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- A solution of ethanol ( $C_2H_5OH$ ) in water is prepared by dissolving 57.0 mL of ethanol (density = 0.79 g/cm<sup>3</sup>) in enough water to make 240.0 mL of solution. What is the molarity of the ethanol in this solution?

$$\frac{57 \text{ mL Ethanol}}{240 \text{ mL Total}} \times \frac{1000 \text{ mL Total}}{1 \text{ L Total}} \times \frac{0.79 \text{ g Ethanol}}{\text{mL Ethanol}}$$

$$\times \frac{1 \text{ mol}}{46 \text{ g Ethanol}}$$

$$C_1 V_1 = C_2 V_2$$

$$\frac{\text{mol}}{\text{L}} \times \text{L} =$$

have a 0.50 M sol'n

want 2.0 L of 0.024 M

$$C_1 V_1 = C_2 V_2$$

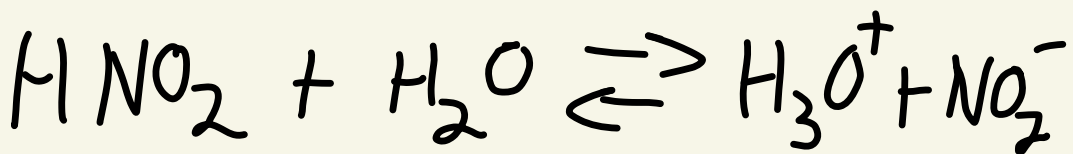
$$0.50 \text{ M } ? \text{ L} = 0.024 \text{ M } 2.0 \text{ L}$$

0.50 L ? conc  
NaOH

0.50 M HCl

$$0.0115 \text{ L HCl} \times 0.50 \frac{\text{mol}}{\text{L}} = \frac{x \text{ mol}}{\text{L}} \text{ NaOH}$$

0.0575 mol



acid

Base

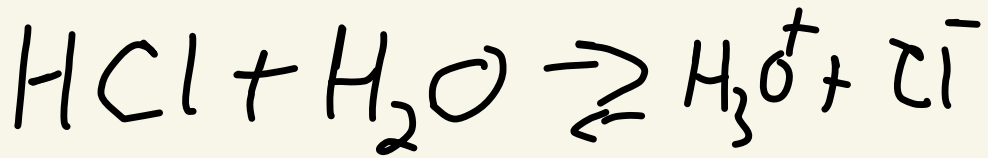
conj  
acid

conj  
Base



$$K_a = 4.0 \times 10^{-4}$$

$$K_a = \frac{[\text{H}_3\text{O}^+][\text{NO}_2^-]}{[\text{HNO}_2]}$$



$$"K_a" = \frac{[\text{H}_3\text{O}^+][\text{Cl}^-]}{[\text{HCl}] \approx 0}$$

$\approx$  infinite

# Redox + trade $e^-$

1 Lose  $e^-$

1 gain  $e^-$

2 is oxidized

2 are reduced

3 is the reducing agent

3 oxidizing agent

4 oxidation state goes up

4 ox state ↓ down

assigning oxidation #  
(some exceptions)

