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Fulvio Cacace: Curriculum Vitae

Fulvio Cacace took his degree in chemistry at the University of Rome in 1954. In 1956, he earned a temporary teaching appointment. He became assistant professor in 1958 and full professor of General and Inorganic Chemistry at the University of Rome “La Sapienza” in 1971. His teaching activity covers stages at the University of Camerino (1965–68) and at the University of Tuscia (1982–1985). He obtained a “libera docenza” in Radiochemistry in 1960 and in Nuclear Chemistry in 1964.

Besides carrying out research activity in his department laboratories, he spent several periods as a research guest at foreign scientific institutions, such as: G. Werner Institute of Nuclear Chemistry, Uppsala, Sweden (1960); Brookhaven National Laboratory, USA (1961–1962, 1968, 1977, 1980, 1982); Kernforschungsanlage (KFA), Juelich, Germany (1972). He also had a teaching and research stage at Irvine, University of California, in 1968.

From 1968 to 1974, Fulvio Cacace directed the Nuclear Chemistry Institute of Italian Research Council (CNR), chairing its Scientific Committee for many years.

Among the many charges he was appointed to, one can remember that he has been the National Coordinator of the strategic CNR Project “Advanced Radiochemical Technologies and Methodologies” and, since 1979, he is a member of the Research Committee at the University of Rome La Sapienza.

In 1990 he received an award from the Italian Chemical Society for his contribution to the Chemical Sciences in the field of structure and reactivity of ions in the gas phase.

He gave his service in the editorial board of many scientific journals, such as: *Gazzetta Chimica Italiana*, *J. Heteroatom Chemistry*, *J. Labeled Compounds* and

Radiopharmaceuticals, *International Journal of Mass Spectrometry and Ion Processes*, *Radiochemical and Radioanalytical Letters*, *Inorganica Chimica Acta*, etc.

Fulvio Cacace co-authored more than 200 papers, reviews, chapters in scientific treatises and textbooks. His research activity concerns the following aspects of gas-phase ion chemistry and radiochemistry:

1. Study of the structure, stability, and reactivity of gaseous ions using the “decay technique.” He developed and applied this technique to generate species with exactly defined structure and charge position, in the absence of solvation and counterion. This approach allowed the preparation of otherwise inaccessible ions and the comparison of their reactivity in different media, e.g. gas-phase versus solution systems.
2. Study of gaseous ion chemistry by coupled radiolytic and mass-spectrometric techniques. The results in this field concern, in particular, aromatic alkylation and nitration, and represent a link between theoretical chemistry and ion chemistry in solution. The coupling of radiolytic and mass-spectrometric methods allowed in fact to extend the investigation of gaseous ion–molecule reactions in the atmospheric pressure range.
3. Ab initio calculations and experimental study of the structure, stability and reactivity of simple inorganic ions such as H_2NO_3^+ , O_3H^+ , hydrazoic acid, nitric esters, boric and polyboric protonated acids, and anions in the gas phase.
4. Chemical effects of nuclear transformations, reactions of high-energy nucleogenic atoms, isotope exchange reactions and new synthetic approaches to labeled molecules. Among the radionuclides investigated, besides ^3H and ^{14}C , the studies on molecules containing ^{11}C , ^{13}N , ^{18}F isotopes led to

the development of diagnostic methods such as PET.

Publications

- [1] F. Cacace, M. Zifferero, Derivati degli acidi teobromin-1-carbonico e teobromin-1-acetico, *Ann. Chim.* 45 (1955) 1026.
- [2] F. Cacace, G. Fabrizi, M. Zifferero, Derivati degli acidi teofillin-7-carbonico, teofillin-7-acetico e teofillin-7-propionico, *Ann. Chim.* 45 (1955) 983.
- [3] F. Cacace, G. Fabrizi, M. Zifferero, Derivati della N-etanol-teofillina e della N-etanol-teobromina, *Ann. Chim.* 46 (1956) 91.
- [4] F. Cacace, R. Crisera', M. Zifferero, Preparazione di alcuni derivati degli acidi 8-Br-teofillin-7-acetico e 8-alchilammino-teofillin-7-acetici, *Ann. Chim.* 46 (1956) 99.
- [5] F. Cacace, R. Masironi, Derivati della 8-mercaptoteofillina: sintesi di una 2', 3'-tiazolidino-7,8-teofillina, *Ann. Chim.* 46 (1956) 806.
- [6] F. Cacace, M. Zifferero, Azione del sodio sugli alcoli acetilenici terziari, *Ric. Sci.* 26 (1956) 1525.
- [7] B. Aliprandi, F. Cacace, Reazioni chimiche con ioni accelerati: bombardamento con ioni $^{14}\text{C}^+$ della colesterina allo stato solido, *Ann. Chim.* 46 (1956) 1204.
- [8] B. Aliprandi, F. Cacace, G. Giacomello, Reazioni chimiche con ioni accelerati: bombardamento con ioni $^{14}\text{C}^+$ di benzoato sodico nel separatore isotopico, *Ric. Sci.* 26 (1956) 3029.
- [9] F. Cacace, R. Masironi, Derivati della 8-amminoteofillina, *Ann. Chim.* 47 (1957) 362.
- [10] F. Cacace, R. Masironi, Azione di acidi minerali su alcune 8-nitroxantine, *Ann. Chim.* 47 (1957) 366.
- [11] F. Cacace, R. Giuliano, Inam-Ul-Haq, L'acido benzimidazol-N-acetico e la sua azione auxinica, *Rend. Acc. Naz. dei Lincei XXII* (1957) 510.
- [12] B. Aliprandi, F. Cacace, G. Montefinale, Derivati degli acidi teofillin-7-malonico e teofillin-7-lattico, *Il Farmaco XII* (1957) 751.
- [13] F. Cacace, L. Cieri, M. Zifferero, Prodotti radioattivi ottenuti irradiando con neutroni benzanilide cristallina, *Ann. Chim.* 47 (1957) 892.
- [14] B. Aliprandi, F. Cacace, E. Possagno, Alchilazione di benzimidazoli sostituiti, *Ann. Chim.* 48 (1958) 1349.
- [15] F. Cacace, L. Cieri, Irradiazione con neutroni di ossalato di chinolina in presenza di alfa-naftolo, *Ric. Sci.* 28 (1958) 1174.
- [16] B. Aliprandi, F. Cacace, L. Cieri, G. Ciranni, R. Masironi, M. Zifferero, Chemical reactions with accelerated ions, *Radioisotopes in Scientific Research*, Pergamon, London, 1958, Vol. II, p. 146.
- [17] F. Cacace, G. Giacomello, M. Zifferero, Use of ions acceleration for labeling chemical compounds, *Energia Nucl.* 5 (1958) 387.
- [18] F. Cacace, G. Montefinale, Microsintesi di urea e acidi barbiturici marcati con ^{14}C , *Ric. Sci.* 28 (1958) 1419.
- [19] F. Cacace, G. Ciranni, G. Giacomello, M. Zifferero, Nuovi metodi per preparare sostanze organiche contenenti radiocarbonio, *Ric. Sci.* 28 (1958) 2131.
- [20] F. Cacace, L. Cieri, Distribuzione del radiocarbonio nei prodotti di irradiazione con neutroni della N,N-difenilbenzammide, *Ann. Chim.* 49 (1959) 1392.
- [21] F. Cacace, G. Giacomello, G. Montefinale, Irradiazione con neutroni della benzammide e della benzensolfonammide allo stato solido, *Gazz. Chim.* 89 (1959) 1829.
- [22] B. Aliprandi, F. Cacace, Marcatura di composti organici mediante scambio con acqua tritiata, *Ann. Chim.* 49 (1959) 2011.
- [23] F. Cacace, A. Guarino, E. Possagno, Effetti chimici delle radiazioni ionizzanti: formazione di acidi carbossilici in seguito ad irradiazione di una miscela di n-pentano e di $^{14}\text{CO}_2$ con raggi X, *Gazz. Chim.* 89 (1959) 1837.
- [24] B. Aliprandi, F. Cacace, Acidi carbossilici radioattivi ottenuti per mezzo di radiazioni beta da una miscela gassosa di n-pentano e $^{14}\text{CO}_2$, *Gazz. Chim.* 89 (1959) 2268.
- [25] F. Cacace, M. Ikram, M.L. Stein, Applicazione della cromatografia in fase gassosa all'analisi di distillati alcoolici, *Ann. Chim.* 49 (1959) 1383.
- [26] B. Aliprandi, F. Cacace, L. Cieri, Effetto delle condizioni di irradiazione sulla distribuzione degli atomi radioattivi nella molecola del toluolo marcato per scambio con tritio gassoso, *Ric. Sci.* 30 (1960) 90.
- [27] F. Cacace, E. Ciranni, G. Ciranni, Distribuzione degli atomi radioattivi in molecole organiche marcate per scambio con tritio gassoso, *Rend. Acc. Naz. dei Lincei XXVIII* (1960) 865.
- [28] F. Cacace, A. Guarino, G. Montefinale, E. Possagno, Radioactive atoms distribution in aromatic compounds labeled by exposure to tritium gas, *Int. J. Appl. Radiat. Isot.* 8 (1960) 82.
- [29] F. Cacace, E. Possagno, Effetto delle condizioni di irradiazione sulla reazione di scambio tra tritio gassoso e composti organici. (Nota III), *Gazz. Chim.* 90 (1960) 1800.
- [30] B. Aliprandi, F. Cacace, Marcatura di composti organici mediante scambio con acqua tritiata. (Nota II), *Ann. Chim.* 50 (1960) 931.
- [31] F. Cacace, G. Ciranni, E. Possagno, Sostanze marcate con radiocarbonio ottenute per irradiazione con raggi gamma di miscele gassose costituite da propano + $^{14}\text{CO}_2$ e ciclopentano + $^{14}\text{CO}_2$, *Ann. Chim.* 50 (1960) 920.
- [32] F. Cacace, A. Guarino, Radiation labeling with carbon-14 of aliphatic hydrocarbons, *Nature* 186 (1960) 632.
- [33] F. Cacace, Inam-Ul-Haq, Radiometric analysis of tritiated organic compounds by means of vapor phase chromatography, *Science*, 131 (1960) 732.
- [34] F. Cacace, Inam-Ul-Haq, Analisi radiometrica di composti organici volatili marcati con ^{14}C e ^3H mediante cromatografia in fase vapore, *Ric. Sci.* 30 (1960) 501.
- [35] F. Cacace, A. Guarino, Inam-Ul-Haq, Separazione gas cromatografica ed analisi radiometrica di sostanze ad alto punto di ebollizione marcate con ^{14}C , *Ann. Chim.* 50 (1960) 915.
- [36] F. Cacace, R. Cipollini, G. Perez, Continuous elemental

