fig. S4 The N_2 adsorption–desorption isotherms of MIL-125(Ti)-NH_2, MIL-125(Ti)-AM and MIL- 125(Ti)-AM-Eu.

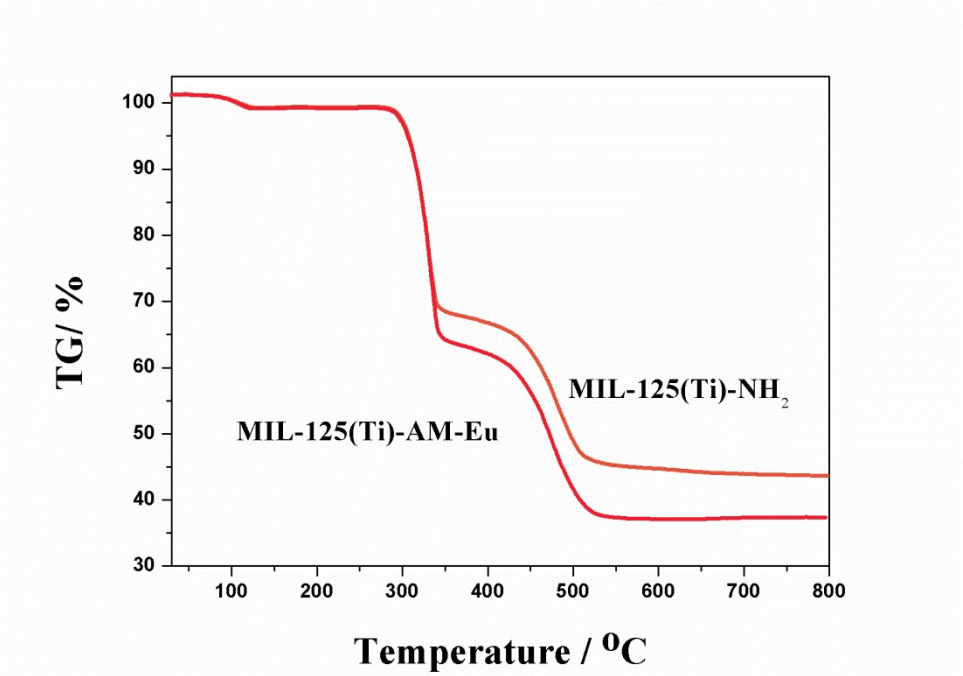


Fig. S5 Thermal gravimetric analysis (TGA) curves of MIL-125(Ti)-NH_2 and MIL-125(Ti)-AM-Eu.

