Numbers of appearing and...

half of the disk is larger by a factor of 1.7 than on the western half, due to this effect, the number of disappearance cases amounts to 61%. The number of disappearing groups in the western helio-hemisphere is larger than in the eastern one by 2.1 times, and the number of appearing groups amounts to 57.5%. The rotation effects are insignificant for the whole solar disk, as far as differences between the numbers of appearing and disappearing groups are concerned.

B. Rubashev

[Abstracter's note: Complete translation]

Card 3/3

81836
S/033/60/037/03/004/027
E032/E314

B. 1540

AUTHOR: Chistyakov, V.F.

TITLE: On the Circulatory Nature of the 11-year Cycle of Solar Activity

PERIODICAL: Astronomicheskiy zhurnal, 1960, Vol 37, No 3, pp 425 - 435 (USSR)

ABSTRACT: An attempt is made to explain several peculiarities in the development of the 11-year cycles on the basis of Spörer's law, which is interpreted as evidence of meridional circulation in the surface layer of the Sun. It is emphasised that although the cycles are of different intensity, they all have many common features connected with the latitude drift of the spot zone: a) the invariance of form of Spörer's curves $\bar{\varphi}(t)$; b) the possibility of matching the ends of the descending branches of the cyclic curves; c) a constant mean latitude of the zone at the end of the cycle, etc. Analysis of the cyclic migration of the N_φ curves of annual distribution of spot numbers with latitude yields information on the epoch of maximum of the cycle if Spörer's law is used. The established fact that the meridional

Card1/2

S/034/60/000/208/002/004
E032/E314

3.1540 (1062, 1128, 1184)

AUTHORS: Chistyakov, V.F. and Ivakina, I.P.

TITLE: High Eruptive Activity on the Sun

PERIODICAL: Astronomicheskiy tsirkulyar, 1960, No. 208. pp. 12 - 13

TEXT: On December 4-5, 1959, between 23^h36^m and 03^h36^m UT the Ussurka Solar Station (АФР-2 (AFR-2) telescope) noted an unusually high eruptive activity in the active region near the centre of the solar disc. The heliographic coordinates of the leaders of the bipolar group were as follows: head - $\varphi = +10^o$, $L = 236^o$; tail - $\varphi = +10^o$, $L = 228^o$. During 4 hrs 15 minutes of observations seven flares were noted in this region, two of which were "1+" flares with maxima at $0^h36^m.5$ and 1^h21^m. The most interesting and unusual features were eruptions which were frequently ejected in groups in the form of a fan. The centre of the radial system of ejections was a fine spot ($\varphi = +9^o$, $L = 238^o$) which, during subsequent days, grew in area and had a darker nucleus. Analysis of the

Card 1/4

S/034/60/000/208/002/004
E032/E314

High Eruptive Activity ....

film showed that during a single hour (23^h37^m - 0^h37^m) 30 eruptions occurred in this region in the form of isolated rays. The number of eruptions was then as follows: 0^h37^m - 1^h37^m - 12 eruptions and 1^h37^m - 2^h37^m - 12 eruptions and 2^h37^m - 3^h37^m - 18 eruptions. The longest rays extended over 15^0 along the Equator (180 000 km) and were darker than the stable filaments. The approximate instants of the most powerful eruptions (eruptive fan) were as follows: 23^h52^m - 57^m, 0^h21^m - 28^m, 0^h37^m - 59^m, 1^h44^m and 2^h37^m - 48^m. Radio observations on 1.44 m (208 Mc/s) were carried out in parallel between 23^h and 2^h. The intensity was as follows: December 1 - 25×10^{-22}, December 2 - 49×10^{-22}, December 3 - 108×10^{-22}, December 4 - 27×10^{-22} and December 5 - 19×10^{-22} $Wm^{-2}c.p.s.^{-1}$. During the observations of December 5, the intensity remained constant

Card 2/4

High Eruptive Activity ....

to within 5%. Five major radio bursts were recorded during the observations:

Time	Amplitude x 10^{22} W m^{-2} $c.p.s.^{-1}$
23^h19^m - 23^h22^m	300
23^h54^m - 23^h56^m	200-250
0^h12^m - 0^h15^m	250
0^h21^m - 0^h29^m	200
0^h33^m - 0^h35^m	400 .

According to the local magnetic station, a magnetic storm with sudden commencement began on December 5, 1959 at 6^h 59^m UT and continued for about twelve hours.

Card 3/4

20897

High Eruptive Activity ....

S/034/60/000/208/002/004
E032/E314

ASSOCIATION: Dal'nevostochnyy filial Sibirskogo otdeleniya AN SSSR (Far-Eastern Branch of the Siberian Division of the AS USSR)

SUBMITTED: December 9, 1959

Card 4/4

37455
S/035/62/000/004/013/056
A001/A101

3.1540

AUTHOR: Chistyakov, V. F.

TITLE: The chromospheric flare and eruptive prominence of December 21, 1959

PERIODICAL: Referativnyy zhurnal, Astronomiya i Geodeziya, no. 4, 1962, 55, abstract 4A439 ("Astron. tsirkulyar", 1960, marta 30, no. 209, 16 - 18)

TEXT: The author describes active formations observed on December 21, 1959, on an area of about 700 square degrees. A powerful chromospheric flare ($\varphi = 5^{\circ}$; $L = 82^{\circ}$) set in at 0^h43^m UT, attained the maximum at 0^h49^m and ended at $3^h50^m.5$. The flare was preceded by disappearance of a large filament located near the western limb. At 0^h40^m UT the area of the filament amounted to $2,200 \times 10^{-6}$ $S_{\odot}$; at 0^h44^m the filament area reduced markedly, then the filament started to disintegrate and partially rise upwards. At $0^h52^m.5$ a powerful eruptive prominence started eruption, increased its height and continued to develop up to $1^h19^m.75$ UT. The maximum height of the prominence in the projection plane was about 600,000 km, and the highest velocity of its top rise was 660 km/sec.
[Abstracter's note: Complete translation] V. Yesipov

Card 1/1

Far Eastern Affx, AS USSR

20300
S/034/60/000/215/001/001
E032/E314

3.1540 (1062, 1128, 1184)

AUTHORS: Chistyakov, V.F.

TITLE: On the Depth of Sunspots

PERIODICAL: Astronomicheskiy tsirkulyar, 1960, No. 215, pp. 11 - 15

TEXT: Wilson was the first to suggest that sunspots represented depressions on the solar surface. Estimates of the geometrical depths of sunspots have varied between 200 and 2 500 km. For example, Rodionov (Ref. 4: Byulleten' KISO, No. 8-9 (22-23), 31-34, 1953) estimated the depth as 900 km. The present author has made an attempt to investigate the reality of this idea. It is clear that a circular sunspot will appear elliptical in perspective and the contraction will occur only along the minor axis (in the direction of the heliocentric radius vector $\overline{y}$). Comparison of the ratio of the semi-axes with the $\cos\theta$ law should show whether the perspective effect is real and whether the Wilson effect can be verified. Examination of 137 sunspots has shown that the Wilson effect is real and the depth of

Card 1/2

20300

S/034/60/000/215/001/001
E032/E314

On the Depth of Sunspots.

sunspots (measured from the outer boundary of the photosphere) decreases towards the limb, ranging between 710 and 1 750 km. In theoretical calculations use is made of the results reported by Michard (Ref. 7). There are 1 figure, 2 tables and 9 references: 6 Soviet-bloc and 3 non-Soviet-bloc. The three English-language publications are: Ref.2. W.M.Mitchell, PA, Vol.13, 392-398, 1905; Ref. 3. G. Abetti "Solar Physics", HdAp, Vol. 4, 90, Berlin, 1929; Ref. 7: R. Michard, And Ap Vol.16, 218-286, 1953.

ASSOCIATION: Dal'nevostochnyy filial Sibirskogo otdeleniya AN SSSR (Far-East Branch of the Siberian Division of the AS USSR)

SUBMITTED: June 20, 1960

Card 2/2

CHISTYAKOV, V.F.

Total lunar eclipse of September 5, 1960. Astron.tsir. no.216: 4-6 D '60. (MIRA 14:4)

1. Dal'nevostochnyy filial Sibirskogo otdeleniya AN SSSR.
(Eclipses, Lunar—1960)

S/035/62/000/008/032/090
A001/A101

AUTHOR: Chistyakov, V. F.

TITLE: The effect of superposition of solar activity cycles and their duration

PERIODICAL: Referativnyy zhurnal, Astronomiya i Geodeziya, no. 8, 1962, 66 - 67; abstract 8A442 ("Solnechnyye dannyye", 1961, no. 7, 78 - 83)

TEXT: A new method of determining duration of 11-year cycles of solar activity is proposed, free of the effect of cycle superposition. The method is based on the possibility of superposing descending branches of various cyclic curves independent of the cycle power. The author uses Gnevyshev's data according to which W equal to 11, 33 and 63 correspond to φ equal to 8, 10 and 12° at the final phase of all cycles; he determines epochs T_8, T_{10} and T_{12} corresponding to average latitude of sunspot zone 8, 10 and 12°. The cycle duration t_{11} is determined as an average from three values of cycle lengths obtained from the above-mentioned epochs. The average cycle duration turned out to be 11.15 years. The values of commonly accepted cycle lengths and $\overline{t_{11}}$ do not coincide in general

Card 1/2

The effect of...

due to the effect of their superposition which depends, in its turn, on the phase of the secular cycle. When $\overline{t_{11}}$ is used, the correlation between cycle duration and their intensity is improved. In determining the double cycle τ^*_{22} as the sum of $\overline{t_{11}}$ for the odd and subsequent even cycle, a rather close correlation has been obtained between τ^*_{22} and the sum of Wolf numbers in the years of maxima of the cycles considered. The chronological sequence of magnitudes of τ^*_{22} reflects well the secular course of cycles. The values of τ^*_{22} are grouped by fours, and discontinuously at the boundaries of the fours. The author predicts the duration of the current secular cycle to be 86.6 years and the epoch of the end of cycle no. 20 at 1974.4. There are 14 references.

