Literatur

C.S. Allardyce, P.J. Dyson, Ruthenium in medicine: Current clinical uses and future prospects. Platin. Met. Rev. **45**(2), 62–69 (2001)

R. Alsfasser et al., *Moderne Anorganische Chemie* (De Gruyter, Berlin, 2007), S. 343. ISBN 3-11-019060-5

E.S. Antonarakis, A. Emadi, Ruthenium-based chemotherapeutics: Are they ready for prime time? Cancer Chemother. Pharmacol. **66**(1), 1–9 (2010)

J.W. Arblaster, Densities of osmium and iridium. Platin. Met. Rev. **33**(1), 14–16 (1989)

J.W. Arblaster, What is the true melting point of osmium? Platin. Met. Rev. **49**(4), 166–168 (2005)

M. Armbruster et al., Über Eisentribromid: Untersuchungen von Gleichgewichten, Kristallstruktur und spektroskopische Charakterisierung. Z. anorg. allg. Chem. **626,** 187–195 (2000)

P. Armbruster et al., „Evidence for 264108, the heaviest known even-even isotope". Z. Phys. A **324**(4), 489–490 (1986)

G. Audi et al., The NUBASE evaluation of nuclear and decay properties. Nucl. Phys. A **729,** 3–128 (2003)

M. Auerbach, H. Ballard, Clinical use of intravenous iron: Administration, efficacy, and safety. Hematology Am. Soc. Hematol. Educ. Program **2010,** 338–347 (2010)

C.F. Barnard, J. Bennett, Oxidation states of ruthenium and osmium. Platin. Met. Rev. **48**(4), 157–158 (2004)

G. Bauer, K. Ruthardt, *Elemente der Achten Nebengruppe: Platinmetalle Platin · Palladium · Rhodium · Iridium · Ruthenium · Osmium* (Springer, Heidelberg, 2013), S. 157. ISBN 978-3-662-28796-5

BDDDX, *Fotos „Eisen-III-oxid"* (2005) *und „wasserfreies Eisen-III-chlorid"* (2006)

H. Bielawa et al., Der Ammoniakkatalysator der nächsten Generation: Barium-promotiertes Ruthenium auf oxidischen Trägern. Angew. Chem. **113**(6), 1093–1096 (2001)

R. Blachnik et al., *Taschenbuch für Chemiker und Physiker. Band III: Elemente, anorganische Verbindungen und Materialien, Minerale,* 4. Aufl. (Springer, Berlin, 1998), S. 454. ISBN 3-540-60035-3

G. Brauer, *Handbuch der präparativen anorganischen Chemie,* Bd. 1, 3. Aufl. (Enke, Stuttgart, 1975). ISBN 3-432-02328-6

H. Sicius, *Eisengruppe: Elemente der achten Nebengruppe,* essentials,
DOI 10.1007/978-3-658-15561-2

G. Brauer, *Handbuch der präparativen anorganischen Chemie,* Bd. 3, 3. Aufl. (Enke, Stuttgart, 1981). ISBN 3-432-87823-0

J.L. Brick et al., The rhenium osmium chronometer, the iron meteorites revisited. Meteorit. **26,** 318 (1991)

K. Brodersen et al., Die Feinstruktur des Ruthenium-III-bromids. Z. Anorg. Allg. Chem. **357**(4–5), 162–171 (1967)

R.C. Burns, T.A. O'Donnell, Preparation and characterization of osmium pentachloride, a new binary chloride of osmium. Inorg. Chem. **18,** 3081–3086 (1979)

R.P. Bush, Recovery of platinum group metals from high level radioactive waste. Platin. Met. Rev. **35**(4), 202–208 (1991)

M. Cohen, Calculation of bulk moduli of diamond and zinc-blende solids. Phys. Rev. B **32**(12), 7988–7991 (1985)

Commodity Trade GmbH, Preis Osmium. (abgerufen 18. Juli 2016)

S. Cotton, *Chemistry of Precious Metals* (Springer Science & Business Media, Heidelberg, 2012), S. 5. ISBN 978-94-009-1463-6

F.A. Cotton, C.E. Rice, Structure of the high-temperature form of osmium(IV) chloride. Inorg. Chem. **16,** 1865 (1977)

