

# 國立成功大學

## 114學年度碩士班招生考試試題

編 號：66

系 所：資源工程學系

科 目：熱力學

日 期：0211

節 次：第 2 節

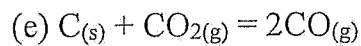
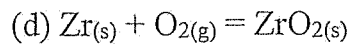
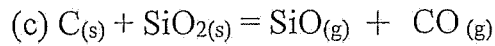
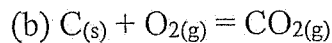
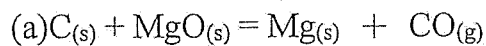
注 意：1.不可使用計算機  
2.請於答案卷(卡)作答，於  
試題上作答，不予計分。

1 (a) Please derive and explain the meaning of the combined statement of the first and second laws,  $dU = TdS - PdV$ .

(b) Is the above statement valid for reversible or irreversible process?

2 An isolated system can be divided into two subsystem A and B. The two subsystem are allowed to exchange heat internally. Use the increase-in -entropy principle to prove that the direction of heat transfer is always from the hot subsystem to cold subsystem.

3 List the following reactions in the order of increasing reaction entropy. Explain your results.



4 When pressure is increased, what will happen to the melting point of ice? what will happen to the boiling point of water? Explain your results.

5 In a binary A-B solution, the activity coefficient of A at temperature T is  $\ln \gamma_A = \alpha X_B^2$ , in which  $\alpha$  is independent of composition. Please prove that the activity coefficient of B must be  $\ln \gamma_B = \alpha X_A^2$ . (hint: using Gibbs-Duhem eq.)

*(20 points for each )*