any element " by itself like

$N_2, O_2, Na$  oxidation # =  $\emptyset$

in compounds

any mono-atomic ion

oxidation state = charge

F always -1

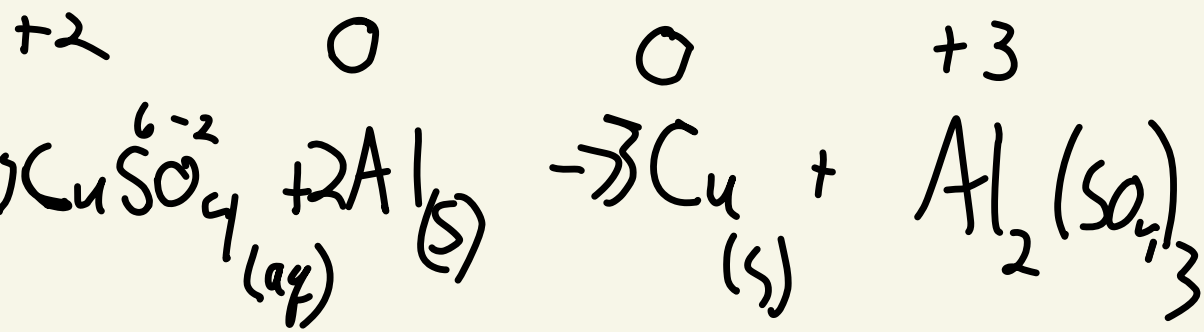
Oxygen almost always -2

Hydrogen almost always +1

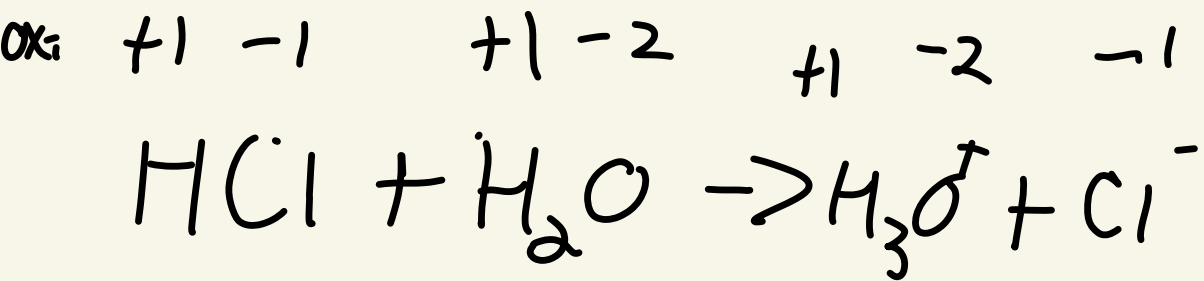
Oxidation #s in a compound  
add to  $\emptyset$

ox states in poly atomic  
ion add up to charge  
on ion

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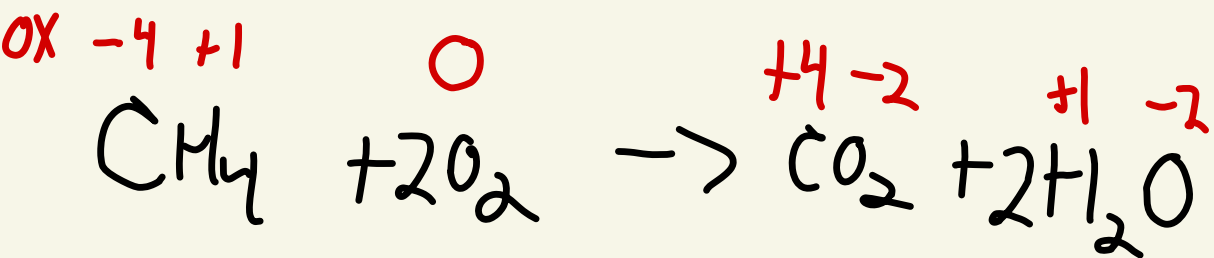