K. Dehnicke, R. Lößberg, Eine neue Synthese und das IR-Spektrum von Osmiumpentachlorid/A New Synthesis and the IR Spectrum of Osmiumpentachloride. Z. Naturforsch. B **35,** 1525–1528 (1980)

I. Dragojević et al., New isotope $^{263}{}_{108}$Hs. Phys. Rev. C **79,** 011602 (2009)

T. Drews et al., „Solid state molecular structures of transition metal hexafluorides". Inorg. Chem. **45**(9), 3782–3788 (2006)

C.E. Düllmann, Investigation of group 8 metallocenes @ TASCA. *7th Workshop on Recoil Separator for Superheavy Element Chemistry* (Gesellschaft für Schwerionenforschung, Darmstadt, 2008)

C.E. Düllmann et al., Chemical investigation of hassium (element 108). Nature **418,** 859–862 (2002)

J. Dvorak et al., Doubly magic nucleus $_{108}{}^{270}$Hs$_{162}$. Phys. Rev. Lett. **97**(24), 242501–242504 (2006)

M. Eagleson, *Concise Encyclopedia Chemistry* (De Gruyter, Berlin, 1994), S. 760. ISBN 978-3-11-011451-5

K. Eichner, H.F. Kappert, *Zahnärztliche Werkstoffe und ihre Verarbeitung,* 8. Aufl. (Thieme, Stuttgart, 2005), S. 93. ISBN 3-13-127148-5

Eisenbeisser, *Foto „Primärzementit"* (2007)

C. Elschenbroich, *Organometallchemie,* 6. Aufl. (Teubner, Wiesbaden, 2008), S. 632 ff. ISBN 978-3-8351-0167-8

G. Fellenberg, *Chemie der Umweltbelastung,* 3. Aufl. (Teubner, Stuttgart, 1997), S. 158. ISBN 3-519-23510-2

G. Ferey, R. de Paper, A new form of FeF_3 with the pyrochlore structure: Soft chemistry synthesis, crystal structure, thermal transitions and structural correlations with the other forms of FeF_3. Mater. Res. Bull. **21,** 971–978 (1986)

U. Fuchs, *Foto „Hochofen"* (2004)

A. Ghiorso et al., Responses on ‚Discovery of the transfermium elements' by Lawrence Berkeley laboratory, California; Joint Institute for Nuclear Research, Dubna; and Gesellschaft fur Schwerionenforschung, Darmstadt followed by reply to responses by the Transfermium Working Group. Pure Appl. Chem. **65**(8), 1815–1824 (1993)

