

Supplementary information

Kinetics on the valorization of hexoses with Sn-USY catalysts in methanolic media: glycosidation vs retroaldol cleavage.

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S-1: Validation of the model for case studies with different temperatures, a catalyst load of 10 g/L and glucose as substrate

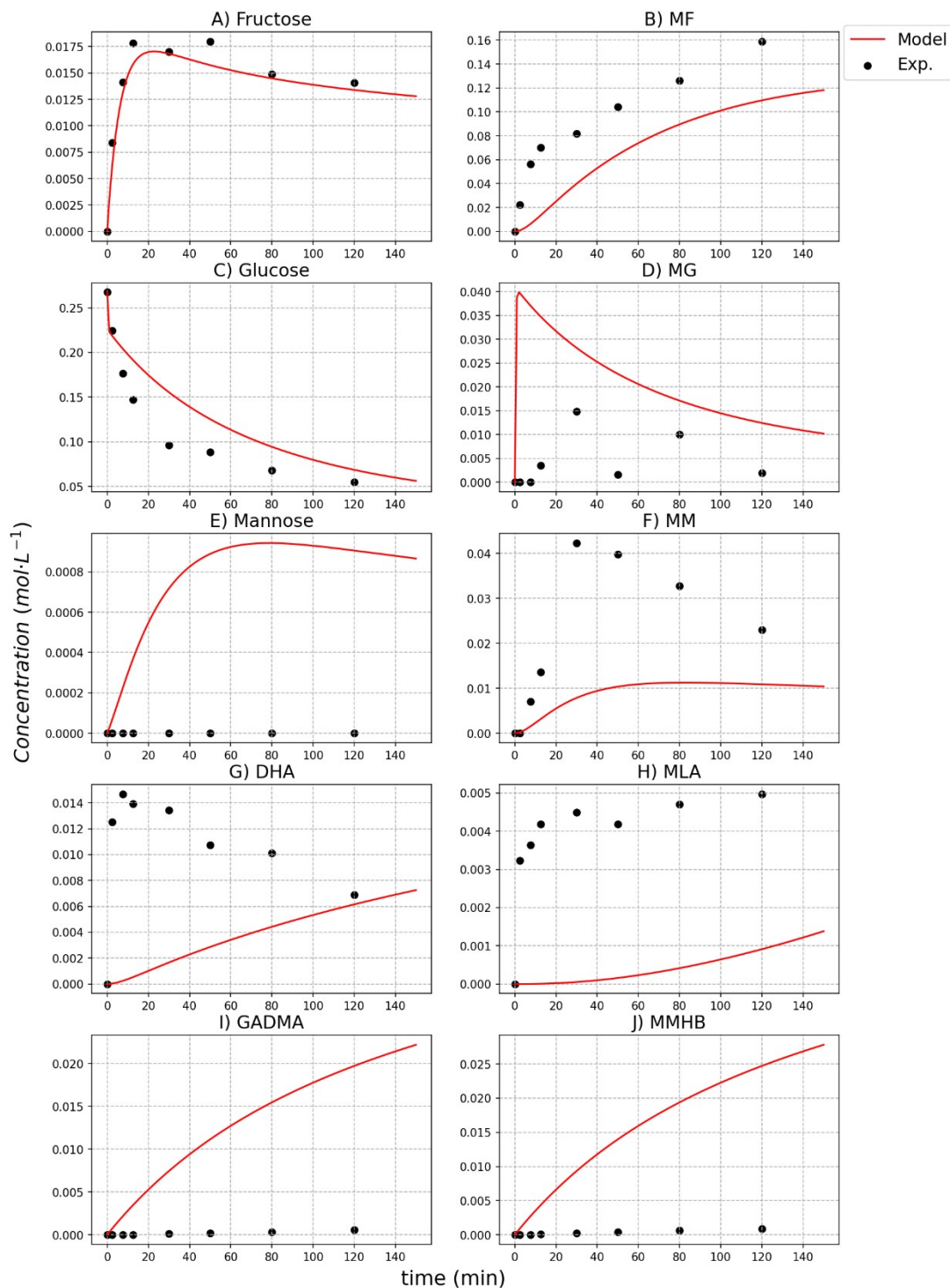


Figure S-1. Validation of the kinetic model at 100 °C when glucose is fed as substrate. The concentration is presented for the following components: A) Fructose, B) Methyl Fructoside (MFP), C) Glucose, D) Methyl Glucoside (MGP), E) Mannose, F) Methyl Mannoside (MMP), G) dihydroxyacetone (DHA), H) Methyl lactate (MLa), I) glycolaldehyde dimethyl acetal (GADMA) and J) methyl 2-hydroxy-4-methoxybutanoate (MMHB).

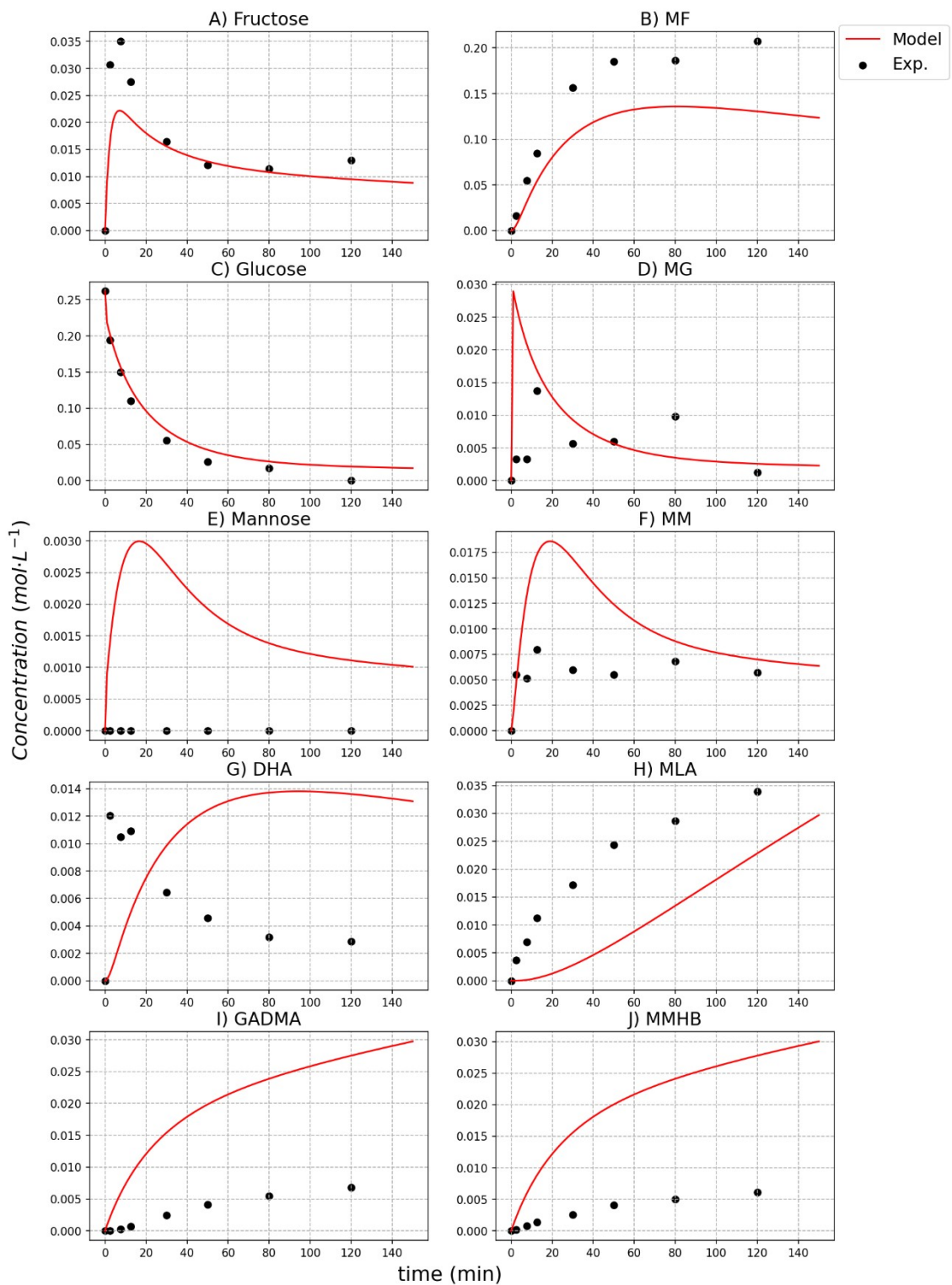


Figure S-2. Validation of the kinetic model at 120 °C when glucose is fed as substrate. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

