

# The *Izvestiya* of the Platinum Institute

## THE WORLD'S FIRST PLATINUM METALS JOURNAL

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The thirty-two volumes of the *Izvestiya Sektora Platiny i Drugikh Blagorodnykh Metallov* (*Annals of the Sector for Platinum and Other Noble Metals*, hereafter called *Izvestiya* for the sake of simplicity) bear more than a passing resemblance to the thirty-two piano sonatas of Ludwig van Beethoven. Beethoven's sonatas span a period of 27 years (1796 to 1823), through which can be traced the composer's increasing mastery of form and the development of his unique genius. Similarly, the volumes of *Izvestiya* span a not too different period of 35 years (1920 to 1955) and reflect the development of Soviet research on the platinum metals from its humble beginnings during the chaotic Civil War to its full maturity during the post-World War II era.

Like the Beethoven sonatas, too, the *Izvestiya* is unique. It was the first, and, for more than three decades of its existence, the only journal devoted exclusively to the platinum metals. Two years after its demise, its unique position was assumed by *Platinum Metals Review*, the first issue of which appeared in January 1957.

### The Platinum Institute

The founding of the *Izvestiya* is intimately connected with the world-famed Platinum Institute of the USSR (1) and with its founder and first director, Lev Aleksandrovich Chugaev (1873-1922) (2-5). During World War I, in response to increased demands for platinum catalyst needed for the contact process for manufacturing sulphuric acid, Chugaev, together with Vitalii Grigor'evich

Khlopin (1890-1950), and Vyacheslav Vasil'evich Lebedinskii (1888-1956) (6) devised industrial methods for refining platinum and its congeners. In 1915 Nikolai Semenovich Kurnakov (1860-1941) (7, 8), another pioneer in the systematic exploitation of Russian mineral resources (including platinum) and discoverer of "Kurnakov's reaction" for differentiating *cis* from *trans* isomers of divalent platinum and palladium, together with Vladimir Ivanovich Vernadskii (1863-1943) and Aleksandr Evgen'evich Fersman (1883-1945) organised as part of the Rossiiskaya Akademiya Nauk (Russian Academy of Sciences) a commission known as the Kommissiya po Izucheniyu Estestvennykh Proizvoditel'nykh Sil Rossii (Commission for the Study of Russian Natural Productive Sources), abbreviated KEPS. In response to this commission's appeal, Chugaev drafted a report arguing that platinum, one of Russia's most valuable natural resources, should not be exported in raw form but that a state monopoly should be created for locating, producing and processing this important metal. He proposed the formation of an institute to be devoted to the systematic study of all aspects of research and development on the metals of the platinum group.

After the Bolshevik Revolution of October 1917, Chugaev's dream became a reality. In 1918 he was appointed director of the newly created Institut po Izucheniyu Platiny i Drugikh Blagorodnykh Metallov (Institute for the Study of Platinum and Other Noble Metals) of the USSR Academy of Sciences at Petrograd. On Chugaev's death in 1922,

The front cover of the first issue of the *Izvestiya of the Platinum Institute*, published at Petrograd (Leningrad) in 1920 under the editorship of its founder, L. A. Chugaev, and his assistants N. K. Pshenitsyn and I. I. Chernyaev



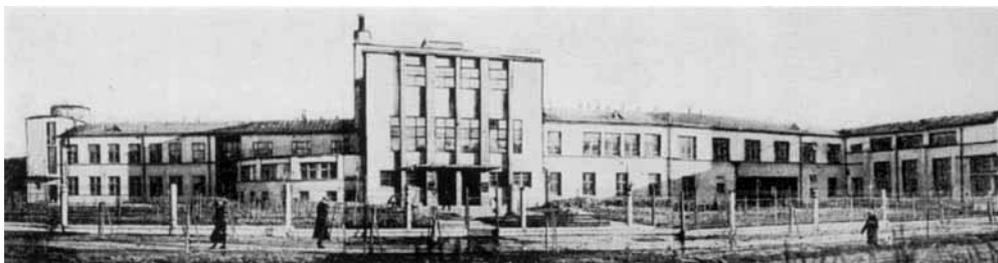
Kurnakov succeeded him as director of the Institute. In 1934 the Institut Fiziko-Khimicheskogo Analiza (Institute of Physico-chemical Analysis, founded in 1918 by Kurnakov as part of KEPS), the Platinum Institute, and the General Chemistry Laboratory of the Academy of Sciences merged to form the Institut Obshchei i Neorganicheskoi Khimii, IONKh (Institute of General and Inorganic Chemistry) with headquarters in Moscow and with Kurnakov as director. Following Kurnakov's death in 1941, it was renamed the N. S. Kurnakov Institute of General and Inorganic Chemistry. Academician Il'ya Il'ich Chernyaev (1893–1966) (9), discoverer of the *trans* effect so important in the synthetic chemistry of the platinum metals, was director of the Institute until his death in 1966.