- analysis of organic compounds in gas-chromatographic effluents, *Science* 132 (1960) 1253.
- [37] F. Cacace, Cary–Loenco system, *Science* 131 (1960) 732.
- [38] F. Cacace, G. Giacomello, M. Zifferero, Hot atom chemistry of ^{14}C in solid organic compounds, *Chemical Effects of Nuclear Transformations*, International Atomic Energy Agency, IAEA, Vienna 1961, Vol. II, p. 51.
- [39] F. Cacace, The distribution of radioactive atoms in aromatic molecules labeled by exposure to tritium gas, *Chemical Effects of Nuclear Transformations*, International Atomic Energy Agency, IAEA, Vienna 1961, Vol. II, p. 133.
- [40] B. Aliprandi, F. Cacace, Marcatura di composti aromatici per scambio con acido trifluoroacetico tritiato. (Nota III), *Ann. Chim.* 51 (1961) 397.
- [41] F. Cacace, A. Guarino, G. Montefinale, Labeling of organic compounds by mercury-photosensitized reaction with tritium gas, *Nature* 189 (1961) 54.
- [42] F. Cacace, E. Ciranni, G. Ciranni, G. Montefinale, Labeling of organic compounds by UV promoted exchange with tritium gas, *Energia Nucl.* 8 (1961) 561.
- [43] F. Cacace, Labeled organics in gas chromatography, *Nucleonics* 19 (1961) 45.
- [44] F. Cacace, R. Cipollini, G. Perez, E. Possagno, Analisi elementare continua di composti organici volatili separati mediante cromatografia in fase vapore, *Gazz. Chim. It.* 91 (1961) 804.
- [45] F. Cacace, A. Guarino, Effetti chimici delle radiazioni ionizzanti, *Monografia*, Ministero dell'Industria, 1961.
- [46] F. Cacace, A.P. Wolf, Uso della reazione ^{14}N (p, α) ^{11}C nello studio della chimica di rinculo del carbonio, *Chim. l'Indust.* 44 (1962) 752.
- [47] F. Cacace, A.P. Wolf, The effect of radiation on the reactions of recoil carbon-11 in ammonia, *J. Am. Chem. Soc.* 84 (1962) 3202.
- [48] F. Cacace, R. Cipollini, G. Di Marco, G. Giacomello, A. Guarino, Sintesi di idrocarburi alifatici marcati con carbonio-14, promossa da radiazioni ionizzanti, *Gazz. Chim. It.* 93 (1963) 1105.
- [49] G. Stöcklin, F. Cacace, A.P. Wolf, Radiogaschromatographie ^{14}C und ^{11}C -markierter aliphatischer kohlenwasserstoffe und amine. *Zeit. für Anal. Chem.* 194 (1963) 406.
- [50] G. Giacomello, F. Cacace, Radio gas cromatografia di idrocarburi ed altre sostanze marcate, *Scuola Azione 3* (1963) 51.
- [51] F. Cacace, R. Cipollini, G. Perez, Continuous elemental analysis for gas chromatographic effluents, *Anal. Chem.* 35 (1963) 1348.
- [52] F. Cacace, R. Cipollini, G. Perez, Analisi elementare continua di effluenti gas cromatografici, *Chim. l'Indust.* 45 (1963) 11, 1426.
- [53] F. Cacace, A new technique for the study of ion–molecule reactions at atmospheric pressure by means of doubly labeled substances, *Proceedings of the Conference on Methods of Preparing and Storing Marked Molecules*, EURATOM, Bruxelles, 1964, p. 1339.
- [54] F. Cacace, Conferenza sugli effetti chimici delle trasformazioni nucleari, Amsterdam 1963, *Ric. Sci. (Notiziario)* 4 (1964) 1, Serie 2, 5–8.
- [55] B. Aliprandi, F. Cacace, G. Ciranni, Gas chromatographic and isotope dilution analysis of the isomers formed on mononitration of benzoic acid, *Anal. Chem.* 36 (1964) 2445.
- [56] F. Cacace, Marcatura con metodi radiochimici, *Bollettino EURATOM* 2 (1964) 26.
- [57] F. Cacace, A.P. Wolf, Reactions of energetic carbon atoms with ammonia. II. *J. Am. Chem. Soc.* 87 (1965) 5301.
- [58] S. Ascoli, F. Broch-Toniolo, F. Cacace, G. Giacomello, Il separatore di isotopi dell'Università di Roma, *Ric. Sci.* 35 (1965) (II-A), 15.
- [59] G. Giacomello, F. Cacace, La chimica di atomi radioattivi ad alta energia in sistemi organici, *Scientia* 59 (1965) 1.
- [60] S. Ascoli, F. Cacace, The isotope separator of the Rome University and its application to the study of the chemical reactions of energetic ions, *Nuclear Instrum. Methods* 38 (1965) 198.
- [61] B. Aliprandi, F. Cacace, A. Guarino, Chemical effects of nuclear decay in doubly tritiated ethane at atmospheric pressure, da “chemical effects of nuclear transformations,” International Atomic Energy Agency, IAEA, Vienna 1965, Vol. II, p. 471.
- [62] B. Aliprandi, F. Cacace, A. Guarino, Synthesis of isotopically pure ethane-1,2- ^3H , *Proceedings della Conferenza di Venezia, Agosto 1964, sulla Preparazione ed Applicazioni Biomediche di Molecole Marcate*, EURATOM, Bruxelles 1965, p. 35.
- [63] F. Cacace, G. Ciranni, A. Guarino, A tracer study of the reactions of ionic intermediates formed by nuclear decay of tritiated molecules, I. Methane- t_4 , *J. Am. Chem. Soc.* 88 (1966) 2903.
- [64] F. Cacace, G. Ciranni, A. Guarino, Studio degli effetti chimici del decadimento nucleare: I. Meccanismo delle reazioni conseguenti al decadimento di un atomo di tritio nella molecola di metano- T_4 , *Acc. Naz. dei Lincei, Rendiconti Sci. Fis. Mat. Nat.* XL (1966) 264.
- [65] F. Cacace, G. Stöcklin, A.P. Wolf, Reactions of energetic carbon atoms in methylamine, *Radiochim. Acta* 5 (1966) 155.
- [66] F. Cacace, G. Di Marco, The radiolysis of gaseous mixtures of methylamine and ammonia and its bearing on the recoil chemistry of carbon atoms in ammonia, *Radiochim. Acta* 6 (1966) 187.
- [67] F. Cacace, G. Perez, A rapid method for precise gas phase analysis of ^{14}C -labeled compounds, *J. Label. Compounds* II (1966) 102.
- [68] F. Cacace, R. Cipollini, G. Perez, Analisi elementare continua di composti organici separati mediante cromatografia in fase vapore, *Pontificia Acad. Sci. (Commentarii)* I (1966) 1.
- [69] F. Cacace, S. Caronna, Reactions of He^3H^+ ions with gaseous hydrocarbons, I. Toluene, *J. Am. Chem. Soc.* 89 (1967) 6848.
- [70] B. Aliprandi, F. Cacace, A. Guarino, A tracer study of the reactions promoted by the decay of a tritium atom contained in the molecule of ethane, *J. Chem. Soc.* (1967) (Section B) 519.
- [71] F. Cacace, M. Caroselli, A. Guarino, Reactions of the