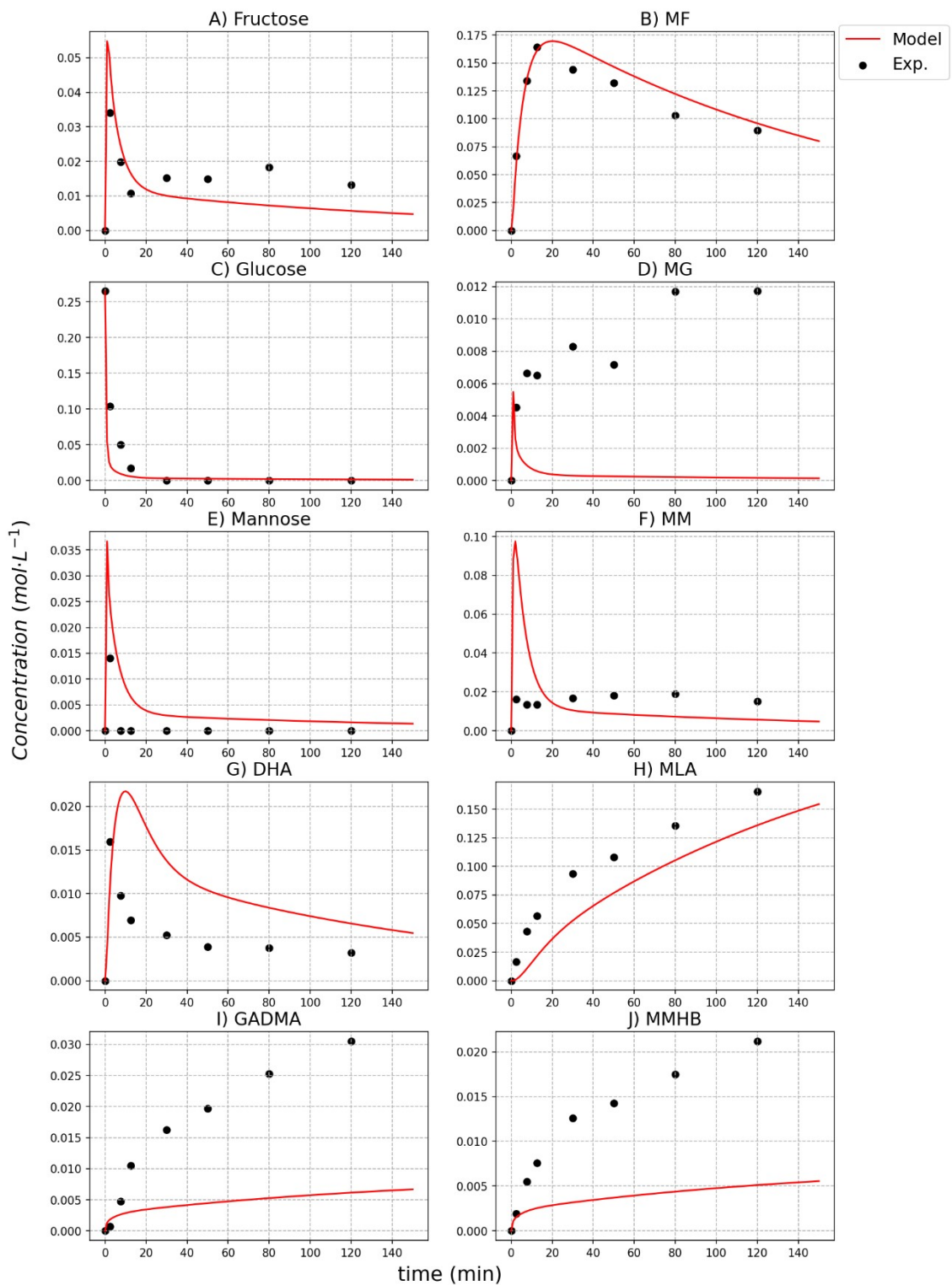


Figure S-3. Validation of the kinetic model at 140 °C when glucose is fed as substrate. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

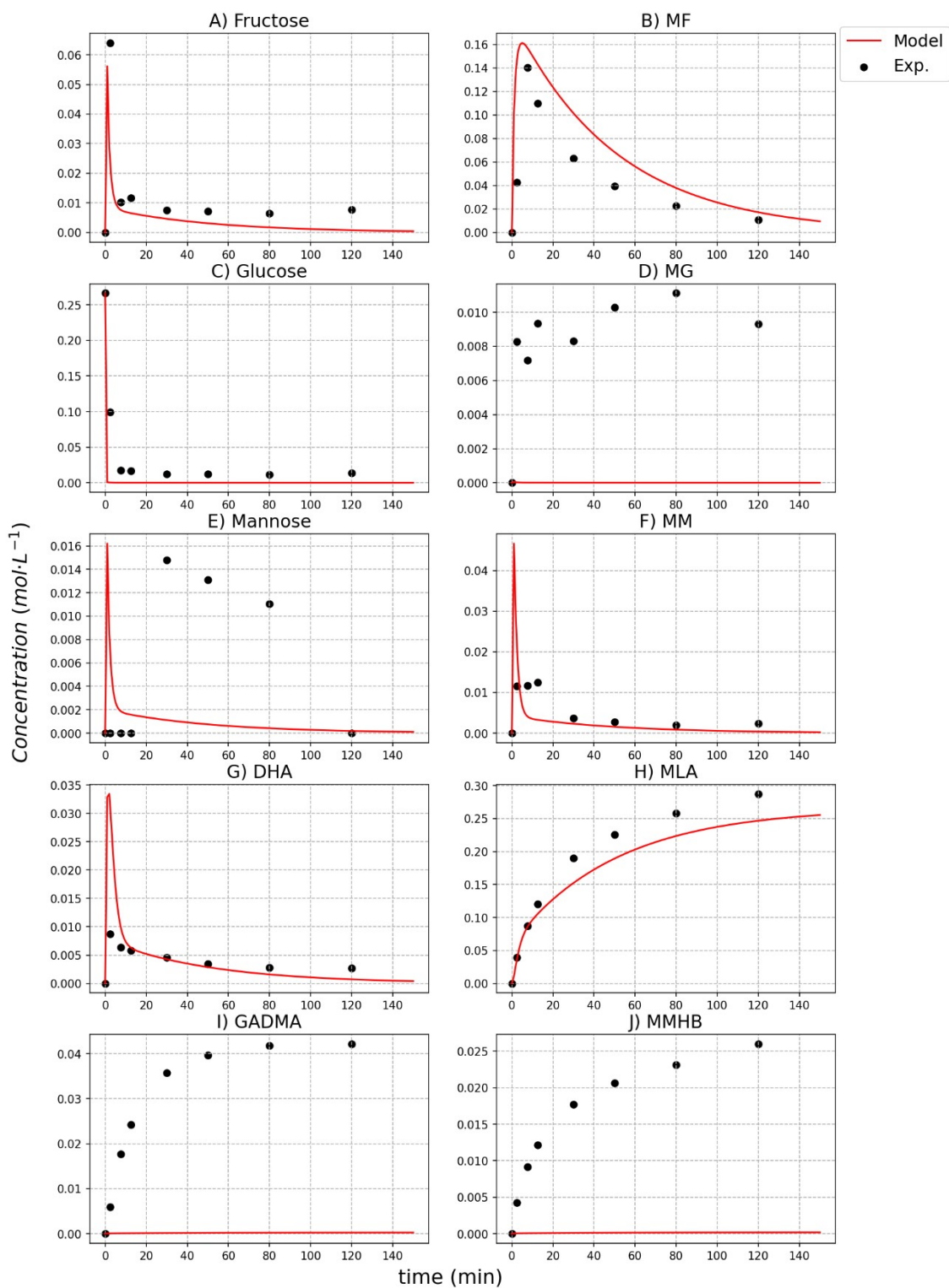


Figure S-4. Validation of the kinetic model at 160 °C when glucose is fed as substrate. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

S-2: Validation of the model for case studies with different temperatures, a catalyst load of 10 g/L and fructose as substrate