### The *Izvestiya*

In accordance with the Soviet policy of encouraging a Russian chemical literature, Chugaev founded a special journal, the *Izvestiya Instituta po Izucheniyu Platiny i Drugikh Blagorodnykh Metallov* (Annals of the Institute for the Study of Platinum and

Other Noble Metals), to publish the research results of the new institute. Its founding is considered to coincide with the founding of the Institute; from Volume 6 (1928) on, all issues of the journal bear the designation "osnovany L. A. Chugaevym v 1918 g" (founded by L. A. Chugaev in 1918).

The first issue of the new journal, Tom 1, Vypusk 1 (Vol. 1, No. 1), edited by L. A. Chugaev with the assistance of Nikolai Konstantinovich Pshenitsyn (1891–1961) and I. I. Chernyaev, however, was not published until 1920 at Petrograd under the auspices of KEPS. A slim volume, 15 cm × 22.5 cm—a size which varied only slightly through the years—it consisted of only 49 pages and two articles, both by Chugaev. The first dealt with the goals and tasks of the Institute (p. 1),



The N. S. Kurnakov Institute of General and Inorganic Chemistry at Moscow from where the *Izvestiya* was published for many years. The late Academician Ilya Il'ich Chernyaev, who supplied this picture, was an editor of the *Izvestiya* during its latter years and subsequently became editor of the more general *Zhurnal Neorganicheskoi Khimii*, which replaced it in 1956

while the second, "Researches on the Complex Compounds of Platinum" (p. 11) was subdivided into two parts—"I. On Hydrazine Compounds of Platinum" (co-authored with M. S. Grigor'eva) (p. 14) and "II. On Hydroxylamine Compounds of Platinum" (co-authored with I. I. Chernyaev) (p. 29). The table of contents was printed in both Russian and French, a convenient practice that continued through Volume 18 (1941), after which the French translation was omitted.

The second issue, Tom 1, Vypusk 2 (Vol. 1, No. 2, now considered to be Volume 2, 40 pages), appeared the following year and contained Parts III-VI of Chugaev's series "Researches on the Complex Compounds of Platinum", co-authored with N. K. Pshenitsyn(III), S. S. Kil'tinovich(V), and N. A. Vladimirov(VI). No issue appeared in 1922 or 1923 (or in 1925, 1930, 1934, 1943 to 1946, or 1953). The third issue, Vypusk 3 (No. 3) was published in Leningrad (Petrograd was renamed after Lenin's death) in 1924 and "dedicated to the memory of L. A. Chugaev." For the first time, the name of the journal appears on the title page in French translation, "*Annales de l'Institut de Platine et des Autres Métaux Précieux*," a practice continued through Volume 19 (1941) (at one time *Chemical Abstracts* used the abbreviation *Ann. inst. platine (U.S.S.R.)* for the journal). No editor is designated, and the entire volume is devoted to nine articles about Chugaev's life and work. This volume is designated a joint publication with the

Nauchnoe Khimiko-Technicheskoe Izdatel'stvo N.T.O. (Scientific Chemical-Technical Publishing Firm).