J. Gobrecht, E. Rumpler, *Werkstofftechnik – Metalle* (Oldenbourg, München, 2006), S. 139 ff. ISBN 3-486-57903-7
N.N. Greenwood, A. Earnshaw, *Chemistry of the Elements* (Elsevier, Amsterdam, 2012), S. 1083. ISBN 978-0-08-050109-3
W.P. Griffith, Ruthenium and osmium oxo complexes as organic oxidants. Platin. Met. Rev. **33**(4), 181–185 (1989)
W.P. Griffith, The periodic table and the platinum group metals. Platin. Met. Rev. **52**(2), 114–119 (2008)
F.R. Hartley, *Chemistry of the Platinum Group Metals Recent Developments* (Elsevier, Amsterdam, 2013), S. 474–475. ISBN 978-0-08-093395-5
W.M. Haynes, *CRC Handbook of Chemistry and Physics,* 96. Aufl. (CRC Press, Boca Raton, 2015), S. 4–79. ISBN 978-1-4822-6097-7
H. Hillebrecht et al., About trihalides with TiI3 chain structure: Proof of pair forming of cations in -RuCl3 and RuBr3 by temperature dependent single crystal x-ray analyses. Z. Anorg. Allg. Chem. **630,** 2199–2204 (2004)
H. Hiller, *Foto „Osmium-VIII-oxid"* (2009)
H. Hödrejärv, Gottfried Wilhelm Osann and ruthenium. Proc. Est. Acad. Sci., Chem. **53**(3), 125–144 (2004)
D.C. Hoffman et al., Transactinides and the Future Elements, in *The Chemistry of the Actinide and Transactinide Elements,* 3. Aufl., Fuger, et al. (Springer Science & Business Media, Dordrecht, 2006). ISBN 1-4020-3555-1
S. Hofmann et al., The new isotope ^{270}110 and its decay products ^{266}Hs and ^{262}Sg. Eur. Phys. J. A **10,** 5–10 (2001)
A.F. Holleman, E. Wiberg, N. Wiberg, *Lehrbuch der Anorganischen Chemie,* 102. Aufl. (De Gruyter, Berlin, 2007). ISBN 978-3-11-017770-1
J.H. Holloway et al., The crystal structure of ruthenium pentafluoride. J. Chem. Soc. **1964,** 644–648 (1964)
C.E. Housecroft, *Inorganic Chemistry* (Pearson Education, London, 2005), S. 675. ISBN 0-13-039913-2
C.E. Housecroft, A.G. Sharpe, *Inorganic Chemistry* (Prentice Hall, Upper Saddle River, 2004). ISBN 978-0130399137
P.C. Hydes, Electrodeposited ruthenium as an electrical contact material. Platin. Met. Rev. **24**(2), 50–55 (1980)
Internetservice Kummer, *Foto „Ruthenium"* (Buchenberg, 2016)
A.V. Ivanov, The possible existence of Hs in nature from a geochemical point of view. Phys. Part. Nucl. Lett. **3**(3), 165–168 (2006)
C. Janiak et al., *Riedel Moderne Anorganische Chemie* (De Gruyter, Berlin, 2012), S. 356. ISBN 978-3-11-024901-9
B.F.G. Johnson, *Inorganic Chemistry of the Transition Elements* (Royal Society of Chemistry, Cambridge, 1977), S. 321. ISBN 0-85186-540-2
G. Kickelbick, *Chemie für Ingenieure* (Pearson GmbH, Hallbergmoos, 2008), S. 256. ISBN 3-8273-7267-4
Y. Kohgo et al., Body iron metabolism and pathophysiology of iron overload. Int. J. Hematol. **88**(1), 7–15 (2008)
Y. Koizumi et al., in *Proceedings of the International Gas Turbine Congress 2003,* Development of a Next-Generation Ni-base Single Crystal Superalloy (Tokyo, 2003)

Z. Kolarik, E.V. Renard, Potential applications of fission platinoids in industry. Platin. Met. Rev. **49,** 79–90 (2005)
K.-H. Lautenschläger, *Taschenbuch der Chemie* (Harri Deutsch, Frankfurt a. M., 2007), S. 410. ISBN 978-3-8171-1760-4
Yu. Lazarev et al., New nuclide ^{267}108 produced by the $^{238}U + {}^{34}S$ reaction. Phys. Rev. Lett. **75**(10), 1903–1906 (1995)
M. Leblanc et al., Single crystal refinement of the structure of rhombohedral FeF_3. Revue de Chimie Minérale **22**, 107–114 (1985)
G.W. Leddicotte, *The Radiochemistry of Osmium* (National Academies, Washington, 1961), S. 5
B.V. Lenntech, *Foto „Eisen"* (Delft, 2016)
S.V. Ley et al., Tetrapropylammonium Perruthenate, Pr4N+RuO4−, TPAP: A catalytic oxidant for organic synthesis. Synthesis **7,** 639–666 (1994)
P. Loferski, *Platinum Group Metals, Minerals Information* (United States Geological Survey, Washington, 2016)
Q. Lu et al., Anodic activation of Pt/Ru/C catalysts for methanol oxidation. J. Phys. Chem. B **109**(5), 1715–1722 (2005)
P. Machmer, On the polymorphism of osmium tetrachloride. Chem. Commun. **1967,** 610a (1967)
J.E. Macintyre, *Dictionary of Inorganic Compounds* (CRC Press, Boca Raton, 1992), S. 221–296. ISBN 978-0-412-30120-9
A. Marinov et al., New outlook on the possible existence of superheavy elements in nature. Phys. At. Nucl. **66**(6), 1137–1145 (2003)
V.S. Martín et al., in *Encyclopedia of Reagents for Organic Synthesis*, ed. by L.A. Paquette, D. Crich, P.L. Fuchs, G.A. Molander. Ruthenium(VIII) Oxide (Wiley, New York, 2006)
J. Matthey, Nanocrystalline ruthenium supercapacitor material. Platin. Met. Rev. **46**(3), 105 (2002)
J.M. McDermid, B. Lönnerdal, Iron. Adv. Nutr. **3**(4), 532–533 (2012)
V. Medvedev et al., Spiegel, insbesondere für eine mikrolithische Projektionsbelichtungsanlage (DE 102015204631 A1, Carl Zeiss GmbH, Jena, Deutschland, veröffentlicht 10. März 2016)
Metallium Inc., *Foto „Eisen"* (Watertown, 2016)
J.R. Minkel, Osmium is stiffer than diamond. Phys. Rev. Focus **9,** 16 (2002)
G. Münzenberg et al., The identification of element 108. Z. Phys. A: Hadrons Nucl. **317**(2), 235–236 (1984)
V. Ninov et al., Observation of superheavy nuclei produced in the reaction of 86Kr with 208Pb. Phys. Rev. Lett. **83**(6), 1104–1107 (1999)
O. de Nora, Anwendung maßbeständiger aktivierter Titan-Anoden bei der Chloralkali-Elektrolyse. Chem. Eng. Techn. **42**(4), 222–226 (1970)
N.N., Ruthenium in living radical polymerisation. Platin. Met. Rev. **43**(3), 102 (1999)
P.O. Nubel, C.L. Hunt, A convenient catalyst system employing RuCl3 or RuBr 3 for metathesis of acyclic olefins. J. Mol. Catal. A: Chem. **1455,** 323–327 (1999)
YuT Oganessian et al., Synthesis of superheavy nuclei in the $^{48}Ca + {}^{244}Pu$ reaction. Phys. Rev. Lett. **83**(16), 3154–3157 (1999)
G. Osann, Fortsetzung der Untersuchung des Platins vom Ural. Poggendorffs Ann. Phys. Chem. **14,** 329–357 (1828)

