

## Supplementary data

### Phosphate removal by a nano-biosorbent from the synthetic and real (*Persian Gulf*) water

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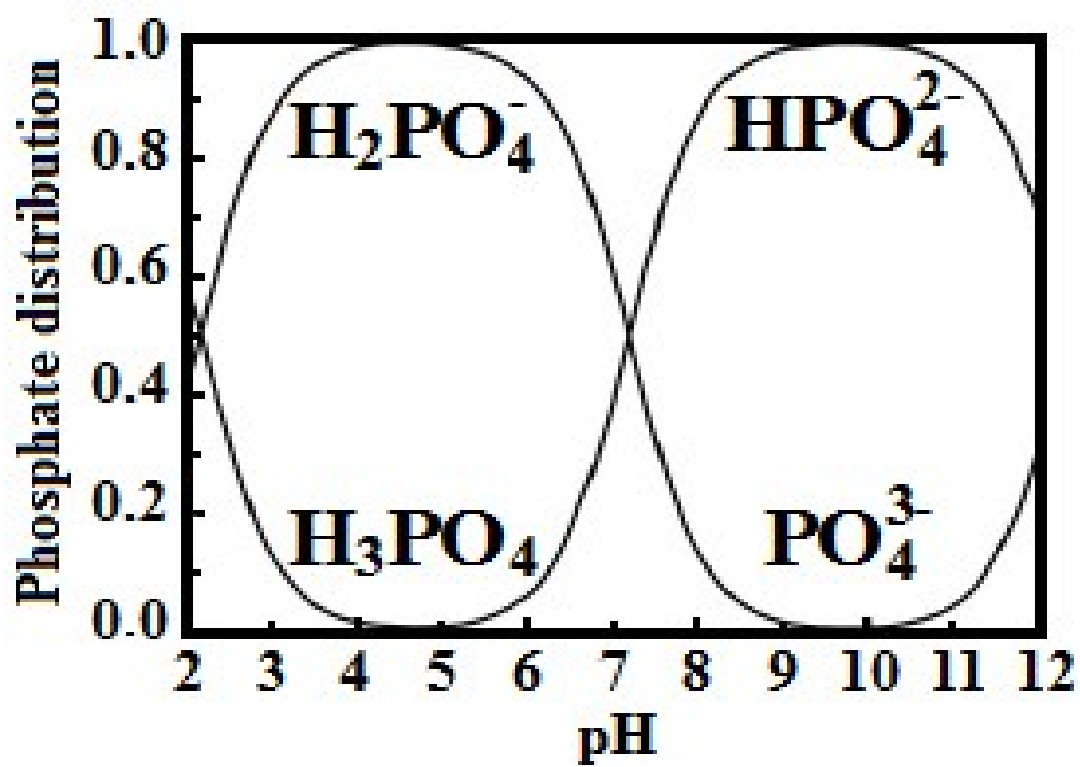


Figure S1. P speciation as function of pH.

Table S1. Adsorption isotherm and kinetics equations.

Name	Equation*
Langmuir	$q_e = \frac{q_m K_L C_e}{1 + K_L C_e}$
Freundlich	$q_e = K_F C_e^{1/n}$
Pseudo-first-order	$q_t = q_e [1 - \exp(-k_1 t)]$
Pseudo-second-order	$q_t = k_2 q_e^2 t / 1 + k_2 q_e t$
Intra-particle diffusion	$q_t = k_{int} t^{1/2}$
Initial adsorption rate	$h = k_2 q_e^2$

\*  $q_e$  (mg g<sup>-1</sup>) is the specific equilibrium amount of adsorbate,  $C_e$  (mg L<sup>-1</sup>) is the equilibrium concentration of adsorbate,  $q_m$  is the maximal adsorption capacity and  $K$  ( $K_L$  and  $K_{LF}$ ) (L mol<sup>-1</sup>) and  $n$  are empirical constants that indicate the extent of adsorption and the adsorption effectiveness, respectively.