T. Mandrykina

[Abstracter's note: Complete translation]

CHISTYAKOV, V.F.

Linear depths of sunspot nuclei. Astron.tsir. no.224:3-6 Ag '61. (MIRA 16:1)

1. Dal'nevostochnyy filial Sibirskogo otdeleniya AN SSSR.
(Sunspots)

S/033/61/038/004/004/010
E133/E135

AUTHOR: Chistyakov, V.F.

TITLE: A study of the Wilson effect in Sunspots

PERIODICAL: Astronomicheskiy zhurnal, vol.38, no.4, 1961, 617-622

TEXT: The Wilson effect is the apparent displacement of the centre of a sunspot relative to the penumbra when the spot is viewed near the solar limb. This was explained by Wilson by representing a spot as a depression in the solar surface. A large number of investigations have shown that the depth of the depression should be about 1000 km, which is an order of magnitude smaller than the average diameter of a spot. It has also been shown that the appearance of only 75-80% of the spots can be represented in this way. As a result, several alternative suggestions have been made besides this geometrical effect. Several investigators have found that the number of spots falls away faster towards the limb than would be expected from the cosine law predicted by Wilson's explanation (Ref.11: G.H.A. Archenhold, Monthly Notices Roy. Astron. Soc., v.100, no.8, 9, 645, 1940.

Card 1/5

Ref.12: M. Kopetskiy, Bulletin of the Astronomical Institutes of Czechoslovakia (Byul. astronom. institutov Chekhoslovakii, no.3, 67, 1953; no.3, 68, 1956. Ref.13: G.N. Rodionov, Byul. Komiss. po issled. Solntsa, AN SSSR, No.8-9 (22-23), 24, 1953. Ref.14: M. Roggenhausen, Z. Astrophys., v.30, 249, 1952). This appears to be because only large spots are seen near the limb. A new approach was made by R. Michard (Ref.15: Ann. astrophys., v.16, 218, 1953) who suggested that the effect was due to the greater transparency in spots as compared with the photosphere. The present author examined uniformly shaped spots on plates which were taken in 1955-59. The diameter of the image was 80 mm. The spot parameters indicated in Fig.1 were measured with a microscope. All the measurements were made with an accuracy $\geqslant 3.5\%$. Two hundred and fifty two spots were measured in all; 86 of these did not show the Wilson effect (54 of them due to irregularities in the spot shape, or to the pressure of nearby small spots). Omitting these, 84% of the spots showed the positive Wilson effect. Fig.2 gives a plot of D_1/D_o, d_1/d_o, B_1/B_o and B_2/B_o against θ (see Fig.1 for a definition of

these quantities). The first two follow approximately the cos θ curve, but B_1/B_0 lies above this curve and B_2/B_0 lies below it. It follows that the Wilson effect is due to apparent changes in the penumbral area. The author points out that, of the various types of depression possible, only that suggested by Wilson (a cone with a flat base) satisfies the observations. He also notes that spots with irregular forms sometimes become regular, for a few days, in which case they show the Wilson effect. The author thanks N.B. Yegorov for his assistance, and E.R. Mustel', V.A. Krat and V.Ye. Stepanov for advice. A. Belopol'skiy, G.N. Radianov and M. Kopecký are mentioned in the paper for their contributions in this field.
There are 2 figures, 1 table and 22 references: 9 Soviet-bloc and 13 non-Soviet-bloc. The four most recent English language references read as follows:

Ref. 9: R.E. Loughead and R.J. Bray, Austral. J. Phys., v.2, no.2, 177, 1958.

Ref.10: P.A. Sweet, Vistas in Astronomy, v.2, London and New York, 1956.

Card 3/5/4

A study of the Wilson effect in ... S/033/61/038/004/004/010
E133/E135

Ref.16: W.M. Baxter, J. Brit. Astron. Assoc., v.70, no.3, 138, 1960.
Ref.18: W. Sander, Sterne, no. 11-12, 242, 1960.

ASSOCIATION: Dal'nevostochnyy filial Sibirskogo otdeleniya Akademii nauk SSSR
(The Far East Branch of the Siberian Department, AS USSR)

SUBMITTED: August 14, 1960

Card 4/5

41384

S/556/62/000/032/001/001
E032/E314

B/1540

AUTHOR: Chistyakov, V.F.

TITLE: The effect of the depth of sunspots

SOURCE: Vsesoyuznoye astronomo-geodezicheskoye obshchestvo. Byulleten'. no. 32(39). Moscow, 1962, 48 - 51

TEXT: The aim of this work was to verify the applicability of Wilson's geometrical sunspot model. A statistical method developed by the author is used. The method involves the following steps: 1) single round sunspots are selected, independently of whether or not they exhibit the Wilson effect; 2) photoheliograms of sunspots are subjected to micrometric analysis and measurements are taken both in the direction of the radius of the disc and in the perpendicular direction in order to determine the perspective contraction of the sunspot as a whole and of its details, so that this can later be compared with the cos θ law; 3) for each distance from the centre of the disc the perspective contraction is averaged over a number of sunspots, which tends to eliminate the nonconcentricity of the contours of the umbra and the penumbra. The photoheliograms

Card 1/1 3

The effect of ....

analysed were those obtained at the Ussuriyskaya solnechnaya stanstiya (Ussuriysk Solar Station) between 1955 and 1959 and Chevalier's results for 1905 - 1917. Altogether 444 sunspots were considered. Fig. 2 shows the perspective contraction curves (1 - outer penumbra, 2 - inner penumbra). The half sum of the ordinates of curves 1 and 2 in Fig. 2 is equal to the cosine of the heliocentric angle θ. This may be regarded as a geometrical confirmation of the Wilson model (conical funnel with a flat bottom). Sunspot-depth calculations based on this model show that the largest spots have the greatest depths. Fig. 3 shows the geometrical depth of sunspots $h(\theta)$ for sunspots of different areas (fractions of the area of the hemisphere). These results were then combined with other available data to obtain the variation in the magnetic field and the temperature with depth h. A typical result for a sunspot of fractional area equal to 350×10^{-6} is shown in Fig. 4. The general conclusion is that the Wilson effect should be treated as a sunspot-depth effect. There are 4 figures.

Card 2/4 3

S/033/62/039/003/006/010
E032/E114

3,1540

AUTHOR: Chistyakov, V.F.

TITLE: On the observed depths of sunspots

PERIODICAL: Astronomicheskiy zhurnal, v.39, no.3, 1962, 459-467

TEXT: In a previous paper the author pointed out some geometric arguments in favour of Wilson's hypothesis according to which sunspots may be regarded as depressions on the solar surface. However, a purely geometric treatment of Wilson's effect does not show its physical nature. The present paper reports an explanation of the Wilson effect, which is a development of previous work by the author as well as by R. Michard and P.A. Sweet who have shown that sunspots are relatively transparent and rarefied formations. The author's theory is based on the following facts: 1) sunspots are less dense and more transparent than the photosphere; 2) the material of the sunspots and of the photosphere is in a state of radiative equilibrium. It is shown that the main difficulty in Wilson's theory is the fact that the true form of the penumbra of a sunspot viewed at an angle θ is not known. In order to remove this difficulty two statistical methods of estimating sunspot depth

Card 1/2

On the observed depths of sunspots

S/033/62/039/003/006/010
E032/E114

are proposed. All single regular sunspots are used in this method independently of whether they exhibit the Wilson effect or not. Explicit formulas are derived which may be used to determine the sunspot depths. Extensive data, including micrometric measurements of sunspot penumbras carried out independently by R.P. St.Chevalier and the present author, were reduced by these methods. It is concluded that the observed depths of sunspots depends on their position on the solar disc and decrease towards the limb, particularly for $0 > 50°$. The depth of sunspots increases with their size.
There are 4 figures and 4 tables.

ASSOCIATION: Dal'nevostochnyy filial Sibirskogo otdeleniya Akademii nauk SSSR (Far East Branch of the Siberian Division of the AS USSR)

SUBMITTED: November 30, 1960

Card 2/2

S/214/62/000/008/002/003
D218/D308

AUTHOR: Chistyakov, V.F.

TITLE: Erruptive prominence of July 23, 1961

PERIODICAL: Solnechnyye dannyye, no. 8, 1962, 63-69

TEXT: A major sunspot group (coordinates of centers $\varphi_1 = -8^\circ$, $\lambda_1 = 56^\circ$; $\varphi_2 = -8^\circ$, $\lambda_2 = 47^\circ$) moved across the solar disc between July 8 and July 20, 1961. On July 23 the author recorded on erruptive prominence at a height of one solar radius above the limb. Analysis showed that the prominence arose in the region of the above sunspot groups and that the erruption directly preceded the development of a major flare. A continuous parallel study of chromoscopic processes and solar radio emission at 208 Mc/s was carried out on July 23 and detailed characteristics of the phenomenon were obtained. Optical observations were carried out in the H line using a AFP-2 (AFR-2) telescope and a polarization filter with a bandwidth of 0.5 Å. A record of magnetic activity was also obtained. Dynamic characteristics of the prominence are reproduced. There are 4 figures.