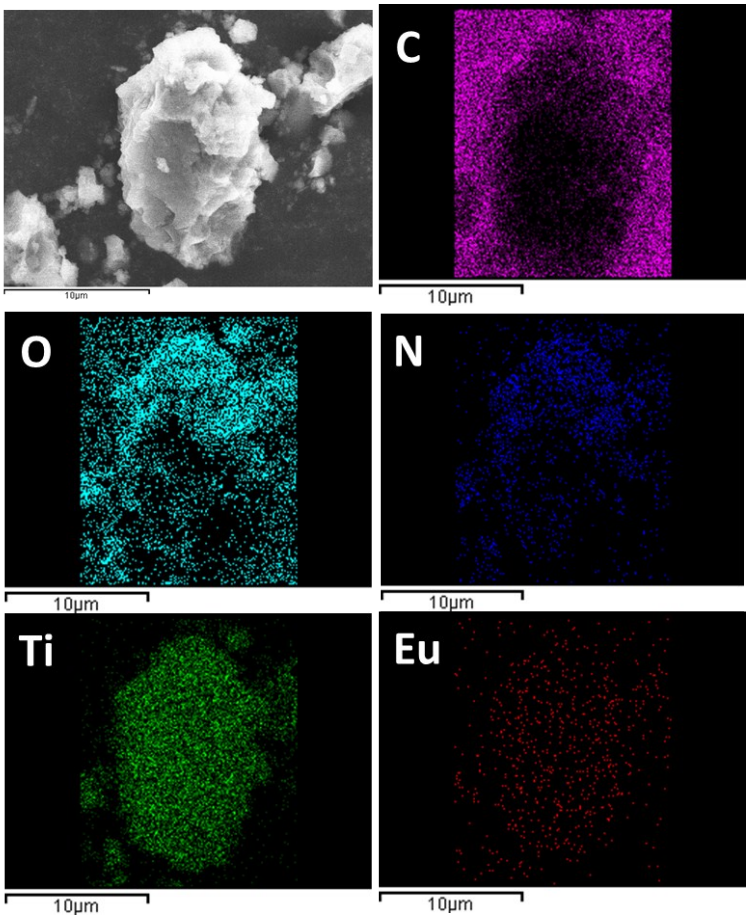


Fig. S6 The EDX-Mapping images of MIL-125(Ti)-AM-Eu for different elements (C, O, N, Ti, Eu).

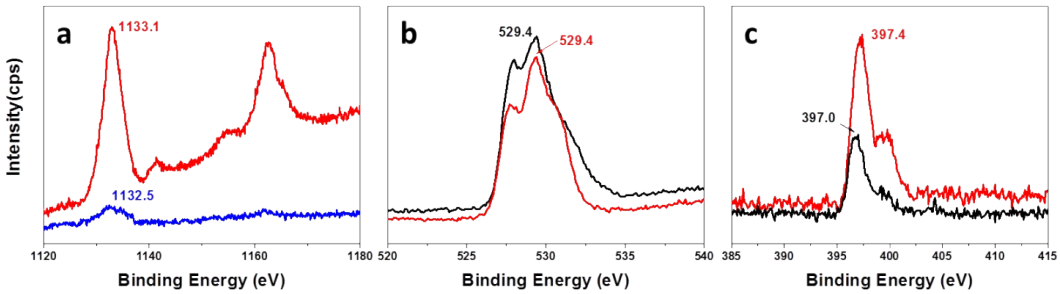


Fig. S7 (a) XPS spectra of MIL-125(Ti)-AM-Eu (blue) and $Eu(NO_3)_3{\cdot}6H_2O$ (red) for Eu 3d and Eu 4d; XPS spectra of MIL-125(Ti)-AM (black) and MIL-125(Ti)-AM-Eu (red): (b) O 1s and (c) N 1s.