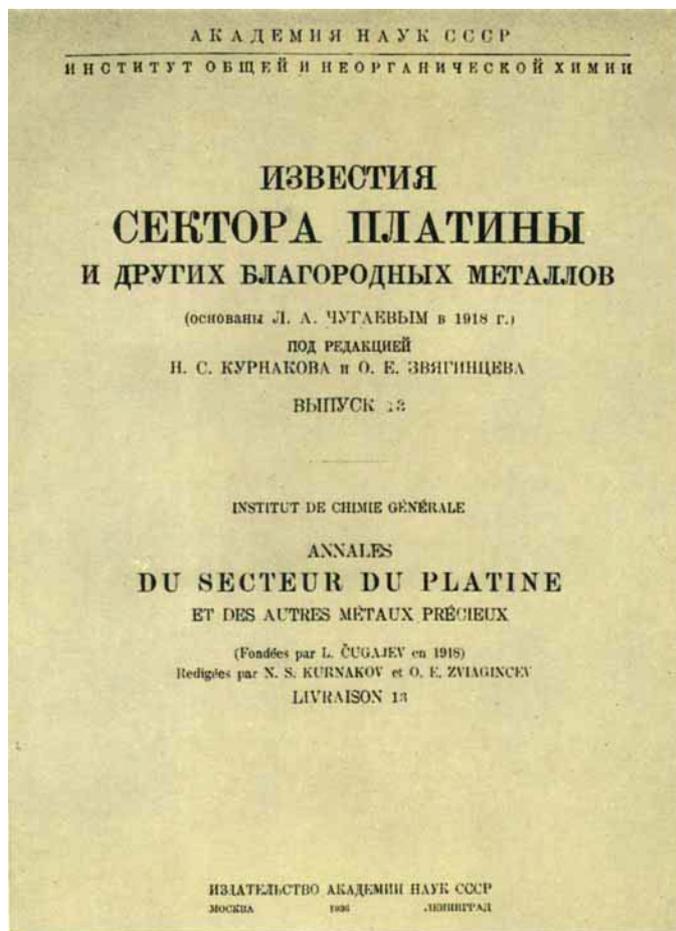
No volume appeared in 1925, but in 1926 Volume 4, consisting of 519 pages, the longest of all 32 volumes, appeared under the editorship of N. S. Kurnakov and Ernest Khristianovich Fritsman (1879-1942) (10). For the first time the designation SSSR (USSR) appears on the title page in connection with the Academy of Sciences and KEPS. Also for the first time the volume is divided into two sections—(1) Experimental and Theoretical Articles (18 papers) and (2) Reports, Reviews, and Abstracts (Russian translations, complete or abridged, of foreign articles) (15 papers). This two-part format, with the exceptions of Volumes 10 (1932) and 13 (1936), was continued through Volume 16 (1939), and reports of meetings and conferences sometimes appeared in the second part. As is the case with many journals, as the number of original articles increased with time, the abstracts and translations were eventually dropped. Five posthumous articles by Chugaev appeared in Volume 4.

Volume 5, published in 1927 by the Izdatel'stvo Akademii Nauk SSSR (Publishing House of the USSR Academy of Sciences) under the editorship of Kurnakov, Fritsman, and O. E. Zvyagintsev, was dedicated to the centenary of the Russian platinum industry. The 22-paper volume contained not only historical articles on the Russian platinum

In 1936 the title of the *Izvestiya* was amended to show its connection with the Institute of General and Inorganic Chemistry. It was then published from Moscow and Leningrad under the editorship of N. S. Kurnakov and O. E. Zvyagintsev

industry but also reprintings of classic 19th century papers by Pëtr Grigor'evich Sobolevskii (1781–1841), Kovan'ko the 1st, and Karl Karlovich Klaus (1796–1864) (11). Beginning with Volume 8 (1931), the name of KEPS no longer appears on the title page under Academy of Sciences of the USSR. Beginning with Volume 9 (1932), which is dedicated to the memory of Nikolai Ivanovich Podkopaev (1872–1930), Fritsman's name no longer appears as editor. Four papers by V. A. Nemilov, Zvyagintsev, Chernyaev, and Aleksandr Abramovich Grinberg (1898–1966) (12) presented for the Platinum Institute at the session of the Academy of Sciences devoted to problems of the Ural-Kusnetsk Region comprise Volume 10, published in the same year.

Beginning with Volume 13 (1936), which contains as a supplement an index to principal works on alloys of precious metals (p. 177), organisational changes are reflected in the change of name of the journal to *Izvestiya Sektora Platiny i Drugikh Blagorodnykh Metallov* (*Annales du Secteur du Platine et des Autres Métaux Précieux*, *Annals of the Sector*



*for Platinum and Other Noble Metals*) and the appearance of "Institut Obshchei i Neorganicheskoi Khimii" (IONKh, Institut de Chimie Générale, Institute of General and Inorganic Chemistry) on the title page, which also now bears the word "Moscow" in addition to "Leningrad". Both places, or no place of publication at all, appear on the title pages until Volume 27 (1952) when the place of publication is given as Moscow only. Although Kurnakov died on March 19th, 1941, his name is still listed as editor along with Zvyagintsev's name on Volumes 18 (1941) and 19 (1942). Strangely enough, his name is bordered in black on Volume 18 but not on Volume 19. After a publication gap of five years, Volume 20 (1947), edited by I. I.

