[illegible], 2013, т. 8, № 1

ТЕОРЕТИЧЕСКИЕ ОСНОВЫ ХИМИЧЕСКОЙ ТЕХНОЛОГИИ

УДК 546.271+544.16+544.18

[illegible]

[illegible]
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[illegible]

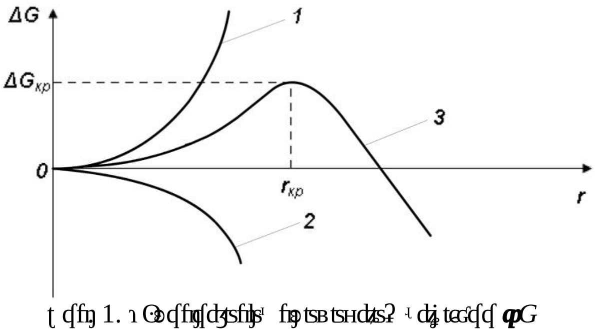
[illegible]

$$\Delta G = \frac{V\rho}{M}\left(\mu_{\ldots} - \mu_{\ldots}\right) + S\sigma, \qquad (1)$$

[illegible] r:

$$\Delta G = \frac{4}{3}\pi r^3 \frac{\rho}{M}\left(\mu_{\ldots} - \mu_{\ldots}\right) + 4\pi r^2 \sigma. \qquad (2)$$

[illegible]



[illegible] 1. [illegible] ΔG [illegible] r.

1 – [illegible]; 2 – [illegible]; 3 – [illegible]

[illegible] $r < r_{кр}$ [illegible] $r > r_{кр}$ [illegible] (2) [illegible]

[illegible] [13]:

$$\Delta F_{\Sigma} = 4\pi r^2 \nu\sigma - T\Delta S \quad (3)$$

[illegible] ΔF_{Σ} [illegible]; r [illegible]; ΔS [illegible]; ν [illegible]:

$$\nu = \frac{3}{4}\frac{V_0 \varphi}{\pi r^3}, \quad (4)$$

[illegible] V_0 [illegible]; φ [illegible].

[illegible] (3) [illegible] (1) [illegible] (4):

$$\Delta F_{\Sigma} = \nu \cdot \Delta G = 4\pi r^2 \nu\sigma - T\Delta S =$$

$$= \nu 4\pi r^2 \sigma - \nu \frac{4}{3}\pi r^3 \frac{\rho}{M}\left(\mu - \mu\right) =$$

$$= 4\pi r^2 \sigma\nu - \frac{V_0^M \varphi\rho}{M}\left(\mu - \mu\right),$$

[illegible]

$$T\Delta S = \frac{V_0^M \varphi\rho}{M}\left(\mu - \mu\right),$$

[illegible]

$$\mu - \mu = \Delta\mu = \frac{M}{V_0^M \varphi\rho} T\Delta S \quad (5)$$

[illegible] ΔS [illegible] N [illegible] [12], [illegible]

$$\Delta S = \frac{R\nu}{N}\ln\left(\frac{N}{\nu}\right). \quad (6)$$

[illegible] (5) [illegible] ΔS (6) [illegible] (4), [illegible]

$$\mu - \mu = \Delta\mu =$$

$$= \frac{3}{4}\frac{M}{\rho\pi r^3}\frac{TR}{N}\ln\left(N / \frac{3V_0^M \varphi}{4\pi r^3}\right). \quad (7)$$

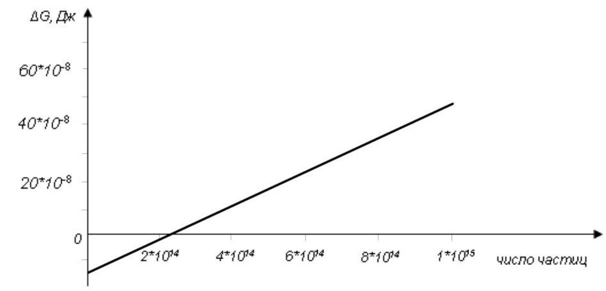
[illegible] (2) [illegible]:

$$\Delta G = -\frac{4}{3}\pi r^3 \frac{\rho}{M}\Delta\mu + 4\pi r^2 \sigma = -\frac{TR}{N}\ln\left(\frac{N}{\nu}\right) + 4\pi r^2 \sigma,$$

