Unit 8 - Week 6

Assignment 6

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-10-28, 23:59 IST.

1) Select the correct option: *1 point*

I. The design of reactor (type, size) influences the separation task for downstream separation system.

II. We should consider the design of Vapour Recovery System before the design of Liquid Separation System.

(a) Only statement – I is true
(b) Only statement-II is true
(c) Both the statements are true
(d) Both the statements are false

a)
b)
c)
d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
c)

2) Select the correct option. *1 point*

I. We should study the Recycle Structure before considering details of Separation System.

II. The recycle stream does not influence the overall material balance of the process.

III. If a feed impurity is present as an azeotrope with a reactant, it is advisable to remove the impurity instead of processing it.

(a) Only statement – I and statement –II are true
(b) Only statement-II and statement – III are true
(c) Only statement-I and statement-III are true
(d) All the statements are true

a)
b)
c)
d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
a)

3) Select the correct option. *1 point*

I. If sets of reactions take place at different temperature andpressure, or if they require different catalysts, then we should use different reactor systems for these reaction sets.

II. Generally speaking, liquid recycling is more expensive than gas recycling.

(a) Only statement – I is true
(b) Only statement - II is true
(c) Both the statements are true
(d) Both the statements are false

a)
b)
c)
d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
a)

4) Select the correct option. *1 point*

I. When pressure increases, relative volatility between two components will increase.

II. During multi-component distillation, we should remove the lightest, most plentiful component first.

(a) Only statement – I is true
(b) Only statement - II is true
(c) Both the statements are true
(d) Both the statements are false

a)
b)
c)
d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
b)

5) Select the correct option. *1 point*

I. A P-graph is a graph that can be used to represent a process flow-sheet during the Algorithmic Method of flow-sheet synthesis.

II. Branch and Bound is an efficient search algorithm and used in the Algorithmic Method of flow-sheet synthesis.

III. Mass balance equations generally appear as inequality constrains of the optimization problem related to the synthesis of flow-sheet.

(a) Only statement – I and statement –II are true
(b) Only statement - II and statement – III are true
(c) Only statement - I and statement - III are true
(d) All the statements are true

a)
b)
c)
d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
a)

6) *1 point*

The important factor/factors that must be considered while selecting any flow sheet is/are:
(a) Economic Viability
(b) Safety Issues
(c) Environmental and Legal Issues
(d) All of the above

a)
b)
c)
d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
d)

7) *1 point*

A chemical plant has production rate as 2×10^5 kg/year with 1.5 year product life spans. The heavy fouling on the equipment is expected. Which mode of production do you recommend?

a) Continuous
b) Batch
c) Any one of the above mentioned modes can be selected
d) None of the mentioned modes should be selected

a)
b)
c)
d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
b)

8) Consider the following reaction for the production of Vinyl Chloride from Ethylene:

$$2C_2H_4 + Cl_2 + \frac{1}{2}O_2 \longrightarrow 2C_2H_3Cl + H_2O$$

For the Chemicals used in the above reaction, the following data are given:

Chemical	Molecular Weight (g/mol)	Cost($/kg)
Ethylene(C_2H_4)	28.05	0.45
Chlorine(Cl_2)	70.91	0.18
Vinyl Chloride(C_2H_3Cl)	62.50	0.45
Oxygen(O_2)from air	31.99	0
Water(H_2O)	18.01	0

The gross profit (in $ / kg of Vinyl Chloride) is equal to _____.
(Write your Answer up to 3 places after decimal)

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.100,0.200

1 point

9) Consider the following Reaction Pathways for the Manufacture of Vinyl Chloride (only the Overall Reactions are given): *1 point*

Reaction Pathway P: $C_2H_2 + HCl \longrightarrow C_2H_3Cl$
Reaction Pathway Q: $C_2H_4 + Cl_2 \longrightarrow C_2H_3Cl + HCl$
Reaction Pathway R: $C_2H_4 + HCl + O_2 \longrightarrow C_2H_3Cl + H_2O$
Reaction Pathway S: $2C_2H_4 + Cl_2 + O_2 \longrightarrow 2C_2H_3Cl + H_2O$

For the Chemicals used in the above reaction, the following data is given:

Chemical	Molecular Weight (g/mol)	Cost($/kg)
Ethylene(C_2H_4)	28.05	0.45
Chlorine(Cl_2)	70.91	0.18
Vinyl Chloride(C_2H_3Cl)	62.50	0.45
Acetylene(C_2H_2)	26.03	1.39
Hydrogen Chloride(HCl)	36.46	0.25
Oxygen(O_2)from air	31.99	0
Water(H_2O)	18.01	0

If Hydrogen Chloride (HCl) can be sold as a by-product, then which one of the given Reaction Pathways must be preferred over others?

(Hint: Compute the Gross Profit as the income derived from the sales of the products and by-products minus the cost of the Raw Materials.)

(a) P
(b) Q
(c) R
(d) S

a)
b)
c)
d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
b)

10) *1 point*

Consider the following Reaction Pathways for the Manufacture of Soda Ash (only the Overall Reactions are given):
Reaction Pathway P: $Na_2SO_4 + CaCO_3 \longrightarrow Na_2CO_3 + CaSO_4$
Reaction Pathway Q: $CaCO_3 + 2NaCl \longrightarrow Na_2CO_3 + CaCl_2$
Reaction Pathway R: $2NaOH + CO \longrightarrow Na_2CO_3 + H_2O$
Reaction Pathway S: $2NaHCO_3 \longrightarrow Na_2CO_3 + H_2O + CO_2$
For the Chemicals used in the above reaction, the following data is given:

Chemical	Molecular Weight (g/mol)	Cost($/kg)
Sodium sulphate(Na_2SO_4)	142.04	0.8
Limestone($CaCO_3$)	100.0869	0.9
Soda ash(Na_2CO_3)	105.9888	0.95
Calcium sulphate($CaSO_4$)	136.14	1.0
Sodium Chloride(NaCl)	58.44	0.25
Calcium Chloride($CaCl_2$)	110.98	0.3
Carbon dioxide (CO_2)	44.01	0
Water(H_2O)	18	0
Sodium bicarbonate($NaHCO_3$)	84.007	0.8
Sodium hydroxide(NaOH)	39.997	0.5

If Soda Ash can be sold as a product, then which one of the given Reaction Pathways must be preferred over others?

(Hint: Compute the Gross Profit as the income derived from the sales of the products and by-products minus the cost of the Raw Materials.)

(a) P
(b) Q
(c) R
(d) S

a)
b)
c)
d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
c)