Dr. GEORGIOS TSAPARLIS

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SCIENTIFIC WORKS

PART 1

PUBLICATIONS IN INTERNATIONAL JOURNALS

A list of publications in English, plus citation data, *h*-index and *i10*-index, can be found at the Google Scholar page:

https://scholar.google.com/citations?hl=en&user=Al2exskAAAAJ&view_op=list_works

See also: my

- **ResearchGate page: https://www.researchgate.net/profile/Georgios_Tsaparlis**
- **Kudos page: https://www.growkudos.com/hub/21285/publications**
- **Academia page: https://uoi.academia.edu/GeorgiosTsaparlis**

APRIL 2024

A: LIST OF ORIGINAL PUBLICATIONS IN INTERNATIONAL PEER-REVIEWED JOURNALS

NOTES:

1. PAPERS ARE CATEGORIZED ACCORDING TO TOPIC. Some papers appear under more than one topic.
2. The full texts (in pdf) of papers published in the electronic journal *Chemistry Education Research and Practice* can be downloaded from http://www.rsc.org/cerp

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Physical Chemistry (Quantum Chemistry)

Kettle S. F. A. & Tsaparlis G. R. (1977). The Heisenberg exchange integral in a non-orthogonal basis for antiferromagnetic and ferromagnetic systems. *Theoretica Chimica Acta*, 45, 95-109. **DOI:** 10.1007/BF00552544

Kettle S. F. A. & Tsaparlis G. R. (1983). Exchange interactions in oxygen-bridged dimers of copper(II) with aromatic N-oxides, Part I: Method and application to di-ì-(pyridine N-oxide)-bis[dichorocopper(II)]. *Journal of Chemical Physics*, 78, 5004-5014. **DOI:** 10.1063/1.445367

Tsaparlis G. R. (1983). Exchange interactions in oxygen-bridged dimers of copper(II) with aromatic N-oxides, Part II: Effects of the bridge angle and of aromatic-ring substituents. *Journal of Molecular Structure* (THEOCHEM), 105, 325-334. **DOI:** 10.1016/0166-1280(83)80210-3

Teaching and Learning Quantum Chemistry

Tsaparlis G. (1997). Atomic orbitals, molecular orbitals and related concepts: Conceptual difficulties among chemistry students. *Research in Science Education*, 27, 271-287. **DOI:** 10.1007/BF02461321

Tsaparlis G. (2001). Towards a meaningful introduction to the Schrödinger equation through historical and heuristic approaches. *Chemistry Education Research and Practice*, 2, 203-213. **DOI:** 10.1039/B1RP90023D

Papaphotis G. & Tsaparlis G. (2002). Quantum-chemical concepts: are they suitable for secondary students? *Chemistry Education Research and Practice*, 3, 125-144. **DOI:** 10.1039/B2RP90011D

Papaphotis G. & Tsaparlis G. (2008). Conceptual versus algorithmic learning in high school chemistry: the case of basic quantum chemical concepts, Part 1. Statistical analysis of a quantitative study. *Chemistry Education Research and Practice*, 9, 323-331. **DOI:** 10.1039/B818468M

Papaphotis G. & Tsaparlis G. (2008). Conceptual versus algorithmic learning in high school chemistry: the case of basic quantum chemical concepts, Part 2. Students' common errors, misconceptions, and difficulties in understanding. *Chemistry Education Research and Practice*, 9, 332-340. **DOI:** 10.1039/B818470B

Tsaparlis G. & Papaphotis G. (2009). High-school students' conceptual difficulties and attempts at conceptual change: The case of basic quantum chemical concepts. *International Journal of Science Education*, 31, 895-930. **DOI:** 10.1080/09500690801891908

Stefani C. & Tsaparlis G. (2009). Students' levels of explanations, models, and misconceptions in basic quantum chemistry: a phenomenographic study. *Journal of Research in Science Teaching*, 46, 520-536. **DOI:** 10.1002/tea.20279