- carbonium ions from the decay of propane-1,2- t_2 in gaseous and liquid propane, *J. Am. Chem. Soc.* 89 (1967) 4584.
- [72] S. Ascoli, F. Cacace, G. Giacomello, E. Possagno, Reactions of 40-keV tritiated ions with solid organic compounds, *J. Phys. Chem.* 71 (1967) 427.
- [73] F. Cacace, G. Perez, Interrupted-elution radio gas chromatography, *Anal. Chem.* 39 (1967) 1863.
- [74] F. Cacace, G. Ciranni, in A combination of preparative gas chromatography and isotope dilution for the precise quantitative analysis of isomeric reaction products, *Gas Chromatography A.B. Littlewood (Ed.), The Institute of Petroleum, London, 1967, p. 337.*
- [75] F. Cacace, G. Perez, Analisi radio gas cromatografica ad eluizione interrotta di molecole organiche marcate, *Rend. Acc. Naz. dei Lincei XLIV* (1968) 112.
- [76] F. Cacace, R. Cipollini, G. Ciranni, Reactions of He^3H^+ ions with gaseous hydrocarbons. II. Methane and ethane, *J. Am. Chem. Soc.* 90 (1968) 1122.
- [77] F. Cacace, Reactions of the helium tritide molecular ion with gaseous cycloalkanes, Annual Meeting, *Chimica Organica, 1968, pp. 185–190.*
- [78] F. Cacace, M. Caroselli, R. Cipollini, G. Ciranni, Reactions of He^3H^+ ions with gaseous hydrocarbons. III. Cyclopropane, propane, isobutane and n-butane, *J. Am. Chem. Soc.* 90 (1968) 2222.
- [79] F. Cacace, A. Guarino, E. Possagno, Reactions of He^3H^+ ions with gaseous hydrocarbons. IV. Cyclobutane, cyclopentane, and cyclohexane, *J. Am. Chem. Soc.* 91 (1969) 3131.
- [80] F. Cacace, G. Perez, Application of interrupted-elution to combustion radio gas chromatography, *Anal. Chem.* 41 (1969) 368.
- [81] F. Cacace, Gaseous carbonium ions from the decay of tritiated molecules, *Adv. Phys. Org. Chem.* 8 (1970) 79.
- [82] F. Cacace, R. Cipollini, G. Ciranni, Reactions initiated by the beta-decay of molecular tritium in systems containing noble gases, *Radiochem. Radioanal. Lett.* 4 (1970) 51.
- [83] F. Cacace, A. Guarino, M. Speranza, Reactions of helium tritide ions with gaseous hydrocarbons. V. *cis*- and *trans*-1,2-dimethylcyclopropane. Unambiguous evidence for gaseous protonated cyclopropanes, *J. Am. Chem. Soc.* 93 (1971) 1088.
- [84] F. Cacace, G. Perez, Aromatic substitution in the gas phase. Part I. Reaction of the helium tritide molecular ion with halogenobenzenes, *J. Chem. Soc. B* (1971) 2086.
- [85] F. Cacace, R. Cipollini, G. Ciranni, Aromatic substitution in the gas phase. Part II. Reactions of the helium tritide ion with anisole, *t*-butylbenzene, and $\alpha\alpha$ -trifluorotoluene, *J. Chem. Soc. B* (1971) 2089.
- [86] L. Babernics, F. Cacace, Reactions of the gaseous carbonium ions from the decay of [1,2- $^3\text{H}_2$]-cyclopentane, *J. Chem. Soc. B* (1971) 2313.
- [87] F. Cacace, Gaseous carbonium ions from the decay of tritiated molecules, *Angew. Chem. (Intern. Edition)* 10 (1971) 882.
- [88] F. Cacace, R. Cipollini, G. Occhiucci, Aromatic substitution in the gas phase. Part III. Reaction of the D_2T^+ ion with gaseous arenes, General Remarks on the Reactivity of Gaseous Brønsted Acids, *J. Chem. Soc. Perkin Trans. II* (1972) 84.
- [89] F. Cacace, M. Speranza, Stereochemical course of a gas-phase electrophilic attack at saturated carbon reaction of meso-1,2-dichloro-1,2-difluoroethane with gaseous Brønsted acids, *J. Am. Chem. Soc.* 94 (1972) 4447.
- [90] F. Cacace, S. Caronna, Reactions of the helium tritide ion with liquid arenes, *J. Chem. Soc. Perkin Trans. II* (1972) 1604.
- [91] F. Cacace, G. Stöcklin, Gas-phase aromatic substitutions by brominium ions from the isomeric transitions of $^{80\text{m}}\text{Br}$, *J. Am. Chem. Soc.* 94 (1972) 2518.
- [92] E. Baciocchi, F. Cacace, G. Ciranni, G. Illuminati, Isomeric distributions and relative reactivities in the uncatalyzed chlorination of benzonitrile, nitrobenzene, and benzotrifluoride. The directive effects of electron-withdrawing substituents as a function of reagent and solvent, *J. Am. Chem. Soc.* 94 (1972) 7030.
- [93] F. Cacace, Nucleari, reattori, *Enciclopedia Intern. di Chimica, PEM Ed., VII, Est., 1972, pp. 129–140.*
- [94] F. Cacace, Nucleare, fissione *Enciclopedia Intern. di Chimica, PEM Ed., VII, Est., 1972, pp. 125–129.*
- [95] F. Cacace, E. Possagno, Gas-phase isopropylation of toluene. On the question of the positional selectivity in gas-phase aromatic substitutions, *J. Am. Chem. Soc.* 95 (1973) 3397.
- [96] F. Cacace, P. Giacomello, Gas-phase reaction of *tert*-butyl ions with arenes. Remarkable selectivity of a gaseous charged electrophile, *J. Am. Chem. Soc.* 95 (1973) 5851.
- [97] F. Cacace, A. Guarino, M. Speranza, Reactions of helium tritide ions with gaseous bicyclo [n, 1, 0]alkanes. Evidence for gaseous bicycloalkylium ions, *J. Chem. Soc. Perkin Trans. II* (1973) 66.
- [98] F. Cacace, R. Cipollini, P. Giacomello, E. Possagno, Gas-phase alkylation of arenes with alkyl carbocations, *Gazz. Chim. It.* 104 (1974) 977.
- [99] M.C. Anania, M. Attina*, F. Cacace, Sulla determinazione gas cromatografica dell'acido azotidrico, *Il Farmaco* 29 (1974) 456.
- [100] F. Cacace, R. Cipollini, Gas-phase aromatic substitutions: Reaction of radiolytically formed D_2T^+ ions with chlorobenzene and fluorobenzene, *Radiochem. Radioanal. Lett.* 16 (1974) 343.
- [101] F. Cacace, Beta decay of tritiated molecules as a tool for studying ion–molecule reactions, *Interactions between Ions and Molecules, P. Ausloos (Ed.), Plenum, New York, 1975.*
- [102] P. Giacomello, F. Cacace, Predominant ortho-substitution in gas-phase attack of the *t*-butyl cation on *m*-xylene, *J. Chem. Soc. Chem. Commun.* (1975) 379.
- [103] F. Cacace, M. Schüller, Synthesis, purification, storage and isotopic analysis of CT_4 on the multicurie scale, *J. Label. Compounds XI* (1975) 313.
- [104] F. Cacace, G. Ciranni, M. Schüller, Decay synthesis of multitruncated compounds using CT_4 as a natural generator of CT_3^+ cations, *J. Am. Chem. Soc.* 97 (1975) 4747.
- [105] F. Cacace, Role of nuclear techniques in the study of gas-phase ionic reactions, *Hot Atom Chemistry Status Report, IAEA, Vienna 1975, pp. 229–239.*
- [106] M. Attina*, F. Cacace, G. Ciranni, P. Giacomello, Predom-