Card 1/1

ACCESSION NR: AP4007675 S/0214/63/000/006/0065/0070

AUTHOR: Chistyakov, V. F.

TITLE: Mirror symmetry of branches of the curve of the secular solar activity cycle

SOURCE: Solnechny*ye danny*ye, no. 6, 1963, 65-70

TOPIC TAGS: secular cycle, solar activity, mirror symmetry, sunspot, solar activity curve, 11 year cycle, 22 year cycle, sunspot cycle

ABSTRACT: Data from telescopic observations are used for studying secular variations of solar activity, and curves are drawn which represent the state of solar activity over a period of 350 years. This curve represents the state of maxima of Wolf numbers for each 11-year cycle of sunspot activity. It contains a secular minimum in 1690 and an inflection point near 1740. This curve shows the mirror symmetry of the descending branch of one secular cycle with the ascending branch of the following cycle. A smoothed curve is drawn for detecting those secular cycles for which this mirror symmetry is marked. A third curve is drawn on the basis of actual Wolf numbers from the

Card 1/2

ACCESSION NR: AP4007675

16th century to the beginning of the 19th century. This curve shows symmetric inflection points near 1600 and 1740. Two other curves are drawn which represent the content of radioactive carbon C^{14} in the atmosphere during the secular sunspot cycles and the appearance of auroras. A study of these curves indicates that from 1370 to 1960 mirror symmetry of descending secular branches with the succeeding ascending branches was noted near the secular minima of about 1450, 1690, 1810, and 1900. These symmetries may be used for determining the periods of secular cycles. The presence of inflection points indicates that secular fluctuations in solar activity (smoothed curve) are not always "sinusoidal," but may also be of a more complicated nature. Orig. art. has: 5 figures and 1 table.

ASSOCIATION: Dal'nevostochnyy filial Sibirskogo otdeleniya AN SSSR (Far Eastern Branch of the Siberian Department, AN SSSR)

SUBMITTED: 00Feb64 DATE ACQ: 21Jan64 ENCL: 00

SUB CODE: AS NO REF SOV: 007 OTHER: 006

Card 2/2

NIKITENKO, L.A.; SHINAREVA, G.V.; CHISTYAKOV, V.F.

Observation of a high-latitude sunspot. Astronom.tsir. no.255:6-7 S '63. (MIRA 17:2)

1. Ussuriyskaya solnechnaya stantsiya.

L 45123-66 EWT(1) GW

ACC NR: AR6015221 SOURCE CODE: UR/0269/65/000/012/0056/0056

AUTHOR: Chistyakov, V. F.

TITLE: Turning points in the development of 11-year cycles of solar activity

SOURCE: Ref. zh. Astronomiya, Abs. 12.51.424

REF SOURCE: Izv. Gl. astron. observ. v Pulkove, v. 24, no. 2, 1965, 60-72

TOPIC TAGS: sun, solar activity, sunspot cycle, Wolf number

ABSTRACT: Five turning points of eleven-year cycles, 2 of which coincide with the turning points of S. M. Kozik, have been determined by a method similar to that proposed by Yu. I. Vitinskiy and R. M. Ikhsanov to determine the epochs of maximums. Turning points s and u make it possible to define the "nucleus" of the cycle, characterized by an invariable six-year duration. This "nucleus" shows an inner instability manifested by shifts in position within it of the K_1, K_2 and t turning points. This instability reflects the 22-year cycle of solar activity. Owing to a certain rigidity in the relationship between the turning points defined, their introduction does not modify substantially the conception of the duration of the 11-year cycle.

Card 1/2 UDC: 523.746.5

L 45123-66

ACC NR: AR6015221

Analysis of Wolf numbers in connection with turning points has made it possible to determine a series of peculiarities in the change of these during the 22 and 80--90 year cycles. These changes are of interest for the forecast of solar activity. An attempt has been made to use the patterns obtained to forecast main features of the 22-year sunspot cycle. The bibliography has 22 titles. [Translation of abstract] [GC]

SUB CODE: 03/ SUBM DATE: none/

Card 2/2 mjs

L 10837-67 EWT(1) GW

ACC NR: AR6033096 SOURCE CODE: UR/0269/66/000/007/0055/0055

24

AUTHOR: Chistyakov, V. F.

TITLE: Study of external bright sunspot rings

SOURCE: Ref. zh. Astronomiya, Abs. 7.51.388

REF SOURCE: Sb. Solnechn. aktivnost'. No. 2, M., Nauka, 1965, 168-182

TOPIC TAGS: sunspot, optic brightness, photosphere, external bright sunspot ring, energy flux

ABSTRACT: Some special features of bright rings surrounding sunspots were investigated. Use was made of a large series of heliograms obtained at the Ussuri solar station in 1961. The ratio between the areas occupied by the bright ring and the sunspot decreases with increase in sunspot area and sunspot magnetic field intensity. Usually the area of an external ring exceeds the sunspot area by a factor of two to three. Like the photosphere, the bright rings have a granular structure with the relative granule area being higher in the bright ring region than in the photosphere (65% in a bright ring and 40% in the photosphere). The optic brightness of the ring exceeds photospheric brightness by 3%. Increase in

Card 1/2 UDC: 523.746

L 10837-67
ACC NR: AR6033096

ring brightness is due to the increase in brightness of the intergranular background and the simultaneous increase in brightness of individual granules. In the region of the external bright ring no connection has been detected between isophote maps and maps of radial velocities and isogausses. This fact confirms the redistribution in depth of the energy flux forming the bright ring. The "law of photometric interconnection" is involved here. Radiation deficit in the penumbra region is compensated by the radiation of the umbra and by an excess of radiation in the region of the external bright ring. B. Shel'ting. Bibliography of 30 titles. [Translation of abstract]

SUB CODE: 03/

Card 2/2 bjp

L 04894-67 EWT(1) GW/GD

ACC NR: AT6027225 SOURCE CODE: UR/0000/66/000/000/0191/0195

AUTHOR: Barkov, V. F.; Shinarev, V. N.; Chistyakov, V. F.

ORG: none

TITLE: Investigation of a DFS-13 spectrograph

SOURCE: AN SSSR. Sibirskoye otdeleniye. Sibirskiy institut zemnogo magnetizma, ionosfery i rasprostraneniya radiovoln. Issledovaniya po geomagnetizmu i aeronomii (Studies in geomagnetism and aeronomy). Moscow Izd-vo Nauka, 1966, 191-195

TOPIC TAGS: spectroscope, solar telescope, electronic device, timing device, ATsU-23 solar telescope, DFS spectrograph

ABSTRACT: A modified version of the DFS-13 diffraction spectrograph is described which is employed in combination with a ATsU-23 horizontal solar telescope at the Ussuriysk solar station (Ussuriyskaya solnechnaya stantsiya). The modification, consisting of providing automatic control of the electronic timer, makes the spectrograph suitable for astronomic observations. The diffraction grating of the spectrograph is 120 x 60 mm in size, has 600 line/mm, and concentrates 82% of the reflected light at the wavelength $\lambda = 4047$ Å. The first-order

Card 1/2

L 04894-67
ACC NR: AT6027225

linear dispersion is 4 Å/mm; it increases slightly with the wavelength. The instrument profile, determined from the neon lines, is represented by an empirical formula in the form of the sum of three Gaussian curves. The half-width of the profile is 0.086 Å. The device is focused photographically onto an Agfa Printon plate, first roughly then exactly. The linear dispersion (established from photographs of the mercury and neon spectra in the center of the solar disc) increases monotonically with the wavelength and equals 4.09 Å/mm for λ = 4200 Å and 4.06 Å/mm for λ = 6000 Å. Light scattering, produced essentially at the various optical surfaces and by reflection from the walls and the internal elements of the device, is reduced by several diaphragms. The scattered light makes up only 0.4% of the incident light at 6000 Å, 0.9% at 4500 Å, and 1.4% at 3500 Å. In combination with the ATsU-23, the spectrograph has made it possible to study the physical processes in the active regions of the sun. Orig. art. has: 3 formulas and 6 figures.

SUB CODE: 17,20/ SUBM DATE: 25Dec65/ ORIG REF: 005

Card 2/2

L 13052-66 EWT(m)/EWA(d)/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c) MJW/JD/HW

ACC NR: AP5027911 SOURCE CODE: UR/0133/65/000/011/1021/1023

AUTHOR: Sominskiy, Z. A.; El'bert, S. M.; Bisk, M. B.; Potopayev, A. P.; Kazachkov, B. M.; Borodin, A. I.; Chistyakov, V. G.