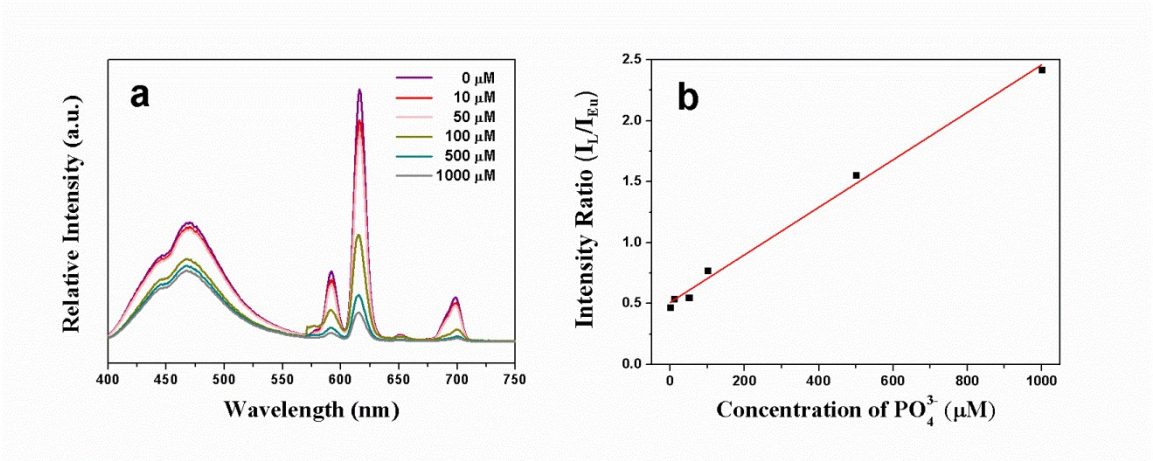


Fig. S8 (a) The emission spectra of MIL-125(Ti)-AM-Eu immersed in PO_4^{3-} solvents with different concentrations from 0 μM to 1000 μM; (b) the plot of the intensity ratio of $^5D_0 \rightarrow {}^7F_2$ transition of Eu^{3+} and the ligand emission (I_L/I_{Eu}) as a function of comcentration (μM) of PO_4^{3-}.

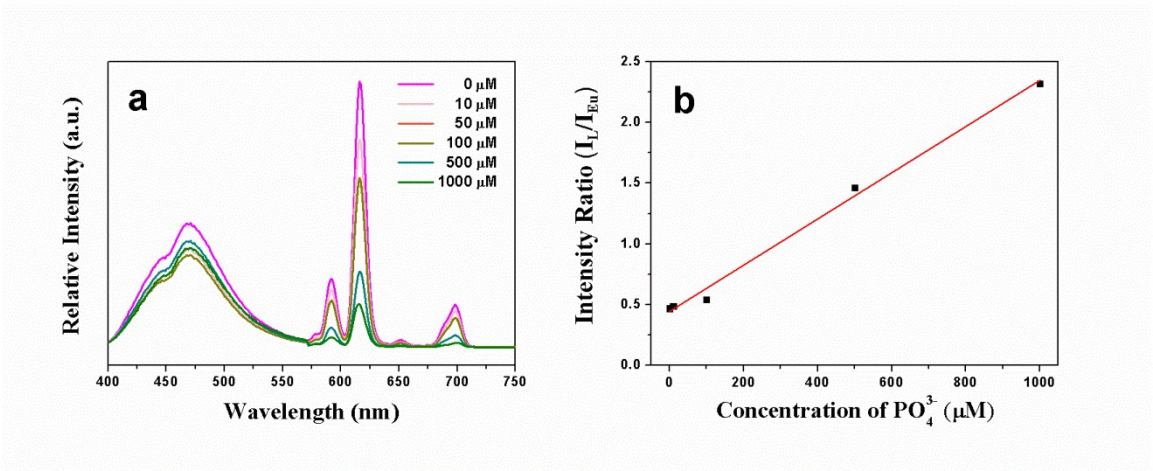


Fig. S9 (a) The emission spectra of MIL-125(Ti)-AM-Eu immersed in $C_2O_4^{2-}$ solvents with different concentrations from 0 μM to 1000 μM; (b) the plot of the intensity ratio of $^5D_0 \rightarrow {}^7F_2$ transition of Eu^{3+} and the ligand emission (I_L/I_{Eu}) as a function of comcentration (μM) of $C_2O_4^{2-}$.