Teaching and learning physical chemistry

Tsaparlis G. & Gorezi, M. (2005). A modification of a conventional expository physical chemistry laboratory to accommodate an inquiry/project-based component: method and students' evaluation. *Canadian Journal of Science, Mathematics, and Technology Education*, 5, 111-131. **DOI:** 10.1080/14926150509556647

Tsaparlis G. (2005). Non-algorithmic quantitative problem solving in university physical chemistry: a correlation study of the role of selective cognitive variables. *Research in Science and Technological Education*, 23, 125-148. **DOI:** 10.1080/02635140500266369

Tsaparlis G. & Gorezi, M. (2007). Addition of a project-based component to the expository physical chemistry laboratory. *Journal of Chemical Education*, 84, 668-670 (plus the full paper in JCE Software). **DOI:** 10.1021/ed084p668

Tsaparlis G. & Finlayson O. E. (2014). Physical chemistry education: its many facets and aspects. *Chemistry Education Research and Practice,* 15, 257-265. **DOI:** 10.1039/C4RP90006E, Editorial.

Tsaparlis G. (2014). The logical and psychological structure of physical chemistry and its relevance to the organization/sequencing of the major areas covered in physical chemistry textbooks. *Chemistry Education Research and Practice,* 15, 391-401**.** DOI:10.1039/C4RP00019F
Plus *Additions and Corrections*.

Tsaparlis G. & Finlayson O. (2015). Physical chemistry education – the 2014 themed issue of *Chemistry Education Research and Practice*. *LUMAT, 3*(4), 568-575. Free access at: http://www.luma.fi/lumat-en/

Tsaparlis, G. (2016). The logical and psychological structure of physical chemistry and its relevance to graduate students' opinions about the difficulties of the major areas of the subject. *Chemistry Education Research and Practice*, 17, 320-336. DOI: 10.1039/C5RP00203F.

Tsaparlis G. (2019). Teaching and learning electrochemistry (Review article in Special Issue: Chemistry Education, Eds. R. Blonder & R. Shenhar). *Israel Journal of Chemistry*, 59 (6-7) 478-492. https://doi.org/10.1002/ijch.201800071

Stroumpouli, C. and Tsaparlis, G. (2022). Chemistry students' conceptual difficulties and problem solving behavior in chemical kinetics, as a component of an introductory physical chemistry course (plus Supplementary Materials). *Chemistry Teacher International, 4 (3) 279-296.*
https://doi.org/10.1515/cti-2022-0005

Stambouli, O., Pegka, S., Gerothanassis, I., and Tsaparlis, G, (2023). Undergraduate chemistry students' perceived abilities and declarative knowledge on some basic aspects and concepts of spectroscopy. *Journal of Chemical Education,* 2023, 100, 11, 4181–4189 (plus Supporting Information). https://doi.org/10.1021/acs.jchemed.2c00720

Problem solving in science - Effect of psychometric factors

Tsaparlis G. (1998). Dimensional analysis and predictive models in problem solving. G. Tsaparlis, *International Journal of Science Education*, 20, 335-350. **DOI:** 10.1080/0950069980200306

Tsaparlis G., Kousathana M., & Niaz M. (1998). Molecular-equilibrium problems: Manipulation of logical structure and of M-demand, and their effect on student performance. *Science Education*, 82, 437-454. **DOI:** 10.1002/(SICI)1098-237X(199807)82:4<437::AID-SCE2>3.0.CO;2-C

Tsaparlis G. & Angelopoulos V. (2000). A model of problem-solving: Its operation, validity, and usefulness in the case of organic-synthesis problems. *Science Education*, 84, 151-153. **DOI:** 10.1002/(SICI)1098-237X(200003)84:2<131::AID-SCE1>3.0.CO;2-4

Stamovlasis D., Kousathana M., Angelopoulos V., Tsaparlis G., & Niaz, M. (2002). Achievement in chemistry problem-solving as a function of the mobility-fixity dimension. *Perceptual and Motor Skills*, 95, 914-924. **DOI:** 10.2466/pms.2002.95.3.914

Demerouti M., Kousathana, M. & Tsaparlis G. (2004). Acid-base equilibria, Part II: Effect of developmental level and disembedding ability on students' conceptual understanding and problem solving ability. *The Chemical Educator*, 9, 132-137.