ORG: none

TITLE: Parameter refinement in the hot working of tubes made from Kh18N10T, 30KhGSA and Kh5M steels

SOURCE: Stal', no. 11, 1965, 1021-1023

TOPIC TAGS: tool steel, metal tube, plastic deformation

ABSTRACT: Optimum preheating schedules are established for the subsequent hot working of tubes made of Kh18N10T steel. Care was taken to hold the mandrel temperature below 600°C in order to preserve the useful tool life. Thermocouples were placed into various portions of the mandrel and the temperatures measured for varying conditions. All tubes were drawn to 100 m air blast, water-air spray mixture and water spray cooling was employed. A mixture of zinc oxide and graphite was used as a lubricant. Data are presented for tubes drawn to 40, 50, 60 and 70 m after various preheat temperatures (between 80 and 250°C) and for the cooling methods discussed above. Data on the change in mandrel temperature showed a large degree of variation (310 to 510°C) increasing with draw length and preheat temperature. The cooling efficiency also was

UDC: 621.774.39

Card 1/3

L 13052-66

ACC NR: AP5027911

a significant factor, the highest cooling rate being achieved with water spray cooling. For Kh18N10T steel, the preheat temperature recommended was between 150-200°C. The other phase of the study dealt with the determination of optimum temperature intervals for the hot deformation of 30KhGSA and Kh5M steels. Mechanical property data were obtained in the form of dynamic bend resistance as a function of temperature of testing (ambient temperature to 700°C) for Kh5M and impact resistance as a function of temperature of testing (20-600°C) for 30KhGSA. Also the fracture appearance was analyzed in both cases. The plasticity of Kh5M steel increased up to the temperature range of 300-400°C where it remained constant and subsequently rose again. The transition from ductile to brittle fracture took place at temperatures of about 40-60°C. The explanation proferred for the retardation in rise of plasticity in the range 300-400°C was dislocation solute interactions (C and N especially). This Cottrell type cloud retarded the motion of dislocations. At higher temperatures, the ductility of the steel increased due to thermal activation assisting the release of dislocations from their C and N atmospheres. For 30KhGSA steel, the impact strength rose with temperature to 150°C where it reached a maximum at 150-200°C and subsequently dropped, reaching another peak at about 400°C. Thereafter, the drop became very sharp and at 500°C the value was the same as for room temperature. Above 550°C, a sharp rise in impact strength occurred as a function of temperature. Again Cottrell cloud was used to explain the leveling off of impact strength at 400-550°C. Alloying elements which combine chemically with the solute C and N atoms offset this behavior; this explains the higher

Card 2/3

L 13052-66

ACC NR: AP5027911

plastic properties of Kh5M. Considering the effect mentioned, it was concluded that the optimum working temperature interval for Kh5M should be 200-300°C, and 100-200°C for 30KhGSA. Thus the optimum preheating temperatures in the inductor should be 100--200°C and 60-120°C respectively. The tool life was considerably lengthened by following the above hot working parameters. Orig. art. has: 2 figures, 2 tables.

SUB CODE: 11/ SUBM DATE: 00/ ORIG REF: 002/ OTH REF: 002

Card 3/3

CHISTYAKOV, V. I.; GORENSHTEYN, A. B.

"Winning of milled and sod peat."

Report submitted for the 2nd International Peat Congress, Leningrad, 15-22 Aug 63.

CHISTYAKOV, Viktor Ilich; NAUMOV, D.K., redaktor; FRIDKIN, A.M., tekhnicheskiy redaktor.

[Excavating machines for winning peat] Mashiny ekskavatornogo sposoba dobychi roia. Moskva, Gos.energ.izd-vo, 1957. 255 p. (MIRA 10:11)

(Peat machinery)

CHISTYAKOV, V.I., inzhener

Industrial testing of an axial hammer mill. Torf. prom. 34 no. 3:17-19 '57. (MLRA 10:5)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut torfyanoy promyshlennosti.
(Peat machinery)

CHISTYAKOV, V.I., inzh.

Machine for mechanizing the operations involved in drying excavated peat. Torf. prom. no.1:5-8 '58. (MIRA 12:12)

1.Vsesoyuznyy nauchno-issledovatel'skiy institut torfyanoy promyshlennosti.
(Peat--Drying) (Peat machinery)

AUTHOR: Chistyakov, V.I., Engineer SOV-118-58-8-6/24

TITLE: Complex Mechanization Applied in Excavator Peat Cutting (Kompleksnaya mekhanizatsiya ekskavatornogo sposoba dobychi torfa)

PERIODICAL: Mekhanizatsiya trudoyëmkikh i tyazhëlykh rabot, 1958, Nr 8, pp 13-16 (USSR)

ABSTRACT: The TEMP-2 multi-bucket excavators, the ESM-8A electric spreading machines and the UKB-4 - SKS-2 collectors are used for the excavation of peat. At present under the direction of the Vsesoyuznyy nauchno-issledovatel'skiy institut torfyanoy promyshlennosti - VNIITP (The All-Union Scientific Research Institute of the Peat Industry) two more machines were constructed which will permit complete mechanization of peat production. The first machine, the MDO helical-axial hammer crusher, is placed on the TEMP-2 excavator. Another machine, the UMS-2, was constructed to replace the manual labor of turning and stacking peat bricks. It is expected that the use of these machines will cut down the cost of production by 40-45 %.

Card 1/2

Composite Mechanization Applied in Excavator Peat Cutting SOV-118-58-8-6/24

There are 3 diagrams, 1 photo and 1 table.

ASSOCIATION: VNIITP

1. Peat--Production 2. Mines--Equipment 3. Earth moving equipment--Applications

Card 2/2

CHISTYAKOV, V.I., inzh.

Operational testing of spiral axis hammer-mill crushers. Torf. prom. 35 no.3:5-9 '58. (MIRA 11:5)

1.Vsesoyuznyy nauchno-issledovatel'skiy institut torfyanoy promyshlennosti.

(Peat machinery--Testing)
(Milling machinery--Testing)

S/169/63/000/002/073/127
D263/D307

AUTHOR: Chistyakov, V. I.

TITLE: Planning of detailed exploration of the deposits of nonferrous and rare metals

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 2, 1963, 11, abstract 2D63 (Izv. vyysh. uchebn. zavedeniy. Geol. i razvedka, 1962, no. 6, 60-69)

TEXT: Planning an execution of systems of detailed exploration of deposits of nonferrous and rare metals is as a rule made without coordinating with the constructions of correct systems of mining and without taking into account the exploitation of the outputs and boreholes during operation. The result is considerable loss of time and material, and deterioration of the conditions of exploitation of the deposits. From the study of geological and mining factors, and taking into account the experience of planning and exploitation of mining undertakings, it is possible to choose the correct systems of mining and consequently also the planning of its

Card 1/2

Planning of detailed ...

main elements and indices, including the parameters of exploratory and preliminary work. Selection of a correct system of exploration and cutting of geological blocks is particularly important for mining industry, so that the dimensions of exploration blocks are equal to or a multiple of the normal dimensions of exploitation blocks. Cross-cuttings should be carried out across the spreading and parallel to it, and those arising at adjacent layers should be one above the other. The author gives 3 examples of a preliminary selection of the system of mining based on preliminary exploration for deposits in various mining and geological conditions. Planned systems of exploration and preparation should be coordinated at technical departments of trusts or sovnarkhozes according to territorial criteria and acceptability of industrial exploitation of deposits. [Abstracter's note: Complete translation.]

Card 2/2

ISAKOV, G.A., kand. tekhn. nauk; CHISTYAKOV, V.I.

Coking of block peat in chamber coke ovens. Trudy VNIITP no.18:232-238 '61. (MIRA 17:1)

GOLOUSHIN, N.S., kand. tekhn. nauk; CHISTYAKOV, V.I.; KULIKOV, V.P.; KISINA, A.M.; LOVETSKIY, L.V.; SMIRNOV, Yu.P.; SHOLENINOV, V.M.

Use of peat semicoke and coke in metallurgy. Trudy VNIITP no.18:238-246 '61. (MIRA 17:1)

1. Leningradskiy politekhnicheskiy institut im. Kalinina (for all except Sholeninov. 2. Cherepovetskiy metallurgicheskiy zavod (for Sholeninov).

BOGOPOL'SKIY, S.N.; GOLOUSHIN, N.S.; GRIGOR'YEVYKH, G.F.; LEVIN, L.Ya.; SMIRNOV, Yu.P.; TKACHEV, V.V.; CHISTYAKOV, V.I.; SHOLEMINOV, V.M.; SHUR, A.B.; LOVETSKIY, L.V.

Partial replacement of coke breeze in the sinter charge by peat coke. Stal' 23 no.9:781-785 S '63. (MIRA 16:10)

CHISTYAKOV, V.I.

Planning exploratory mining operations in connection with a detailed survey of mineral deposits. Trudy MGRI 30:50-52 '56.
(Mining engineering) (MLRA 9:11)

CHISTYAKOV, V.I.

127-58-6-5/25

AUTHOR: Chistyakov, V.I., Candidate of Technical Sciences

TITLE: The Planning of Survey Work with Subsequent Exploitation (O proyektirovanii razvedochnykh rabot s uchëtom posled yushchey ekspluatatsii)

PERIODICAL: Gornyy Zhurnal, 1958, Nr 6, pp 20-25 (USSR)

ABSTRACT: Detailed explorations of deposits of non-ferrous and rare metals always involve huge expenses of capital for preliminary mining workings. Such exploration sometimes necessitates the drilling of subterranean galleries and pits to the 5th level of the mine and the total length of such workings very often reaches 6 - 7 thousand meters. The author describes cases, when, after the subsequent exploitation of deposits started, the exploratory galleries and pits could not be used for exploitation, and the capital invested in these workings was lost. The exploring party did not take into consideration the requirements of the Gosudarstvennaya komissiya po zapasam (State Commission on Reserves) (GKZ) and the Rules of Technical Exploitation (Pravila tekhnicheskoy ekspluatatsii) (PTE). The author cites the causes of these mistakes: 1) Insufficient elabor-

Card 1/2

The Planning of Survey Work with Subsequent Exploitation

ation of methods of prospecting and exploration; 2) Geological-exploring organizations neglect and ignore the interests of the mining industry; 3) Insufficient trained prospectors and explorers. The author porposes a series of measures to avoid such mistakes.
There are 2 figures and 1 table.

ASSOCIATION: Moskovskiy geologo-razvedochnyy institut (The Moscow Geological Exploring Institute)

AVAILABLE: Library of Congress

Card 2/2 1. Geology 2. Geophysical prospecting 3. Geophysical surveying

CHISTYAKOV, V.I.

