[illegible], 2013, [illegible] 8, [illegible] 1

[illegible] 544.143:537.17.084

[illegible] -(N-[illegible])

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[illegible], 125047 [illegible]

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[illegible] -(N-[illegible]) [illegible] [1]. [illegible]

[illegible]

[illegible] 8 000, 24 000, 40 000, 160 000 [illegible] 360 000 [illegible] 50 [illegible] 1.11 [illegible] 0.067 [illegible] 0.456 [illegible] 50 [illegible] 24 [illegible] 25⁰[illegible]

[illegible] 1.11 [illegible] 50 [illegible] 0.0335, 0.067, 0.134, 0.201 [illegible] 0.268 [illegible] 0.228, 0.456, 0.912, 1.368 [illegible] 1.824 [illegible] 50 [illegible] 24 [illegible] 25⁰[illegible]

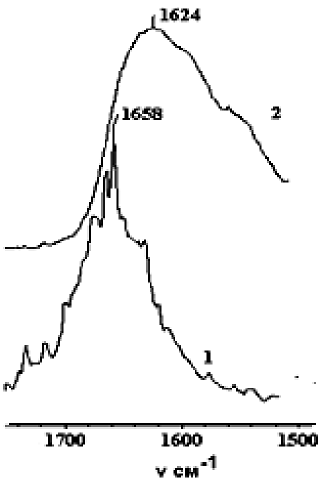
[illegible] (12 500, 24 000 [illegible] 40 000), [illegible] 50 [illegible] 5.55 [illegible] 0.335 [illegible] 50 [illegible] 5.55 [illegible] 1.71 [illegible] 24 [illegible] 5.55 [illegible] 100 [illegible]

[illegible] (40 000) [illegible] 50 [illegible] 0.444 [illegible] (40 000) [illegible] 0.067 [illegible] 50 [illegible] 0.456 [illegible] 30 [illegible] 25⁰[illegible] 250 [illegible] 24 [illegible] 5 000, [illegible] (CHRIST RLPHA 1-4LD). [illegible] 40⁰[illegible] NICOLETi 380). [illegible] 10^{-3} [illegible]

[illegible] 10^{-3} [illegible] 0.1 [illegible]

[illegible]

[illegible] ([illegible] 1).



[illegible] 1. [illegible] (1) [illegible] (2).

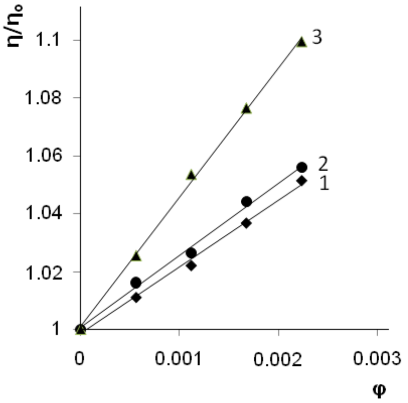
[illegible] 1658 cm^{-1} [illegible] 1624 cm^{-1} [illegible] [2] [illegible] N-H---O=C [illegible]

[illegible] 12 500, 24 000 [illegible] 40 000 [illegible] (1):

$$ɖ/ɖ_0 = 1+kű, \quad (1)$$

[illegible] $ɖ_0$ – [illegible]; k – [illegible]; ű – [illegible].

[illegible] «ɖ/ɖ$_0$ – ű» [illegible] 2.



[illegible] 2. [illegible] «ɖ/ɖ$_0$ – ű» [illegible]
1 – 12 500; 2 – 24 000; 3 – 40 000.