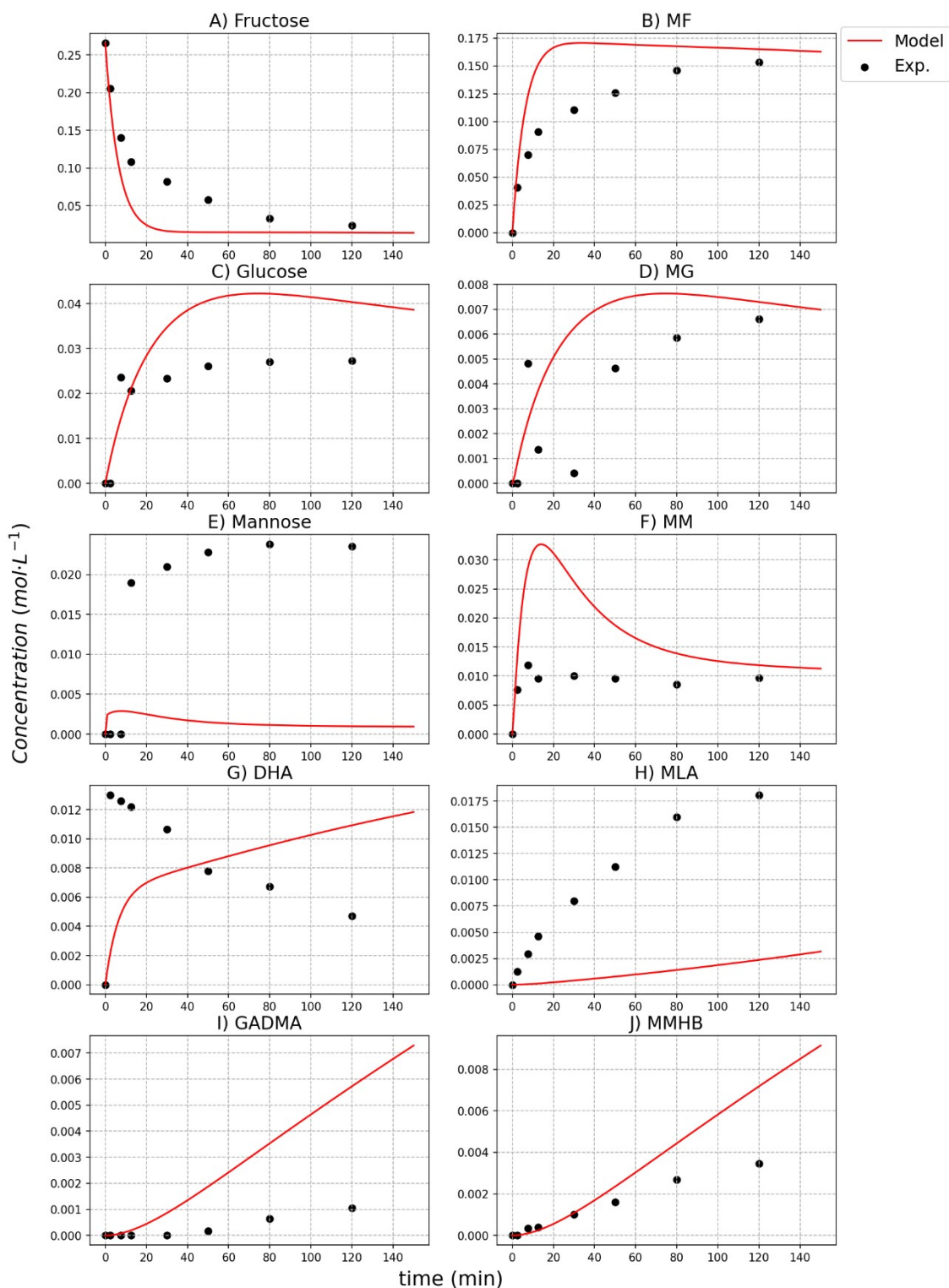


Figure S-5. Validation of the kinetic model at 100 °C when fructose is fed as substrate. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

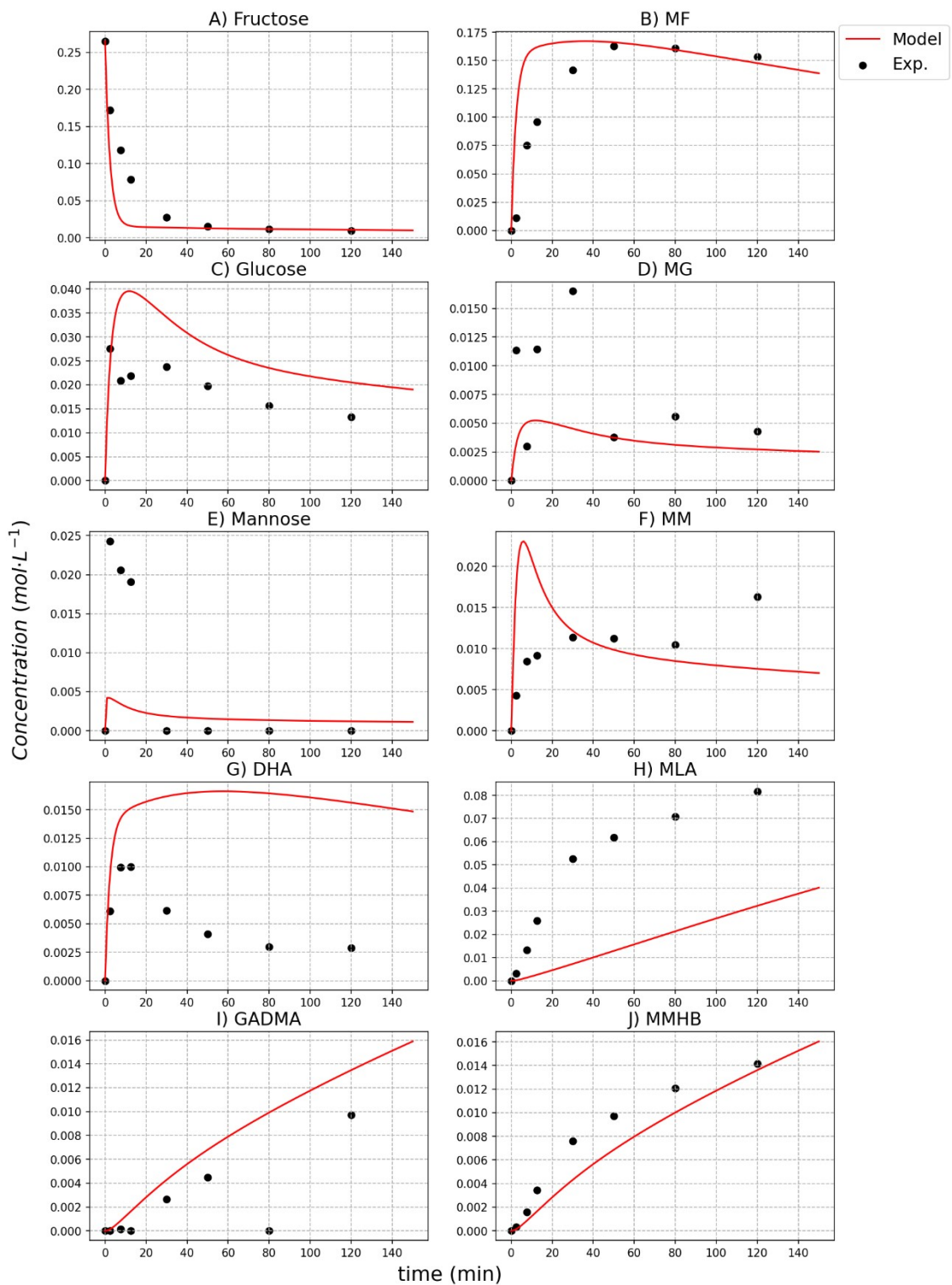


Figure S-6. Validation of the kinetic model at 120 °C when fructose is fed as substrate. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

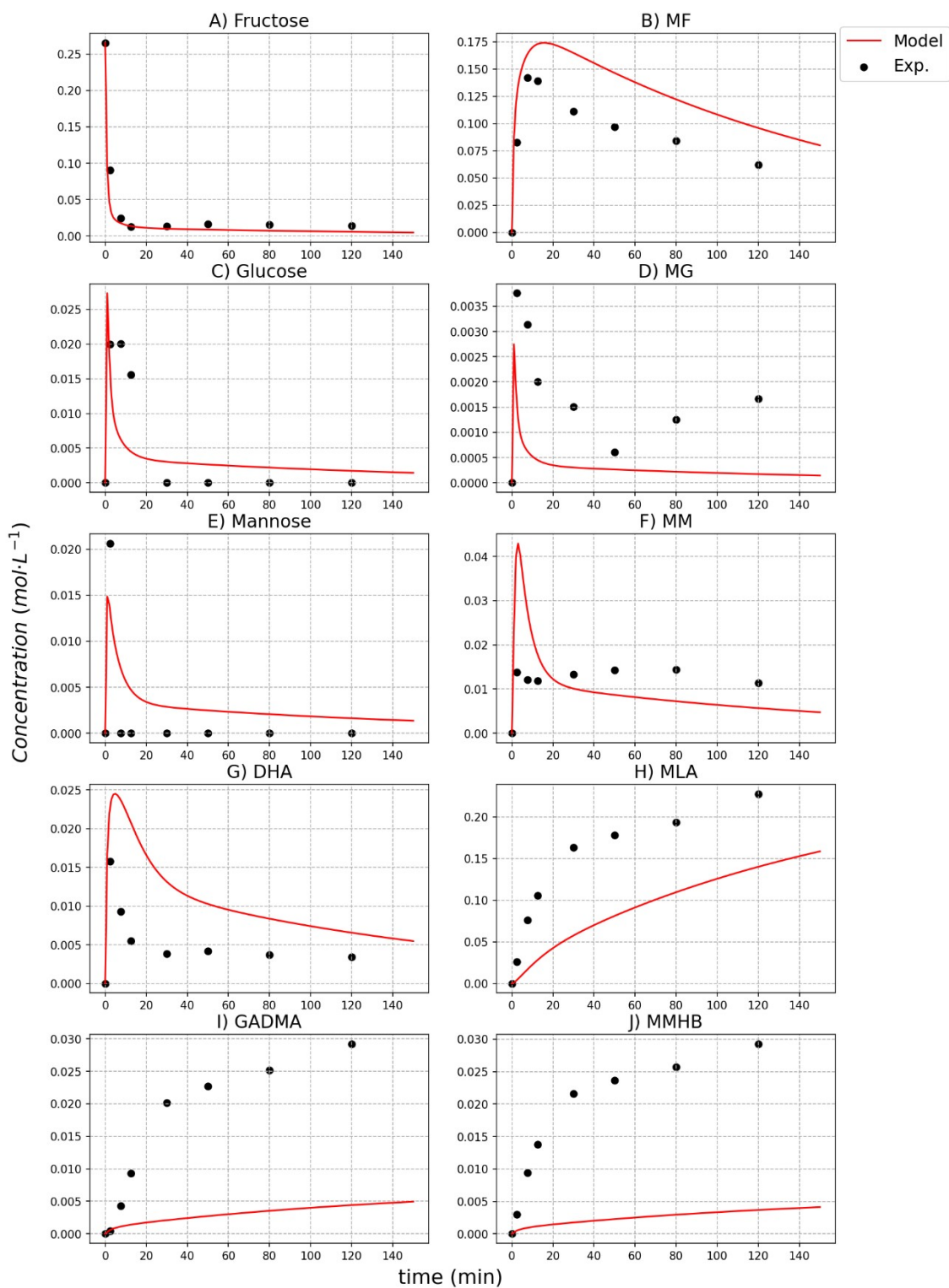


Figure S-7. Validation of the kinetic model at 140 °C when fructose is fed as substrate. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

