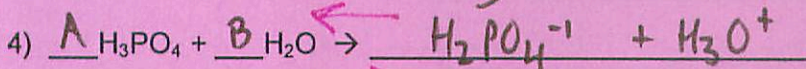
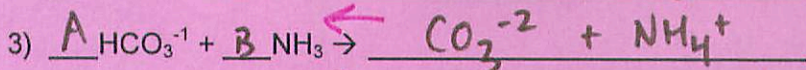
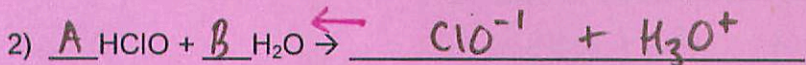
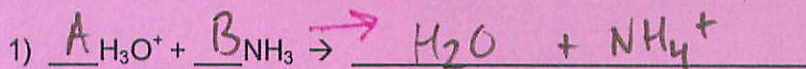


Name KEY

**Acid Base Groupwork:** Use your BL reference handout to complete the following equations. Label the A, B, CA, and CB. Then draw the arrow showing which way the reaction will proceed.



Name all of the acids (not the conjugate acids) in the above equations.

1) hydronium ion

2) hypochlorous acid

3) hydrogen carbonate ion

4) phosphoric acid

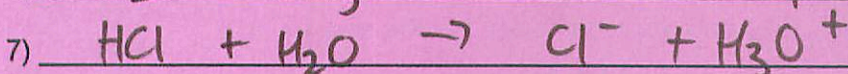
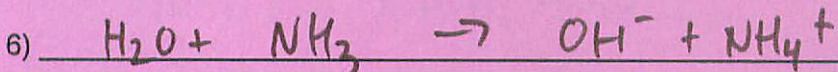
5) nitric acid

(A)

(B)

Define amphoteric a species that can both donate and receive proton

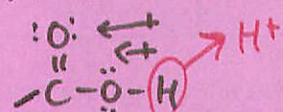
Write two equations, the first with water acting as an acid, and the second with water acting as a base.



8) What does an acidic hydrogen do? Why is the hydrogen in an organic acid functional group acidic while a hydrogen in an alcohol group is not acidic? Draw diagrams to illustrate your point.

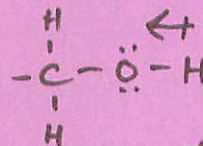
ionizes as  $\text{H}^+$

ACID



2 O's pull electrons away

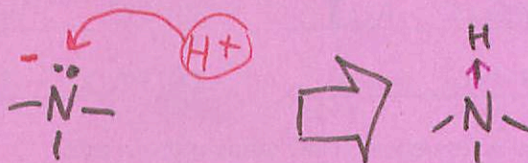
ALCOHOL



single oxygen not strong enough to completely remove electrons

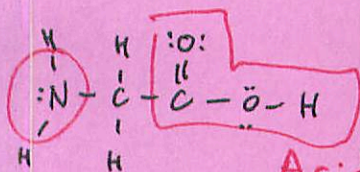
9) Why is nitrogen usually able to accept a proton? Draw a nitrogen and show where the  $\text{H}^+$  would attach? Does this make nitrogen containing compounds acids or bases?

N has lone pair usually  
N is highly electronegative



10) Look at the following amino acid glycine. An amine group is a nitrogen with a lone pair, and an acid group is the  $\text{-COOH}$  group. Identify the amine and the acid group on the molecule. Is this molecule acidic, basic or amphoteric?

Explain!

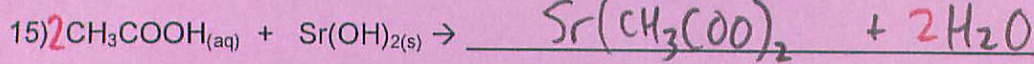
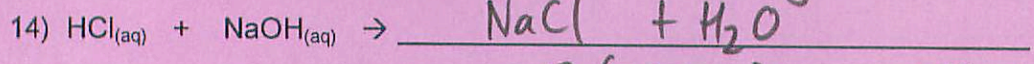
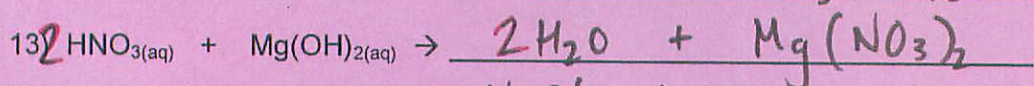
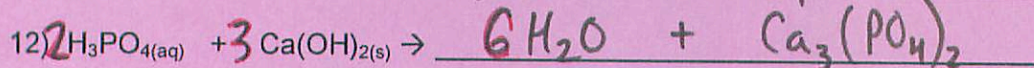
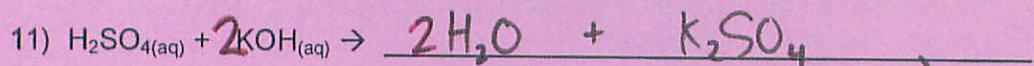