Chernyaev, O. E. Zvyagintsev, and A. V. Babaeva, is completely in Russian; no French on the title page or table of contents appears. The words "im. N. S. Kurnakova" following IONKh on the title page reflects the name change of the Institute.

Volume 21 (1948), devoted principally to the Proceedings of the 3rd Conference on the Chemistry of Complex Compounds, held in Moscow on November 13th-17th, 1944, again reflects a change in editorship; Babaeva's name is replaced by the name of M. M. Yakshin. Volume 26 (1951) is divided into two sections—the first devoted to experimental results obtained by workers at the Platinum Section of IONKh and the second devoted to the Proceedings of the Fifth All-Union Conference on the Chemistry of Complex Compounds, organized by the Academies of Sciences of the Ukrainian SSR and the USSR and held in Kiev on March 23rd to 26th, 1950.

Volume 27 (1952), published in Moscow, indicates a change in editorship, the last one for this journal; Yakshin's name is dropped, and Chernyaev and Zvyagintsev remain as co-editors. Volume 28 (1954) is divided into two sections. The first, consisting of 130 pages, is devoted entirely to the Proceedings of the Conference on the Regularity of the *trans*-Effect of I. I. Chernyaev, held in Moscow, March 24th to 26th, 1952, with lectures by Chernyaev, Grinberg, Gel'man, Yatsimirskii, and other luminaries of Soviet science. The second section consists of experimental articles.

Volume 30 (1955) contains the Resolution of the Sixth All-Union Conference on the Chemistry of Complex Compounds, held in Moscow, December 1st to 4th, 1953, and, more important for our purposes, an index (actually tables of contents) for Volumes 1 to 30 (pp. 189-202). This is followed by two detailed indexes for the same volumes—one of authors (pp. 203 to 205) and one of subjects (pp. 206 to 222). Volume 31 (1955) is subtitled "Works on the Chemistry of Complex Compounds" and contains the Resolution of

the Conference on the Application of Complex Compounds in Analytical Chemistry. Volume 32 (1955), the last of this important and unique journal, is subtitled "Analysis of Noble Metals (Proceedings of the Third Conference on the Analysis of Noble Metals, November 16th to 18th, 1954)", and the final article in the entire series (p. 80) reports the resolution adopted at this conference.

### Contents of the *Izvestiya*

In his extensive review "The Platinum Metals," Raleigh Gilchrist (13) reported that of the roughly eight hundred articles published on this subject from 1915 to 1940, the largest number of papers (*circa* 28 per cent) were contributed by Russian scientists. A large proportion of these more than two hundred papers appeared in the *Izvestiya*, which naturally provided the primary publication outlet for Soviet research efforts on the noble metals. All aspects, both theoretical and experimental, were included. Not only were the fields of inorganic, physical, and analytical chemistry included but also an appreciable number of historical or biographical (obituary) articles and lengthy review articles. Among the diverse topics discussed were syntheses of new compounds and improved preparative methods for known compounds, qualitative and quantitative analytical procedures, the Russian platinum industry, extraction and separation methods, refining, metallography, alloys, substitution reactions, stereochemistry and isomerism, nomenclature, and physicochemical studies.

Among the heaviest contributors to the journal were, not unexpectedly, I. I. Chernyaev, 65 contributions; V. V. Lebedinskii, 49; N. K. Pshenitsyn, 42; O. E. Zvyagintsev, 38; V. A. Nemilov, 37; and A. A. Grinberg, 26. Other leading contributors included A. V. Ablov, A. V. Babaeva, G. B. Bokii, T. A. Vidusova, L. M. Volshtein, A. D. Gel'man, B. G. Karpov, M. A. Klochko, N. S. Kurnakov, M. A. Porai-Koshits, A. M. Rubenshtein, A. A. Rudnitskii, V. G. Tronev, I. A. Fedorov,

E. Kh. Fritsman, and M. M. Yakshin. Although Chugaev died shortly after he founded the journal, he is represented by 19 articles, 12 of which were published posthumously; the last 5 of these were not published until 1929 (Volume 7).