Programming test drilling operations in detailed prospecting considering the use of the test boreholes in exploitation. Izv.vys.ucheb.zav.; geol.i razv. 5 no.1:74-83 Ja '62. (MIRA 15:2)

1. Moskovskiy geologorazvedochnyy institut imeni S.Ordzhonikidze. (Prospecting)

CHISTYAKOV, V.I.

Planning the detailed prospecting for nonferrous and rare metal deposits. Izv.vys.ucheb.zav.; geol.i razv. 5 no.6:60-69 Je '62. (MIRA 15:7)

1. Moskovskiy geologorazvedochnyy institut imeni Ordzhonikidze.
(Prospecting)

CHISTYAKOV, V.K.

Muschketowite from skarns of the Uyzokskiy iron ore region in Gornaya Shoriya. Izv.vys.ucheb.zav.; geol.i razv. 2 no.8:59-64 Ag '59. (MIRA 13:4)

1. Tomskiy gosudarstvennyy universitet.
(Gornaya Shoriya--Magnetite)

CHISTYAKOV, V.K.

Hornblendes from skarns of the Uyzokskii iron ore region in Gornaya Shoriya. Izv.vys.ucheb.zav.: geol. i razv. 2 no.9: 27-36 S '59. (MIRA 13:4)

1. Tomskiy gosudarstvennyy universitet im. V.V.Kuybysheva. (Gornaya Shoriya--Hornblende)

CHISTYAKOV, V. K., Cand Geolog-Mineralog Sci (diss) -- "The mineralogy of the iron-ore deposits of Uyzorskiy Rayon, Gornaya Shoriya". Tomsk, 1960. 19 pp (Min Higher and Inter Spec Educ RSFSR, Tomsk State U im V. V. Kuybyshev), 150 copies (KL, No 15, 1960, 133)

CHISTYAKOV, V.K.

Mineralogy and formation conditions of contact metasomatic rocks and ores of the Uyzok area of Gornaya Shoriya. Uch.zap.TGU no.36:91-113 '60. (MIRA 14:5)

1. Kafedra mineralogii i kristallografii Tomskogo gosudarstvennogo universiteta im. V.V.Kuybysheva.
(Gornaya Shoriya—Mineralogy)

CHISTYAKOV, V.M.

USSR/ Electronics - Telephone communications

Card 1/1 Pub. 133 - 11/18

Authors : Morozov, A. P.; Chistyakov, V. M.; and Barabanov, N. V., Engineers

Title : Experiences with the (BUS-12) auxiliary amplifier station

Periodical : Vest. svyazi 2, 20 -22, Feb 1955

Abstract : The experiences gained during the exploitation of the auxiliary amplifier station BUS-12 are described. The BUS-12 was considered a modern device with excellent technical-tactical characteristics. The circuit diagram and mode of operation of the BUS-12 are described. Diagrams.

Institution: ..... Leningrad Interurban Telephone Office

Submitted: .....

Translation M-1348, 11 Dec 56
and 519821

CHISTYAKOV, V.M., uchitel'.

Biological means of deoxidizing oxyhemoglobin. Est.v shkole no.5:79-80 S-O '56. (MIRA 9:10)

1. Russko-Bektyashkinskaya srednyaya shkola Sengileyevskogo rayona Ul'yanovskoy oblasti.

(OXYHEMOGLOBIN)

AUTHOR: Chistyakov, V.M. SOV-47-58-6-13/28

TITLE: Experiments With Semiconductors (Opyty s poluprovodnikami)

PERIODICAL: Fizika v shkole, 1958, Nr 6, pp 58 - 59 (USSR)

ABSTRACT: The author explains how simple experiments can be made by using thin semiconductor films placed directly on a copper conductor. A film of copper sulfide (CuS) can also serve as a semiconductor. It can be obtained by placing a heated copper conductor into sulphur powder and heating it slowly over an alcohol flame. If the contact, formed by semiconductors with a copper oxide layer and a copper sulfide film, is attached to a constant voltage of 1.5 - 2v, the rectifying action of a semiconductor can be shown. There are 2 diagrams.

ASSOCIATION: Srednyaya shkola pri sovkhoze "Spartak" Saratovskoy oblasti (Secondary school with the Sovkhoz "Spartak", Saratov Oblast)

1. Semiconductors--Electrical properties

Card 1/1

18.8310

29363
S/152/61/000/011/002/002
B126/B110

AUTHORS: Chistyakov, V. M., Kononova, M. I.

TITLE: Mechanism of the protective effect of benzoic acid as an inhibitor of steel corrosion in carbon tetrachloride

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Neft' i gaz, no. 11, 1961, 103-105

TEXT: The authors studied the kinetics of an invisible protective film formed on metal surfaces in moist carbon tetrachloride containing benzoic acid. For corrosion tests the electrochemical and gravimetric methods were applied to rectangular samples (53·19·2 mm) made of Ст.-10 (St.-10) steel. To ascertain the induction period of destruction of the protective film by the former method, the samples were immersed into inhibited tetrachloride (0.01% H_2O) for a certain time and their potentials were measured. Subsequently, and in the same vessel, the point of an electrolytic contact filled with agar-agar gel was pressed to the surface of each sample; the gel was prepared on the basis of a saturated aqueous tetrachloride solution with pH≈4. The film was thus slowly destroyed,

Card 1/3

Mechanism of the protective...

and a sudden jump of the electrode potential toward negative values showed the final destruction. The results proved that the protective properties of the film formed in inhibited tetrachloride progressively improved with time from 2 sec in 24 hr to >600 sec. in 816 hr. Similar results were obtained by the gravimetric method. The samples were immersed into inhibited moist tetrachloride for a certain time, then the adsorbed benzoic-acid molecules were washed off with dry tetrachloride, and the samples were again immersed into moist tetrachloride but without inhibitor. The protective effect of the film was gravimetrically calculated from the formula: $Z_{pe} = \frac{I - I_o}{I} \cdot 100\%$ (2), where I = induction period of corrosion in tetrachloride without inhibitor; the samples were previously immersed into inhibited tetrachloride. I_o = induction period of corrosion of control samples not immersed into inhibited tetrachloride. Z_{pe} = protective effect of the film in tetrachloride without inhibitor calculated from induction period of corrosion. These latter tests also showed that the protective effect of the film increased with time and that the absence of an inhibitor in tetrachloride resulted in gradual destruction of the protective film. This proves that a dynamic equilibrium exists between

Card 2/3

Mechanism of the protective...

the protective film and the corrosive medium containing an inhibitor. There are 2 tables and 2 Soviet references.

ASSOCIATION: Moskovskiy gosudarstvennyy pedagogicheskiy institut im. V. I. Lenina (Moscow State Pedagogical Institute imeni V. I. Lenin)

SUBMITTED: June 28, 1961

Card 3/3

S/080/61/034/011/009/020
D243/D301

AUTHORS: Chistyakov, V.M., and Balezin, S.A.

TITLE: Inhibitors of corrosion of carbon steel in carbon tetrachloride

PERIODICAL: Zhurnal prikladnoy khimii, v. 34, no. 11, 1961, 2460 - 2466

TEXT: The aim was to study the mechanism by which benzoic acid acts as a corrosion inhibitor of carbon steel in carbon tetrachloride in order better to protect steel in all phases of the system CCl_4 - air, CCl_4 - water, water - air. Weight, X-ray, spectrophotometric, electrical and chemical methods of investigation were used. The surface of the steel samples was treated in standard fashion. The samples were then weighed and placed in the corrosion medium. Investigations were conducted mainly at 18-20°C with isolated experiments at 40°C in diffused light in glass vessels with ground glass stoppers. Two specimens and 100 ml. of CCl_4 were placed in each vessel. CCl_4 was moistened with bidistillate of water. The

Card 1/3

corrosion products were removed mechanically and the specimens then washed, dried in a dessicator and weighed. The oxide film on the surface of the steel was reduced by hydrogen at 500°C in 30 mins. From the results it was concluded that benzoic acid molecules are adsorbed on the metal surface, assisting thereby the corrosion process. This physical adsorption becomes in time a process of specific adsorption and chemosorption which improves the protective properties of the developing film. Film formation is a dynamic process, but relatively slow, and proceeds only in the presence of the inhibitor. The film is hydrophobic and usually invisible. Benzoic acid's action depends on the state of the natural oxide film on the surface of the steel, the concentration of inhibitor, the oxygen concentration, CCl_4 moisture content and temperature of the medium. Benzoic acid greatly prolongs the induction period. Nine universal inhibitors, based on benzoic acid, were tested and found to afford carbon steel high protection in all phases of the system. There are 4 figures, 3 tables and 7 references: 3 Soviet-bloc and 4 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: K.W. Talkins, R.W. Hawley,

S/080/61/034/011/009/020
Inhibitors of corrosion of carbon ... D243/D301

Corrosion Eng., 15, 9, 15-17, 1959; C.K. Rosenbaum, J.W. Walton, J. Am. Chem. Soc., 52, 9, 3568, 1930; C.W. Clifford, Ind. Eng. Ch., 13, 628, 631, 1921; J.J. Fox, A.E. Martin, Proc. Roy. Soc., A 174, 957, 234, 1940.

SUBMITTED: December 12, 1960

Card 3/3

CHISTYAKOV, V.M.; BALEZIN, S.A.

Mechanism of steel corrosion in carbon tetrachloride. Izv.vys. ucheb.zav.; khim.i khim.tekh. 4 no.6:955-967 '61. (MIRA 15:3)

1. Moskovskiy gosudarstvennyy pedagogicheskiy institut imeni Lenina, kafedra obshchey i analiticheskoy khimii.
(Steel—Corrosion) (Carbon tetrachloride)

18.8310
5.1140

32846
S/020/62/142/002/029/029
B101/B144

AUTHORS: Balezin, S. A., and Chistyakov, V. M.

