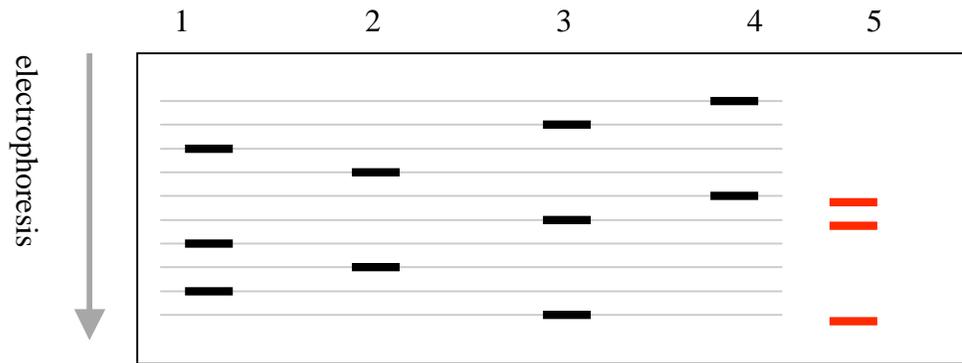


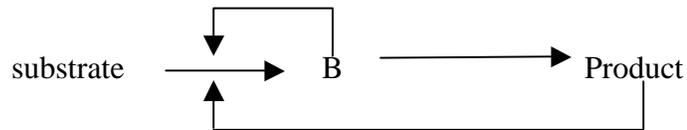


b)

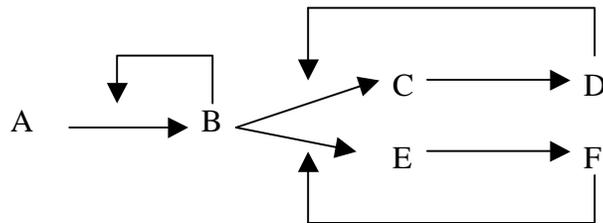


4.

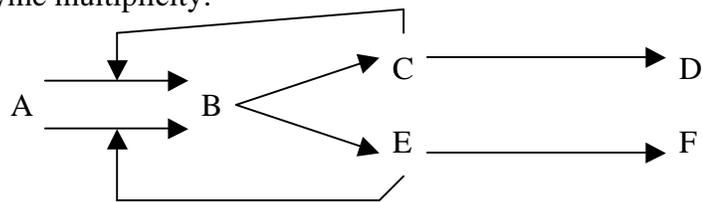
a) concerted inhibition:



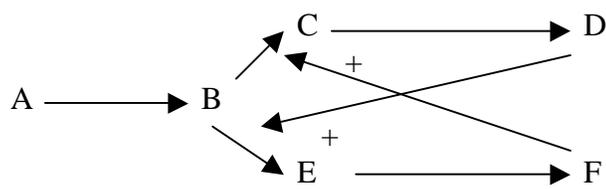
b) sequential inhibition



c) enzyme multiplicity:



d) reciprocal control:



5. a) it involves uniparental (i.e. maternal) inheritance; it contains HVR's (hypervariable regions) which can be monitored for changes over the generations; the genes within the mitochondrial DNA are highly conserved.

b) mitochondrial DNA are believed to have come from bacterial origins according to the endosymbiotic theory. The genes coding for the mitochondrial proteins have since migrated to the nuclear DNA. Mitochondrial DNA like prokaryotes, contains circular DNA and has no nucleosomes or histones; however, it has a different form of replication utilizing D-loop formation and unidirectional DNA synthesis.

6

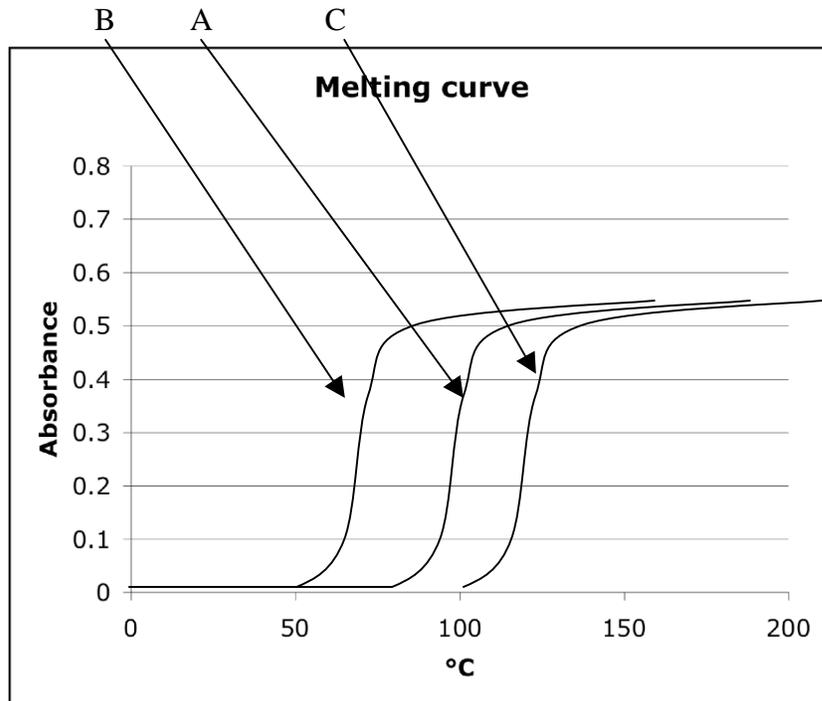
Cytosine is most likely to undergo deamination to form Uracil. This type of transformation would have a greater chance of being overlooked by repair mechanisms if uracil was a normal constituent of the DNA. This would result in a mismatch which would result in a mutation in the next replication cycle. To prevent this, it is believed that thymine became the pyrimidine of choice, removing the ambiguity that would have been present had U been a normal component of DNA.

7. DNA topology:

a)

$Lk^{\circ} = 1029/10.5 = 117$  ;  $\Delta Lk = 0$  if there is no cleavage of the double strand. Outside of the strand separation, the rest of the double strand will experience the strain equivalent to  $\Delta Lk = 21/10.5 = 2$ . But strictly speaking,  $\Delta Lk = 0$  overall.

b) Topoisomerase Type I cleaves only 1 strand and introduces  $\Delta Lk = 1$ . Topoisomerase type II cleaves both strands and introduces  $\Delta Lk = 2$ . Topo II uses ATP and can introduce negative supercoiling. Both of these topoisomerases can "relax" the strain of unwinding DNA.



8. stabilizing factors: hydrogen bonding, hydrophobic interactions, base-stacking

destabilizing factor: phosphate-phosphate repulsion

The most important stabilizing factor is base-base stacking