淡江大學96學年度轉學生招生考試試題

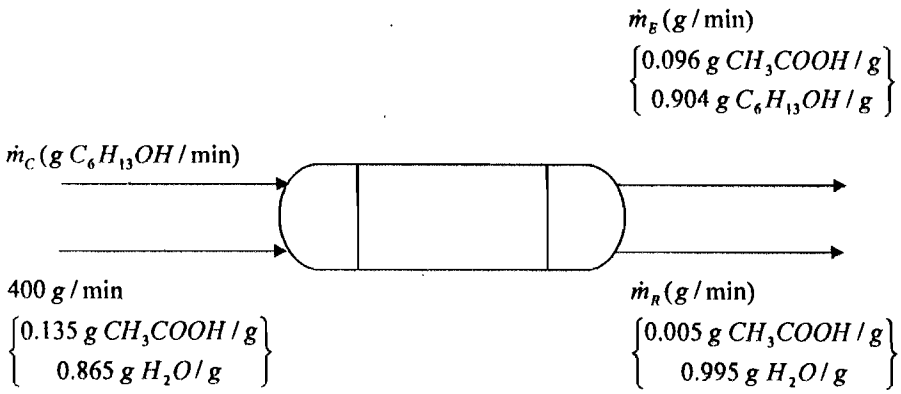
系別：化學工程與材料工程學系三年級　科目：質 能 均 衡

可否使用計算機			
可	✓	否	

本試題共 1 頁

(1) Using dimensional equations, convert
   (a) 25 days to milliseconds. (10%)
   (b) 50 ft/s to km/h. (10%)
   (c) 540 $m^4/(day \cdot kg)$ to $cm^4/(min \cdot g)$. (10%)

(2) Shown below is flowchart of a process in which acetic acid (A) is extracted from a mixture of acetic acid and water (B) into 1-hexanol (C), a liquid immiscible with water.



Calculate $\dot{m}_C$, $\dot{m}_E$, and $\dot{m}_R$. (30%)

(3) Three hundred gallons of a mixture containing 75 wt% ethanol (ethyl alcohol) and 25% water (mixture specific gravity = 0.877) and a quantity of a 40 wt% ethanol—60% water mixture (SG = 0.942) are blended to produce a mixture containing 60 wt% ethanol. The object of this problem is to determine V_{40}, the required volume of the 40% mixture.
Calculate V_{40}. (hint: 1 ft^3 = 7.48 gal) (20%)

(4) A stream of humid air containing 1.0 mole% $H_2O(v)$ and the balance dry air is to be humidified to a water content of 10.0 mole% H_2O. For this purpose, liquid water is fed through a flowmeter and evaporated into the air stream. The flowmeter reading, R is 90. The only available calibration data for the flowmeter are two points scribbled on a sheet of paper, indicating that readings R = 15 and R = 50 correspond to flow rates $\dot{V} = 40.0\ ft^3/h$ and $\dot{V} = 96\ ft^3/h$, respectively.
Estimate the molar flow rate (lb-mole/h) of the humidified (outlet) air. (20%)