- inant *o*-alkylation in the gas-phase attack of *t*-butyl cations on phenol and anisole, *J. Chem. Soc., Chem. Commun.* (1976) 466.
- [107] P. Giacomello, F. Cacace, Gas-phase alkylation of xylenes by $t\text{-C}_4\text{H}_9^+$ ions, *J. Am. Chem. Soc.* 98 (1976) 1823.
- [108] C. Botre', F. Cacace, R. Cozzani, Direct combination of high-pressure liquid chromatography and atomic absorption for the analysis of metallorganic compounds. *Analyt. Lett.* 9 (1976) 825.
- [109] F. Cacace, M. Speranza, Aromatic substitution in the gas phase. Ambident behavior of halo- and dihalobenzenes toward D_2T^+ . Tritiodeprotonation versus tritiohalogenation, *J. Am. Chem. Soc.* 98 (1976) 7299.
- [110] F. Cacace, M. Speranza, Gas-phase aromatic substitution. Isomerization of gaseous arenium ions from the attack of D_2T^+ on dihalobenzenes, *J. Am. Chem. Soc.* 98 (1976) 7305.
- [111] M. Speranza, F. Cacace, Gas-phase reactivity and radiolytically formed Brønsted acids toward aromatic halogenated compounds, *Proceedings of the Fourth Symposium on Radiation Chemistry*, Tihany, 1976, p. 209.
- [112] G. Stöcklin, F. Cacace, Decay-induced incorporation of tritium to nucleosides in aqueous solutions, *Curr. Topics Radiat. Res.* 12 (1977) 103.
- [113] M. Attina', F. Cacace, G. Ciranni, P. Giacomello, Aromatic substitution in the gas phase. Predominant *o*-alkylation in the attack of $t\text{-C}_4\text{H}_9^+$ ions to anisole, *J. Am. Chem. Soc.* 99 (1977) 4101.
- [114] M. Attina', F. Cacace, G. Ciranni, P. Giacomello, Aromatic substitution in the gas phase. Ambident behavior of phenol toward $t\text{-C}_4\text{H}_9^+$ cations, *J. Am. Chem. Soc.* 99 (1977) 5022.
- [115] M. Attina', F. Cacace, G. Ciranni, P. Giacomello, Aromatic substitution in the gas-phase. Alkylation of xylenes and toluene by $i\text{-C}_3\text{H}_7^+$ ions, *J. Am. Chem. Soc.* 99 (1977) 2611.
- [116] M. Speranza, F. Cacace, Aromatic substitution in the gas phase. On the mechanism of the dehalogenation reactions of halobenzenes and dihalobenzenes promoted by gaseous Brønsted acids, *J. Am. Chem. Soc.* 99 (1977) 3051.
- [117] F. Cacace, *Metodi radiochimici*, Estratto da *Enciclopedia della Chimica*, ISEDI.
- [118] F. Cacace, *Principi di chimica nucleare e radiochimica*, Estratto da *Enciclopedia della Chimica*, ISEDI.
- [119] F. Cacace, P. Giacomello, Aromatic substitution in the liquid phase by bona fide free methyl cations. Alkylation of benzene and toluene, *J. Am. Chem. Soc.* 99 (1977) 5477.
- [120] F. Cacace, A.P. Wolf, Substrate selectivity and orientation in aromatic substitution by molecular fluorine, *J. Am. Chem. Soc.* 100 (1978) 3639.
- [121] F. Cacace, P. Giacomello, Aromatic substitution by ^3H -methyl decay ions. A comparative study of the gas- and liquid-phase attack on benzene and toluene, *J. Chem. Soc. Perkin Trans. II* (1978) 652.
- [122] M. Attina', F. Cacace, G. Ciranni, P. Giacomello, Gas-phase condensation of *t*-butyl cations with Lewis bases, *J. Chem. Soc., Chem. Commun.* (1978) 938.
- [123] F. Cacace, *Kinetics of Ion-molecule Reactions*, Plenum, New York, 1979, p. 199.
- [124] M. Attina', F. Cacace, G. Ciranni, P. Giacomello, Gas-phase reaction of free isopropyl ions with phenol and anisole, *J. Chem. Soc.* (1979) 891.
- [125] M. Attina', F. Cacace, G. Ciranni, Radiolytic study on the gas-phase protonation of pinacol. The first demonstration of pinacol rearrangement in the dilute gas state, *Radiochim. Acta* 26 (1979) 103.
- [126] F. Cacace, M. Speranza, Proof of existence of cyclic C_4H_7^+ ions in dilute gas state, *J. Am. Chem. Soc.* 101 (1979) 1587.
- [127] M. Attina', F. Cacace, P. Giacomello, M. Speranza, Competitive condensation and proton-transfer processes in the reaction of $t\text{-C}_4\text{H}_9^+$ ions with ammonia in gaseous systems at atmospheric pressures, *J. Am. Chem. Soc.* 102 (1979) 6896.
- [128] F. Cacace, P. Giacomello, A.P. Wolf, Substrate selectivity and orientation in aromatic substitution by molecular fluorine, *J. Am. Chem. Soc.* 102 (1980) 3511.
- [129] M. Attina', F. Cacace, P. Giacomello, Aromatic substitution in the gas phase. A comparative study of the alkylation of benzene and toluene with C_3H_7^+ ions from the protonation of cyclopropane and propene, *J. Am. Chem. Soc.* 102 (1980) 4768.
- [130] F. Cacace, G. Ciranni, P. Giacomello, Aromatic substitution in the gas-phase. Alkylation of arenes by C_4H_9^+ ions, *J. Am. Chem. Soc.* 103 (1981) 1513.
- [131] M. Attina', F. Cacace, P. Giacomello, Does the cyclohexyl cation exist in the dilute gas state? Direct evidence from a radiolytic study, *J. Am. Chem. Soc.* 103 (1981) 4711.
- [132] F. Cacace, M. Speranza, A.P. Wolf, J.S. Flower, Labeling of fluorinated aromatics by isotopic exchange with ^{18}F fluoride, *J. Label. Compounds Radiopharm.* 18 (1981) 1721.
- [133] M. Speranza, R.A. Ferrieri, A.P. Wolf, F. Cacace, Rapid catalytic synthesis of ^{11}C -labeled aromatics, *J. Label. Compounds Radiopharm.* 19 (1982) 61.
- [134] F. Cacace, M. Speranza, A.P. Wolf, R. Ehrenkauf, Preparation of multitruncated arenes, *J. Label. Compounds*, 19 (1982) 905.
- [135] F. Cacace, Recent radiolytic studies on the mechanism of gas-phase ionic reactions, *Radiat. Phys. Chem.* 20 (1982) 99.
- [136] F. Cacace, On the formation of adduct ions in gas-phase aromatic substitution, *J. Chem. Soc. Perkin Trans. II* (1982) 1129.
- [137] F. Cacace, G. Ciranni, P. Giacomello, Alkylation of nitriles with gaseous carbenium ions. The Ritter reaction in the dilute gas state, *J. Am. Chem. Soc.* 104 (1982) 2258.
- [138] F. Cacace, R. Cipollini, P. Giacomello, Gas-phase reaction of daughter ions from the decay of multitruncated propane with benzene and toluene. Solution of a longstanding anomaly, *J. Phys. Chem.* 86 (1982) 2026.
- [139] F. Cacace, G. Ciranni, P. Giacomello, Aromatic substitution in the gas-phase. Alkylation of arenes C_4H_9^+ ions from the protonation of C_4 alkenes and cycloalkanes with gaseous Brønsted acids, *J. Chem. Soc. Perkin Trans. II* (1982) 1373.
- [140] F. Cacace, M. Speranza, A.P. Wolf, R.R. McGregor, Nucleophilic aromatic substitution; kinetics of fluorine-18 substitution reactions in polyfluorobenzenes, Isotopic exchange between ^{18}F - and polyfluorobenzenes in dimethylsulfoxide. A kinetic study, *J. Fluorine Chem.* 21 (1982) 145.
- [141] B. Aliprandi, F. Cacace, R. Cipollini, Gas-phase alkylation of trimethylbenzenes by $i\text{-C}_3\text{H}_7^+$ and $t\text{-C}_4\text{H}_9^+$ ions. Evidence

