

**QUIZ #4**

YOUR NAME (please print legibly): \_\_\_\_\_ **ANSWER KEY** \_\_\_\_\_

As succinctly, but as thoroughly and as accurately as you can, answer the following questions:

(1) Match the statement on the left with the most appropriate term on the right by filling in the box provided with letter corresponding to the most correct answer. [15 points]

Most chaotropic salt	<b>I</b>
Degrades $\beta$ -glucan	<b>O</b>
Membrane-disrupting organic solvent	<b>C</b>
Inhibits thymidylate synthase	<b>F</b>
Hydrolyses phospho-Ser	<b>B</b>
Organic solvent that precipitates nucleic acid	<b>H</b>
Water-miscible organic solvent	<b>D</b>
Acts as a molecular crowding agent	<b>K</b>
Inhibits imidazoleglycerol 3-P dhydratase	<b>A</b>
Strong anionic detergent	<b>M</b>
Carbon source best utilized by yeast	<b>G</b>
Acts as an osmotic stabilizing agent	<b>N</b>
Acts as a chelator of divalent cations	<b>E</b>
Reduces disulfide bonds	<b>J</b>
Salt that helps precipitate SDS-protein complexes	<b>L</b>

(A) 3-amino-triazole
(B) CTD phosphatase
(C) dimethylsulfoxide
(D) ethanol
(E) ethylenediamine-tetraacetic acid
(F) 5-fluoro-ototic acid
(G) glucose
(H) isopropanol
(I) lithium acetate
(J) 2-mercaptoethanol
(K) polyethylene glycol
(L) potassium acetate
(M) sodium dodecyl sulfate
(N) sucrose
(O) Zymolyase

(2) You prepare a mixture in which you resuspend  $2 \times 10^7$  cells of a *MATa leu2* strain in 100  $\mu$ l of the appropriate buffer and add 1  $\mu$ g of a *LEU2*-containing plasmid that has a size of 10 kb and subject the mixture to the standard manipulations to cause DNA-mediated transformation of the yeast cells. Under these conditions, estimate the ratio of plasmids to cells (i.e. number of plasmid DNA molecules per cell)? Assume, for the sake of making your estimate, that DNA base pairs (A-T and G-C) have an average molecular mass of  $\sim 500$  and recall that Avogadro's number is  $6.023 \times 10^{23}$  molecules per mole. [10 points]

1  $\mu$ g plasmid DNA is 1,000,000 pg (pg is  $10^{-12}$  g)

MW of plasmid is 10,000 base pairs X  $\sim 500$  per bp =  $\sim 5,000,000$ ;

so,  $\sim 5,000,000$  g / mol or  $\sim 5,000,000$  pg / pmol

number of moles of plasmid present =  $1,000,000$  pg /  $\sim 5,000,000$  pg per pmol =  $\sim 0.2 \times 10^{-12}$  mol

number of molecules of plasmid present =  $\sim 0.2 \times 10^{-12}$  mol X  $6.023 \times 10^{23}$  molecules per mol  
=  $\sim 1.2 \times 10^{11}$  molecules

estimate of number of plasmids per cell =  $\sim 1.2 \times 10^{11}$  molecules /  $2 \times 10^7$  cells =  $0.6 \times 10^4 =$

**$\sim 6,000$  plasmids per yeast cell in the transformation mix**