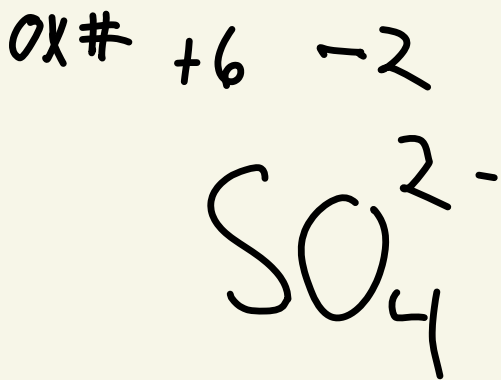
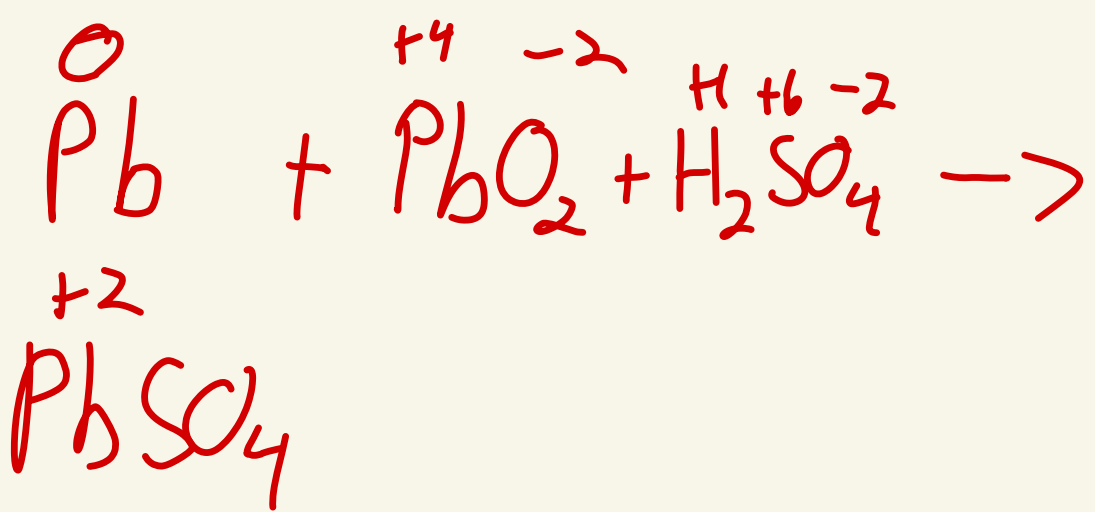
no changes

not Redox



C - Loses 8 e<sup>-</sup>  
 is oxidized  
 reducing agent  
 (CH<sub>4</sub>)

oxygen  
 is reduced  
 gaining e<sup>-</sup>  
 is oxidizer



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Acid/Base  
definition

- Conjugates  
+  $K_a$

Convert pH  $\leftrightarrow$  concentration

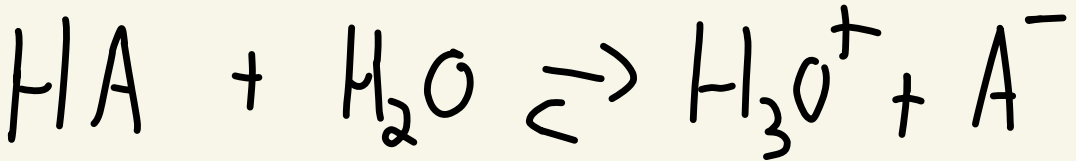
$[H^+] \leftrightarrow pH \leftrightarrow pOH$

