

B.Tech. Eighth Semester (Food, Pulp & Paper, Oil & Paint and Petro. Tech.) (CGS)

11088 : Petrochemical Technology - VI : Paper - 8 PC 01

P. Pages : 2

Time : Three Hours



AU - 3069

Max. Marks : 80

- Notes :
1. Due credit will be given to neatness and adequate dimensions.
 2. Assume suitable data wherever necessary.
 3. Diagrams and chemicals equations should be given wherever necessary.
 4. Illustrate your answer necessary with the help of neat sketches.
 5. Discuss the reaction, mechanism wherever necessary.
 6. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION - A

1. a) Define and discuss the following term with respect to adsorption; 10
 - i) Deactivation
 - ii) Reactivation
 - iii) Stage wise operation with suitable example.
- b) What is basic different between reactivation and regeneration? Discuss with suitable examples. 4

OR

2. Why recovery of heavier hydrocarbons from natural gas is economically justified? Name various technology available for this. Describe any one in brief, in all aspect. 14
3. Prove that, for irreversible exothermic catalytic reaction, 13
$$k_1 = k_2 = 0.227 \text{ sec}^{-1} \text{ at } 593^\circ \text{K}$$
$$k_3 = 0.3985 \text{ sec}^{-1}.$$
Hence discuss the simplification of reaction scheme.

OR

4. How to obtain the optimum operating conditions for phthalic anhydride synthesis? Discuss by considering true values of temperature and time. 13
5. Discuss the utility of following; 13
 - i) Adsorption technique
 - ii) High pressure steam generator.
 - iii) Mathematical modelling in processing.

OR

6. Compare the following and also discuss their utility in chemical industry. 13
 - i) Adsorption and absorption.
 - ii) Fixed bed reactors and fluidised bed reactor.
 - iii) Chemical adsorption and physical adsorption.

SECTION – B

7. Discuss the engineering aspect of steam reforming with respect to catalyst response and reactor type in brief. 14

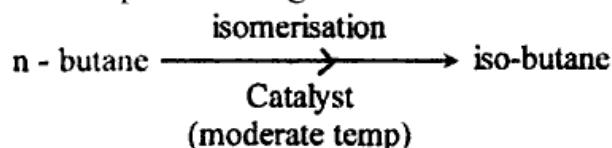
OR

8. If gas entering in a shift convertor contain 34.9 mole of H_2 , 7.2 mole of CO , 5.4 mole of CO_2 and 90% conversion of monoxide is possible. How much steam will be required in total and per mole of CO ? Also which will be the best suitable operating temperature, if;
 $k = 65.7$ at $1250.7^\circ K$
 $k = 1.192$ at $1048^\circ K$
 $k = 47.685$ at $1231.95^\circ K$
Justify your answer 14

9. Calculate the value of yield incase of reversible exothermic reaction $A \rightleftharpoons B$ for the time 0.25 minute at temperature 70, 80, 90, $100^\circ C$. 13
Assume $\Delta G = -10,000$ J/mole at $298^\circ K$.
 $\Delta H = -40,000$ J/mole
(It is const. over the temp. range $273-473^\circ K$)

OR

10. Following are the condition and composition at which equilibrium reached for the reaction. <http://www.sgbauonline.com> 13



Temp $^\circ K$	Mole % (n-butane)
310	21
385	43

Assuming that activity is equal to mole fraction. Calculate the standard free energy of reaction at temperature 310 and $385^\circ K$ and average value of heat of reaction over this temperature range.

11. Discuss the design aspect of steam cracking for olefin synthesis with respect to diameter of tube, number of tube, metals of construction, arrangement of tubes etc. 13
On which basis will you classified the various unit associated with olefin synthesis in cold section and hot section?

OR

12. What are the factor's which affect the operating conditions for ammonia synthesis? 13
Discuss in detail. What is the best suitable operating conditions for ammonia to optimize the yield?
