MORE BUFFER PREPARATION

CHEM 251 SDSU

A 500 mL buffer is normally prepared from 0.060 moles of benzylamine and 0.050 moles of benzylamine hydrochloride, but you have run out of those chemicals.
In your lab you have the chemicals listed below, which would you use to <u>prepare a buffer with the same pH and same formal concentration</u> as the benzylamine buffer. Assume that the addition of a solid to the solution does not change the volume.

Diethylamine (solid)
Glycine hydrochloride (solid)
Phosphoric acid (1.5 M aqueous)
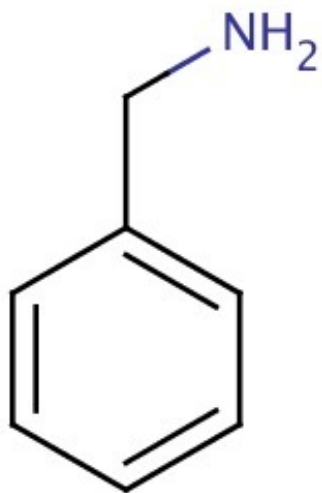Potassium hydroxide (solid)
Nitric acid (3 M)
Water (liquid)

DETERMINE THE TARGET PH

Benzylamine (B): 0.060 mol
Benzylamine hydrochloride (BH$^+$Cl$^-$): 0.050 mol
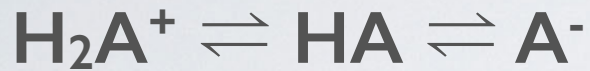Total volume: 500 mL

Benzylamine

$$pH = pK_a + log\frac{B}{BH^+}$$

$$pH = 9.35 + log\frac{0.060}{0.050}$$
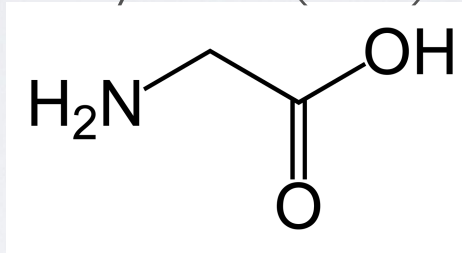
$$pH = 9.429$$

pKₐ VALUES

Taget pH = 9.429

	pK$_{a1}$	pK$_{a2}$	pK$_{a3}$
Benzylamine	9.35	-	-
Diethylamine	11.00	-	-
Glycine-HCl	2.350	9.778	-
Phosphoric acid	2.148	7.198	12.375
Potassium hydroxide	Strong Base		
Nitric acid	Strong Acid		

PH ADJUSTMENT

$$H_2A^+ \rightleftharpoons HA \rightleftharpoons A^-$$

$pKa_1 = 2.350, \ pKa_2 = 9.778$

Glycine (HA)

Need to add sufficient base to convert all the glycine HCl into the HA and A^- forms.

Steps:
- Determine amount of base needed to convert all H_2A^+ into **HA**.

- Add additional base to adjust the ratio of **HA** and A^- to obtain the desired pH.