Tsaparlis G. (2005). Non-algorithmic quantitative problem solving in university physical chemistry: a correlation study of the role of selective cognitive variables. *Research in Science and Technological Education*, 23, 125-148. **DOI:** 10.1080/02635140500266369

Avramiotis S, & Tsaparlis G. (2013). Using computer simulations in chemistry problem solving. *Chemistry Education Research and Practice,* 14, 299-311. DOI: 10.1039/C3RP20167H

Problem solving in science – Application of complexity theory

Stamovlasis D. & Tsaparlis G. (2001). Non-linear analysis of the effect of working memory capacity on organic-synthesis problem solving. *Chemistry Education Research and Practice*, 1, 375-380. **DOI:** 10.1039/B0RP90017F

Stamovlasis D. & Tsaparlis G. (2001). Application of complexity theory to an information-processing model in science education. *Nonlinear Dynamics in Psychology and Life Sciences*, 5, 267-286. **DOI:** 10.1023/A:1009514607622

Stamovlasis D. & Tsaparlis G. (2003). A complexity theory model in science education problem solving: Random walks for working memory and mental

capacity. *Nonlinear Dynamics in Psychology and Life Sciences*, 7, 221-243. **DOI:** 10.1023/A:1022810500672

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Stamovlasis D. & Tsaparlis G. (2012). Applying catastrophe theory to an information-processing model of problem solving in science education. *Science Education*, 96, 392-410. **DOI:** 10.1002/sce.21002

Problem solving in science – General

Kousathana M. & Tsaparlis G. (2002). Students' errors in solving numerical chemical-equilibrium problems. M. *Chemistry Education Research and Practice*, 3, 5-17. **DOI:** 10.1039/B0RP90030C

Kampourakis C. & Tsaparlis G. (2003). A study of the effect of a practical activity on problem solving in chemistry. *Chemistry Education Research and Practice*, 4, 319-333. **DOI:** 10.1039/B2RP90047E

Stamovlasis D., Tsaparlis G., Kamilatos C., Papaoikonomou D., & Zarotiadou E. (2004). Algorithmic problem solving versus conceptual understanding: A principal component analysis of a national examination. *The Chemical Educator*, 9, 398-405.

Stamovlasis D., Tsaparlis G., Kamilatos C., Papaoikonomou D., & Zarotiadou E. (2005). Algorithmic problem solving versus conceptual understanding: Further evidence from a national examination. *Chemistry Education Research and Practice*, 6, 104-118. **DOI:** 10.1039/B2RP90001G

Zikovelis V. & Tsaparlis G. (2006). Explicit teaching of problem categorisation and a preliminary study of its effect on student performance – the case of problems in colligative properties of ideal solutions. *Chemistry Education Research and Practice*, 7, 114-130. (special issue in honour of Prof. Alex H. Johnstone) **DOI:** 10.1039/B5RP90018B

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Higher-order cognitive/thinking skills (HOCS/HOTS)

Zoller U. & Tsaparlis G. (1997). Higher and lower-order cognitive skills : The case of chemistry. *Research in Science Education*, 27, 117-130. **DOI:** 10.1007/BF02463036

Zoller U., Fastow, M., Lubezky A., & Tsaparlis G. (1997). Student self-assessment of higher-order cognitive skills in college science teaching. *Journal of College Science Teaching*, Vol. XXVII (2) 99-101.