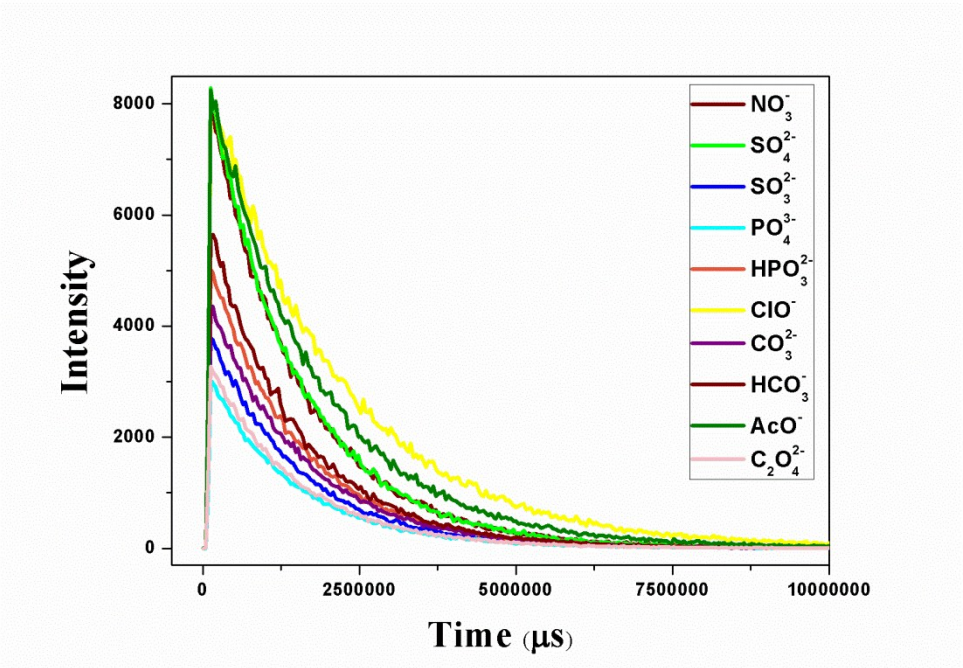


Fig. S10 The luminescence decay times ($^5D_0 \rightarrow {}^7F_2$) of MIL-125(Ti)-AM-Eu after the adsorption of different anions. The excitation wavelength is 255 nm.

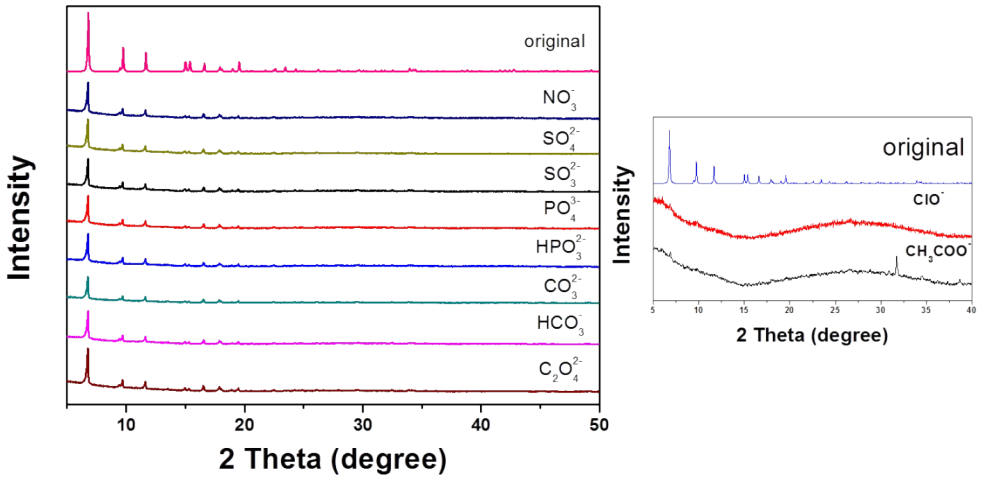


Fig. S11 The PXRD patterns of the various anions incorporated MIL-125-AM-Eu.

Table S1 The ICP-MS results of MIL-125-AM-Eu.

Compound	Ti (ppm)	N (ppm)	Eu (ppm)
MIL-125-AM-Eu	15.81	6.99	3.23

Table S2 Responses of the luminescence decay times and quantum yield of anions coalescent MIL-125(Ti)-AM-Eu.

Anions	Lifetimes (μs)	Quantum Yield
NO_3^-	2209	23.3%
SO_4^{2-}	1957	22.1%
SO_3^{2-}	1431	9.3%
PO_4^{3-}	1439	8.35%
HPO_3^{2-}	1630	18.5%
ClO^-	1933	28.1%
CO_3^{2-}	1765	15.7%
HCO_3^-	1658	13.6%
AcO^-	2047	32.5%
$C_2O_4^{2-}$	1456	11.5%