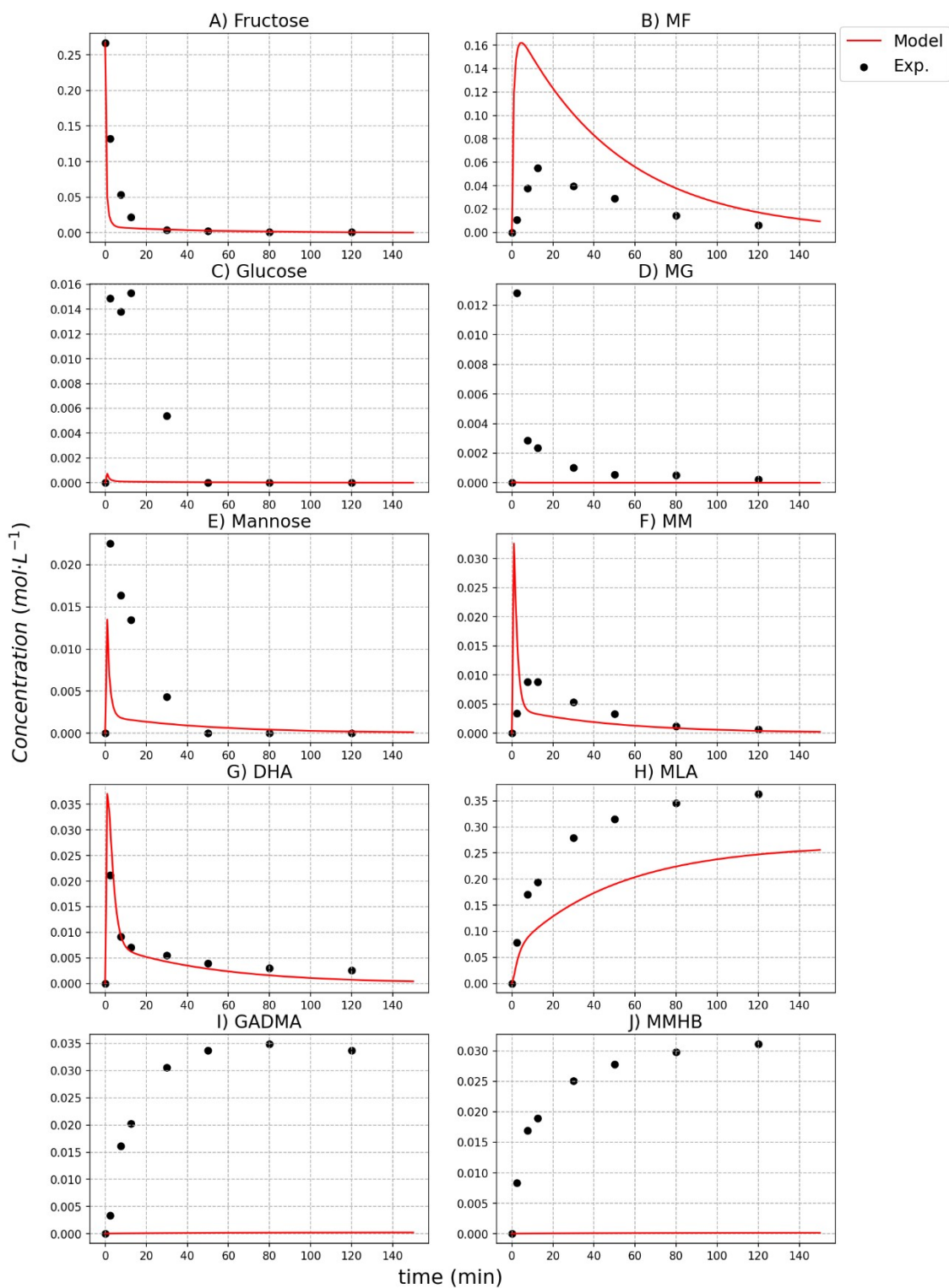


Figure S-8. Validation of the kinetic model at 160 °C when fructose is fed as substrate. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

S-3: Validation of the model for case studies with different temperatures, a catalyst load of 10 g/L and fructose as substrate

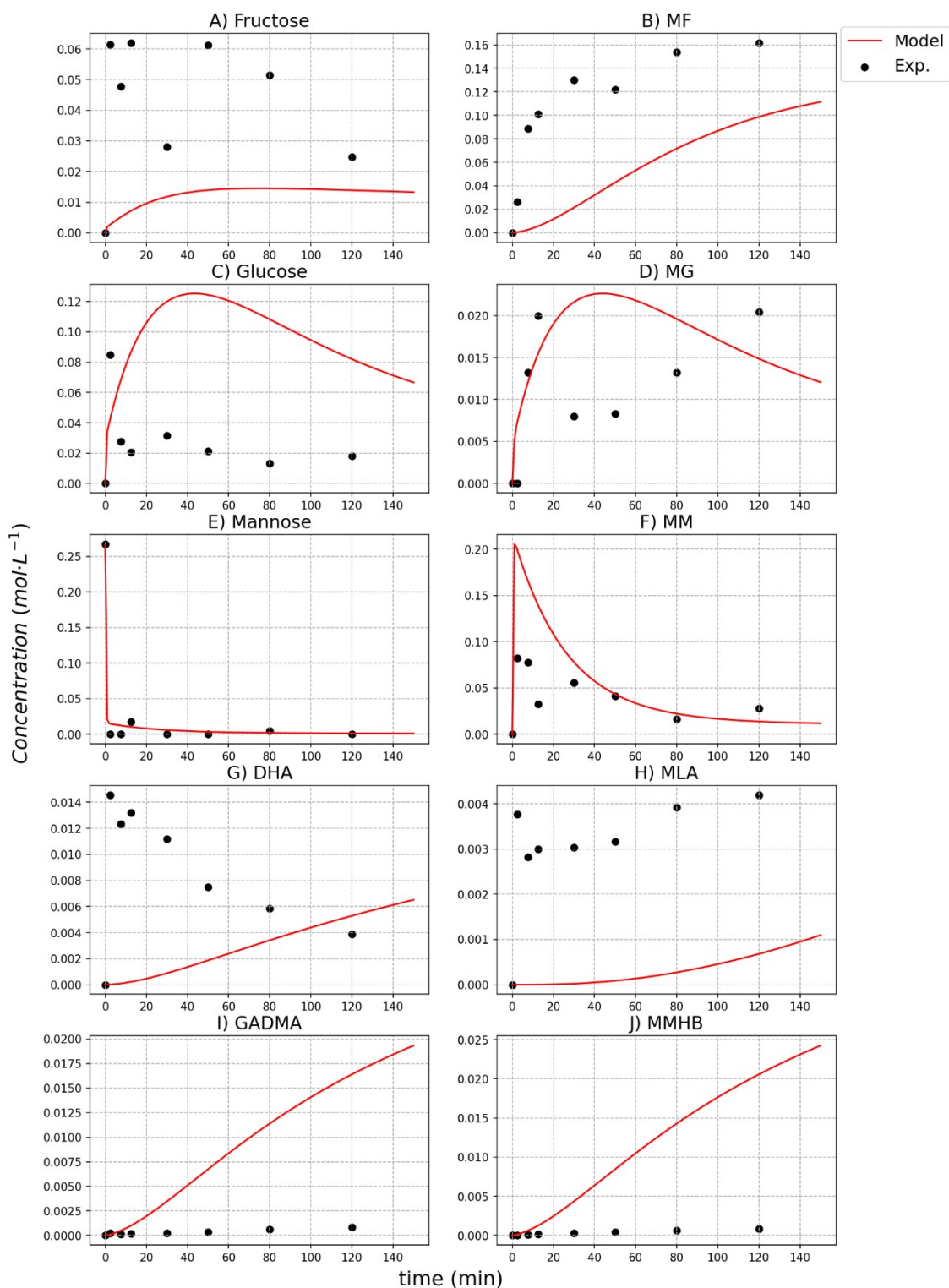


Figure S-9. Validation of the kinetic model at 100 °C when mannose is fed as substrate. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