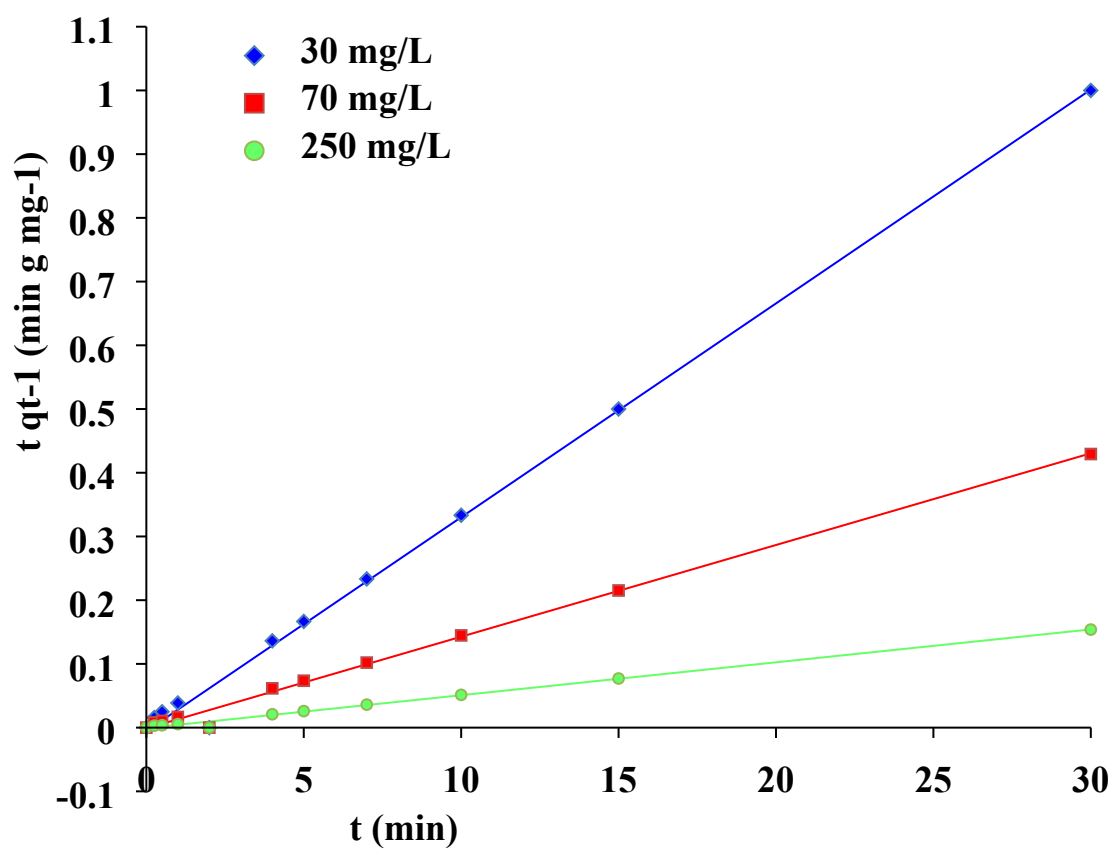


Figure S2. The plot of linear form of the pseudo-second-order for the adsorption of P ions by B-HNO<sub>3</sub>-NZVI.

