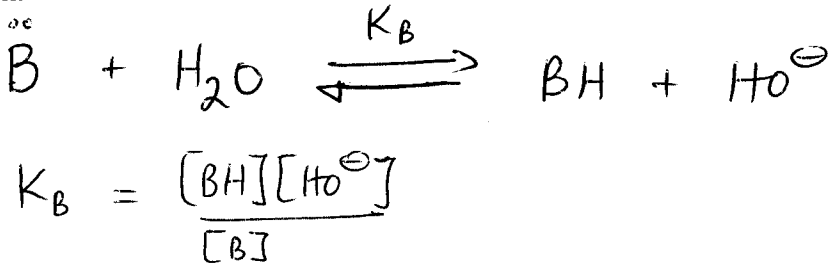
SOLUTIONS

Chem 2P21 Assignment 4
Due Monday, April. 7, 5 pm

Name: _____
ID Number: _____

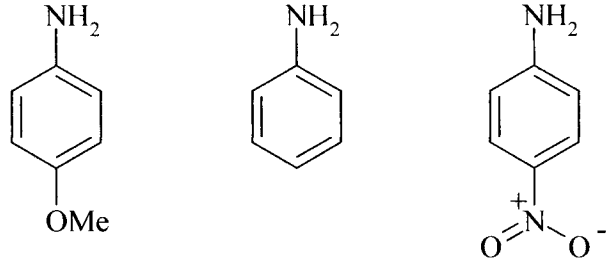
1. a) Triethylamine (pK_B 3.24) is a better base in water than ethylamine (pK_B 3.36), and both are better bases than ammonia (pK_B 4.74). Define K_B in water *in general terms* from your knowledge of chemistry, and explain the trend in basicity for these three compounds in a brief paragraph. (5 marks)



$$K_B = \frac{[BH][HO^{\ominus}]}{[B]}$$

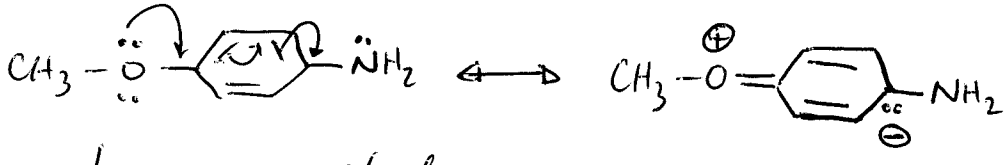
$NEt_3 > NH_2Et > NH_3$ because alkyl groups are electron releasing (due to hyperconjugation).

1. b) 4-methoxyaniline is more basic (pK_B 8.70) than aniline itself (pK_B 9.40), whereas 4-nitroaniline (pK_B 13.00) is much less basic. The structures are given below. *Briefly* rationalise this trend in basicity. (5 marks)



4-methoxy aniline | aniline | 4-nitro aniline

4-methoxyaniline has an electron-rich N atom due to resonance:



4-nitro aniline has an electron poor N atom due to resonance: