NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF APPLIED CHEMISTRY
BACHELOR OF SCIENCE HONOURS DEGREE
SUPPLEMENTARY EXAMINATIONS – AUGUST 2010
REACTOR TECHNOLOGY – SCH 4208
TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATES

Answer all questions.

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1. (a) For a non-catalytic reaction of particles with surrounding fluid, describe with the aid of a diagram.
   (i) progressive core model
   (ii) shrinking core model [20]

   (b) List five examples in which the reacting particle change in size as the reaction proceeds. [5]

2. (a) With the aid of diagram, explain the characteristics of a the following reactors
   (i) tubular reactor
   (ii) continuous stirred tank reactor [10]

   (b) List the advantages and disadvantages of the reactors in question 2 (a). [10]

   (c) What are the disadvantages of a batch reactor? [5]

3. (a) Using suitable examples where possible, explain why it is of utmost importance to ascertain the exact nature and amount of by-products formed in a reaction when designing a reactor. [13]

   (b) Explain the three reasons why a semi-batch reactor may be a suitable choice for a chemical reactor. [12]

4. (a) Explain two complicating factors that must be accounted for in heterogeneous non-catalytic systems but not considered in homogenous systems. [10]

   (b) For each of the following cases, list 3 industrial reactions in which the solid

   (i) does not change appreciably in size during the reaction
   (ii) change appreciably in size during the reaction [12]

   (c) State the material balance of an ideal batch reactor for an element of the reactor. [3]

END OF QUESTION PAPER!!!