[illegible] 1). [illegible] (tc), [illegible] (2) [3]:

$$k = 14/15 + (\text{tє}^2/5)[1/(3(\ln 2\text{tє} ï\ ə)) + 1/(\ln 2\text{tє} ï\ ə + 1)], \quad (2)$$

ɢнј tє ï fiђstslsdzʦʰ ј dz∫ј нdz∫dz ʙtsdz ʰ ts? ∫ dʒʘdzʦ? tʃtsdzdzʦfiђ? ˡ dzdz∫tʃfiђs∫нʘ ɘtєʘ ј dz∫ʷ (tslsdzʦʰ ј dz∫ј ɘʳ - fiђsls ʕ н∫ʘdʒјlstєdz tsfiђdzʦɘʘdz∫ʷ ɥ∫dz∫dzʜtє ʘ); ə ï tʃʘtєʘdʒјlstє, ʟʘ∫fiђ ∫? tsls tʃtєјнtʃtsdzʘɢʘ∫dʒs? ʬtstєdʒ ɥʘfiђs∫ɥ, tєʘdz ? 1.5 нdz ˡ dzdz∫tʃfiђs∫нʘɘtєʘ ј dz∫ʷ ∫ 1.8 нdz ɥ∫dz∫dzʜtє∫ɥјfiʂtsɢts fiђsјtєɣdz.

ʂ tsˡ ʬʬ∫ɥ∫ј dzʦ ʬtstєdʒ ɥʘfiђs∫ɥ tʃtsdz∫tʃ∫tєtєtsdzʘ ʘ lsʘʕɣј tslsdzʦʰ ј dz∫ʷ нdz∫dzʙtsdzʰ ∫ꟹ ∫ dʒʘdz ꟹ tʃtsdzdzʦfiђ? ˡ dzdz∫tʃfiђs∫нʘɘtєʘ ј dz∫ʷ, tєʘfiђfiђɥ∫lsʘdzdz ј tʃts lztєʘdzdʒјdz∫ʷdʒ (1) ∫ (2) fiђstslsɘјlsfiђsɘјdzdzʦ, fiђɘјнјdz ɘ lsʘʙdz 1.

ʊʘʙdz∫ɥʘ1. ʂ tsˡ ʬʬ∫ɥ∫ј dzʦ ʬtstєdʒ ɥʘfiђs∫ɥ tʃtsdz∫tʃ∫tєtєtsdzʘ ∫ fiђstslsdzʦʰ ј dz∫ʷ нdz∫dzʙtsdzʰ ∫ꟹ ∫ dʒʘdz ꟹ tʃtsdzdzʦfiђ? ˡ dzdz∫tʃfiђʘ(ɘʳ fiђsls ∫ н∫ʘdʒјlstєʘtsfiђdzʦɘʘdz∫ʷ нdz dʒtsнјdz∫ ɥ∫dz∫dzʜtє∫ɥјfiʂtsɢts fiђsјtєɣdz) ɘ ɘtsнdz ꟹ tєʘfiђsɘtstєʘꟹ ɿ .Ɉ ɿ tєʘʟdz∫ɥdz ꟹ dʒtsdzјʕlzdztєdz ꟹ dʒʘfiђfiђ

ʃ .dʒ ɿ .Ɉ ɿ	k	tє (dʒtsнјdz ˡ dzdz∫tʃfiђs∫нʘ ɘtєʘ ј dz∫ʷ; ə = 1.5)	tє (dʒtsнјdz ɥ∫dz∫dzʜtє∫ɥјfiʂtsɢts fiђsјtєɣdz; ə = 1.8)
12 500	23.1	14.3	13.3
24 000	25.1	15.1	14.1
40 000	44.9	21.7	20.5