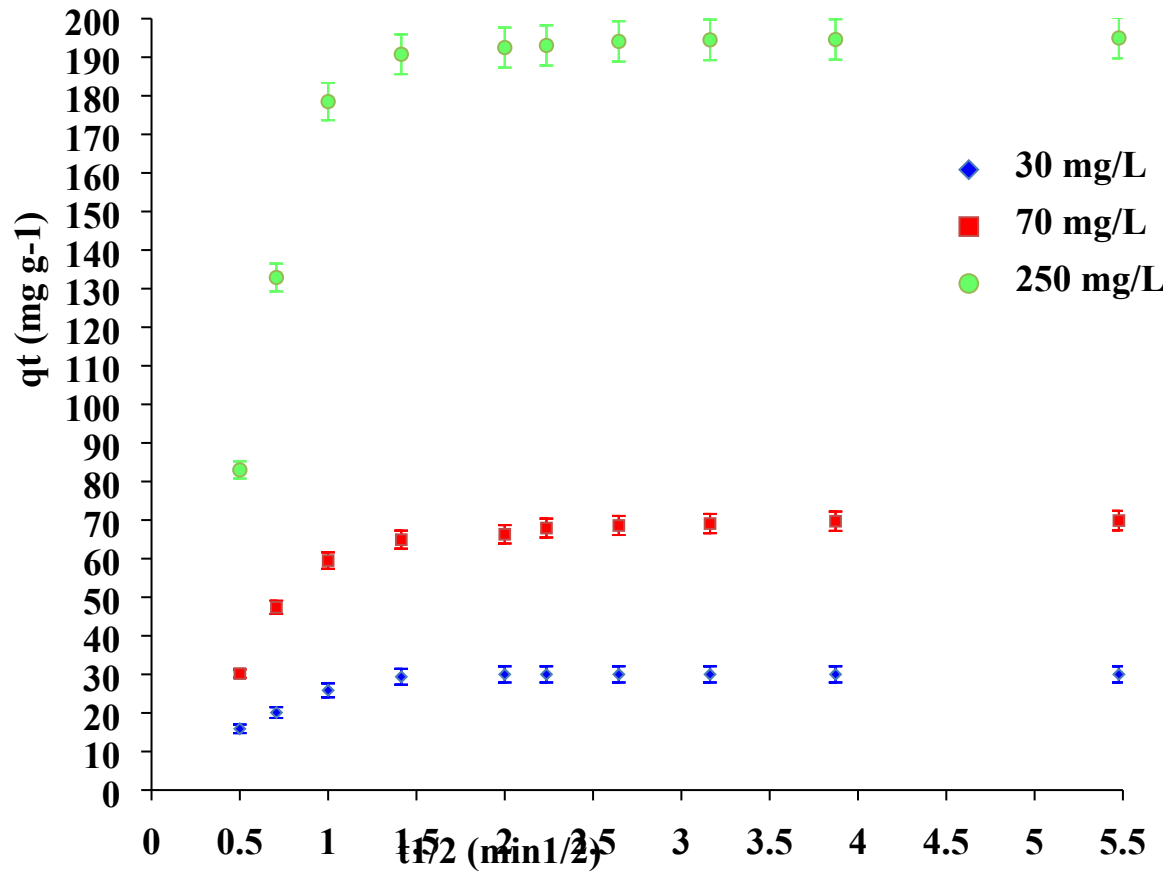


Figure S3. Intraparticle diffusion for P adsorption on B-HNO<sub>3</sub>-NZVI.

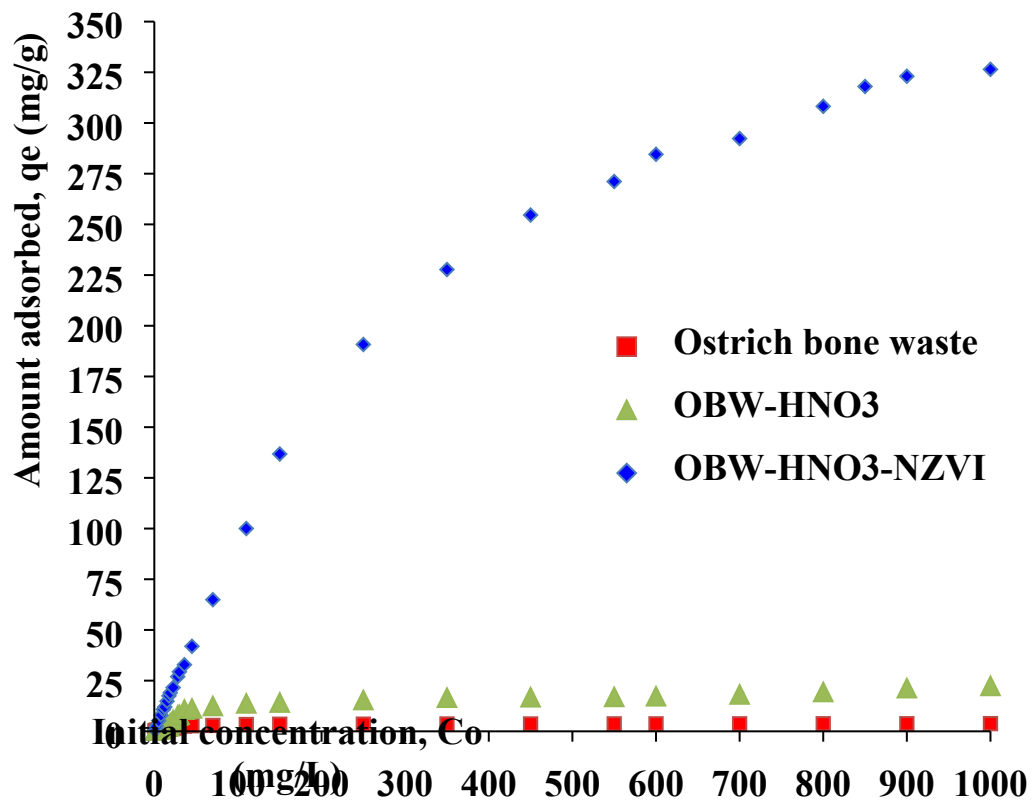


Figure S4. The effect of initial concentrations for the adsorption of P ions on the biomaterials at 25°C.