**AMINES WORKSHEET**

1. The usual question – write and name all isomers of C5H13N. I found 21 (including 4 pairs of enantiomers)

2. Consider the following pKb values (you might need to look up the structures):

i. 2-Methyl-2-butanamine pKb = 3.15

ii. 2,2-Dimethylpropylamine pKb = 3.85

iii. triethylamine pKb = 3.25

iv. triethanolamine (old name) pKb = 6.24

v. aniline pKb = 9.13

vi. 4-aminophenol, pKb = 8.52

a) explain the difference between the values i and ii

b) explain the difference between the values iii and iv

c) why v and vi have much higher values than i to iv

d) explain the difference between the values for v and vi.

3. Describe (all reagents/conditions) how to synthesise each of the following amines from the given starting materials:

a) 3-pentanamine from

(i) 3-chloropentane

(ii) 3-pentanone

b) *N*-ethyl-1-propanamine from

(i) propanoyl chloride and ethylamine;

(ii) ethanol as your only source of organic carbon (this is definitely a challenging one!)

c) *N*-ethyl-*N*-methylethanamine from

(i) an appropriate acid chloride and secondary amine

(ii) methanol as your only source of organic carbon (another fun one)

4. Write mechanisms for the following:

a) Reaction of dimethylamine with ethanoyl chloride:

Step 1. Nucleophilic attack to give the tetrahedral intermediate

Step 2. Deprotonation of the amine residue by another amine molecules

Step 3. Loss of the better leaving group

b) Reaction of methylamine with acetone (propanone) in water to give an imine

Step 1. Nucleophilic attack to give the dipolar tetrahedral intermediate

Step 2. Deprotonation of the amine residue and protonation of the O− by different water molecules.

Step 3. Protonation of the oxygen by one of the products from Step 2 ☺

Step 4. Loss of water to give carbocation (stabilised by N)

Step 5. Deprotonation to give the final product by water.

5. Devise a synthesis starting with benzene of the following species. You can use appropriate inorganic and small organic reagents.

a) phenol

b) benzylamine (1-phenylmethamine)

c) 4-methyliodobenzene (note that I deactivates the benzene ring)

d)