[illegible] $R = kN_a$, [illegible]

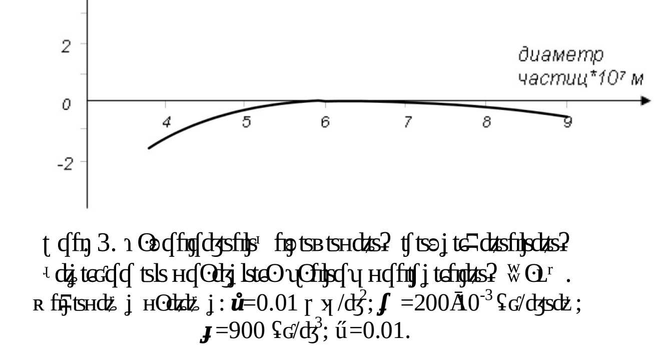
$$\Delta G = -\frac{TkN_a}{N}\ln\left(\frac{N}{\nu}\right) + 4\pi r^2 \sigma. \quad (8)$$

[illegible] ΔG [illegible] 2 [illegible] 3.



[illegible] 2. [illegible] r=0.01 [illegible]; [illegible] =200·10^{-3} [illegible]; [illegible] =900 [illegible]; [illegible]=0.01.

[illegible] ΔG, [illegible] «[illegible]», [illegible] ΔG [illegible] (8) [illegible] $\Delta G=0$ [illegible] [14, 16].



[illegible] 3. [illegible] r=0.01 [illegible]; [illegible] =200·10^{-3} [illegible]; [illegible] =900 [illegible]; [illegible]=0.01.

[illegible] (8) [illegible] r:

$$\frac{d\Delta G}{dr} = -\frac{3TkN_a}{Nr} + 8\pi r\sigma \qquad (9)$$

[illegible] (9) [illegible]:

$$\frac{d\Delta G}{dr} = -\frac{3TkN_a}{Nr} + 8\pi r\sigma = 0. \qquad (10)$$

[illegible] $\Delta G=0$ [illegible] (8) [illegible] r:

$$\sigma = \frac{TkN_a \ln(N/\nu)}{N4\pi r^2}, \qquad (11)$$

[illegible] (10) [illegible]:

$$r = \sqrt{\frac{3TkN_a}{N8\pi\sigma}}. \qquad (12)$$

[illegible] $\Delta G=0$ [illegible] 10^{-8}-10^{-10} [illegible], [illegible] r ≈ 10^{-6}-10^{-9} [illegible]

[illegible] (11). [illegible] N [illegible]

$$N = \frac{V_0(1-\varphi)\rho N_a}{M}. \qquad (13)$$

[illegible] (4) [illegible] (13) [illegible] (11) [illegible] [12]:

$$\sigma = \frac{Tk}{4r^2}\left[\frac{1}{\pi(1-\varphi)}\ln\frac{4}{3}\frac{(1-\varphi)\rho N_a\pi r^3}{M_M\varphi}\right]. \qquad (14)$$

[illegible] (14) [illegible] [12] [illegible]:

$$\sigma = \gamma\frac{Tk}{d^2}, \qquad (15)$$

[illegible] γ [illegible] $\ln(N/\nu)$, [illegible] [12] [illegible] γ ≈ 15-30, d [illegible]

$$\gamma = \frac{1}{\pi(1-\varphi)}\ln\frac{4}{3}\frac{(1-\varphi)\rho_M N_a\pi r^3}{M_M\varphi}, \qquad (16)$$

[illegible] γ [illegible]

[illegible] $r=10^{-6}$ [illegible]; $\varphi=0.1$; $\rho=200\cdot10^{-3}$ [illegible]; $\rho=900$ [illegible]^3 [illegible] $\gamma=9.44$ [illegible] $\sigma=3.88\cdot10^{-8}$ [illegible]^2.