Zoller U., Fastow, M., & Lubezky A. & Tsaparlis G. (1999). Students' self-assessment in chemistry examinations requiring higher- and lower-order cognitive skills. *Journal of Chemical Education*, 76, 112-113. **DOI:** 10.1021/ed076p112

Tsaparlis G. & Zoller U. (2003). Evaluation of higher vs. lower-order cognitive skills-type examinations in chemistry: implications for university in-class assessment and examinations. *University Chemistry Education, 7, No. 2, 50-57.*

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Stamovlasis D., Tsaparlis G., Kamilatos C., Papaoikonomou D., & Zarotiadou E. (2005). Algorithmic problem solving versus conceptual understanding: Further evidence form a national examination. *Chemistry Education Research and Practice*, 6, 104-118. **DOI:** 10.1039/B2RP90001G

Tsaparlis, G. (2020). Higher and lower-order thinking skills: The case of chemistry revisited. *Journal of Baltic Science Education*, *19*(3), 467-483. https://doi.org/10.33225/jbse/20.19.467

Concepts

Tsaparlis G. (2003). Chemical phenomena versus chemical reactions: Do students make the connection? *Chemistry Education Research and Practice*, 4, 31-43. **DOI:** 10.1039/B2RP90035A

Demerouti M., Kousathana, M., & Tsaparlis, G. (2004). Acid-base equilibria, Part I: Upper secondary students' misconceptions and difficulties. *The Chemical Educator*, 9, 122-131.

Demerouti M., Kousathana M., & Tsaparlis, G. (2004). Acid-base equilibria, Part II: Effect of developmental level and disembedding ability on students' conceptual understanding and problem solving ability. *The Chemical Educator*, 9, 132-137.

Kousathana M., Demerouti M., & Tsaparlis G. (2005). Instructional misconceptions in acid–base equilibria: An analysis from a history and philosophy of science perspective, *Science & Education*, 14, 173-193. **DOI:** 10.1007/s11191-005-5719-9

Tsaparlis G., Hartzavalos S., & Nakiboğlu C. (2013). Students' knowledge of nuclear science and its connection with civic scientific literacy in two european contexts: the case of newspaper articles. Science & Education, 22, 1963-1991. **DOI**: 10.1007/s11191-013-9578-5

Tsaparlis G., Pappa E. T., & Byers, B. (2018). Teaching and learning chemical bonding: Research-based evidence for misconceptions and conceptual difficulties experienced by students in upper secondary schools and the effect of an enriched text. *Chemistry Education Research and Practice*, *19*(4) 1253-1269.

DOI: 10.1039/C8RP00035b. (Plus Supplementary files, DOI: C8RP00035b1, C8RP00035b2, C8RP00035b3.)

Tsaparlis G., Pappa E. T., & Byers, B. (2019). Proposed pedagogies for teaching and learning chemical bonding in secondary education. Chemistry Teacher International, Vol. 2, No. 1.
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Structural concepts

Tsaparlis G. R. (1984). The chemical bond as an atomic tug-of-war. *Journal of Chemical Education*, 61, 677. **DOI:** 10.1021/ed061p677

Tsaparlis G. (1997). Atomic and molecular structure in chemical education: A critical analysis from various perspectives of science education. *Journal of Chemical Education*, 74, 922-925. **DOI:** 10.1021/ed074p922

Pappa E. T. & Tsaparlis G. (2011). Evaluation of questions in general chemistry textbooks according to the form of the questions and the Question-Answer Relationship (QAR): the case of intra- and intermolecular chemical bonding. *Chemistry Education Research and Practice*, 12, 262-270 (plus Supplementary Information). **DOI:** 10.1039/C1RP90031E

Taber K. S., Tsaparlis G., Nakiboğlu C. (2012). Student conceptions of ionic bonding: patterns of thinking across three national contexts. *International Journal of Science Education*, 34, 2843-2873. **DOI:**10.1080/09500693.2012.656150

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Tsaparlis G., Pappa E. T., & Byers, B. (2019). Proposed pedagogies for teaching and learning chemical bonding in secondary education. Chemistry Teacher International, Vol. 2, No. 1.
https://www.degruyter.com/document/doi/10.1515/cti-2019-0002/html
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Tsaparlis, G., Pantazi, G., Pappa E. T., and Byers B. (2021). Using electrostatic potential maps as visual representations to promote better understanding of

chemical bonding, *Chemistry Teacher International,* 3(4), 391-411 (plus Supplementary Information). https://doi.org/10.1515/cti-2021-0012

Instructional methodology

Tsaparlis G. (1994). Hierarchical organization of descriptive chemistry. *La Chimica nella Scuola*, N.2, 47-49.