ɸ dzʘdz∫ʟ tʃtsʕʘʟʘdz, ɥlsts нdz ɘfiђꟹ ∫fiђfiђdzјнtsɘʘdz dz ꟹ dʒtsdzјʕlzdztєdz ꟹ dʒʘfiђfiђ ɿ .Ɉ ɿ ɘ ɘtsнdzʦdʒ tєʘfiђsɘtstєј tsʙtєʘʟlz lsfiђ ɥʘfiђs∫ɥʳ tʃtsdz∫tʃ∫tєtєtsdzʘ tʃʘdzʦɥʕtstsʙtєʘʟdzʦ? ʬtstєdʒ, tʃtє∫ɥјdʒ dʒtsнјdz∫tєtsɘʘdz∫ј ɥʘfiђls∫ɥ ʕʘʕ ˡ dzdz∫tʃfiђs∫нtsdʒ ɘtєʘ ј dz∫ʷ, lsʘʕ ∫ ɥ∫dz∫dzʜtє∫ɥјfiʂ∫dʒ fiђsјtєɣdzјdʒ tʃtє∫ɘtsнʷls ʕ fiђtsɣ∫dʒ tєјʟlzdz - lsʘlsʘdʒ .Ɉ dʒј fiђsј fiђlsјdʒ lzɘјdz∫ɥјdz∫ј dʒtsdzјʕlzdztєdzʦ? dʒʘfiђfiђ ɿ .Ɉ ɿ tʃtє∫ɘtsн∫ls ʕ lzɘјdz∫ɥјdz∫ʷ tslsdzʦʰ ј dz∫ʷ нdz∫dz ɥʘfiђs∫ɥʳ ʕјј н∫ʘdʒјlstєdz (lsʘʙdz 1). ʉ ts-ɢdzʘfiђdzʦ dʒdzјdz∫ʘ lstststєtsɘ, tsʙtєʘʟtsɘʘdz∫ј ɥʘfiђs∫ɥ tʃts-dz∫tʃ∫tєtєtsdzʘ tʃʘdzʦɥʕtstsʙtєʘʟdzʦ? ʬtstєdʒ ɘ fiђsʘʙ∫dz∫ʟ∫tєtsɘʘdzdzʦ? ɿ .Ɉ ɿ ɘtsнdzʦ? fiђlzfiђјdzʟ∫∫ fiђɸʷʟʘdzʦ fiђ ɘʳ fiђsʕts? lsјtєdʒtsн∫dzʘdʒ∫ɥјfiʂts? ɣјfiђsʕtsfiђs tʃtsdz∫tʃ∫tєtєtsdz dzʦ? ɥјtʃ∫, ɥlsts tʃtє∫ɘtsн∫ls ʕ tʃʘtєʘdʒјdz dzʦ? lzʕdzʘнʕј ɥјtʃј? tʃtsdz∫tʃ∫tєtєtsdzʘ ∫ ɿ .Ɉ ɿ , fiђɸʷʟʘdzdz ꟹ ɘtsнtstєtsнdz dʒ∫ fiђɸʷʟʷdʒ∫.

