

Solution to Example 5.1:

- 1) Due to the higher biogeochemical redox, aerobic oxidation (Reaction I) occurs first.
- 2)

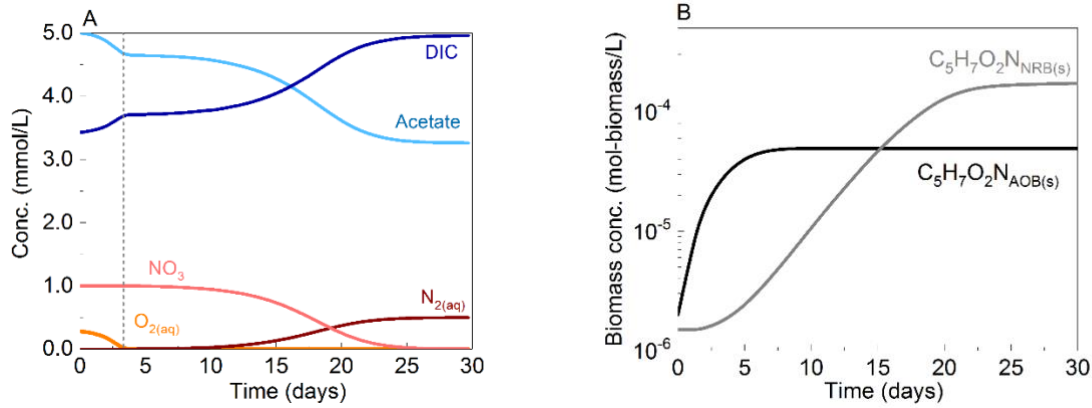


Fig. 3 (A) Total acetate,  $O_{2(aq)}$ , total nitrate ( $NO_3$ ), total inorganic carbon (DIC), and  $N_{2(aq)}$  concentrations and (B) aerobic bacteria (AOB) and nitrate-reducing bacteria biomass (NRB) concentration as a function of time. Due to the existence of  $O_{2(aq)}$ , acetate is consumed through aerobic oxidation at the early period (about 3 days). And no  $NO_3$  reduction or  $N_{2(aq)}$  generation occurs and the NRB concentration almost keep the same. When  $O_{2(aq)}$  concentration is extremely low (almost zero), denitrification (Reaction II) dominates and leads to the increase of  $N_{2(aq)}$  and NRB concentrations. After all  $NO_3$  is consumed by NRB, concentrations of reactants and products keep constant.