G. Osann, Berichtigung, meine Untersuchung des uralschen Platins betreffend. Poggendorffs Ann. Phys. Chem. **15,** 158 (1829)
A. Östlin, L. Vitos, First-principles calculation of the structural stability of 6d transition metals. Phys. Rev. B **84**(11), 113104 (2011)
D.L. Perry, *Handbook of Inorganic Compounds,* 2. Aufl. (Taylor & Francis, London, 2011). ISBN 1-4398-1462-7
V. Pershina et al., Fully relativistic density-functional-theory calculations of the electronic structures of MO_4 (M = Ru, Os, and element 108, Hs) and prediction of physisorption. Phys. Rev. A **78**(3), 032518 (2008)
V.N. Pitchkov, The discovery of ruthenium. Platin. Met. Rev. **40**(4), 181–188 (1996)
A. Racz, *Die kathodische Sauerstoffreduktion: Katalysatoren für Direktmethanol-Brennstoffzellen* (Südwestdeutscher Verlag für Hochschulschriften, Saarbrücken, 2011)
J.A. Rard, Chemistry and thermodynamics of ruthenium and some of its inorganic compounds and aqueous species. Chem. Rev. **85**(1), 1–39 (1985)
H. Remy, M. Kühn, Beiträge zur Chemie der Platinmetalle. V. Thermischer Abbau des Ruthentrichlorids und des Ruthendioxyds. Z. Anorg. Chem **127**(1), 365–388 (1924)
H. Renner et al., in *Ullmann's Encyclopedia of Industrial Chemistry,* ed. by B. Elvers. Platinum Group Metals and Compounds (Wiley-VCH, Weinheim, 2001), S. 317–388
V. Van Rheenen et al., Catalytic osmium tetroxide oxidation of olefins: Cis-1,2-Cyclohexanediol. Org. Synth. **58,** 43 (1978)
O. Ruff, F. Bornemann, Über das Osmium, seine analytische Bestimmung, seine Oxyde und seine Chloride. Z. Anorg. Chem. **65,** 429 (1910)
O. Ruff, E. Vidic, Das Rutheniumpentafluorid und ein Verfahren zur Trennung von Platin und Ruthenium. Z. Anorg. Allg. Chem. **143**(1), 163–182 (1925)
T. Sakurai, A. Takahashi, Behavior of ruthenium in fluoride-volatility processes – V conversions of $RuOF_4$, RuF_4, and RuF_5 into RuO_4. J. Inorg. Nucl. Chem. **41**(5), 681–685 (1979)
M. Schädel, *The Chemistry of Superheavy Elements* (Springer, Heidelberg, 2003), S. 269. ISBN 978-1402012501
M. Schädel, A. Türler, Ein Platz für Schwergewichte. Phys. J. **8**(6), 35–40 (2009)
H. Schäfer et al., Zur Chemie der Platinmetalle. RuO2: Chemischer Transport, Eigenschaften, thermischer Zerfall. Z. Anorg. Allg. Chem. **319**(5–6), 327–336 (1963)
U.E. Schaible, S.H. Kaufmann, Iron and microbial infection. Nat. Rev. Microbiol. **2**(12), 946–953 (2004)
Z. Schnepp et al., Biotemplating of metal carbide microstructures: The magnetic leaf. Angew. Chem. Int. Ed. **49,** 6564–6566 (2010)
K. Schubert, Ein Modell für die Kristallstrukturen der chemischen Elemente. Acta Crystallogr. B **30,** 193–204 (1974)
R.W. Schutz, Ruthenium enhanced titanium alloys. Platin. Met. Rev. **40**(2), 54–61 (1996)
E. Schweda, *Jander/Blasius: Anorganische Chemie I – Einführung & Qualitative Analyse,* 17. Aufl. (Hirzel, Stuttgart, 2012), S. 337. ISBN 978-3-7776-2134-0
K. Seppelt et al., Solid state molecular structures of transition metal hexafluorides. Inorg. Chem. **45**(9), 3782–3788 (2006)
J.Z. Shi et al., Influence of dual-Ru intermediate layers on magnetic properties and recording performance of CoCrPt–SiO2 perpendicular recording media. Appl. Phys. Lett. **87,** 222503–222506 (2005)