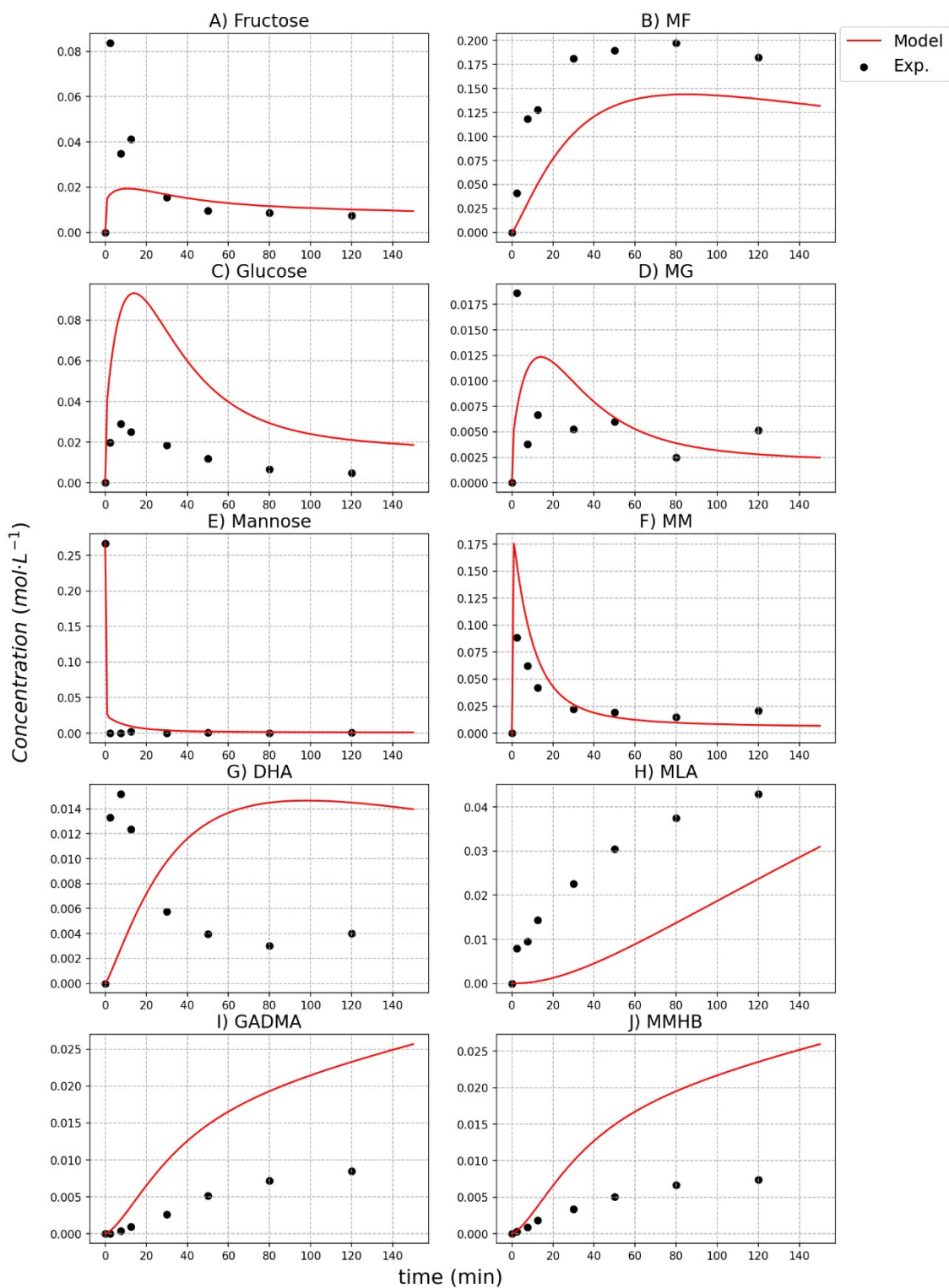


Figure S-10. Validation of the kinetic model at 120 °C when mannose is fed as substrate. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

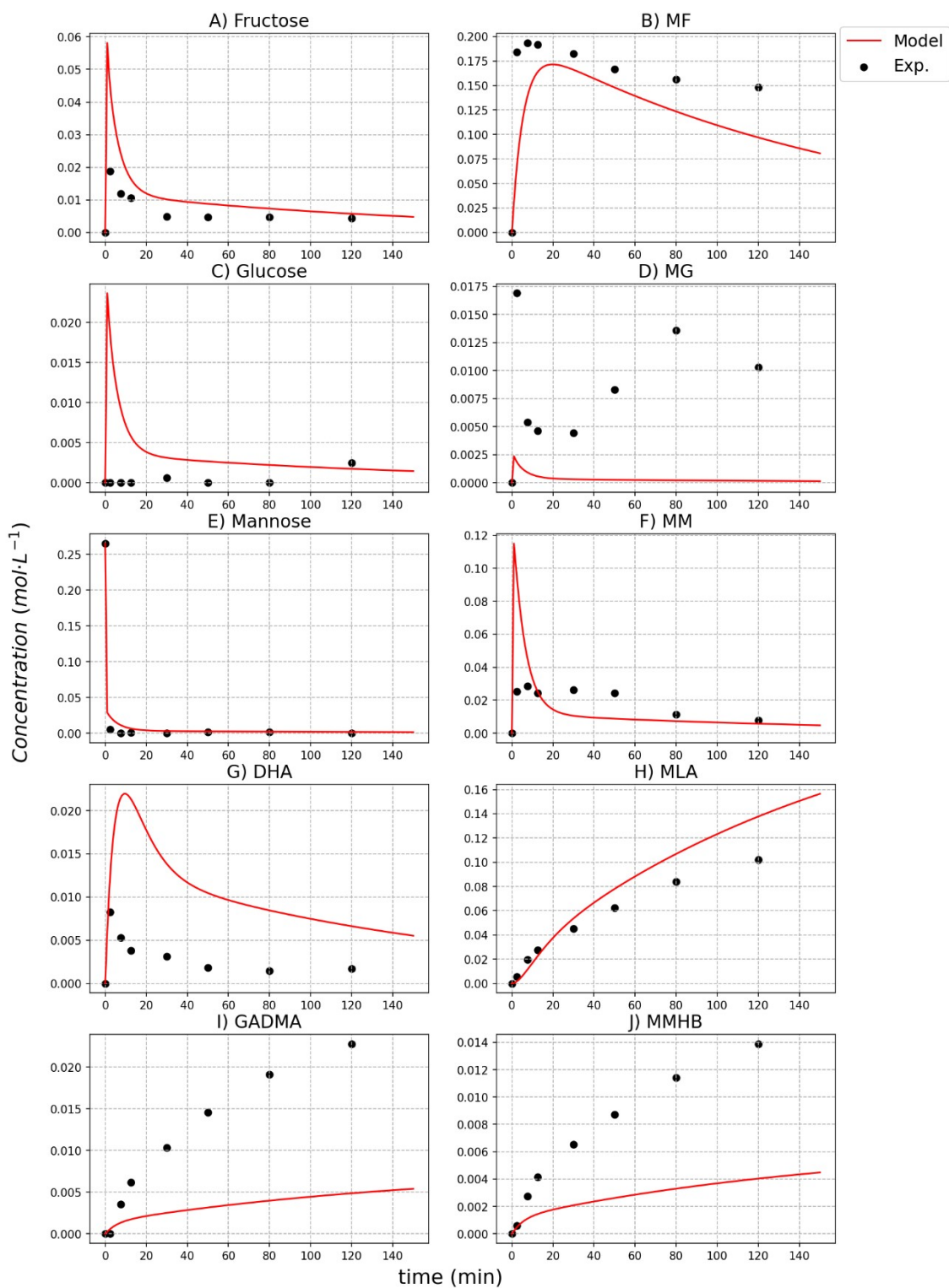


Figure S-11. Validation of the kinetic model at 140 °C when mannose is fed as substrate. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

