Aim: How do we explain the behavior of bases?

1) TABLE **L**: COMMON BASES

dissociation

$NaOH_{(aq)} = Na^{+}_{(aq)} + OH^{-}_{(aq)}$

$KOH_{(aq)} = K^{+}_{(aq)} + OH^{-}_{(aq)}$

$Ca(OH)_{2(aq)} = Ca^{+2}_{(aq)} + 2\ OH^{-}_{(aq)}$

ionization

$NH_{3(aq)} + H_2O(l) = NH_4^{+}{}_{(aq)} + OH^{-}_{(aq)}$

Dissociation –the separation of ions from an ionic compound upon dissolving in water.

According to Arrhenius, bases are substances that produce hydroxide ions in water.

$$\{\text{Bases} \xrightarrow{H_2O} OH^{-}_{(aq)}\}$$

$OH^{-}_{(aq)}$ ions are responsible for basic properties = bitter taste, slippery, conduct electricity, turn litmus blue, neutralize acids, etc…

2) Relative Strengths of Bases in Table **L**

NaOH
KOH
$Ca(OH)_2$

NH_3

} **strong** bases are metal hydroxides of **Groups 1 & 2**, except Be & Mg (b/c they are water insoluble; see Table F)

} **weak** base

Which of the following is the strongest base?

TABLE F

a) $Mg(OH)_2$ Grp 2, insoluble

b) $Al(OH)_3$ Grp 13, insoluble

c) LiOH Grp 1, soluble, strongest

3) How can you tell which is the stronger base experimentally? **NaOH** vs. **NH_3**

A. Test conductivity of solutions.

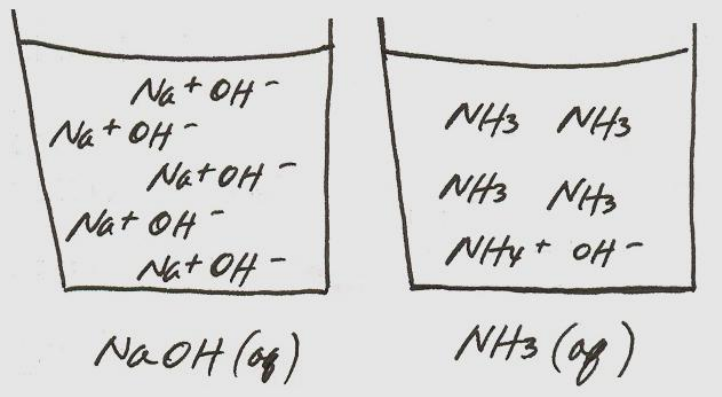
DEMO: conductivity apparatus
Results: {stronger base, greater conductivity, brighter light}

B. Test pH

DEMO: pH meter or paper
Results: { stronger base, higher pH}

P.S. Testing with litmus and phenolphthalein will tell apart an acid from a base, but won't distinguish a strong base from a weak base b/c the results are the same. Litmus is blue and "pheno" is pink in any acid.

4) Why is NaOH a stronger base than NH_3?



stronger base, higher %dissociation(ionization),greater [OH-]

IF TIME PERMITS

5) *A Closer Look:*

Demo: burning magnesium

Burn in O_2 Dissolve in H_2O add phenolphthalein

Mg ====> MgO ==========>$Mg(OH)_2$ ==========>Pink

MgO, K_2O, CaO...**Metal** oxides are **basic.**