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Reply to 'Comments on "The use of MoO_3 and NiO (pure or mixed) oxide catalysts in the decomposition of $KMnO_4$" by S.A. Halawy and M.A. Mohamed' A response from the authors

S.A. Halawy

Chemistry Department, College of Education, King Faisal University, PO Box 1759, Hufof 31982, Eastern Province, Saudi Arabia

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We would like to clarify some of the points raised in the above commentary [1] concerning our article [2]. In the first instance, there is a strong precedent for the use of the techniques and equations involved [3–7] so irrespective of the merits of these approaches this fault, if indeed it is a fault, is not intrinsic to our paper. Secondly, the reaction scheme in our paper (Eqs. (2)–(4) in [2]) was derived from the XRD analysis and not the calculated values of the evolved oxygen as the authors of the commentary are supposing. In addition, the gasometric technique, while not being commonly used in thermal analysis, is a well established method [8–12]. Using this technique, volumes of the evolved oxygen gas are monitoring while the sample is heated with a specified heating rate. Those volumes are related to the mass loss of the sample. In a preliminary experiment, the maximum volume of the evolved gas due to the complete decomposition of the salt is determined. Then, in each experiment the volume of the gas at any temperature is determined and, hence, the percentage of O_2 evolution is calculated. This method is distinct from exchange gas detection (EGD) to which the authors of the commentary refer.

The Coats–Redfern equation is again well established [13,14] and in our study has yielded results which are in good agreement with previously published values [15,16]. Indeed, our calculated values are in good agreement with those of Urbanovici and Segal [17], which perhaps confusingly the authors of the commentary cite as an example of a contradictory study.

There were, however, two minor errors associated with the XRD data. At the time of the study, there was a technical difficulty with the JCPDS library attached to the X-ray instrument, hence the Ni_2O_3 phase was identified manually using ASTM card no. 14-481 not the ICDD "International Center Diffraction Data" card as we reported in the published paper. Also, the formula of $K_2Mn_4O_8$ (ICDD 16-205) was typed incorrectly as $K_2Mn_4O_3$ in Table 1. The other ICDD cards mentioned in the paper are all correct.

We hope that this now clarifies the points raised by the authors of the commentary.

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E-mail address: shalawy99@yahoo.com (S.A. Halawy).

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