[illegible]:

$$\Delta F_{\Sigma} = -\Delta F_0 + \Delta F_s - \Delta F = \Delta F, \qquad (17)$$

[illegible] ΔF_0 [illegible]; ΔF_s [illegible]; ΔF [illegible]; ΔF [illegible]

[illegible] ΔF [illegible] [18]:

$$\Delta F = 4k\nu\pi r^2\sigma, \qquad (18)$$

k [illegible] (2)) [illegible]:

$$\Delta G = -\frac{4}{3}\pi r^3\frac{\rho}{M}\Delta\mu + 4\pi r^2\sigma = 4k\pi r^2\sigma,$$

[illegible]:

$$\Delta G = -\frac{4}{3}\pi r^3\frac{\rho}{M}\Delta\mu + 4\pi r^2\sigma(1-k). \qquad (19)$$

[illegible] (19) [illegible] σ [illegible] (7):

$$\sigma = \frac{TR\ln(N/\nu)}{N(1-k)\pi r^2}. \qquad (20)$$

[illegible] (19) [illegible] r [illegible]

$$\frac{d\Delta G}{dr} = -\frac{3TkN_a}{Nr} + 8\pi r\sigma(1-k) \qquad (21)$$

[illegible] r [illegible] $(d\Delta G/dr)=0$:

$$r = \sqrt{\frac{3TkN_a}{8N\pi\sigma(1-k)}}. \qquad (22)$$

[illegible] $\Delta F_{\Sigma} = -\Delta F_0 + \Delta F_s - \Delta F = 0$ [illegible]

[illegible] [19]. [illegible] [6].

[illegible]

[illegible]

[illegible]

1. [illegible] 2006. [illegible] 1. 872 [illegible] 2. 912 [illegible]

2. [illegible], 1966. 724 [illegible]

3. [illegible], 1976. 240 [illegible]

4. [illegible] 1984. [illegible] 276. [illegible] 5. [illegible] 151–153.

5. [illegible] 2009. 991 [illegible]

6. [illegible], 1986. 487 [illegible]

7. [illegible], 1988. 688 [illegible]

8. [illegible], 2002. [illegible] 2. 716 [illegible]

9. [illegible], 1980. 216 [illegible]

10. [illegible] 1975. 256 [illegible]

11. [illegible], 2001. 524 [illegible]

12. [illegible] 1958. [illegible] XX. [illegible] 5. [illegible] 645–654.

13. [illegible] 1968. [illegible] XXX. [illegible] 4. [illegible] 573–580.

14. [illegible] 2009. [illegible] 4. [illegible] 5. [illegible] 42–47.

15. [illegible] 2006. [illegible] 1. [illegible] 2. [illegible] 36-38.

16. [illegible] 1998. [illegible] 72. [illegible] 6. [illegible] 1103–1105.

17. [illegible] 2001. [illegible] 35. [illegible] 5. [illegible] 523–526.

18. [illegible], 1981. [illegible] 1. 812 [illegible]

19. [illegible] 1985. [illegible] 41. [illegible] 1. [illegible] 192–194.

STUDYING THE CONDITIONS OF EMULSIONS FORMATION WITH THE USE OF THE THEORY OF FORMAL ANALOGY OF PROCESSES

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The article shows the possibility of using formal analogy of processes with restructuring of the original system to calculate the main parameters of self-dispersion: interfacial tension at the interface and the drops radius of the formed emulsion.

***Key words**: emulsion, dispersion, surface tension, critical radius, formal analogy, Gibbs energy.*