淡江大學 105 學年度日間部轉學生招生考試試題

系別：化學工程與材料工程學系三年級　科目：質 能 均 衡　21-1

考試日期：7 月 22 日(星期五) 第 1 節　本試題共 4 大題， 2 頁

本試題雙面印刷

1. Using dimensional equations, convert (20%)

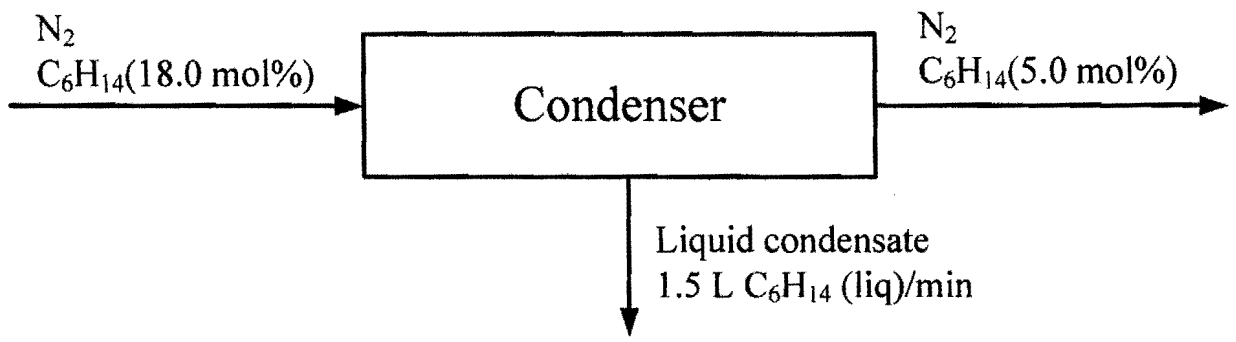
(a) 10 days to milliseconds.

(b) 20 m/h to ft/s.

(c) 500 kg/m^3 to lb/ft^3.

(d) 5.0 kJ/min to W.

2. A gas stream contains 18.0 mol% hexane and the remainder nitrogen. The stream flows to a condenser, where its temperature is reduced and some of the hexane is liquefied. The hexane mole fraction in the gas stream leaving the condenser is 0.05. Liquid hexane condensate is recovered at a rate of 1.5 L/min. The density of liquid hexane is 0.655 g/cm^3. (25%)



(a) What is the flow rate of the gas stream leaving the condenser in mol/min?

(b) What percentage of the hexane entering the condenser is recovered as a liquid?

3. Saturated steam at 1 atm is discharged from a turbine at a rate of 1000 kg/h. Superheated stream at 300 °C and 1 atm is needed as a feed to a heat exchange; to produce it, the turbine discharge stream is mixed with superheated steam available from a second source at 400 °C and 1 atm. The mixing unit operates adiabatically. Calculate the amount of superheated steam at 300 °C produced and the required mass flow rate of the 400 °C steam. (25%)

背面尚有試題

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4. Ethane is burned with 50 % excess air. The percentage conversion of the ethane is 90%; of the ethane burned, 25% reacts to form CO and the balance reacts to form CO_2. The reactions are listed as follows. (30%)

$$C_2H_6 + \frac{7}{2}O_2 \rightarrow 2CO_2 + 3H_2O$$

$$C_2H_6 + \frac{5}{2}O_2 \rightarrow 2CO + 3H_2O$$

The compositions of air are 21 mol% of O_2 and 79 mol% of N_2. Calculate:

(a) The molar composition of the stack gas on a dry basis.

(b) The mole ratio of water to dry stack gas.