Zarotiadou E. & Tsaparlis G. (2000). Teaching lower-secondary chemistry with a Piagetian constructivist and an Ausbelian meaningful-receptive method: a longitudinal comparison *Chemistry Education Research and Practice*, 1, 37-50. **DOI:** 10.1039/A9RP90005E

Georgiadou A. & Tsaparlis G. (2000). Chemistry teaching in lower secondary school with methods based on: a) psychological theories; b) the macro, representational, and submicro levels of chemistry. *Chemistry Education Research and Practice*, 1, 277-289. **DOI:** 10.1039/A9RP90023C

Kampourakis C. & Tsaparlis G. (2003). A study of the effect of a practical activity on problem solving in chemistry. *Chemistry Education Research and Practice*, 4, 319-333. **DOI:** 10.1039/B2RP90047E

Sarantopoulos P. & Tsaparlis G. (2004). Analogies in chemistry teaching as a means of attainment of cognitive and affective objectives: A longitudinal study in a naturalistic setting, using analogies with a strong social content. *Chemistry Education Research and Practice*, 1, 33-50. **DOI:** 10.1039/B3RP90029K

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Stamovlasis D., Dimos A., & Tsaparlis G. (2006). A study of group-interaction processes in learning lower-secondary physics. *Journal of Research in Science Teaching*, 43**,** 556-576. **DOI:** 10.1002/tea.20134

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Tsaparlis, G., Hartzavalos, S., Vlacha, V., Malamou, C., Neila, I., and Pantoula, C. (2020). Affective and cognitive outcomes of project-based teamwork in a model lower secondary School: The case of nuclear energy. *Science Education International*, 31 (1), 52-64. https://doi.org/10.33828/sei.v31.i1.6

Secondary chemistry curricula

Tsaparlis G. (2000). The states-of-matter approach (SOMA) to introductory chemistry. *Chemistry Education Research and Practice*, 1, 161-168. **DOI:** 10.1039/A9RP90017A

Tsaparlis G. & Kampourakis C. (2000). An integrated physical-science (physics and chemistry) introduction for lower-secondary level (grade 7). *Chemistry Education Research and Practic*e, 1, 277-289. **DOI:** 10.1039/A9RP90029B

Tsaparlis G. (2008). Using PARSEL modules to contextualising the States-Of-Matter Approach to Introductory Chemistry (SOMA). *Science Education International*, Special issue on project "Popularity and relevance of science Education for scientific Literacy" (PARSEL), J. Holbrook (ed.), 19, 323-330.

Tsaparlis G., Kolioulis D., & Pappa E. (2010). Lower-secondary introductory chemistry course: A novel approach based on science-education theories, with emphasis on the macroscopic approach, and the delayed meaningful teaching of the concepts of molecule and atom. *Chemistry Education Research and Practice*, 11, 107-117 (plus Supplementary Information). **DOI:** 10.1039/C005354F

Tsaparlis G., Hartzavalos S., & Nakiboğlu C. (2013). Students' knowledge of nuclear science and its connection with civic scientific literacy in two european contexts: the case of newspaper articles. Science & Education, 22, 1963-1991. **DOI**: 10.1007/s11191-013-9578-5

Tsaparlis, G. (2015). First and second thoughts about teaching secondary chemistry. *LUMAT, 3*(3), 371-380. Free access at: http://www.luma.fi/lumat-en/

