

## ACID-BASE Problem, # 1<sup>1</sup>

Bio390

1. Calculate the ratio in which  $\text{Na}^+\text{H}_2\text{PO}_4^-$  and  $\text{Na}_2^+\text{HPO}_4^-$  must be mixed to give a buffer solution of pH equal to 7.0. The pKa for this buffer is 7.21.

ANSWER:  $\frac{\text{"salt"}}{\text{"acid"}} = \underline{\hspace{2cm}}$

2. You are provided with the following values relative to the regulation of plasma pH in a mammal.

### NORMAL VALUES:

pH: 7.40

pKa (carbonic acid-bicarbonate buffer): 6.10

$\alpha$  for  $\text{CO}_2$  at body temperature:  $\frac{0.03 \text{ mmols}}{\text{L} \cdot \text{mm Hg}}$

$\text{PCO}_2$  (in systemic arterial plasma): 40 mmHg

a. Would you expect an increase or decrease in plasma bicarbonate concentration during **uncompensated** respiratory alkalosis? Explain!

b. Estimate the plasma bicarbonate concentration if the kidney regulated the concentration of this salt to bring pH back to 7.4 during **compensation** of respiratory alkalosis at  $\text{PCO}_2$  of 22 mm Hg.

---

<sup>1</sup> thanks to Dr. J.F. Anderson, Dept Zoology, Univ of Florida, Gainesville for the original idea for this problem