Siegert, *Foto „Eisennachweis mit Blutlaugensalz“* (2007)
G. Singh, *Chemistry of Lanthanides and Actinides* (Discovery Publishing House, New Delhi, 2007), S. 307. ISBN 81-8356-241-8
R. Smolańczuk, Properties of the hypothetical spherical superheavy nuclei. Phys. Rev. C **56**(2), 812–824 (1997)
S. Soverna et al., First chemical investigation of hassium (Hs, Z=108). Czech. J. Phys. **53**(1), A291–A298 (2003)
H. Sowa, H. Ahsbahs, Pressure-induced octahedron strain in VF_3-type compounds. Acta Crystallogr. B **54,** 578–584 (1998)
J.M. Stellman, Osmium, Encyclopaedia of Occupational Health and Safety, International Labour Organization (1998), S. 63.34
Tmv23, *Foto „Eisen-III-chloridlösung“* (2010)
Y. Traa, J. Weitkamp, Kinetik der Methanisierung von Kohlendioxid an Ruthenium auf Titandioxid. Chem. Ing. Tech. **70**(11), 1428–1430 (1998)
M. Volkmer, *Basiswissen Kernenergie* (Informationskreis Kernenergie, Bonn, 1996), S. 80. ISBN 3-925986-09-X
K. Wehlte, *Werkstoffe und Techniken der Malerei* (Otto Maier, Ravensburg, 1967), S. 113. ISBN 3-473-48359-1
A.F. Wells, *Structural Inorganic Chemistry,* 4. Aufl. (Clarendon Press, Oxford, 1975)
F. Widdel et al., Ferrous iron oxidation by anoxygenic phototrophic bacteria. Nature **362,** 834–836 (1993)
E. Wildermuth et al., in *Ullmann’s Encyclopedia of Industrial Chemistry,* ed. by B. Elvers. Iron Compounds (Wiley VCH, Weinheim, 2000), S. 41–62
C.L. Yaws, *The Yaws Handbook of Physical Properties for Hydrocarbons and Chemicals Physical Properties for More Than 54,000 Organic and Inorganic Chemical Compounds, Coverage for C1 to C100 Organics and Ac to Zr Inorganics* (Gulf Professional Publishing & Elsevier, Houston, 2015), S. 740. ISBN 978-0-12-801146-1