TITLE: Corrosion inhibitors for carbon steel in carbon tetrachloride

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 2, 1962, 416-418

TEXT: The inhibitory effect of benzoic acid (BA) on the corrosion of the carbon steels 3, 10, and 20 in CCl_4 has been investigated gravimetrically, roentgenometrically, spectrophotometrically, electrochemically, and chemically. Experiments at room temperature in air, O_2, and Ar have shown that the protective effect of BA and the induction period depend on the state of the natural oxide film on the steel surface, and is related to the adsorption of BA. The isothermal lines for the protective effect of BA (Fig. 1) showed, however, no agreement with the adsorption isotherms. Moreover, BA showed the strongest protective effect in water-saturated CCl_4 (0.01% H_2O). This is attributed to the formation of basic iron benzoate. The protective effect of BA thus depends on the state of the oxide film, the inhibitor concentration, the moisture content of CCl_4 and

Card 1/3

the temperature. The mechanism of the protective effect primarily consists in the adsorption of BA, followed by a chemical reaction with the oxide film. On the basis of these results, universal inhibitors were composed: УАТ-5 (UAT-5): 0.04% ethyl benzoate; УАТ-6 (UAT-6): 0.01% BA + 0.01% pyrocatechol; УАТ-7 (UAT-7): 0.01% BA + 0.01% C_6H_5OH; УАТ-8 (UAT-8): 0.01% BA + 0.005% ammonium benzoate; УАТ-9 (UAT-9): 0.05% BA + 0.025% sodium benzoate; УАТВ-1 (UATV-1): 0.05% ethyl benzoate + 0.002% dicyclohexyl amine nitrite; УАТВ-2 (UATV-2): 0.01% BA + 0.005% sodium benzoate + 0.002% dicyclohexyl amine nitrite. UAT inhibitors protect steel longer than 180 days against corrosion in liquid and vaporous commercial CCl_4, but not at the water line. The protective effect of UATV inhibitors also covers the water line (30 days). There are 2 figures, 2 tables, and 3 references: 2 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: K. W. Calkins, R. W. Hawley, Corrosion Eng., no. 9, 15, 15 (1959).

ASSOCIATION: Moskovskiy gosudarstvennyy pedagogicheskiy institut im. V. I. Lenina (Moscow State Pedagogical Institute imeni V. I. Lenin)

32846
S/020/62/142/002/029/029
B101/B144

Corrosion inhibitors for carbon...

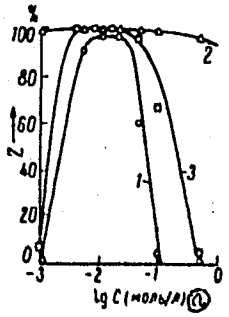
PRESENTED: July 31, 1961, by V. I. Spitsyn, Academician

SUBMITTED: July 28, 1961

Fig. 1. Isothermal lines for the protective effect (Z) of benzoic acid as a function of concentration (log C, moles/liter). (1) CCl_4 with 0.003% H_2O at 20°C; (2) CCl_4 saturated with H_2O (0.01%) at 20°C; (3) idem at 40°C.

Legend: (a) log C (moles/liter).

Fig. 1



Card 3/3

S/153/61/004/006/003/008
E091/E453

AUTHORS: Chistyakov, V.M., Balezin, S.A.

TITLE: On the corrosion mechanism of steel in carbon tetrachloride

PERIODICAL: Izvestiya vysshikh uchebnykh zavedoniy, Khimiya i khimicheskaya tekhnoligiya, v.4, no.6, 1961, 955-967

TEXT: Problems associated with the investigation of the mechanism and kinetics of corrosion of carbon steels in moist carbon tetrachloride are considered. Gravimetric, X-ray analysis, spectrophotometric, electrochemical and chemical methods of investigation were used. Degree of corrosion K and rate of corrosion ρ of specimens of steels 3, 10 and 20 were determined gravimetrically by the loss of weight of the steel specimen Δm by the formulae

$$K = \frac{\Delta m}{s} \ g/m^2 \quad \text{and} \quad \rho = \frac{K}{t} \ g/m^2 \ day$$

Card 1/4

where s - surface area of the specimen and t - time of contact between metal and corrosive medium. The experiments were carried out in special glass vessels, constructed by the authors, cross-sections of which are shown in the paper. The products of corrosion were determined by chemical and X-ray analysis. Electrochemical investigations were carried out by a method proposed by L.G.Gindin. Potentials were measured by means of a calomel electrode and the current of steel-magnesium couples was measured with a microammeter. The electrodes of the macrocouple were insulated with a thin layer of cellulose, which is chemically inert with respect to carbon tetrachloride. The moisture content of carbon tetrachloride was determined by a micromethod by means of calcium hydride, measuring the volume of liberated H_2, and by determining the gain in weight of a dry, grease-free gelatine [illegible], immersed for a specified time into the carbon tetrachloride. It was found that corrosion of steel in carbon tetrachloride occurs only if the moisture content of the latter is above 20%, since adsorption and condensation of water molecules from the bulk of dielectric at the metal surface takes

place under such conditions. The mechanism of corrosion is electrochemical. The oxygen from the air, together with hydrogen chloride, which is the final product of hydrolysis of carbon tetrachloride, are mainly responsible for corrosion of steel in moist carbon tetrachloride, particularly during the induction period. A study of the kinetics of corrosion of steel in carbon tetrachloride of various moisture contents showed that corrosion occurs in stages. It is concluded that steel can be protected against corrosion in moist carbon tetrachloride either by reducing the moisture content of the latter to below 20% or by permanently preserving and strengthening the natural oxide film. The former method is possible only when the water content of the tetrachloride is low, and when it can be ensured that no moisture enters from without. The latter method of protection is temporary in nature, since eventually the protective oxide film will normally be destroyed. However, application of corrosion inhibitors capable of greatly prolonging the induction period, e.g. benzoic acid, can completely prevent corrosion. There are 8 figures and 9 tables.

ASSOCIATION: Moskovskiy gosudarstvennyy pedagogicheskiy institut im. V.I.Lenina. Kafedra obshchey i analiticheskoy khimii (Moscow State Pedagogical Institut imeni V.I.Lenin. Department of General and Analytical Chemistry)

SUBMITTED: February 22, 1960

Card 4/4

LOGINOV, A., kand.pedagog.nauk; KOVACH, S.K. (g.Satanov, Khmel'nitskoy obl.); BAYEV, S.Ya., uchitel'; POPOVA, A.N., uchitel'nitsa; ZAMULIN, G.T.; YEMEL'YANOVA, T.I.; PYATNITSKIY, M.P.; YAROSHCHUK, N.A., uchitel'; CHISTYAKOV, V.M., uchitel'; LENSHIN, A.S. (g. Novosibirsk); NOSKOV, V.I., (g.Feodosiya); RUD', K.A., uchitel'nitsa; VASIK, G.Ye., uchitel'; GAPONENKO, I.M.

Editor's mail. Khim. v shkole 15 no.3:73-78 My-Je '60. (MIRA 14:7)

1. Pedinstitut, g. Ulan-Bator (for Loginov). 2. Ordzhonikidzevskaya srednyaya shkola No.5, Stavropol'skiy kray (for Bayev). 3. Nikiforovskaya shkola sel'skoy molodezhi, Tambovskoy oblasti (for Popova). 4. Pedagogicheskiy institut g. Krasnodara (for Zamulin, Yemel'yanova, Pyatnitskiy). 5. Srednyaya shkola No.8, g. Vinnitsy (for Yaroshchuk). 6. Srednyaya shkola sovkhoza "Spartak" Saratovskoy obl. (for Chistyakov). 7. Srednyaya shkola No.14 g. Stalina (for Rud'). 8. Shkola No.569 g. Moskvy (for Vasik). 9. Pedagogicheskiy institut, g. Novozybkov (for Gaponenko).

(Chemistry--Study and teaching)

CHISTYAKOV, V.M.; KONONOVA, M.I.

Mechanism of the protective action of benzoic acid as an inhibitor of corrosion of steel in four-layer carbon. Izv. vys. ucheb. zav.; neft' i gaz 4 no.11:103-105 '61. (MIRA 17:2)

1. Moskovskiy gosudarstvennyy pedagogicheskiy institut imeni V.I. Lenina.

CHISTYAKOV, V.M.

Obtaining oxygen from the nitrates of alkaline metals. Khim. v shkole 18 no.6:52-55. N-D '63. (MIRA 17:1)

1. Pedagogicheskiy institut, Kuybyshev.

L 25796-66 (A) EWT(m)/T/EWP(t) IJP(c) DJ/JD/WB

ACC NR: AM6008546 Monograph UR/ 53 52

Chistyakov, Vladimir Mikhaylovich B+1

Moderators of metal corrosion; inhibitors (Zamedliteli korrozii metallov; ingibitory) Minsk, Nauka i Tekhnika, 1965. 60 p. illus., biblio. 2900 copies printed.

