

BYM3782 BIOREACTOR DESIGN

PROBLEM SESSION 1

Course Instructor: Assist. Prof. Dr. Benan İnan

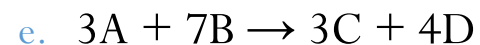
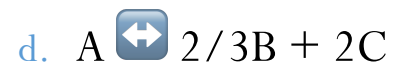
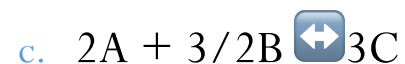
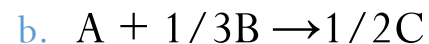
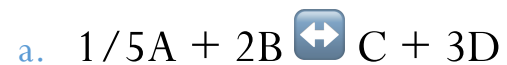
Course Assistant: Res. Assist. Beyza Karacaoğlu

2023-2024 SPRING TERM

INCLASS 1 & 2 SOLUTIONS

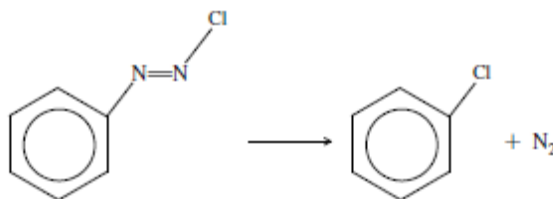
Question 1

- Write down the reaction rate laws for each of the reactions given below:



Question 2

Calculate the activation energy required for degradation of benzenediazonium chloride to chlorobenzene and nitrogen.



k (s⁻¹)	0.00043	0.00103	0.0180	0.00355	0.00717
T (K)	313	319	323	328	333

Question 3

Nitric acid is made commercially from nitric oxide. Nitric oxide is produced by the gas-phase oxidation of ammonia.



The feed consists of 15 mol% ammonia in air at 8.2 atm and 227°C.

1. What is the total entering concentration?
2. What is the entering concentration of ammonia?
3. Set up a stoichiometric table with ammonia as your basis of calculation.
 - a. Express C_i for all species as functions of conversion for a constant-volume batch reactor. Express P_T as a function of X .
 - b. Express P_i and C_i for all species as functions of conversion for a flow reactor.
4. Write the combined mole balance and rate law solely in terms of the molar flow rates and rate law parameters for C1 and C2 above. Assume the reaction is first order in both reactants.

End of Problem Session 1.