Undergraduate general chemistry textbooks

Pappa E. T. & Tsaparlis G. (2011). Evaluation of questions in general chemistry textbooks according to the form of the questions and the Question-Answer Relationship (QAR): the case of intra- and intermolecular chemical bonding. *Chemistry Education Research and Practice*, 12, 262-270 (plus Supplementary Information). **DOI:** 10.1039/C1RP90031E

Primary science education

Kampourakis C., Georgousi K., & Tsaparlis G. (2001). Physical science knowledge and patterns of achievement at the primary-secondary interface: Part 1. General student population in Greece. *Chemistry Education Research and Practice*, 2, 241-252. **DOI:** 10.1039/B1RP90026A

Georgousi K., Kampourakis C., & Tsaparlis G. (2001). Physical science knowledge and patterns of achievement at the primary-secondary interface: Part 2. Able and promising students. *Chemistry Education Research and Practice*, 2, 253-263. **DOI:** 10.1039/B1RP90027G

History and philosophy of science

Tsaparlis G. (2001). Towards a meaningful introduction to the Schrödinger equation through historical and heuristic approaches. *Chemistry Education Research and Practice*, 2, 203-213. **DOI:** 10.1039/B1RP90023D

M. Niaz, F. Abd-El-Khalick, A. Benarroch, L. Cardellini, C.E. Laburú, N. Marín, L.A. Montes, R. Nola, Y. Orlik, L.C. Scharmann, C.-C. Tsai, & G. Tsaparlis (2003). Constructivism: Defense or a continual critical appraisal - A response

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Kousathana M., Demerouti M., & Tsaparlis, G. (2005). Instructional misconceptions in acid–base equilibria: An analysis from a history and philosophy of science perspective. *Science & Education*, 14, 173-193. **DOI:** 10.1007/s11191-005-5719-9

Book reviews

Tsaparlis, G. (2015). Concepts, theoretical constructs, models, theories and the varied and rich practice of "Relevant chemistry education". Book review of: *Relevant chemistry education*, Ingo E. & Hofstein A. (eds.), Rotterdam: Sense, 2015. *Studies in Science Education*, 52 (2) 247-255. **DOI**:10.1080/03057267.2015.1108539, Published online: 13 Nov 2015.

Tsaparlis, G. (2017). Controlling the variables relating to chemistry teaching and the training of chemistry teachers. Book review of: *A Guidebook of Good Practice for the Pre-Service Training of Chemistry Teachers*, Maciejowska I. and Byers B. (eds.), Faculty of Chemistry, Jagiellonian University in Krakow, 2015. Freely downloadable from the EC2E2N website:

http://www.ec2e2n.net/publication/msct2 *Studies in Science Education, 53(2) 227-234.* DOI:10.1080/03057267.2015.1108539, Published online: 23 Oct 2017.

Review articles

Tsaparlis, G. (2016). Problems and solutions in chemistry education. JOTCSC, 1 (1), 1-30. (Review article). Free access at: http://dergipark.ulakbim.gov.tr/jotcsc

Tsaparlis, G. (2015). First and second thoughts about teaching secondary chemistry. *LUMAT, 3*(3), 371-380. Free access at: http://www.luma.fi/lumat-en/

Tsaparlis G. (2019). Teaching and learning electrochemistry (Review article). *Israel Journal of Chemistry*, *59* (6−7), 478−492. https://doi.10.1002/ijch.201800071

Refereed Editorials

Tsaparlis, G. (2005). Dear Readers and Writers (Editorial). *Journal of Baltic Science Education*, *4* (2) 4. URL: http://oaji.net/articles/2016/987-1481284646.pdf

Tsaparlis, G. (2018). Organizing and attending international conferences (Editorial). *Journal of Baltic Science Education*, *17* (6) 912-917. https://doi.org/10.33225/jbse.18.17.912

Tsaparlis, G. (2024). What and who inspired me to become a scientist and further a science educator? (Editorial). *Journal of Baltic Science Education*, *23* (2) 180-186. https://doi.org/10.33225/jbse/24.23.180