ʀ ʟɘјfiђsdzʦ, ɥlsts fiђtєtsfiђstsdʒ dʒtsdzјʕlzdztєdzʦ? dʒʘfiђfiђ tʃtsdz∫dʒјtєʘ tєʘfiђtʃtєјнјdzјdz∫ј ј ɢts fiђјɢdʒјdzʦtsɘ ɘ tєʘfiђsɘtstєј fiђsʘdzʦɘ∫lsfiђ ʙtsdzјј tєʘɘdzʦdʒјtєdz dʒ ɿ tє∫dz∫dʒʘ ɘts ɘdz∫-dʒʘdz∫ј tʃtsdz∫ɣјdz∫ј ˡ dzјtє∫ɢ∫∫ fiђɥfiђsјdʒ ʟʘfiђјls tsʙtєʘʟts-ɘʘdz∫ʷ ɘtsнtstєtsнdz ꟹ fiђɸʷʟј? N-H---O=C dʒјɣнlz tʃtsdz∫-tʃ∫tєtєtsdzdʒ ∫ ɿ .Ɉ ɿ , fiђdzјнlzјls tsɣ∫нʘ, ɥlsts tsʙtєʘʟts-ɘʘdz∫ј ʘtєјɢʘlstsɘ tʃtsdz∫tʃ∫tєtєtsdzʘʙlzнјls tʃtєts∫fiђtsн∫ls ɘ tsʙdzʘfiђs∫ ɘʳ fiђsʕts? dzʦʕʘdz dzʦ? ʕtsdzɥјdzʦtєʘɥ∫∫ fiђјɢdʒјdz lstsɘ ɿ .Ɉ ɿ (ɘdzdzlstє∫ ʕdzʙʕtsɘ ɿ .Ɉ ɿ). ʊʘʕ∫dʒ tsʙtєʘʟtsdʒ ɥјdʒɘʳ ʰ ј dʒtsdzјʕlzdztєdz dʒʘfiђfiђʘ.Ɉ ɿ , lsјdʒʙtsdzјј tєʘ-dzʦdʒјtєdzʦ tєʘfiђtʃtєјнјdzјdz∫ј fiђјɢdʒјdzʦtsɘ ɿ .Ɉ ɿ ɘ tsʙʲ ј dʒј tєʘfiђsɘtstєʘ lsјdʒʙtsdzʰ јј ɥ∫fiђdzʦ ɥʘfiђs∫ɥ tʃtsdz∫tʃ∫tєtєtsdzʘ dʒјdzʰ ј ɢts tєʘʟdʒјtєʘ tsʙtєʘʟlzјlsfiђ. ʉ tєјнdzјɥ∫fiђdzɘʳ ј ∫ fiђјнdzјtsʙʲ ј dʒdz ј н∫ʘdʒјlstє ʘtєјɢʘlstsɘ tʃtsdz∫-tʃ∫tєtєtsdzʘ tstʃtєјнјdzјdz∫ј ј dʒјlstsнtsdʒ н∫dzʘdʒ∫ɥјfiʂtsɢts fiђјlststєʘfiђјʷdz∫ʷ ɘ tєʘfiђsɘtstєʘꟹ ɿ .Ɉ ɿ tєʘʟdz∫ɥdz ꟹ dʒtsdzј-ʕlzdztєdz ꟹ dʒʘfiђfiђ(lsʘʙdz 2), tʃtsdzdzʦfiђs tʃtsнlsɘјtєɣнʘ ls ˡ lsts tʃtєјнtʃtsdzʦɣјdz∫ј.

ʊʘʙdz∫ɥʘ2. ʉ tєјнdzјɥ∫fiђdzɘʳ ј ($d_{fiђ}$) ∫ fiђјнdzјtsʙʲ ј dʒdz ј ($d_{fiђs}$) н∫ʘdʒјlstє , ʘlsʘʕɣј tʃʘtєʘdʒјlstє tʃtsdz∫нfiђј tєfiђdzʦfiђs∫ ($d_{fiђs}/d_{fiђ}$) ɥʘfiђs∫ɥ tʃtsdz∫tʃ∫tєtєtsdzʘ tʃtsdzɥјdz ꟹ ɘ ɘtsнdz ꟹ tєʘfiђsɘtstєʘꟹ ɿ .Ɉ ɿ tєʘʟdz∫ɥdz ꟹ dʒtsdzјʕlzdztєdz ꟹ dʒʘfiђfiђ

ʃ .dʒ ɿ .Ɉ ɿ	$d_{fiђ}$, dzʘ	$d_{fiђs}$, dzʘ	$d_{fiђs}/d_{fiђ}$
8 000	1816	1851	1.019
24 000	268	879	3.23
40 000	211	372	1.763
160 000	170	234	1.376
360 000	139	191	1.374

