

1. (15%) Which of the following pairs is mismatched? A) Scanning tunneling microscope --- allows visualization of atoms B) Fluorescence microscope --- uses a fluorescent light C) Darkfield microscope --- uses visible light D) Confocal microscope --- produces a three-dimensional image E) Scanning electron microscope --- produces a three-dimensional image (請選出正確答案，並寫出題目與正確答案之中文意思)。
2. (15%) Which of the following pairs is mismatched? A)  $\text{CO}_2 + 4\text{H}_2 \rightarrow \text{CH}_4 + 2\text{H}_2\text{O}$  --- Methane-producing bacteria B)  $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+}$  --- *Thiobacillus ferrooxidans* C)  $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$  --- *Clostridium* D)  $\text{N}_2 + 6\text{H}^+ \rightarrow 2\text{NH}_3$  --- *Beijerinckia* E)  $\text{SO}_4^{2-} + 10\text{H}^+ \rightarrow \text{H}_2\text{S} + 4\text{H}_2\text{O}$  --- *Desulfovibrio*。
3. (15%) (Use following table) If the sequence of amino acids coded for by a strand of DNA is serine-alanine-lysine-leucine, what is the order of bases in the sense strand of DNA? A)  $3' \text{UGUGCAAAGUUA}$  B)  $3' \text{AGACGTTTCAAT}$  C)  $3' \text{TCTCGTTTGTTA}$  D)  $5' \text{TGTGCTTTCTTA}$  E)  $5' \text{AGAGCTTTGAAT}$  (請選出正確答案，並說明原因)。

Codon on mRNA and corresponding amino acid

UUA	leucine	UAA	nonsense
GCA	alanine	AAU	sparagine
AAG	lysine	UGC	cysteine
GUU	valine	UCG, UCU	serine

4. (25%)就您所知，最近有那些微生物技術應用於綠色科技之相關研發中?並請敘述其應用之原理及研發現況?
5. (30%)在純菌培養中微生物生長一般性公式為何?如何利用此公式去測量微生物之活性?若是針對環境中的樣本利用此法可能會有什麼問題?