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Spectrophotometric Determination of Phosphorus in Form of Its Molybdophosphoric Acid Ion Associate with Basic Blue K in Solid Phase of K-KY-2×8

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The optimum conditions for formation of ion associate (IA) of molybdophosphoric heteropolyacid (GPA) with basic blue K (OCK) in water solution and in solid phase of KY-2×8 were studied. It is determined that optimal conditions for IA formation in the solution are next: C_{HNO_3} = 0.4 mol/L, $C_{Na_2MoO_4}$ = $9.6 \cdot 10^{-4}$ mol/L, C_{ock} = $2 \cdot 10^{-3}$%. The Beer's law is obeyed in CP = $(0.8–3.2) \cdot 10^{-5}$ mol/L with $C_{min}(P)$ = $8.06 \cdot 10^{-6}$ mol/L. It is demonstrated that OCK adsorption isotherm on KY-2×8 has L-type with a_{max} = $1.67 \cdot 10^{-5}$ mol/g and adsorption constant k_{ock} = $2.55 \cdot 10^{5}$ L/mol. Maximum capacity (a_{max} = $0.32 \cdot 10^{-5}$ mol/g) of OCK-KY-2×8 towards GPA is reached at the same acidity as it is in solution, but at much lower ($9.6 \cdot 10^{-5}$ mol/L). Adsorption isotherm of GPA is L- type. For phosphorus adsorption from 50–1000 ml solution on 0.3 g of adsorbent, the distribution coefficient is D_{max} = $3.83 \cdot 10^{4}$ ml/g. $C_{min}(P)$ = $8.06 \cdot 10^{-7}$ mol/L. The Beer's law is obeyed in interval CP = $(0.08–6.45) \cdot 10^{-5}$ mol/L. For determination of 25 μg of phosphorus in solution 10^3-fold of K, Na, Ca, Mg, Cu, Zn, Co, Ni, Cd, Pl, Al, Tl, In, Ga, Ge, Nb, Ta, V, B ions has do influence. The influence of silicon is diminished by regulation of acidity.

Keywords: solid-phase spectrophotometry, phosphorus, the immobilized dyes, base blue K, food-stuffs