- for steric hindrance in deprotonation of gaseous arenium ions, *Radiochim. Acta* 31 (1982) 107.
- [142] M. Attina', F. Cacace, A.P. Wolf, Labeled aryl fluorides from the nucleophilic displacement of activated nitro groups by $^{18}\text{F-F}^-$. *J. Label. Compounds Radiopharm.* 20 (1983) 501.
- [143] F. Cacace, Recent applications of techniques based on nuclear decay to ionic chemistry in gaseous and condensed systems, Proceedings of the Seventh International Congress of Radiation Research, Amsterdam, Luglio 1983.
- [144] B. Aliprandi, F. Cacace, R. Cipollini, Gas phase methylation of polymethylbenzenes by dimethylfluoronium ions. A radiolytic and mass spectrometric study, *Radiochim. Acta* 34 (1983) 103.
- [145] F. Cacace, G. Ciranni, A. Di Marzio, Protonation-induced isomerization of gaseous bromoxylenes: A radiolytic and mass spectrometric study, *J. Chem. Soc. Perkin Trans. II* (1984) 775.
- [146] S. Fornarini, M. Speranza, M. Attina', F. Cacace, P. Giacomello, Gas-phase protonation of allene and propyne. Remarkably selective formation of 2-propenyl ions, *J. Am. Chem. Soc.* 106 (1984) 2498.
- [147] F. Cacace, M. Colosimo, M. Speranza, Gas phase reactions of free phenylium ions with C_3H_6 hydrocarbons, *Tetrahedron* 40 (1984) 4873.
- [148] F. Cacace, G. Ciranni, C. Sparapani, M. Speranza, Trapping with gaseous methanol the C_7H_7^+ daughter ions from the decay of tritiated toluenes, *Radiochim. Acta* 35 (1984) 195.
- [149] F. Cacace, G. Ciranni, C. Sparapani, M. Speranza, Structure and reactivity of C_7H_7^+ ions from the decay of tritiated toluenes. I. Reactions of free tolyl ions with methanol in the gas and liquid phases, *J. Am. Chem. Soc.* 106 (1984) 8046.
- [150] M. Attina', F. Cacace, G. de Petris, S. Fornarini, P. Giacomello, "Ipso" aromatic alkylation in the gas phase. Intermediacy and structure of gaseous heptaalkylbenzenium ions *J. Am. Chem. Soc.* 107 (1985) 2297.
- [151] M. Attina', F. Cacace and G. de Petris, Intramolecular selectivity of the alkylation of substituted anilines by gaseous cations, *J. Am. Chem. Soc.* 107 (1985) 1556.
- [152] F. Cacace, Heavy ions in hot atom chemistry, *Treatise on Heavy-Ion Science*, Plenum, New York, 1985.
- [153] M. Attina', F. Cacace, R. Cipollini, M. Speranza, Free cyclohexyl cations from the decay of tritiated cyclohexane, *J. Am. Chem. Soc.* 107 (1985) 4824.
- [154] B. Aliprandi, F. Cacace, Alkylation of benzyl chloride by gaseous carbenium ions, *J. Radioanalyt. Nucl. Chem. Articles*, 92/2 (1985) 357.
- [155] M. Attina' and F. Cacace, Substrate and positional selectivity of the gas-phase nitration of substituted benzenes by protonated methyl nitrate. The first example of a well-behaved aromatic nitration by a gaseous cation, *J. Am. Chem. Soc.* 108 (1986) 318.
- [156] F. Cacace, G. Ciranni, Temperature dependence of the substrate and positional selectivity of the aromatic substitution by gaseous tert-butyl cation, *J. Am. Chem. Soc.* 108 (1986) 887.
- [157] G. Occhiucci, F. Cacace, M. Speranza, Gas-phase cationic benzylation of ambident aromatic substrates studied with the decay technique, *J. Am. Chem. Soc.* 108 (1986) 872.
- [158] P. Caiafa, M. Attina', F. Cacace, A. Tomassetti, R. Strom, 5-methylcytosine levels in nucleosome subpopulations differently involved in gene expression, *Bioch. Bioph. Acta* 867 (1986) 195.
- [159] F. Cacace, G. de Petris, S. Fornarini, P. Giacomello, Gas-phase cationic methylation of biphenyl and methylbiphenyls. A mass spectrometric and radiolytic study *J. Am. Chem. Soc.* 108 (1986) 7495.
- [160] B. Aliprandi, F. Cacace, S. Fornarini, Gas phase alkylation of dihalobenzenes by free isopropyl cations, *Tetrahedron*, 43 (1987) 2831.
- [161] M. Attina', F. Cacace, M. Yanez, Electrophilic aromatic nitration in the gas phase *J. Am. Chem. Soc.* 109 (1987) 5092.
- [162] M. Attina', F. Cacace, G. de Petris, Aromatic nitration at the encounter rate in the gas phase, *Angew. Chem.* 26 (1987) 1177.
- [163] M. Attina', F. Cacace, Gas phase competitive nitration of benzene and toluene by protonated alkyl nitrates, *Gazz. Chim. Ital.* 118 (1988) 241.
- [164] M. Attina', F. Cacace, A. Ricci, Gas phase aromatic nitration by protonated fluoroalkyl nitrates, *Tetrahedron* 44 (1988) 2015.
- [165] F. Cacace, The radiolytic approach to gas phase ion chemistry. *Acc. Chem. Res.* 21 (1988) 215.
- [166] F. Cacace, M.E. Crestoni, S. Fornarini, R. Gabrielli, Cationic aromatic silylation in the gas phase, *Int. J. Mass Spectrom. Ion Process.* 84 (1988) 17.
- [167] F. Cacace, M. Speranza, Nuclear-decay techniques, *Techniques for the Study of Ion-Molecules Reactions*, J.M. Farrar and W. Saunders, Jr. (Eds.) Wiley, New York, 1988.
- [168] F. Cacace, M.E. Crestoni, G. de Petris, S. Fornarini, F. Grandinetti, A comparative study of gas phase aromatic desilylation and detertbutylation by charged electrophiles, *Can. J. Chem.* 66 (1988) 3099.
- [169] F. Bernardi, F. Cacace, F. Grandinetti, Relative stability of isomeric methyl nitrate cations $(\text{MeNO}_3)\text{H}^+$, *J. Chem. Soc. Perkin Trans. II* (1989) 413.
- [170] M. Attina', F. Cacace, A. Ricci, Gas phase reactions of arylsilanes with nitrating cations. Nitration vs nitrodesilylation, *Gazz. Chim. Ital.* 119 (1989) 217.
- [171] M. Attina', F. Cacace, G. de Petris, F. Grandinetti, Gas phase protonation of alkyl and phenyl azides, *Int. J. Mass. Spectrom. Ion Process.* 90 (1989) 263.
- [172] F. Cacace, M. Attina', G. de Petris, M. Speranza, Protonated nitric acid. Experimental evidence for the existence of two isomers, *J. Am. Chem. Soc.* 111 (1989) 5481.
- [173] M. Attina', F. Cacace, A. Di Marzio, Evaluation of the Arrhenius parameters for the thermal isomerization of a gaseous ion. The temperature dependence of the cyclohexylium ion unimolecular rearrangement. *J. Am. Chem. Soc.* 111 (1989) 6004.
- [174] M. Attina', F. Cacace, G. de Petris, A. Di Marzio, P. Giacomello, Gaseous isomeric $\text{Ph-C}_3\text{H}_6^+$ ions: A radiolytic and mass spectrometric study, *Int. J. Mass Spectrom. Ion Process.* 93 (1989) 185.
- [175] F. Cacace, M. Attina', G. de Petris, M. Speranza, Protonated

