

... , ... , ... , ... « »

Pb²⁺, Cd²⁺

30-60

«PROTON», «ION» [1, 2, 5].

[5].

(,)₀

.W. Davies [6].
[5]. μ*

3- (/): 1) 10; 2) 20; 3) 40.

30-60

30-60

2926991;

[4]. [CO₃²⁻], [HCO₃⁻], [SO₄²⁻], [Cl⁻]

[OH⁻]

30-60 [3]. [CO₃²⁻], [HCO₃⁻], [SO₄²⁻], [Cl⁻] [OH⁻]

Pb²⁺ Cd²⁺

[1,2,5].

$$Cd^{2+} = [Cd^{2+}] \{ 1 + [CO_3^{2-}] (K_{CdCO_3})^{-1} + [HCO_3^-] (K_{CdHCO_3})^{-1} + [SO_4^{2-}] (K_{CdSO_4})^{-1} + [Cl^-] (K_{CdCl})^{-1} + [OH^-] (K_{CdOH})^{-1} \} \quad (1)$$

$$Pb^{2+} = [Pb^{2+}] \{ 1 + [CO_3^{2-}] (K_{PbCO_3})^{-1} + [CO_3^{2-}]^2 (K_{Pb(CO_3)_2})^{-1} + [HCO_3^-] (K_{PbHCO_3})^{-1} + [SO_4^{2-}] (K_{PbSO_4})^{-1} + [Cl^-] (K_{PbCl})^{-1} + [Cl^-]^2 (K_{PbCl_2})^{-1} + [OH^-] (K_{PbOH})^{-1} + [OH^-]^2 (K_{Pb(OH)_2})^{-1} \} \quad (2)$$

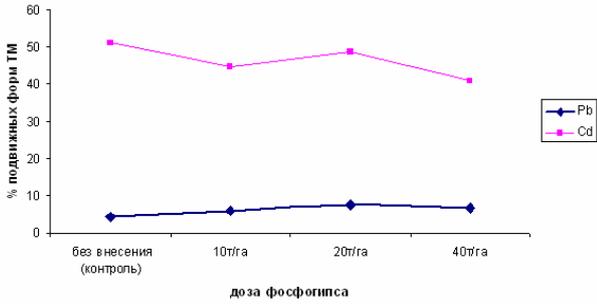
Cd²⁺, Sr²⁺ Pb²⁺, 0,2-0,4 « »

Pb²⁺, Cd²⁺ (10, 20, 40 /). (1, 2)

Pb²⁺ 40 / 4,99% 11,4%,

[1, 2]. Cd²⁺ 59,08% 67,44%.

Pb^{2+} 6,76%, Cd^{2+} – 40,93% (. 1).



. 1.

$$\frac{Ca}{Sr} = -46,259 \cdot \ln(X) + 259,302 \quad (3)$$

$$R^2 = 0,8288.$$

$$Sr^{2+} = [Sr^{2+}] \left(1 + \frac{[CO_3^{2-}]}{K_{SrCO_3}} + \frac{[HCO_3^-]}{K_{SrHCO_3}} + \frac{[SO_4^{2-}]}{K_{SrSO_4}} + \frac{[OH^-]}{K_{SrOH}} \right) \quad (4)$$

$$K_{SrCO_3}^0 = 1,152 \cdot 10^{-3}, K_{SrHCO_3}^0 = 8,578 \cdot 10^{-2}, K_{SrSO_4}^0 = 5,715 \cdot 10^{-3}$$

73,5%

Sr^{2+}

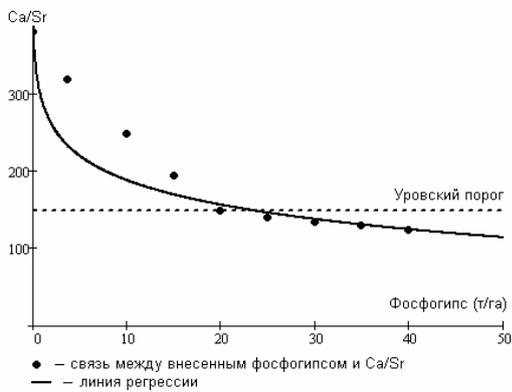
$$100 \quad 7 / \quad 100 = 1/1,2.$$

30-60

Ca Sr
 Sr
 600 /
 2-5%
 [4].
 Ca/Sr

$$K_{M(Ca,Sr)} \approx 2,1845 \cdot$$

382 () 125 (40 /). [4],
 20 /



. 2.

Ca/Sr

(«PROTON») //
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THERMODYNAMIC SUBSTANTIATION OF PHOSPHOGYPSUM RECYCLING IN CHERNOZEM

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Vertex Company

Summary. *Recycling of phosphogypsum in the 30- to 60-cm layer of calcareous ordinary chernozem in the south-European facies of the northern Krasnodar region under rotavation was considered, as well as the thermodynamic features of passivation of pollutant impurities in phosphogypsum.*

Key words: *thermodynamics of pollutant passivation in the soil, phosphogypsum recycling in the 30- to 60-cm layer of chernozem under rotavation.*