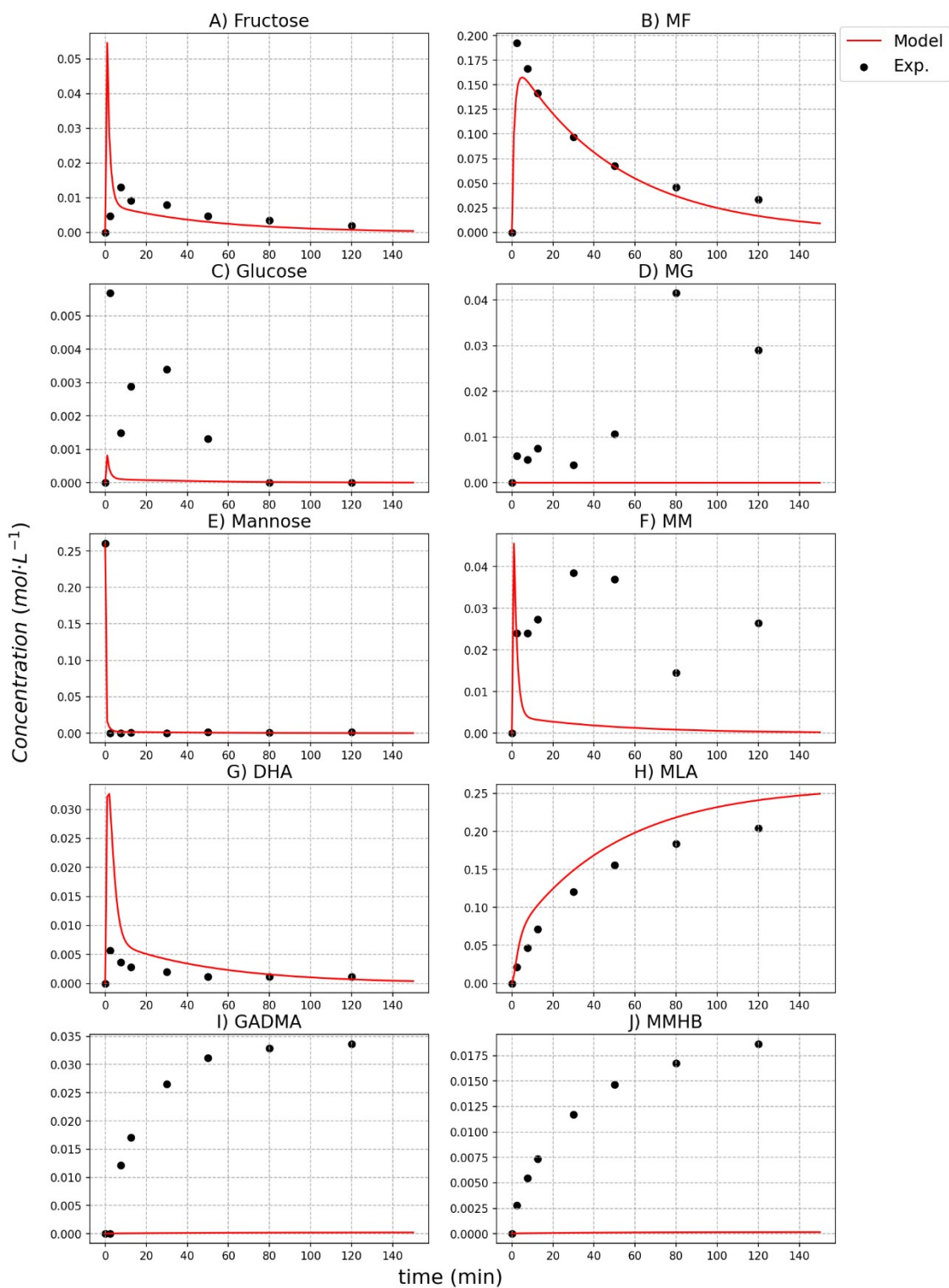


Figure S-12. Validation of the kinetic model at 160 °C when mannose is fed as substrate. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

S-4: Validation of the model for case studies with different catalyst load with glucose as substrate at 140 °C.

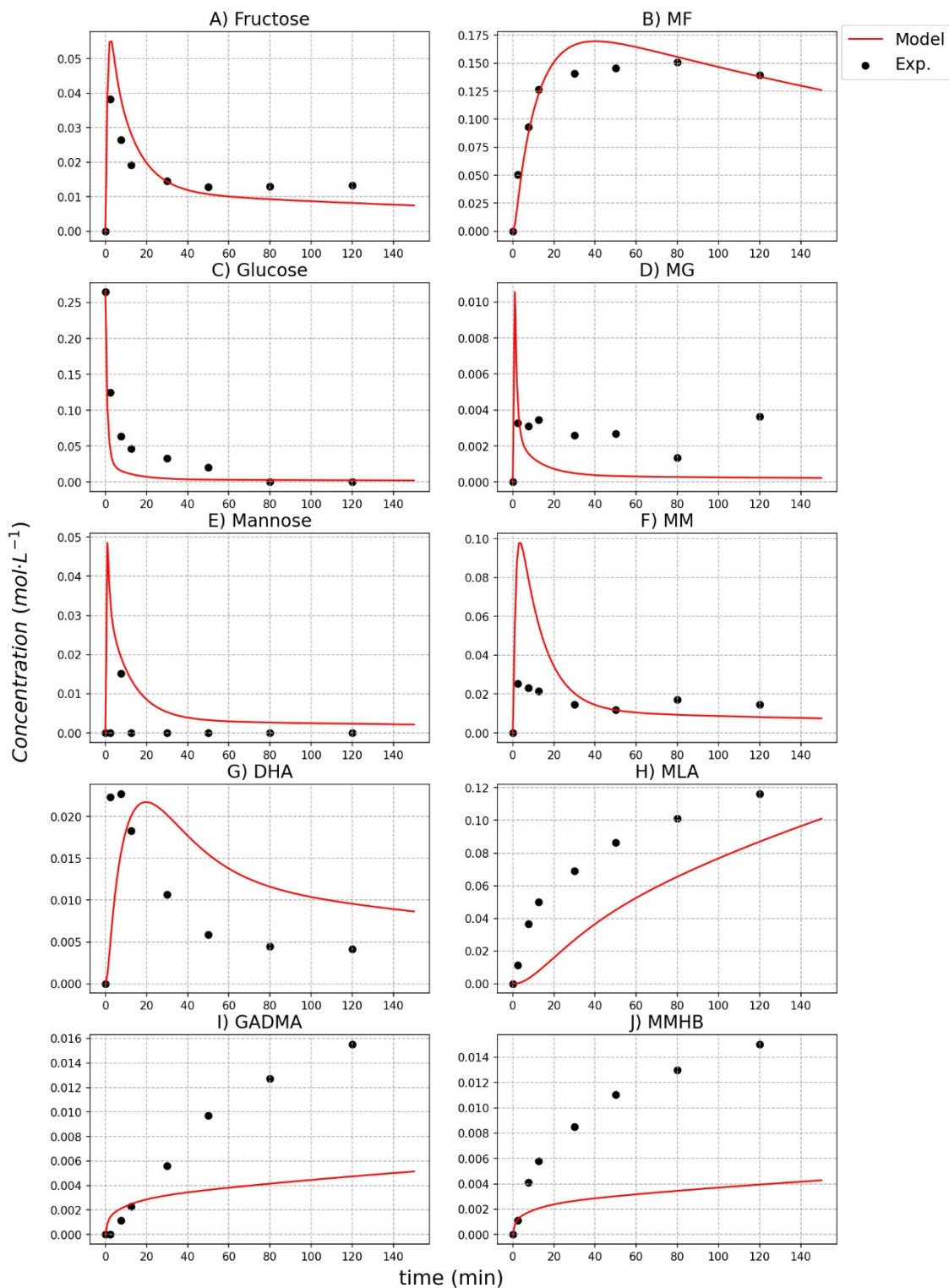


Figure S-13. Validation of the kinetic model at 140 °C when glucose is fed as substrate with a catalyst load of 5 g/L. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