TOPIC TAGS: corrosion protection, corrosion inhibitor, anticorrosion additive, rust inhibitors, atmospheric corrosion, sea water corrosion, fuel additive

PURPOSE AND COVERAGE: This booklet is intended to familiarize engineering and technical personnel of industrial and agricultural enterprises, rail, water, and air transport with the application of inhibitors of metal corrosion. It may also be used by students and teaching personnel of engineering and technical schools. A systematic, comprehensive review was made of the literature data, mostly Soviet, on development and application of inhibitors of metal corrosion in various media. History of metal corrosion inhibition is briefly reviewed with emphasis on achievements made in the last 10—15 years by Soviet scientists. Professor S. A. Balezin and his school were singled out as the most prolific in this field. Contributions of Balezin's school were cited in almost all applications of corrosion inhibitors. The most notable were volatile

Card 1/2

L 25796-66

ACC NR: AM6008546

inhibitors and inhibiting lubricants for control of atmospheric corrision of ferrous metals, also corrosion inhibiting fuel additives. The booklet also contains the author's own research data, including the most recent (1965). There are 64 references including 85 % Soviet.

TABLE OF CONTENTS:

SUB CODE: 13/ SUBM DATE: 65/20Oct65/ ORIG REF: 055/ OTH REF: 009/

Card 2/2 CC

L 04472-67 EWT(m)/EWP(j)/EWP(t)/ETI IJP(c) JD/WB/RM

ACC NR: AP6007525 (N) SOURCE CODE: UR/0419/65/000/002/0118/0120

AUTHOR: Chistyakov, V. M.

13

B

ORG: None

TITLE: Potassium ferrocyanide as an inhibitor of steel corrosion in aqueous media

SOURCE: AN BSSR. Vestsi. Seryya khimichnykh navuk, no. 2, 1965, 118-120

TOPIC TAGS: potassium compound, iron compound, cyanogen compound, corrosion inhibitor, aqueous solution, STEEL, CORROSION RATE

ABSTRACT: The author studies the action of potassium ferrocyanide [$K_4Fe(CN)_6$] as an inibitor of steel corrosion in neutral aqueous media with respect to the interval of protective concentrations of $K_4Fe(CN)_6$, the kinetics of the reaction and the mechanism responsible for the protective effect of this inhibitor using gravimetric and electrochemical methods. The reagents were KCl, $K_4Fe(CN)_6$ and rectangular steel specimens measuring 45×18×2 mm made of GOST-501-58 steel. Nine ml of corrosive medium was used for every cm^2 of steel surface. Corrosion rate (ρ) was determined by the weight loss (Δm) of the steel specimen according to the following formula

$$\rho = \frac{\Delta m}{S\tau}, \text{ in } g/m^2 \cdot hr ,$$

Card 1/2

L 04472-67

ACC NR: AP6007525

where S and τ represent the total area of the metal surface and the time of contact between the specimen and the corrosive medium respectively. The protective action of the inhibitor (Z) is calculated by the following formula

$$Z=\frac{\rho_0-\rho}{\rho_0}100, \text{ in } \%,$$

where ρ_0 represents the rate of corrosion in the control sample (without inhibitor) and ρ represents the rate of corrosion with inhibitor present. The optimum protective concentration of $K_4Fe(CN)_6$ was found to be 0.01 mole/liter, while the interval of protective concentrations lies between 0.01 and 0.10 mole/liter. Orig. art. has: 2 tables.

SUB CODE: 11,07 SUBM DATE: none/ ORIG REF: 001/ OTH REF: 000

Card 2/2 egh

CHISTYAKOV, V.M.

Kinetics of steel corrosion in certain organochlorine liquids. Zhur. prikl. khim. 38 no.5:1021-1026 My '65. (MIRA 18:11)

1. Mogilevskiy mashinostroitel'nyy institut.

AUTHOR: Chistyakov, V.N. 26-58-4-29/45

TITLE: The Creeping Gardens of Siberia (Stelyushchiyesya sady Sibiri)

PERIODICAL: Priroda, 1958, Nr 4, pp 105-107 (USSR)

ABSTRACT: Professor A.D. Kizyurin is a scientist who after long years of experimenting succeeded in developing fruit trees that are able to resist the rough climate of Siberia. Studying the reasons for the destruction of fruit trees by frost, the Professor discovered that low growing trees were not killed by frost when they did not grow over 25 - 30 cm high. He developed creeping apple and cherry trees with low growing trunks, with crowns not higher than the air ceiling. This arrangement enables the fruit trees to stand the coldest weather under a thick cover of snow. The first experiments were conducted in the garden of the Omsk Agricultural Institute where in the course of the years over 100 apple tree varieties have been developed. These arctic fruit trees are already being cultivated on kolkhozes and yield very satisfactory crops in commercial quantities.

Card 1/2 There is one photo.

CHISTYAKOV, V.A.

Prospects for using thermal waters in Omsk Province. Izv. Omsk. otd. Geog. obva no.6:3-11 '64. (MIRA 18:9)

BEZOBCHUK, Kondrat Makarovich; UL'YANITSKAYA, Evelina Izrail'yevna; CHISTYAKOV, V.O., red.; ZAPOL'SKAYA, L.A., tekhn. red.

[Therapeutic use of potable mineral waters]Lechebnoe primenenie pit'evykh mineral'nykh vod. Kiev, Gosmedizdat USSR, 1962. 83 p. (MIRA 16:3)

(MINERAL WATERS)

CHISTYAKOV, V.P.

MALCHENKO, A.L.; CHISTYAKOV, V.P.; CHUSOV, V.G.

Malt crushers of new design. Spirt.prom. 20 no.3:8-14'54. (MLRA 7:10)
(Grain milling machinery)

SEVAST'YANOV, B.A.; CHIST'YAKOV, V.P. (Moskva)

Asymptotic normality in the classical problem of pellets.
Teor. veroiat. i ee prim. 9 no.2:223-237 '64 (MIRA 17:7)

CHISTYAKOV, V. P.

52-3-5/9

AUTHOR: Chistyakov, V. P.

TITLE: Local Limit Theorems for Branching Processes (Lokal'nyye predel'nyye teoremy teorii vetvyashchikhsya sluchaynykh protsessov).

PERIODICAL: Teoriya Veroyatnostey i Yeye Primeneniya, 1957, Vol.II, Nr.3. pp.360-374. (USSR)

ABSTRACT: Sevast'yanov (Ref.1) has given a connected account of the theory of branching random processes, and the purpose of this paper is to describe the fundamentals of this theory. Suppose that one particle in the time interval t becomes k particles of the same type with probability $P_k(t)$; the random process of such a type of generation is called branching if the probabilities $P_k(t)$ do not depend on: (1) the method and the time of generation of the initial particle, for which it is assumed only that it exists at the initial moment of time; (2) the history of the other particles which can enter into the investigation

Card 1/6

Local Limit Theorems for Branching Processes.

at other than the initial moment of time and the particles arising therefrom for $t > 0$. The probability-generating function

$$F(t,x) = \sum_{k=0}^{\infty} P_k(t) x^k$$

It is possible to prove that for $|x| \leq 1$ the function $F(t, x)$ satisfies the equation

$$F(t+s,x) = F[t,F(s,x)] \qquad \text{(Eq.1)}$$

and the boundary condition $F(0, x) = x$. This is the fundamental equation of the theory of branching random processes. Eq.1 is true for processes involving continuous time and for processes involving discontinuous time. Let the probability $P_k(t)$ satisfy the condition

Card 2/6

$$P_k(t + \Delta t) = \delta_{1k} + p_k \Delta t + \eta_k(\Delta t)\Delta t, \quad \text{(Eq.2)}$$

Local Limit Theorems for Branching Processes.

$$\frac{\partial F(t,x)}{\partial t} = f\left[F(t,x)\right] \qquad \text{(Eq.4)}$$

and the boundary condition $F(0,x) = x$. A number of local theorems for the cases $a = 0$ and $a > 0$ are obtained. As a preliminary it is necessary to shorten the asymptotic formula for $Q(t) = 1 - P_0(t)$ and $R(t,x) = 1 - F(t,x)$ obtained by Sevast'yanov (Ref.1), and also to establish the existence of the density distribution function $S_2(y)$. Certain properties of $S_2(y)$ are determined, and the following theorems are true:

1. If $a = 0$, b, c, d are bounded, then when $t \to \infty$ and $0 < c_1 \leq z_{n,t} \leq c_2$

$$\frac{bt}{2}\, p_n^*(t) = e^{-z_{n,t}} + O\left(t^{-\frac{1}{2}}\sqrt{\ln t}\right),$$

Card 4/6

52-3-5/9

Local Limit Theorems for Branching Processes.

$$S(y) = \lim_{t \to \infty} P \left\{ \frac{\mu_t (1-\lambda)}{e^{at}} < y \,\middle|\, \mu_t > 0 \right\}.$$

There is 1 table and 5 references, 4 of which are Slavic.

SUBMITTED: April 25, 1957.

AVAILABLE: Library of Congress.

Card 6/6

CHISTYAKOV, V. P.

SOV/52-2-4-7/7

AUTHOR: None Given.

TITLE: A Summary of Papers Presented at the Sessions of the Scientific Research Seminar on the Theory of Probabilities. (Moscow, February - May, 1957). (Rezyume dokladov, sdelannykh na zasedaniyakh nauchno-issledovatel'skogo seminara po teorii veroyatnostey. (Moskva, Fevral' - May 1957 g.)

PERIODICAL: Teoriya Veroyatnostey i yeye Primeneniya, 1957, Vol.II, Nr.4, pp.478-488. (USSR)

ABSTRACT: Kolmogorov, A.N., On stochastic processes (General definitions of regularity and singularity. The amount of information per unit of time). Freyman, G.A. (Yelabuga), Local limit theorems for large deviations from the mean and their application to number theory. An expression is given for the number of solutions of the equation

$x_1^n + x_2^n + \ldots + x_k^n = N$ as $k \to \infty$ and $k < \gamma N$, where

$0 < \gamma < 1$, and N is a positive integer.