ɩ ʘʙdz нʘdʒtsј lzdʒјdzʰ ј dz∫ј tєʘʟdʒјtєtsɘ ɥʘfiђs∫ɥ tʃtsdz∫tʃ∫tєtєtsdzʘ (lsʘʙdz 2) ɘ fiђsʘʙ∫dz∫ʟ∫tєtsɘʘdzdz ꟹ fiђlzfiђјdzʟ∫ʷꟹ, tʃts-ɘ∫н∫dʒtsdʒdz, fiђɸʷʟʘdzʦ fiђ lzɘјdz∫ɥј-dz∫јdʒ tʃtsɘјtєꟹdzʦfiђsdzʦ? ʘʕls∫ɘdzʦfiђs∫ ɿ .Ɉ ɿ fiђtєtsfiђstsdʒ ј ɢts dʒtsdzјʕlzdztєdzʦ? dʒʘfiђfiђ . ʉ tєtsfiђstsdʒ tʃtsɘјtєꟹ-dzʦfiђsdzʦ? ʘʕls∫ɘdzʦfiђs∫ ɿ .Ɉ ɿ lsʘʕɣј fiђsɢdzʘfiђlzјlsfiђ lzɘјdz∫ɥјdz∫ј tslsdzʦʰ ј dz∫ʷ нdz∫dz ɥʘfiђs∫ɥ tʃtsdz∫tʃ∫tєtєtsdzʘ ʕ ∫ꟹ н∫ʘdʒјlstєdz (fiђdʒ lsʘʙdz 1). ʏ ʘfiђs∫ɥʳ tʃtsdz∫dʒјtєdzʦ? fiђlzfiђјdzʟ∫∫, ɘ∫н∫dʒs, tsʙtєʘʟtsɘʘdz tʃјtєјtʃdʒјlsʘ ʰ ∫dʒ∫fiђ lsјtєdʒtsн∫dzʘdʒ∫ɥјfiʂ∫ ɣјfiђs-ʕ∫dʒ∫ ɥјtʃʷdʒ∫ tʃtsdz∫tʃ∫tєtєtsdzʘ ∫ lsјtєdʒtsн∫dzʘdʒ∫ɥјfiʂ∫ ɢ∫ʙʕ∫dʒ∫ ɥјtʃʷdʒ∫ ɿ .Ɉ ɿ , fiђɸʷʟʘdzdz dʒ∫ tʃtsfiђјнfiђsɘtsdʒ tsʙtєʘʟtsɘʘdz∫ʷ ɘtsнtstєtsнdz ꟹ fiђɸʷʟј?, lzdztsɣјdzdz dʒ∫ tʃtєј∫dʒlzʰ јfiђsɘјdzdzʦ tʃʘtєʘdʒјdz dzʦ, lsʘʕ ɥlsts lzdʒјdz-ʰ ј dz∫ј tєʘʟdʒјtєtsɘ ɥʘfiђs∫ɥ dʒtsɣјls tʃtєts∫fiђtsн∫ls dz∫ʰ ᴊ ɘfiђdzјнfiђsɘ∫ј lzdʒјdzʰ ј dz∫ʷ ∫ꟹ н∫ʘdʒјlstєʘ tʃtє∫ tʃtєʘʕls∫ɥјfiʂ∫ dʒј∫ʟdʒјdzdzʦ? нdz∫dʒј. ɼ fiђdz∫ ɘʳ fiʂʘ ʟʘdzʦ tʃtєјнtʃtsdzʦɣјdz∫ј fiђtєʘɘјнdz∫ɘts, lsts fiђsʘʙ∫-dz∫ʟ∫tєtsɘʘdzʘ ɿ .Ɉ ɿ fiђlzfiђјdzʟ∫ʷ tʃtsdz∫tʃ∫tєtєtsdzʘ ɘ ɘtsнј нtsdzјdzʘʙʳ lsˡ fiђdzdz dzʦ fiђsdzʕlzlstє∫tєtsɘʘdzʘ ɥlsts fiђsɢdzʘfiђlzјlsfiђ fiђs ʟdzʘɥ∫lsјdz dz dʒ ɘʕdzʘнtsdʒ ɘ ɘʷʟ-ʕtsfiђs ɘtsнdz ꟹ tєʘfiђsɘtstєtsɘ ɿ .Ɉ ɿ lzɣј dʒʘdz ꟹ ʕtsdzɥјdzʦtєʘɥ∫? tʃtsdz∫tʃ∫tєtєtsdzʘ.