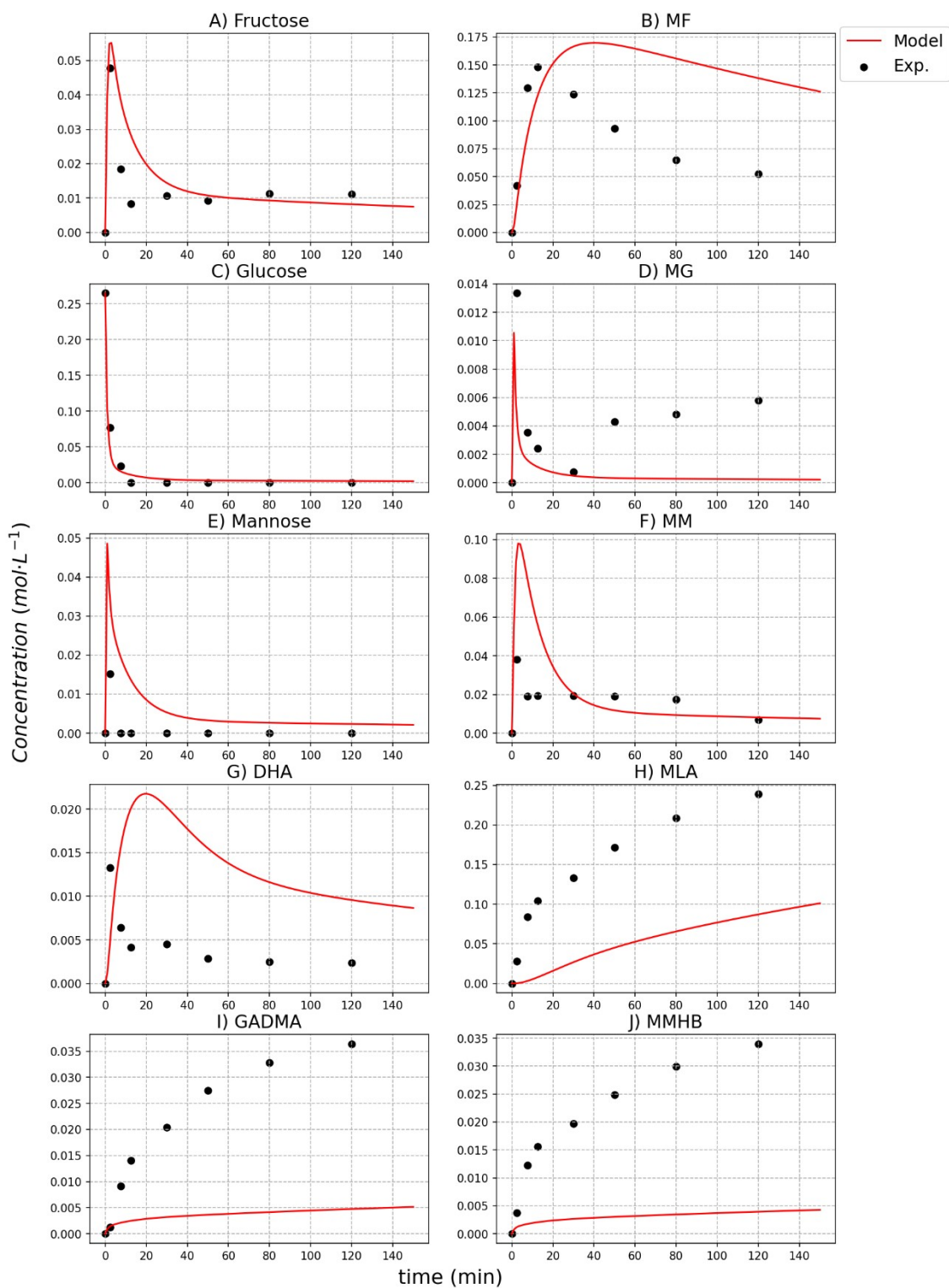


Figure S-14. Validation of the kinetic model at 140 °C when glucose is fed as substrate with a catalyst load of 20 g/L. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

S-5: Validation of the model for case studies with different catalyst load with fructose as substrate at 140 °C.

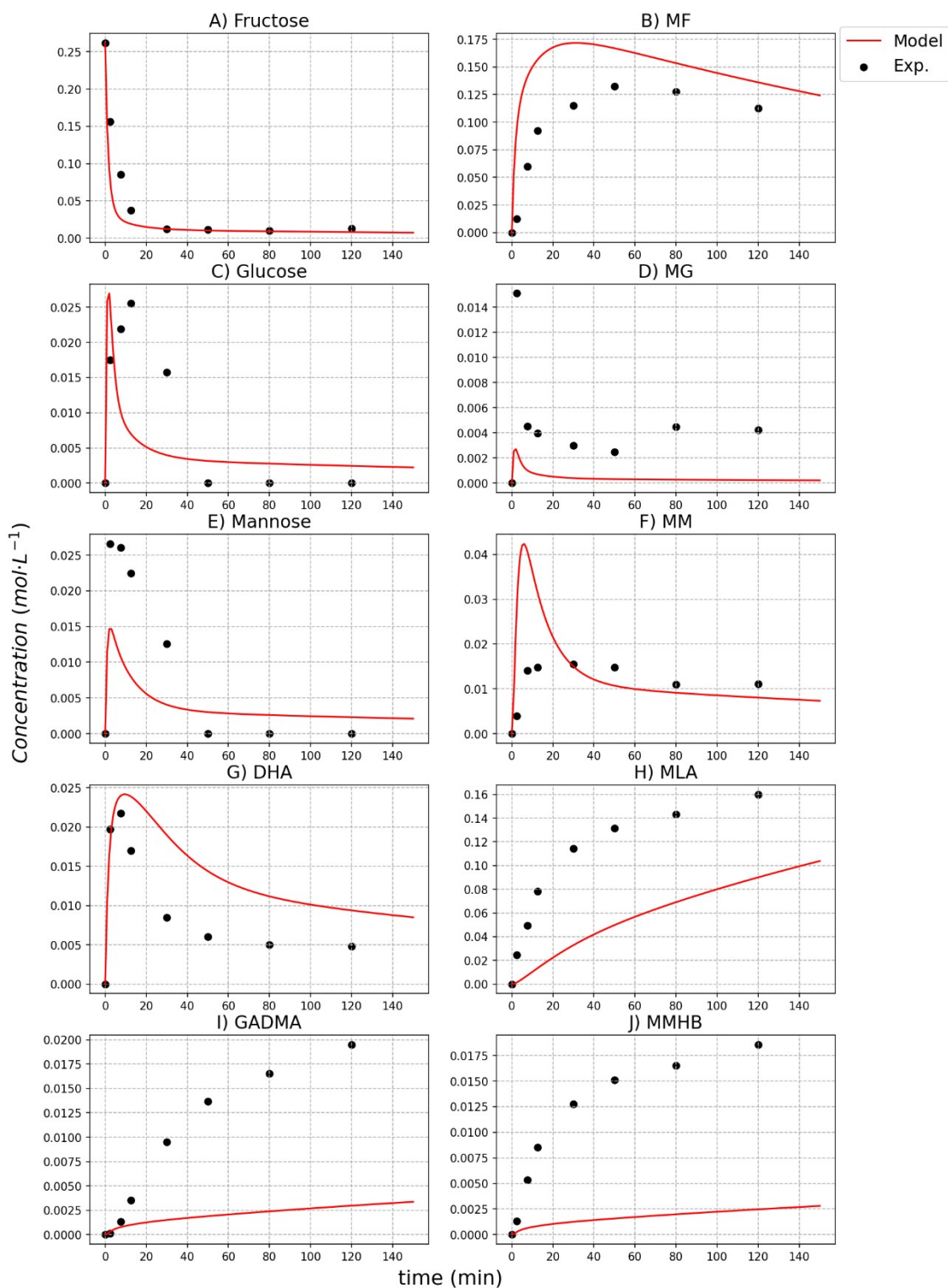


Figure S-15. Validation of the kinetic model at 140 °C when fructose is fed as substrate with a catalyst load of 5 g/L. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

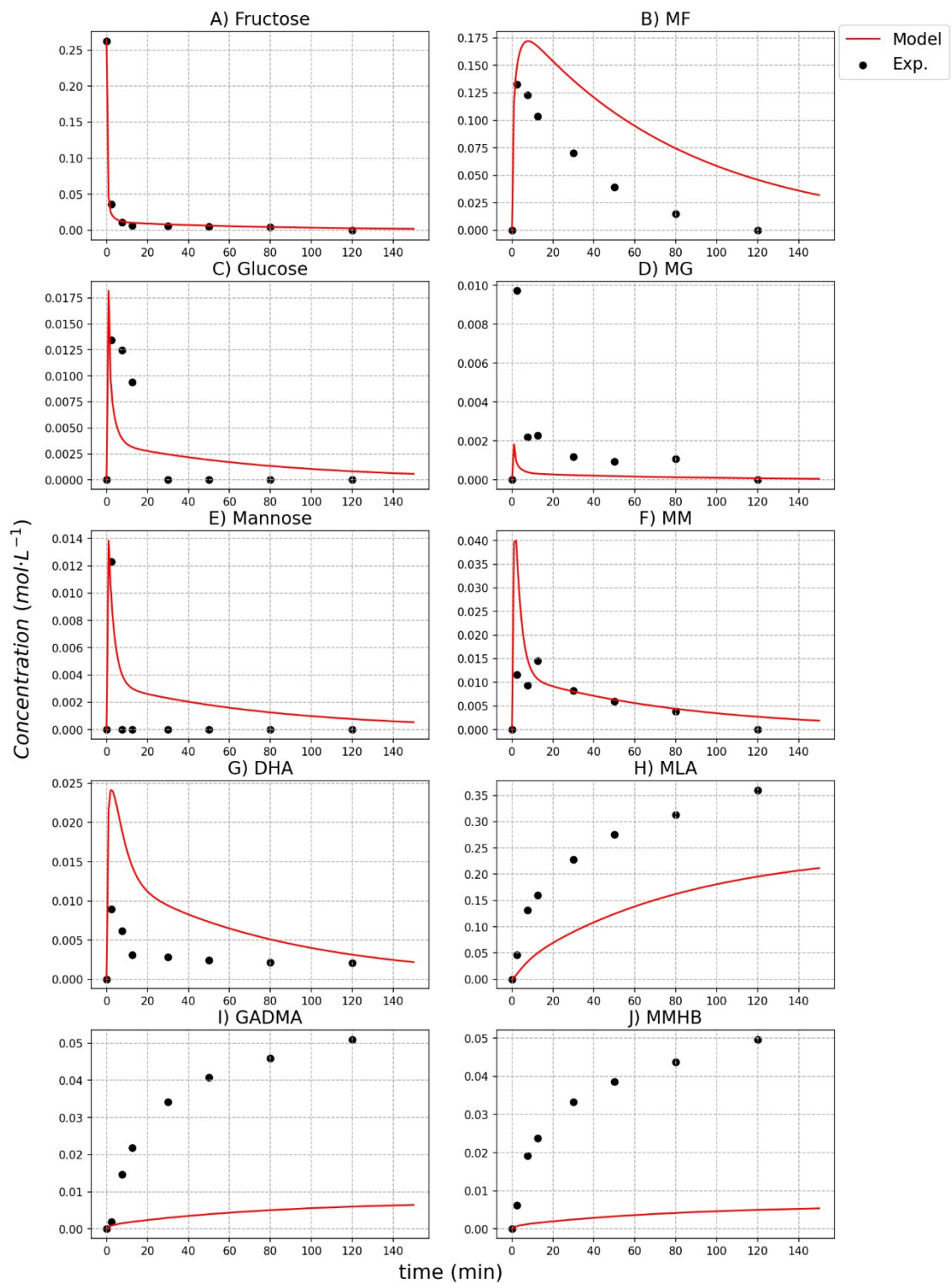


Figure S-16. Validation of the kinetic model at 140 °C when fructose is fed as substrate with a catalyst load of 20 g/L. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

S-6: Validation of the model for case studies with different catalyst load with mannose as substrate at 140 °C.