Acid group

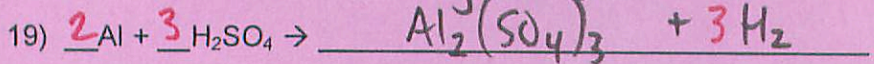
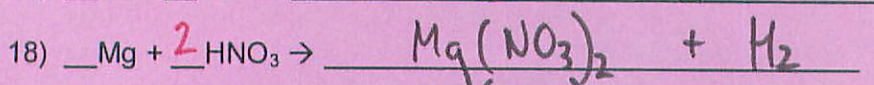
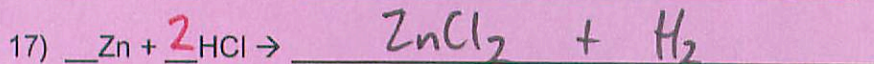
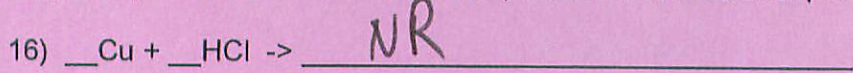
Amine-base

Both - an amine is a base, can accept  $\text{H}^+$  and acid group can donate  $\text{H}^+$

NEUTRALIZATION REACTIONS (Arrhenius) - write products and balance the following reactions:

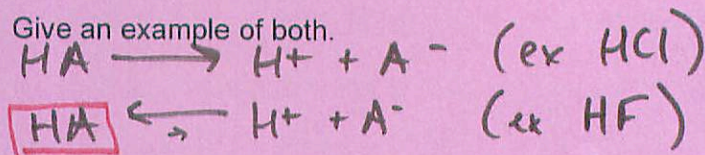


Single Replacement Reactions - write products if the reaction proceeds, if not write NR

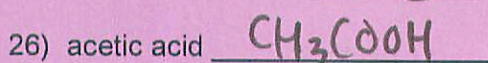
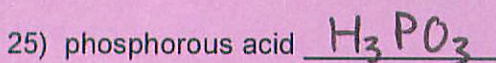
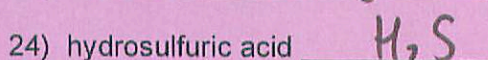
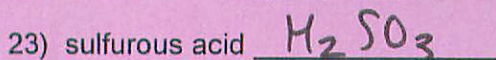
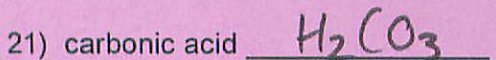


20) How is a strong acid different from a weak acid? Give an example of both.

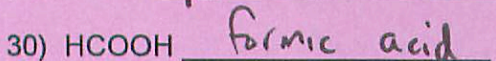
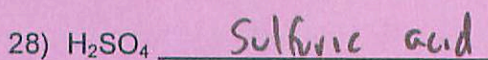
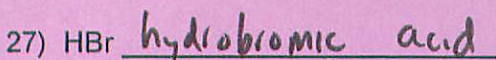
Strong acid ionizes completely  
Weak acid doesn't ionize completely



Formulas: Write formulas for the following acids: (use only your ion sheet, not the new ref HO)



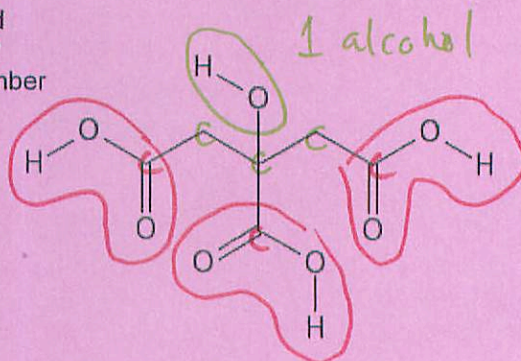
Names: Write names for the following acids: (use only your ion sheet, not the new ref HO)



32) Look at this citric acid molecule. How many organic acid groups are present? How many alcohol groups are present?

Can you know if this acid is strong or weak based on the number of acidic hydrogens?

No, can't tell from # of acid groups.



1 alcohol

3 acid groups

HCl