Card 1/3

A Summary of Papers Presented at the Sessions of the Scientific Research Seminar on the Theory of Probabilities.

Linnik, Yu.V. (Leningrad), Some remarks on least squares in connection with location theory. The contents of this report have been published in Vol.2, Nr.3 of this journal. Bobrov, A.A. (Odessa), A method of arbitrary functions as a basis for limit distributions. A determining process is investigated which has random initial conditions. The state of a system which is of interest is determined by a quantity $s = F(v, \tau)$, depending on the random parameter v and the parameter τ which characterises the system in some definite measure. The question arises of the conditions to be imposed on F as the parameter τ approaches a critical value τ_0 such that the law of the probability distribution of s approaches some distribution law which does not depend on the probability distribution of the random parameter v which is supposed arbitrary but absolutely continuous. The conditions are (1) for any $\varepsilon > 0$, $v_1 < v_2$, $N > 0$ can be chosen such that

Card 2/3 times $[|F| \geq N]_{v_1}^{v_2} < \varepsilon$ for all τ sufficiently near to τ_0 ;

A Summary of Papers Presented at the Sessions of the Scientific Research Seminar on the Theory ofProbabilities.

(2) for any real t and $\nu_1 < \nu_2$ there exists a limiting mean value

$$\lim_{\tau \to \tau_0} \frac{1}{\nu_2 - \nu_1} \int_{\nu_1}^{\nu_2} e^{itF(\nu,\tau)} d\nu = f(t),$$

independent of the arbitrarily chosen interval (ν_1, ν_2). Chistyakov, V.P., Two local limit theorems for branching stochastic processes. The contents of this report have been published in Vol.2, Nr.3 of this journal. Chentsov, N.N., Some general methods in proving limit theorems for stochastic phenomena. The probability distribution in some set A of functions given over elements t of an arbitrary set T and taking values x(t) in some topo-

 logical space R is called a stochastic phenomenon. It

CHISTYAKOV, V.P. (Moscow)

Generalisation of a theorem for branching random processes. Teor.veroiat. i ee prim. 4 no.1:109-113 '59. (MIRA 12:3)
(Probabilities)

CHISTYAKOV, V. P., Cand Phys-Math Sci -- (diss) "Limit theorems for branching random processes involving various types of particles." Moscow, 1960. 6 pp; (Moscow Order of Lenin and Order of Labor Red Banner State Univ im M. V. Lomonosov, Mechanics-Mathematics Faculty); 165 copies; price not given; (KL, 24-60, 128)

23580
S/052/61/006/001/002/005
C 111/ C 333

16.6100

AUTHOR: Chistyakov, V. P.

TITLE: Transient phenomena in branching processes with n types of particles

PERIODICAL: Teoriya veroyatnostey i yeye primeneniye, v. 6, no. 1, 1961, 31-46

TEXT: The author considers a branching process with n types of particles $T_1, \ldots, T_n$. Assume that in the time Δt ($\Delta t \to 0$) a particle of type T_k can change into ω_1 particles of type $T_1, \ldots, \omega_n$ particles of type T_n with the probabilities $\delta_k^{\omega} + p_k^{\omega} \Delta t + O(\Delta t)$, where $\omega = (\omega_1, \ldots, \omega_n)$, $\sum_{\omega} p_k^{\omega} = 0 (k = 1, \ldots, n)$; for $\omega_i = 0 (i \neq k)$ and $\omega_k = 1$ let $\delta_k^{\omega} = 1$ and $p_k^{\omega} < 0$, otherwise let $\delta_k^{\omega} = 0$, $p_k^{\omega} < 0$. Let $\mu_{kj}(t)$ be the number of particles of type T_j in the moment t, if there was only one particle of type T_k at the beginning. The generating functions $F_k(t, x_1, \ldots, x_n)$ of the $P_k^{\omega}(t) = P\{\mu_{kj}(t) = \omega_j,$

Card 1/9

Transient phenomena in ...

$j = 1,\ldots, n\}$ and the $f_k(x_1,\ldots, x_n) = \sum_{\omega} p_k^{\omega} x_1^{\omega_1}\ldots x_n^{\omega_n}$ $(k = 1,..,n)$ are connected by

$$\frac{dF_k}{dt} = f_k(F_1,\ldots, F_n) \quad k = 1,2,\ldots, n) \qquad (1)$$

and satisfy

$$F_k = (0,x_1,\ldots, x_n) = x_k \quad (k = 1,2,\ldots, n).$$

Assume that the factorial moments of the $f_k(\mathfrak{x})$ be:

$$a_{ij} = \left.\frac{df_i}{dx_j}\right|_{x=1}, \quad b_{ij}^{(k)} = \left.\frac{d^2f_k}{dx_i dx_j}\right|_{x=1}, \quad c_{ijl}^{(k)} = \left.\frac{d^3f_k}{dx_i dx_j dx_l}\right|_{x=1}.$$

If the matrix $a = \| a_{ij} \|$ is indecomposable, then there exists a unique simple characteristic number λ with maximum real part, to which there

Card 2/3

Transient phenomena in ...

corresponds the positive eigen vector $\mathbf{u} = \{u_1, \ldots, u_n\}$. Assume that the eigen vector of λ of the transposed matrix be $\mathbf{v}$. Let $(\mathbf{u},\mathbf{v}) = (\mathbf{v},\mathbf{v}) = 1$. Let $\mathcal{A}$ be the closed compact set of indecomposable $n \times n$ matrices with nonnegative elements outsid of the main diagonal.

Definition: To the class $K(\mathcal{A}, \delta, B, c)$ there belong the processes $(\{f_k\} \in K)$ for which $a \in \mathcal{A}$, $0 < \delta < \sum_{i,j,k=1}^{n} b_{ij}^{(k)} < B < \infty$ and $c_{ijl}^{(k)} < c < \infty$ $(c \geq 0)$.

Let $R_k(t,x_1,\ldots,x_n) = 1 - F_k(t,x)$, $k = 1,\ldots,n$. Let

$$g(\lambda,t) = \begin{cases} \dfrac{e^{\lambda t}-1}{\lambda}, & \text{for } \lambda \neq 0 \\ t, & \text{for } \lambda = 0 \end{cases} \qquad (6)$$

Card 3/9

Transient phenomena in ...

$$k(t,x,\lambda) = \frac{e^{\lambda t}\left[v_1(1-x_1)+ \dots + v_n(1-x_n)\right]}{1+\frac{b}{2}\, g(\lambda,t)\left[v_1(1-x_1)+\dots+v_n(1-x_n)\right]} \qquad (7)$$

where $b = \sum_{i,j,k=1}^{n} b_{ij}^{(k)} v_k u_i u_j$. It is $Q_k(t) \equiv P\left\{\sum_{j=1}^{n} \mu_{kj}(t) > 0\right\} = R_k(t,0,\dots,0)$.

Theorem 1: For $t \to \infty$ and $\lambda \to 0$ there holds the asymptotic formula

$$R_j(t,x) = u_j k(t,x,\lambda)\left[1 + \eta_j(t,x,\lambda)\right], \quad j = 1,\dots, n$$

where $\eta_j(t,x,\lambda) \to 0$ uniformly relative to all $\{f_k\} \in K$ and $0 \leq x_k \leq 1$ $(k = 1,\dots,n)$.

Corollary: If $t \to \infty$ and $\lambda \to 0$ (or if $\lambda = 0$), then it holds uniformly relative to $\{f_k\} \in K$:

Card 4/9

Transient phenomena in ...

$$Q_j(t) \sim u_j k(t, \lambda, 0) \sim \begin{cases} \dfrac{2\lambda u_j e^{\lambda t}}{b(e^{\lambda t}-1)} & \text{if } \lambda \neq 0 \\ \dfrac{2u_j}{bt}, \text{if } \lambda = 0 \end{cases}$$

Let

$$P\{\xi < y\} = \begin{cases} 1 - e^{-y}, & \text{if } y \geq 0 \\ 0, & \text{if } y < 0 \end{cases}$$ and

$P\{\xi_1 = \xi_2 = \ldots = \xi_n = \xi\} = 1$. Let the distribution function of the $\xi_1, \ldots, \xi_n$ be $S(y_1, \ldots, y_n)$ and the distribution function of the $Q_k(t) \mathcal{P}_{kj}(t) e^{-\lambda t}/u_k v_j$ $(j = 1, \ldots, n)$ be $S_k(t, \lambda, y_1, \ldots, y_n)$ (if the process is not degenerated at the moment t).

Card 5/9

Transient phenomena in ...

Theorem 2: For $t \to \infty$, $\lambda \to 0$ it holds

$$\max_{y_1,\ldots,y_n} \left| S_k(t,\lambda,y_1,\ldots,y_n) - S(y_1,\ldots,y_n) \right| \to 0$$

uniform relative to $\{f_k\} \in K$.

Let

$$\varphi_k(t,\lambda,s) = 1 - \frac{R_k(t,x_1,\ldots,x_n)}{Q_k(t)}, \text{ where } x_j = \exp\left[- \frac{s_j \mu_{kj} Q_k}{u_k v_j e^{\lambda t}} \right].$$

Corollary: If $t \to \infty$, $\lambda \to 0$, then

$$\varphi_k(t,\lambda, -i\tau_1,\ldots,-i\tau_n) \to \frac{1}{1-i(\tau_1+\ldots+\tau_n)} \qquad (24)$$

uniform relative to $\{f_k\} \in K$ and $|\tau_j| < T (j = 1,\ldots, n)$ for every fixed T.

Assume that the initial distribution of the particles with respect to

Card 6/9