- nitric acid. Structure and relative stability of isomeric H_2NO_3^+ ions in the gas phase, *J. Am. Chem. Soc.* 112 (1990) 1014.
- [176] M. Attina', F. Cacace, R. Cipollini, A. Ricci, Gas-phase aromatic amination by protonated phenylazide. A mass spectrometric and radiolytic study, *Radiochim. Acta* 50 (1990) 177.
- [177] F. Cacace, Nuclear decay techniques in ion chemistry, *Science* 250 (1990) 392.
- [178] F. Cacace, M. Attina', G. de Petris, Gaseous isomeric H_2N_3^+ ions. A joint ab initio and mass spectrometric study of protonated hydrazoic acid, *Gazz. Chim. Ital.* 120 (1990) 691.
- [179] M. Attina', F. Cacace, A. Ricci, F. Grandinetti, G. Occhiucci, Gas-phase ion chemistry of H_3BO_3 . Protonated orthoboric, metaboric and polyboric acids, and their anions in the gas phase, *J. Chem. Soc., Chem. Commun.* 2 (1991) 66.
- [180] M. Attina', F. Cacace, A. Ricci, Gas-phase alkylation of phenyltrimethylsilanes. Using the trimethylsilyl group to probe proton shifts in gaseous arenium ions, *J. Am. Chem. Soc.* 113 (1991) 5937.
- [181] M. Attina', F. Cacace, On the application of the hammett equation to kinetic trends observed in chemical ionization mass spectrometry, *Org. Mass Spectrom.* 26 (1991) 807.
- [182] F. Cacace, M.E. Crestoni, A. Di Marzio, S. Fornarini, Gas-phase aromatic substitution. Reactivity of (trifluoromethoxy)benzene toward charged electrophiles, *J. Phys. Chem.* 89 (1991) 8731.
- [183] M. Attina', F. Cacace, A. Ricci, Extension of free energy correlations to gas-phase ionic reactions. Competitive alkylation of substituted benzonitriles by $(\text{CH}_3)_2\text{Cl}^+$ ions, *Angew. Chem. (Int. Ed.)* 30 (1991) 1457.
- [184] M. Attina', F. Cacace, G. Occhiucci, A. Ricci, Gaseous borate and polyborate anions, *Inorg. Chem.* 31 (1992) 3114.
- [185] F. Cacace, G. de Petris, G. Occhiucci, Mass spectrometry of cyanamide. *Org. Mass Spectrom.* 27 (1992) 161.
- [186] F. Cacace, M.E. Crestoni, S. Fornarini, Proton shifts in gaseous arenium ions and their role in the gas-phase aromatic substitution by free Me_3C^+ and Me_3Si^+ cations, *J. Am. Chem. Soc.* 114 (1992) 6776.
- [187] M. Attina', F. Cacace, F. Grandinetti, G. Occhiucci, A. Ricci, Positive ion chemistry of gaseous boric and polyboric acids, *Int. J. Mass Spectrom. Ion Process.* 117 (1992) 47.
- [188] M. Attina', F. Cacace, M. Speranza, FT-ICR studies of gas-phase ionic nitration of benzene: The role of electron- and proton-transfer processes. *Int. J. Mass Spectrom. Processes* 117 (1992) 37.
- [189] M. Attina', F. Cacace, Concerning sterical hindrance of deprotonation of gaseous polyalkylbenzenium ions, *Int. J. Mass Spectrom. Ion Process.* 120 (1992) R1.
- [190] F. Cacace, M.E. Crestoni, S. Fornarini, D. Kuck, Interannular proton transfer in thermal arenium ions from the gas-phase alkylation of 1,2-diphenylethane, *J. Am. Chem. Soc.* 115 (1993) 1024.
- [191] F. Cacace, G. de Petris, F. Grandinetti, G. Occhiucci, Gas-phase ion chemistry of cyanamide. A mass spectrometric and ab initio study of gaseous $[\text{H}_2\text{N}-\text{CN}]^+$, $[\text{H}_2\text{N}-\text{CN}]\text{H}^+$, and $[\text{HN}-\text{CN}]^-$ ions, *J. Phys. Chem.* 97 (1993) 4239.
- [192] F. Cacace, M. Attina', M. Speranza, Concerning the proton affinity of hydrazoic acid and methyl nitrate, *J. Org. Chem.* 58 (1993) 3639.
- [193] M. Attina', F. Cacace, E. Ciliberto, G. de Petris, F. Grandinetti, F. Pepi, A. Ricci, Gas phase ion chemistry of nitramide. A mass spectrometric and ab initio study of $\text{H}_2\text{N}-\text{NO}_2$ and the $\text{H}_2\text{N}-\text{NO}_2^+$, $[\text{H}_2\text{N}-\text{NO}_2]\text{H}^+$, and $[\text{HN}-\text{NO}_2]^-$ ions, *J. Am. Chem. Soc.* 115 (1993) 12 398.
- [194] M. Aschi, F. Cacace, F. Grandinetti, F. Pepi, Gaseous protonated nitrosyl fluoride. Experimental and theoretical characterization of two distinguishable isomers, HONF^+ and ONFH^+ , and evaluation of the barrier for their interconversion, *J. Phys. Chem.* 33 (1994) 123.
- [195] F. Cacace, F. Grandinetti, F. Pepi, An extraordinarily violent molecular dissociation: The unprecedented kinetic energy release in the decomposition of HONF^+ , a singly charged metastable ion, *Angew. Chem.* 106 (1994) 104.
- [196] F. Cacace, M. Attina', G. de Petris, M. Speranza, Is the proton affinity of nitric acid larger than the proton affinity of methyl nitrate? A direct experimental answer, *J. Am. Chem. Soc.* 116 (1994) 6413.
- [197] F. Cacace, M. Speranza, Protonated ozone: Experimental detection of O_3H^+ and evaluation of the proton affinity of ozone, *Science* 265 (1994) 208.
- [198] F. Cacace, M.E. Crestoni, S. Fornarini, Ion–molecule reactions in gaseous CF_4/CO mixtures. Formation and reactivity of CF_3CO^+ ions, *J. Phys. Chem.* 98 (1994) 1641.
- [199] F. Cacace, F. Pepi, F. Grandinetti, Gaseous F_2NO^+ cations from the addition of NF_2^+ to N_2O . Structure and mechanism of formation, *J. Phys. Chem.* 98 (1994) 8009.
- [200] M. Aschi, M. Attina', F. Cacace, A. Ricci, Experimental study on the mechanism of gas-phase aromatic nitration by protonated methyl nitrate, *J. Am. Chem. Soc.* 116 (1994) 9535.
- [201] F. Cacace, F. Grandinetti, F. Pepi, Experimental observation of stable cyanodiazonium ions, $\text{NC}-\text{N}_2^+$, *J. Chem. Soc., Chem. Commun.* (1994) 2173.
- [202] M. Attina', F. Cacace, Concerning sterical hindrance to deprotonation of gaseous polyalkylbenzenium ions, *Int. J. Mass Spectrom. Ion Processes* 120 (1994) R1.
- [203] F. Cacace, F. Grandinetti, F. Pepi, Gaseous fluorodiazonium ions. Experimental and theoretical study on formation and structure of FN_2^+ , *Inorg. Chem.* 34 (1995) 1325.
- [204] F. Cacace, M. Attina', S. Fornarini, $[\text{R}_3\text{Si-arene}]^+$ σ complexes in the gas phase, *Angew. Chem. Int. Ed. Engl.* 34 (1995) 654.
- [205] F. Angelelli, M. Aschi, F. Cacace, F. Pepi, G. de Petris, Gas-phase reactivity of hydroxylamine toward charged electrophile. A mass spectrometric and computational study of the protonation and methylation of H_2NOH , *J. Am. Chem. Soc.* 99 (1995) 6551.
- [206] M. Aschi, M. Attina', F. Cacace, The Crafts–Friedel reaction. Aromatic alkylation within the complex formed upon addition of a gaseous arenium ion to an olefin, *Angew. Chem. Int. Ed. Engl.* 34 (1995) 1589.
- [207] M. Aschi, M. Attina', F. Cacace, An alternative route to electrophilic substitution. 2. Aromatic alkylation in the ion