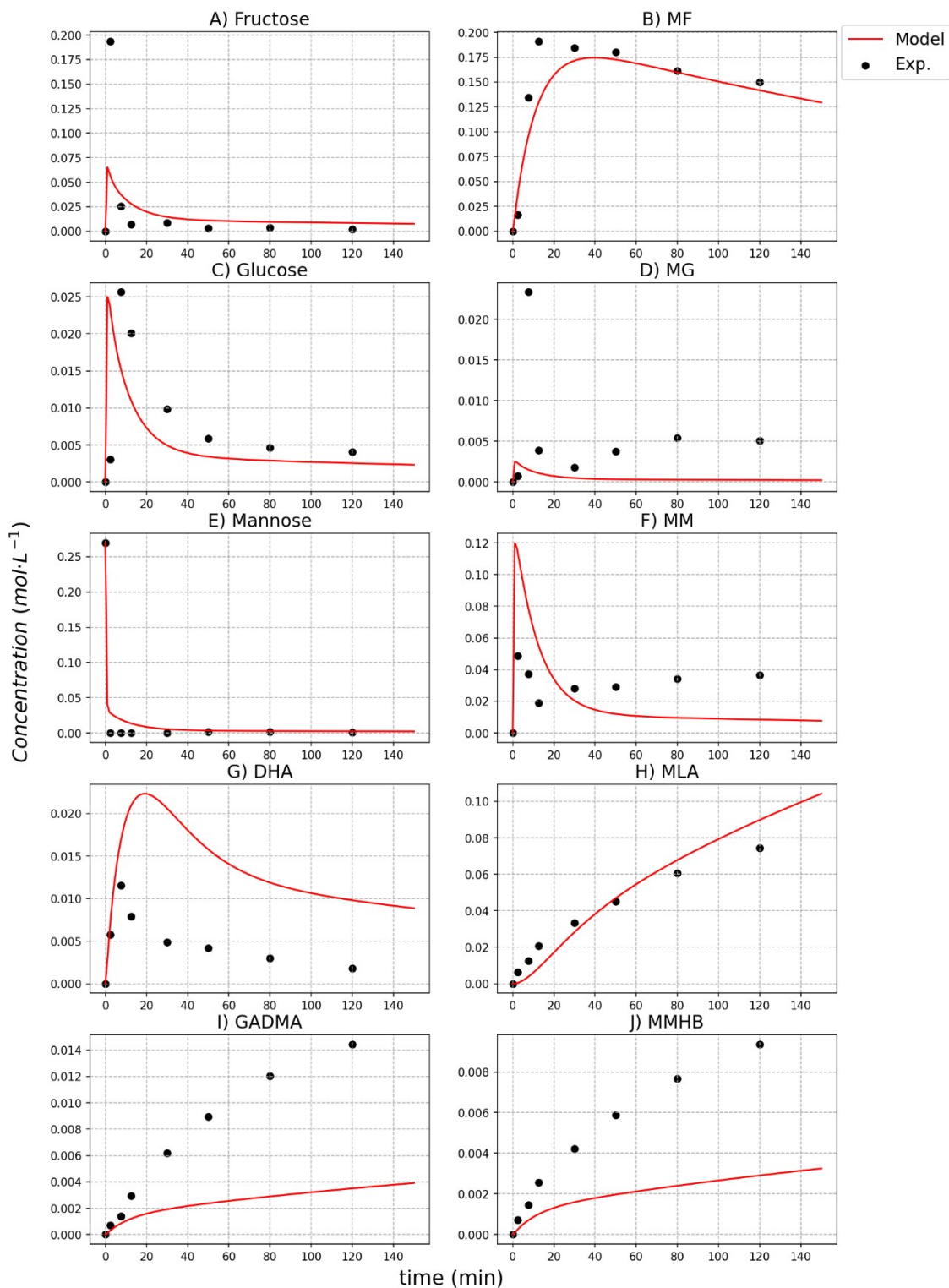


Figure S-17. Validation of the kinetic model at 140 °C when mannose is fed as substrate with a catalyst load of 5 g/L. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.

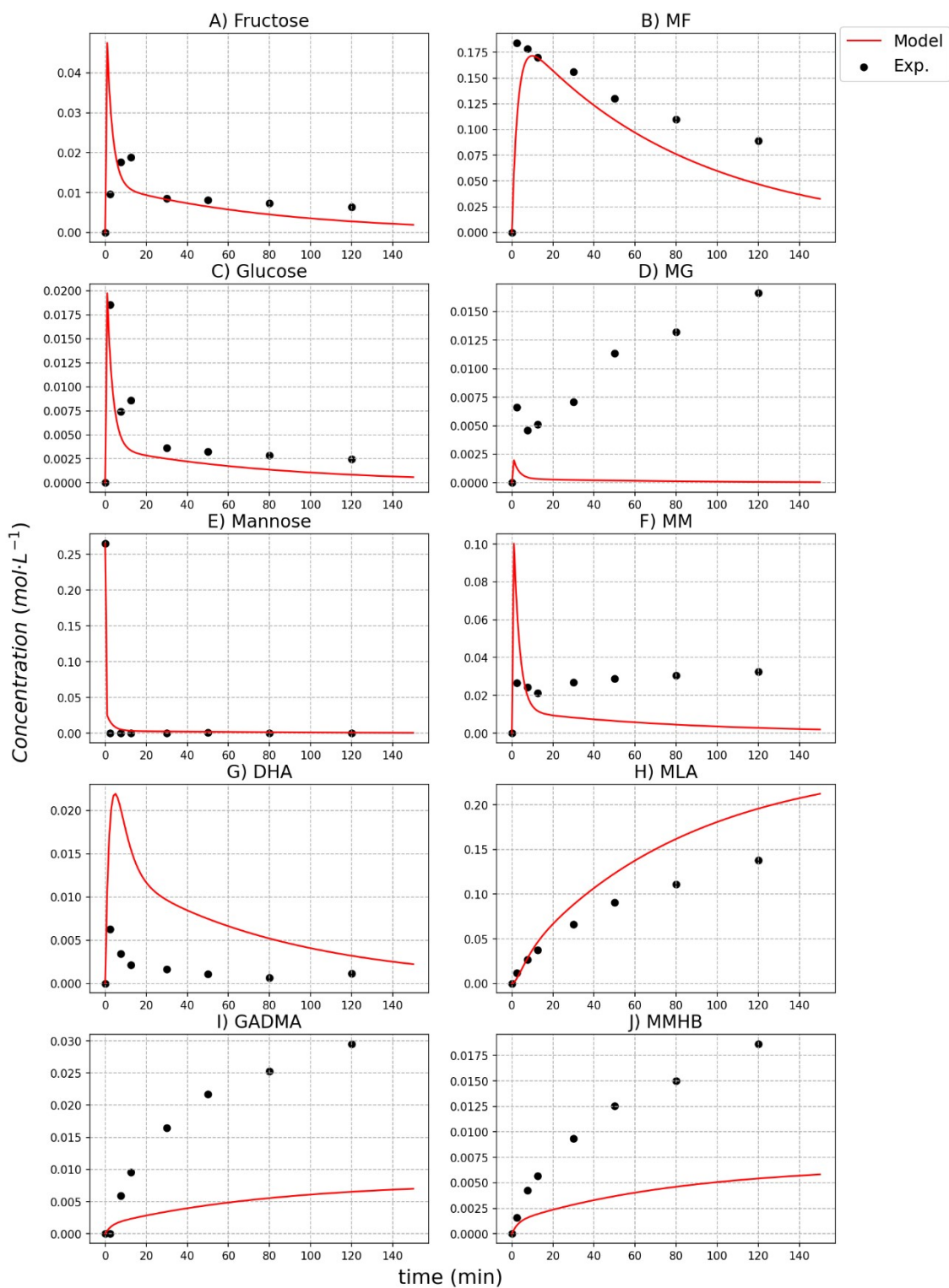


Figure S-18. Validation of the kinetic model at 140 °C when mannose is fed as substrate with a catalyst load of 20 g/L. The concentration is presented for the following components: A) Fructose, B) MFP, C) Glucose, D) MGP, E) Mannose, F) MMP, G) DHA, H) MLa, I) GADMA and J) MMHB.