UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UMICORE AG &CO KG.,
Petitioner

v.

BASF CORPORATION,
Patent Owner

Case IPR. Nos. 2016-00610, 2016-00612, 2006-00613
U.S. Patent Nos. 8,899,023; 9,032,709; 9,039,982

DECLARATION OF AHMAD MOINI IN SUPPORT OF PATENT OWNER'S PRELIMINARY RESPONSE TO PETITIONS FOR *INTER PARTES* REVIEW OF U.S. PATENT NOS. 8,899,023; 9,032,709; AND 9,039,982

I, Dr. Ahmad Moini, hereby declare as follows:

I. INTRODUCTION

1. My name is Ahmad Moini. I make this declaration in connection with the above-captioned Petitions for *Inter Partes* Review (collectively, "the Petitions") of U.S. Patent Nos. 8,899,023 ("the '023 patent); 9032,709 ("the '709 patent); and 9,039,982 ("the '982 patent) (collectively, "the BASF patents").

2. I am a Senior Expert and Research Fellow at BASF Corporation. I received a B.Sc. in Chemistry from Eastern Washington University in 1982 and a Ph.D. in Chemistry from Texas A&M University in 1986. I have been employed by BASF Corporation (previously Engelhard Corporation) as a scientist for 20 years. I have been involved with diesel exhaust catalysts for the past 12 years. I am a named inventor on 48 granted US patents, some of which relate to zeolites for diesel exhaust applications.

3. I understand that the Petitions rely upon expert witness testimony from Dr. Magdi Khair, who opines that the Japanese Patent Application Publication H1-151706 to Muraki ("Muraki") discloses washcoat loadings that meet the ranges claimed in the BASF patents. I have reviewed an English translation of Muraki and Dr. Khair's calculations carefully, and I believe there are numerous errors in his calculations.

4. Dr. Khair's calculations are set forth in ¶ 141-52 of his declaration in IPR2016-00612, which pertains to the '709 patent. He submits nearly identical calculations in IPR Nos. 2016-00610 and IPR 2006-00613. For simplicity my references and citations to Dr. Khair's declaration shall be to Dr. Khair's declaration in IPR2016-00612.

5. Dr. Khair asserts in ¶ 142 of his declaration that Muraki includes information from which the "preferred loading levels can be estimated." Dr. Khair relies upon three pieces of information from Muraki:

- Muraki's statement that his zeolites have a silicon to aluminum ratio that is greater than 1. Ex. 1009 ¶ 145. Dr. Khair states that "[s]ince the molecular formulas of alumina and silica are respectively Al_2O_3 and SiO_2, by requiring a Si:Al atomic ratio of at least 1, Muraki is calling for zeolites with a silica to alumina ratio (or 'SAR') of at least 2." *Id.*
- Muraki's use of 20g/L of ion-exchanged copper in his examples. *Id.* ¶ 147.
- Muraki's use of an 89% ion exchange rate in his examples. *Id.*

6. Dr. Khair does not identify the exact value of the SAR of the zeolite that is used in Muraki. Dr. Khair states that as "of the '709 patent's filing date, it was known that aluminosilicate zeolites with a SAR in excess of 10 could be beneficially used in an exhaust gas treatment system." *Id.* ¶ 146. Based on this, and

his earlier conclusion that Muraki requires a SAR of at least 2, Dr. Khair performs calculations using SARs of 2, 10, and 15.

7. Dr. Khair's calculations are used to determine the g/in^3 of catalyst loading based on the g/L of copper that is loaded onto the filter. Dr. Khair's calculations start by converting 20 g/L of Cu^+ to mol/L of Cu^+. *See, e.g.*, Ex. 1009 ¶ 149 (first bullet). There is no mathematical error in this preliminary step.

8. Next, Dr. Khair computes the g/L of zeolite that is present. This requires computing both the amount of Al_2O_3 and the amount of SiO_2 that is present.

9. For the Al_2O_3, Dr. Khair reasons that for every 2 moles of Cu^+ there must be one mole of Al_2O_3 so that the charges all balance. Thus, the mol/L of Cu^+ should be divided by 2 to determine the mol/L of Al_2O_3 that is necessarily present to balance the charge on the Cu^+.[1] To get the total Al_2O_3, however, one must take into account the ion exchange rate, which is the fraction of zeolite that includes a Cu^+

[1] While there is no error in Dr. Khair's mathematics in this calculation, I note that Dr. Khair's use of the +1 oxidation state of copper is unjustified. One of skill in the art would have understood that the +2 oxidation state of copper is far more common than the +1 oxidation state and would have used this oxidation state rather than the +1 oxidation state. For simplicity, I will proceed as if the +1 oxidation state of copper is appropriate.

ion. Only 89% of the zeolite includes a Cu^+ ion. Therefore, to get the total amount of zeolite, one must further ***divide*** by the ion-exchange rate. Dr. Khair, however, ***multiplies*** by the ion-exchange rate. *See* Ex. 1009 ¶ 149 (second bullet). This is Dr. Khair's first error, and it leads to an underestimation of the amount of catalyst loading that is used in Muraki. It should be noted that, if the total Cu content does not fully satisfy the exchange capacity of the zeolite (e.g. 89% exchange), the remaining exchange sites would be occupied by other types of cations, e.g. H^+ of Na^+. This has a minor contribution to the overall mass of the final catalyst, and has been ignored by Dr. Khair, and in our calculations.

10. Once the moles of Al_2O_3 have been determined, the moles of SiO_2 can be computed simply by multiplying by the SAR. *See id.* ¶ 149 (second bullet, multiplying the SiO_2 by 2 for the calculation using a SAR of 2); *id.* ¶ 150 (second bullet, multiplying the SiO_2 by 10 for the calculation using a SAR of 10); *id.* ¶ 151 (second bullet, multiplying the SiO_2 by 15 for the calculation using a SAR of 15). Once both the mol/L of Al_2O_3 and mol/L of SiO_2 are determined, Dr. Khair computes the g/L of each component by using each component's molecular weight. *See id.* There is no error in this calculation.

11. Finally, Dr. Khair computes the total amount of catalyst loading by adding together (1) the g/L of Al_2O_3, (2) the g/L of SiO_2, and (3) the g/L of Cu^+. *See, e.g.*, *id.* ¶ 149 (third bullet). Here, Dr. Khair makes another significant error.

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