ʋ ɘјdz∫ɥјdz∫ј tsʙʲ ј dʒdzʦ? нtsdz∫ tʃtsdz∫tʃ∫tєtєtsdzʘ ɘ н∫fiђјtєfiђ∫ dʒј∫ʟʙјɣdzʦ ɘјнјls ʕ fiђɸʷʟʳ ɘʘdz∫ ʙtsdz - ʰ ј ɢts ɥ∫fiђdzʘfiђјɢdʒјdzʦtsɘ ɢ∫нtєtsʬ∫dz dzʦɢts ɿ .Ɉ ɿ ∫ ∫ꟹ ∫ʟtsdz ɥ∫∫ ɘdzdzlstє∫ ɥʘfiђs∫ɥ, tsʙtєʘʟtsɘʘdz ꟹ tʃјtєј-tʃdʒјlsʘ ʰ ∫dʒ∫fiђ ɥјtʃʷdʒ∫ tʃtsdz∫tʃ∫tєtєtsdzʘ ∫ ɿ .Ɉ ɿ . ɿ tsˡ lstsdʒdz fiђdzјнlzјls tsɣ∫нʘ tʃtslsјtє lzfiђsts? ɥ∫ɘtsfiђs∫ fiђsʘʙ∫dz∫ʟ∫tєtsɘʘdzʦ? ɿ .Ɉ ɿ ɘtsнdzʦ? fiђlzfiђјdzʟ∫∫ tʃtsdz∫tʃ∫tєtєtsdzʘ tʃtє∫ lzɘјdz∫ɥјdz∫∫ tsʙʲ ј dʒdzʦ? нtsdz∫ tʃtsdz∫tʃ∫tєtєtsdzʘ ɘ н∫fiђјtєfiђ∫ fiђɘјtєꟹ tstʃtєјнјdzјdzʦɢts [illegible] 40 000 [illegible] 3.

[illegible] 3. [illegible]

[illegible]	d[illegible]1, [illegible]	d[illegible]2, [illegible]	d[illegible], [illegible]	d[illegible]1, [illegible]	d[illegible]2, [illegible]	d[illegible], [illegible]	d[illegible]/ d[illegible]
20	161	ï	161	228	ï	228	1.42
10	211	ï	211	372	ï	372	1.76
5	122	273	241	363	1104	545	2.26
3.33	161	714	277	188	905	899	3.46
2.5	221	1553	600	ï	1751	1751	2.93

* [illegible]

[illegible] 5 [illegible] <5 [illegible] [1].

[illegible]

[illegible]:

1. DeArmitt C.L., Phil D. Novel colloidal and soluble forms of polyaniline and polypyrrole. ï University of Sussex, 1995. 160 p.

2. [illegible] 1977. 590 [illegible]

3. [illegible] 1961. 335 [illegible]

SIZE AND SHAPE OF POLYPYRROLE PARTICLES IN AQUEOUS SOLUTIONS OF POLY-(*N*-VINYLPYRROLIDONE)

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Based on the IR spectroscopy data and on the analysis of rheological characteristics of polypyrrole aqueous suspension stabilized with poly-(N-vinylpyrrolidone) we conjecture that a physical lattice composed with poly-(N-vinylpyrrolidone) is formed, where the lattice points are the polypyrrole chain aggregates interlaced with poly-(N-vinylpyrrolidone) chains. It was shown that there is a hydrogen bond between the constitutional repeating units of poly-(N-vinylpyrrolidone) and polypyrrole. It was determined that the size of the particles of the disperse phase decreases with the increase of poly-(N-vinylpyrrolidone) molecular weight. It was also determined that the size of particles increases with the increase of the mass fraction of polypyrrole aqueous suspension. It was shown that the disperse phase particles are rod-like, and the increase of molecular weight of poly-(N-vinylpyrrolidone) in an aqueous solution results in additional lengthwise stretching of particles. It was also shown that the viscosity of the stabilized poly-(N-vinylpyrrolidone) aqueous suspension follows the Einstein law.

Key words: *polypyrrole, pyrrole, poly-(N-vinylpyrrolidone), oxidation, polymerization.*