FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

DEPARTMENT OF CHEMISTRY

SECOND SEMESTER EXAMINATION 2018/2019 ACADEMIC SESSION

COURSE CODE: CHM326 COURSE UNIT: 2

COURSE TITLE: INDUSTRIAL CHEMICAL TECHNOLOGY 1

INSTRUCTION: ANSWER ANY THREE (3) QUESTIONS TIME: 1 1/2 HOURS

Q1 (a). Calculate the heat in kj liberated by a reactor during the production of 5000 cm^3 of acetylene from calcium carbide giving that the heat of formation in kj/mol of CaC_2 = 73540, H_2O = 351658, CaO = 635100, C_2H_2 = 245857 **(8marks)**

b.(i). When is a transformation process said to occur in; (i) Diffusion region (ii). Kinetic region **(3 marks)**

(ii). Explain how the kinetic and diffusion rate of a chemical transformation occurring in a gas liquid system can be increased. **(3 marks)**

c. Write brief note on the following: i. Batch reactor ii. Cascade of complete mixing reactor **(6 marks)**

Q2a. Briefly discuss the various elementary stages involved in a heterogeneous transformation process. **(7 marks)**

b. Describe the basic procedure that could be used to evaluate the material balance equation of a chemical technological process**. (5 marks)**

c. In a technological transformation process, 450kg/s of 65% tetraoxosulphate (vi) acid solution was concentrated to 95% using a continuous evaporator. Calculate

i. Production rate of the concentrated solution ii. Rate of water removal from the evaporator **(8 marks)**

Q3. a. Define the followings: (i) Chemical technological equipment ii. Heat exchangers **(4 marks)**

b (i). Enumerate any four examples of heat exchangers **(2marks)**

(ii). Describe size reduction process of coarse hard raw materials. **(2marks)**

c. Discuss any (4) methods of improving the efficiency of chemical technological equipment (**12marks)**

Q4. (a). Explain the term "mixing" as used industrial chemical processes **(2marks)**

(b). Write short note on the types of forces commonly used in size reduction **(8marks)**

(c). List and briefly discuss five types of mixers used in some industrial processes **(10marks).**