- neutral complexes formed upon addition of gaseous arenium ions to olefins, *J. Am. Chem. Soc.* 117 (1995) 12 832.
- [208] F. Cacace, G. de Petris, F. Pepi, F. Angelelli, Gas-phase nitronium ion affinities, *Proc. Natl. Acad. Sci. USA* 92 (1995) 8635.
- [209] M. Attina', F. Cacace, A. Ricci, "Ipso" aromatic nitration in the gas phase, *J. Phys. Chem.* 100 (1996) 4425.
- [210] F. Cacace, A. Ricci, Gas phase reaction of nitrous acid and methyl nitrate with arenium ions. A new route to electrophilic aromatic nitrosation, *Chem. Phys. Lett.* 253 (1996) 184.
- [211] M. Aschi, M. Attina', F. Cacace, Aromatic substitution in the complexes formed upon addition of gaseous arenium ions to proelectrophiles. A FT-ICR study, *Rev. Chem. Interm.* 22 (1996) 645.
- [212] M. Aschi, F. Cacace, G. de Petris, F. Pepi, Gas-phase proton affinity of nitric acid and its esters. A mass spectrometric and ab Initio study on the existence and the relative stability of two isomers of protonated ethyl nitrate, *J. Phys. Chem.* 100 (1996) 16 522.
- [213] F. Cacace, G. de Petris, F. Pepi, I. Rossi, A. Venturini, The gas-phase reaction of nitronium ion with ethylene. An experimental and theoretical study, *J. Am. Chem. Soc.* 118 (1996) 12 719.
- [214] M. Aschi, F. Cacace, A. Troiani, Probing gaseous ion-molecule complexes with chiral agents: The reaction of arenium ions with (R)-s-butyl chloride, *Angew. Chem. Int. Ed. Engl.* 36 (1997) 116.
- [215] F. Cacace, Gas-phase ion chemistry in the 21st century, *Pure Appl. Chem.* 69 (1997) 227.
- [216] F. Cacace, G. de Petris, F. Pepi, Gas-phase NO^+ affinities, *Proc. Natl. Acad. Sci. USA* 94 (1997) 3507.
- [217] M. Aschi, M. Attina', F. Cacace, G. D'Arcangelo, Gas-phase positive and negative ion chemistry of methyl hydroperoxide, *Inorg. Chim. Acta* 275 (1998) 192.
- [218] M. Aschi, M. Attina', F. Cacace, G. D'Arcangelo, Evaluation of the lifetime of gaseous ion-neutral complexes. 1. A chemical activation study, *J. Am. Chem. Soc.* 37 (1998) 3982.
- [219] F. Cacace, R. Cipollini, G. de Petris, F. Pepi, M. Rosi, A. Sgamellotti, Isotope exchange in ionized O_3/O_2 mixtures: The role of O_5^+ , a unique O_n^+ complex, *Inorg. Chem.* 37 (1998) 198.
- [220] F. Bernardi, F. Cacace, G. de Petris, F. Pepi, I. Rossi, Gaseous $[\text{N}_2\text{O}_5]\text{H}^+$, $[\text{N}_2\text{O}_4]\text{H}^+$, and related species from the addition of NO_2^+ and NO^+ ions to nitric acid and its derivatives, *J. Phys. Chem. A* 102 (1998) 1987.