



**17th INTERNATIONAL CONGRESS
ON THERMAL ANALYSIS AND CALORIMETRY**

**8th JOINT CZECH-HUNGARIAN-POLISH-SLOVAKIAN
THERMOANALYTICAL CONFERENCE**

**14th CONFERENCE ON CALORIMETRY AND THERMAL ANALYSIS
OF THE POLISH SOCIETY OF CALORIMETRY AND THERMAL ANALYSIS**

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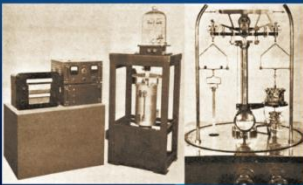


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PREFACE

On behalf of the Organizing Committee of the 17th International Congress on Thermal Analysis and Calorimetry (ICTAC2020) including 8th Joint Czech-Hungarian-Polish-Slovakian Thermoanalytical Conference and 14th Conference on Calorimetry and Thermal Analysis of the Polish Society of Calorimetry and Thermal Analysis – I would like to welcome you cordially at this on-line event.

The Congress contains seven sessions - Thermodynamics, Thermochemistry and Kinetics; Instrumentation; Inorganic Materials; Polymers and Organic Compounds; Materials Science and Energy; Life Science; V4 and CCTA conference. During the Congress Robert Mackenzie memorial lecture, and several plenary and invited lectures will be given by outstanding scientists. For young scientists, Rigaku-ICTAC Young Scientist Award has been given. An essential part of the conference is educational Workshop titled „Good laboratory practice in thermal analysis and calorimetry”.

I would like to thank the ICTAC Executive Board with the President Wim de Klerk, the Dean of the Faculty of Materials Science and Ceramics of the AGH University of Science and Technology in Krakow, prof. Jerzy Jedliński, the Dean of Faculty of Chemical Engineering and Technology at the Cracow University of Technology, Prof. Piotr Michorczyk, Presidents of thermal analysis and calorimetry societies in V4 countries, members of the Advisory Committee, as well as members of the International Scientific Committee for continuous support and advise. Deep thanks go to the members of the Organizing Committee who devoted plenty of time to make this conference a successful event. We are grateful to the City of Krakow and our sponsors for supporting the conference, and to the Editors of the “Journal of Thermal Analysis and Calorimetry” for establishing a Special Issue dedicated to the Congress.

I wish you a pleasant and productive – although remote – conference and hope that our Congress will help to develop new scientific inspirations in the broad area of thermal analysis and calorimetry.

Thank you!

Yours sincerely,

Krzysztof Pielichowski
ICTAC2020 Chair

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CONTENTS

PLENARY AND INVITED LECTURES	13
ORALS AND POSTERS	20
SESSION 1: THERMODYNAMICS, THERMOCHEMISTRY AND KINETICS	21
SESSION 2: INSTRUMENTATION	50
SESSION 3: INORGANIC MATERIALS	64
SESSION 4: POLYMERS AND ORGANIC COMPOUNDS.....	81
SESSION 5: MATERIALS SCIENCE AND ENERGY.....	112
SESSION 6: LIFE SCIENCE	145
SESSION 7: V4 8 & CCTA14.....	158
SPONSOR LECTURES.....	167
THERMAL ANALYSIS WORKSHOP	173
LIST OF AUTHORS	179

S5_P-21

Thermal characteristics and combustion reactivity of coronavirus face masks using TG-DTG-MS analysis

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Keywords: coronavirus face mask, TG-DTG-MS, combustion, thermal analysis properties, heating rate

The presented paper deals with the influence of heating rate on combustion characteristics (reactivity and reactivity evaluation, ignition index (Di), burn-out index (Df), combustion performance index (S), and combustion stability index (RW)) of protective coronavirus face masks. Two types of commonly used face masks in different state (new and exploited) were investigated by TG-DTG analysis in air atmosphere, directly coupled with mass spectrometry (MS). Based on experimental results, the impact of ultimate and proximate analysis data on the evolved gas analysis (EGA) was discussed in detail. Also, the derived values from thermoanalytical data were compared with literature, related to individual constitutive face mask materials. According to the performed research, it was established that different maximal reaction rate values at various heating rates indicate the complex nature of coronavirus face mask thermo-oxidative degradation, which is stimulated with carbon oxidation reactions and volatile matter (VM) release. By detailed analysis of obtained TG-DTG profiles, it was established that process takes place through multiple-step pathways, due to many vigorous radical reactions, caused by polymers degradation. The performed research was done to evaluate the possible utilization of coronavirus waste to energy production and sustainable pandemic environmental risk reduction.

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