

淡江大學 109 學年度日間部寒假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

15-1 15

考試日期：1月18日(星期一) 第1節

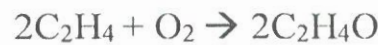
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本試題雙面印刷

1. The specific gravity of gasoline is approximately 0.7. What is the mass (kg) of 10 L of gasoline? (10%)

2. A hydrocarbon gas is burned with air. The dry-basis product gas composition is 1.5 mole% CO, 6% CO₂, 8.2% O₂, and 84.3% N₂. There is no atomic oxygen in the fuel. Calculate the ratio of hydrogen to carbon in the fuel gas and speculate on what the fuel might be. Then calculate the percent excess air fed to the reactor. (25%)

3. The oxidation of ethylene to produce ethylene oxide proceeds according to the equation



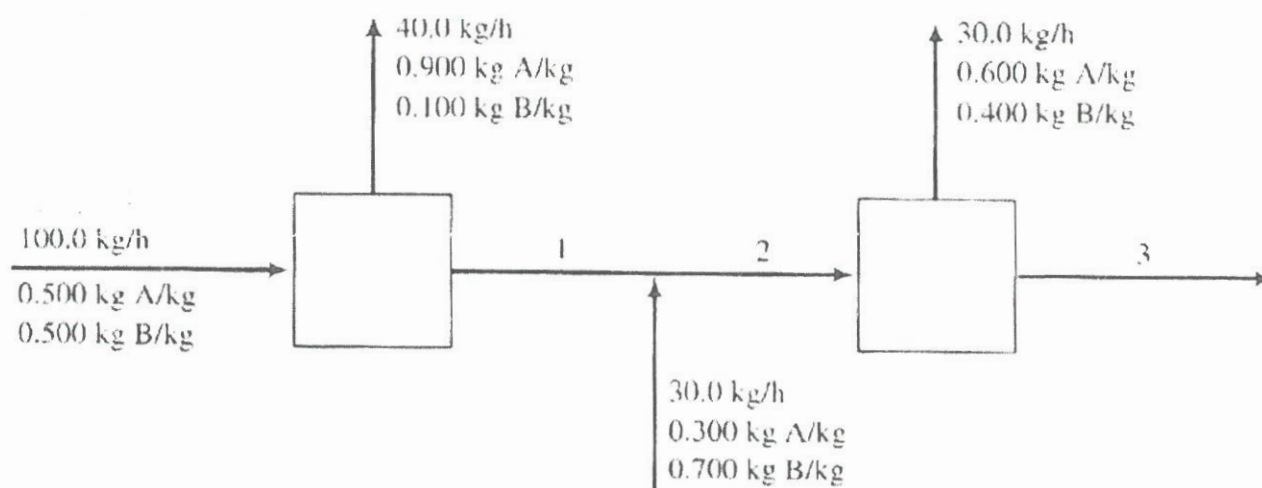
The feed to a reactor contains 100 kmol C₂H₄ and 100 kmol O₂.

(a) Which reactant is limiting? (5%)

(b) What is the percentage excess of the other reactant? (5%)

(c) If the reaction proceeds to completion, how much of the excess reactant will be left; how much C₂H₄O will be formed. (10%)

4. A labeled flowchart of a continuous steady-state two-unit process is shown below. Each stream contains two components, A and B, in different proportions. Three streams whose flow rates and/or compositions are not known are labeled 1, 2, and 3. Calculate the unknown flow rates and compositions of streams 1, 2, and 3. (30%)



5. The specific internal energy of formaldehyde (HCHO) vapor at 1 atm and moderate temperature is given by the formula:

背面尚有試題

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$$\hat{U}(\text{J/mol}) = 25.96T + 0.02134T^2$$

where T is in °C.

- (a) Calculate the specific internal energies of formaldehyde vapor at 100 °C. (5%)
- (b) Use the closed system energy balance equation to calculate the heat (J) required to raise the temperature of 3 mol HCHO at constant volume from 0°C to 100 °C. List all of your assumptions. (10%)