Because of the large number of significant papers included in the *Izvestiya*, it is difficult to single out the most important ones. A list of the most outstanding articles would certainly include Chernyaev's 14-paper series (1926 to 1933) on the nitrite complexes of divalent platinum (14), the first paper of which contained the first statement of his famous *trans* effect (15). This important orientation rule made it possible for the first time to plan systematic routes for carrying out inner-sphere substitution reactions in order to prepare platinum complexes in which all the ligands are different. For example, Chernyaev's synthesis in 1928 of the three possible geometric isomers of the  $[\text{Pt}(\text{NH}_3)(\text{C}_5\text{H}_5\text{N})(\text{NH}_2\text{OH})(\text{NO}_2)]^+$  ion was cited as evidence of a square planar arrangement for platinum(II) (16). In 1949 Anna Gel'man and co-workers (17) prepared the three isomers of  $[\text{Pt}(\text{NH}_3)(\text{C}_5\text{H}_5\text{N})(\text{Cl})\text{Br}]$ . Chernyaev also utilised the *trans* effect in synthesising various isomers of platinum(IV), e.g.  $[\text{Pt}(\text{en})(\text{NH}_3)(\text{Cl})(\text{Br})(\text{NO}_2)]\text{Cl}$  (18). Gel'man's articles with Chernyaev and others on complexes of platinum with unsaturated hydrocarbons such as ethylene (19) can also be cited as important contributions as can Lebedinskii's series of papers on the complexes of iridium and rhodium (20). Of Grinberg's numerous papers, his polarisation theory of the *trans* effect, the earliest explanation that still has current application (21), his studies of the acid-base properties of platinum(IV) complexes (22), and his widely used diagnostic method for determining the configuration of coordination compounds of platinum(II) by reaction with oxalic acid (23) deserve special mention.

With the passing years the *Izvestiya* reflected a broadening in the scope of its subject-matter. Early issues were devoted

exclusively to platinum, and only with Volume 4 (1926) were the other five platinum metals included (osmium, p. 48; iridium, p. 52; palladium, p. 55; rhodium, p. 331; and ruthenium, p. 367). The chemistry of the platinum metals is largely the chemistry of their complexes, so it is not surprising that the journal soon branched out to include coordination compounds of other metals, such as cobalt, gold, silver, chromium, tin, and cadmium. When the *Izvestiya* ceased publication in 1955, its task was taken over in the following year by the new and broader publication *Zhurnal Neorganicheskoi Khimii* (Journal of Inorganic Chemistry), with Il'ya Il'ich Chernyaev as editor.

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## Modern History of Temperature Measurement

Temperature Measurement at The National Physical Laboratory: Collected Papers 1934-1970

EDITED BY C. R. BARBER, H.M.S.O. London 450 pages £14.60

The accuracy and reliability of the millions of temperature measurements made every day throughout the manufacturing industries of the world depend essentially upon the acceptancy of a recognised practical scale of temperature and on the precise establishment of fixed points such as the freezing points of a number of pure metals. The existence of the International Practical Scale of Temperature, first agreed upon in 1927 and revised in 1948 and again in 1968, is nowadays so much taken for granted that its birth pangs and its evolution tend to be forgotten.

Prior to 1927 the only agreed basis was dependent upon mercury thermometers and the scale was limited to the range 0° to 100°C. For some years, beginning in 1911, lengthy discussions took place—interrupted of course by the First World War—between the N.P.L., the Bureau of Standards and the Physikalisch-Technische Reichsanstalt, resulting eventually in the first version of our present scale.

A great deal of the credit for the construction of the International Temperature Scale, and particularly for its subsequent revisions, must be given to the workers at the National Physical Laboratory although, of course, the other national standardising laboratories played their part. This collection of papers published by them over a period of thirty-six years gives a survey of their temperature

researches and, although in some respects the book is largely of historical interest, it does in fact make a more useful contribution, in that it brings together papers on particular subjects and also analyses the present state of knowledge in each section, giving a good measure of additional information that was not included in the original papers.

Two major fields of temperature measurement depend, of course, on the peculiar properties of high purity platinum, resistance thermometry and the use of high temperature thermocouples, and each of these techniques is the subject of several of the papers reprinted, many of them contributed by J. A. Hall and C. R. Barber. The earlier contributions of F. H. Schofield and A. Grace which laid the foundations of the now universally employed technique of liquid steel temperature measurement are also included.

Sadly, the editor of this collection of reprints, C. R. Barber, died suddenly in March 1971. He had become recognised as a leading international authority on all aspects of temperature measurement and its associated experimental techniques. His last contribution to this subject makes a most impressive record of the successful endeavours of the institution with which he was associated for the whole of his career.

L. B. H.