

Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

Week 5

Lecture 21 : Multiple reactions & reactive process balance

Lecture 22 : Reactive process balance

Lecture 23 : Multiple reactions & reactive process balance

Lecture 24 : Reactive process balance (contd.)

Lecture 25 : Reactive process balance (contd.)

Week 5 Lecture Material

Quiz: Week 5 : Assignment 5

Week 5 Feedback Form

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

Week 12

Download Videos

Detailed Assignment Solution

Live Interactive session

Week 5 : Assignment 5

The due date for submitting this assignment has passed.

Due on 2021-09-01, 23:59 IST.

As per our records you have not submitted this assignment.

Question 01 & 02:

The reaction between ethylene and hydrogen bromide to form ethylene bromide is carried out in a continuous reactor. The product stream from the reactor is analyzed and found to contain 55 mol % ethylene bromide and 35 % HBr. The feed to the reactor contains only ethylene and HBr.

1) From the above data, calculate the fractional conversion of the limiting reactant.

2 points

- (a) 0.55
(b) 0.85
(c) 0.96
(d) 0.63

- a)
 b)
 c)
 d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

b)

2) From the above data, calculate the percentage by which the other reactant is in excess.

2 points

- (a) 54 %
(b) 59 %
(c) 70 %
(d) 64 %

- a)
 b)
 c)
 d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

d)

Question 03, 04 & 05:

Acrylonitrile is produced in the reaction of propylene, ammonia, and oxygen:



The feed contains 10.0 mol% propylene, 15.0% ammonia and rest air. A fractional conversion of 30.0% of the limiting reactant is achieved. Taking 100 mol of feed as a basis:

3) From the above data, determine which of the following reactant is limiting?

2 points

- (a) Ammonia
(b) Propylene
(c) Air
(d) Oxygen

- a)
 b)
 c)
 d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

b)

4) From the above data, calculate the percentage by which two other reactants are in excess.

2 points

- (a) 20.0 % excess C_3H_6 and 9.3 % excess O_2
(b) 50.0 % excess NH_3 and 9.3 % excess C_3H_6
(c) 20.0 % excess NH_3 and 5.0 % excess O_2
(d) 50.0 % excess NH_3 and 5.0 % excess O_2

- a)
 b)
 c)
 d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

d)

 5) From the above data, for a 40% conversion of the limiting reactant, calculate the molar amounts of O_2 , C_3H_3N and H_2O in the product stream.

2 points

- (a) 9.8 moles O_2 , 4.0 moles of C_3H_3N and 12.0 moles of H_2O
(b) 11.9 moles O_2 , 3.0 moles of C_3H_3N and 9.0 moles of H_2O
(c) 9.8 moles O_2 , 3.0 moles of C_3H_3N and 12.0 moles of H_2O
(d) 11.9 moles O_2 , 4.0 moles of C_3H_3N and 9.0 moles of H_2O

- a)
 b)
 c)
 d)

No, the answer is incorrect.

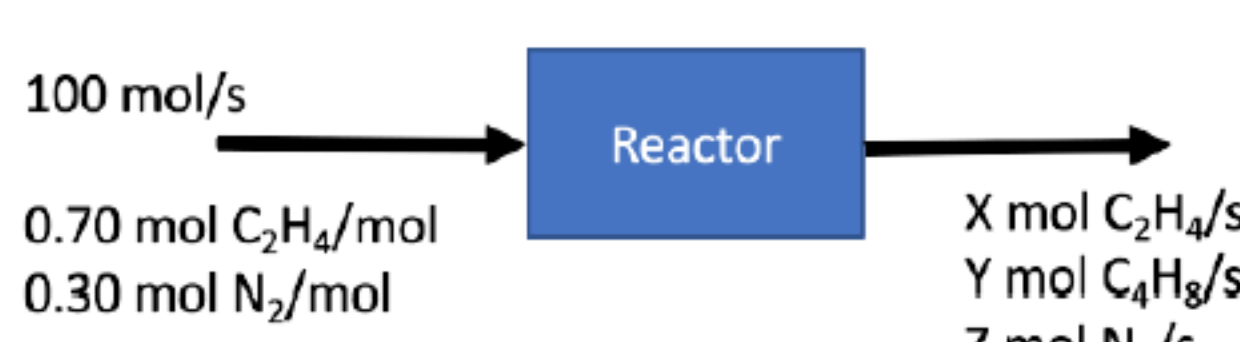
Score: 0

Accepted Answers:

a)

Question 06 & 07:

A mixture of ethylene and nitrogen is fed to a reactor in which some of the ethylene is converted to butene:



6) Calculate the number of independent molecular species involved in the process.

2 points

- (a) 1
(b) 2
(c) 3
(d) 4

- a)
 b)
 c)
 d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

c)

7) Calculate the number of independent atomic species involved in the process.

2 points

- (a) 0
(b) 1
(c) 2
(d) 3

- a)
 b)
 c)
 d)

No, the answer is incorrect.

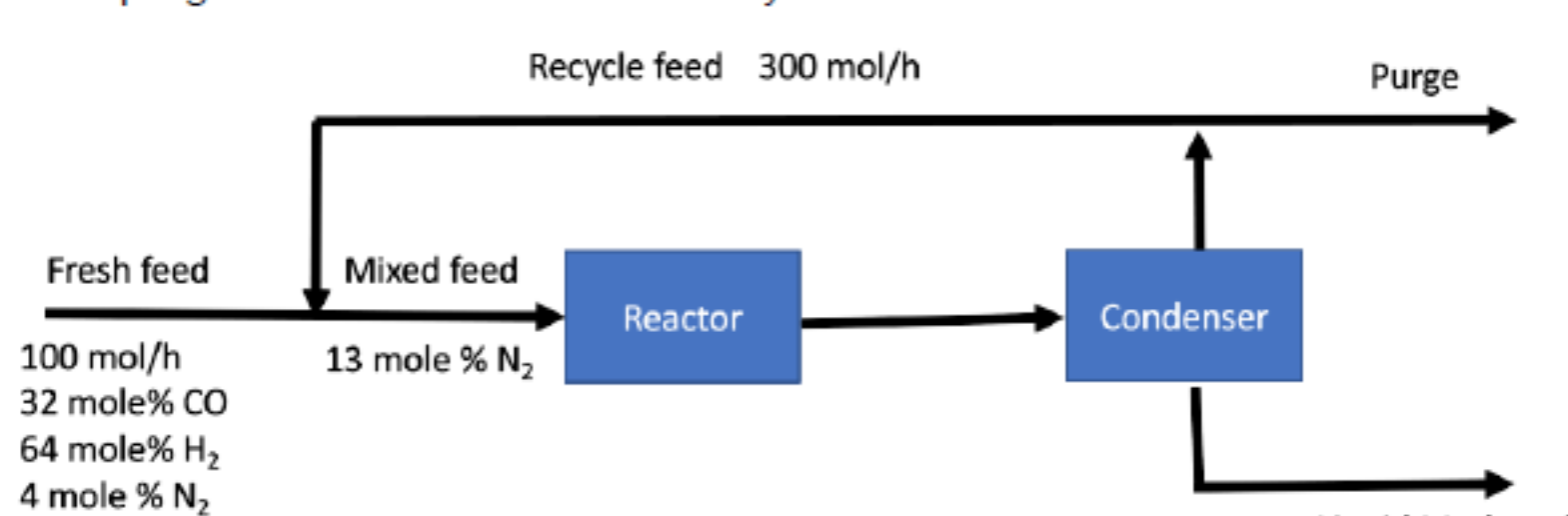
Score: 0

Accepted Answers:

c)

Question 08, 09 & 10:

Given below is a process flow chart for synthesis of liquid methanol. To prevent the buildup of nitrogen in the system, a purge stream is withdrawn from the gas stream leaving the condenser. The gases not purged constitute the stream recycled to the reactor.



8) From the above process flow chart, calculate the composition of purge gas.

2 points

- (a) CO: 30 %, H_2 : 58 % and N_2 : 12 %
(b) CO: 28 %, H_2 : 60 % and N_2 : 16 %
(c) CO: 30 %, H_2 : 52 % and N_2 : 18 %
(d) CO: 28 %, H_2 : 56 % and N_2 : 16 %

- a)
 b)
 c)
 d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

d)

9) From the above process flow chart, calculate the single pass conversion of CO.

2 points

- (a) 31.50 %
(b) 35.00 %
(c) 21.55 %
(d) 19.34 %

- a)
 b)
 c)
 d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

c)

10) From the above process flow chart, calculate the overall conversion of CO.

2 points

- (a) 78.13 %
(b) 55.57 %
(c) 66.72 %
(d) 85.23 %

- a)
 b)
 c)
 d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

a)