$\leftrightarrow [OH^-]$  conj

Acid

Base

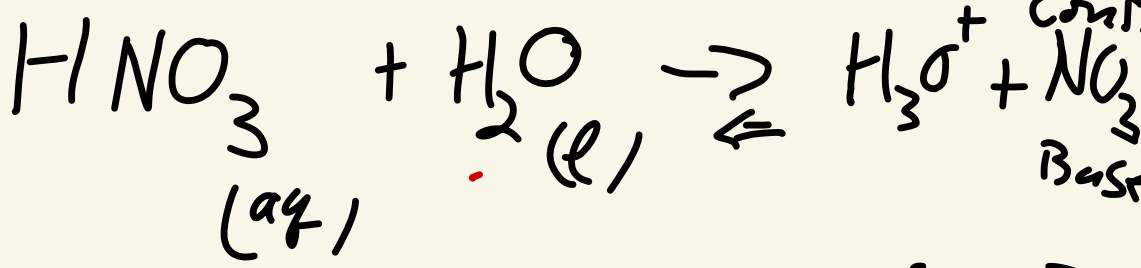
Base



$$K_a = \frac{[H_3O^+][A^-]}{[HA]}$$

conj acid

Strong acid

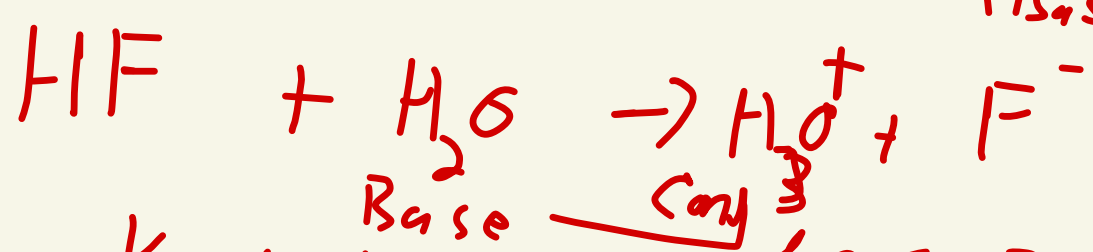


$$K_a \gg 1 = \frac{[\text{H}_3\text{O}^+][\text{NO}_3^-]}{[\text{HNO}_3]}$$

$$K_a \approx \infty$$

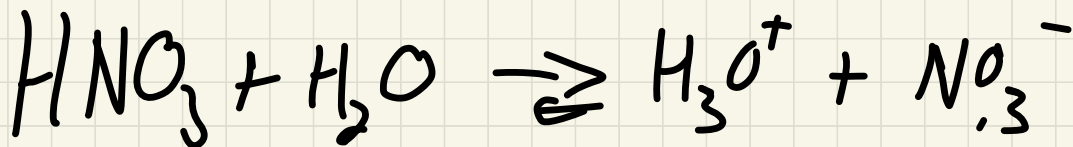
acid

cont. Base



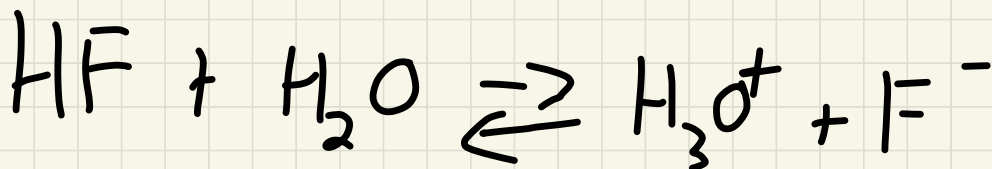
$$K_a \ll 1$$

$$K_a = \frac{[\text{H}_3\text{O}^+][\text{F}^-]}{[\text{HF}]}$$



$$K \gg 1$$

$$\frac{[\text{H}_3\text{O}^+][\text{NO}_3^-]}{[\text{HNO}_3]}$$



$$K_a \ll 1$$

$$\frac{[\text{H}_3\text{O}^+][\text{F}^-]}{[\text{HF}]}$$

$\text{Ba}(\text{OH})_2$  0.015 M

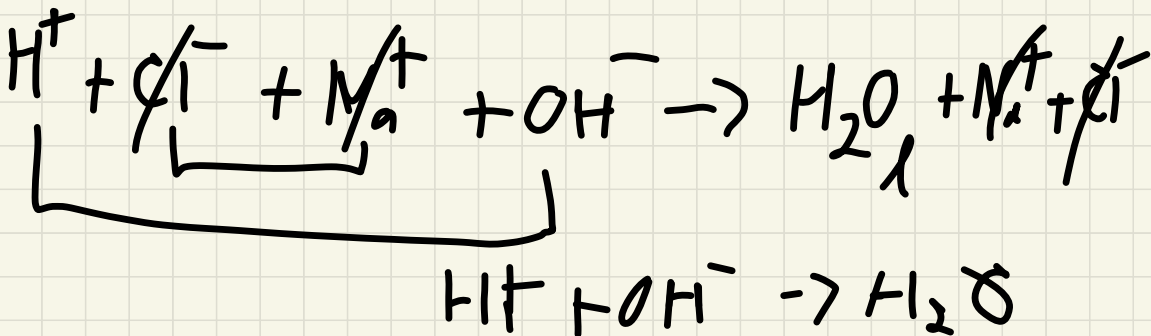
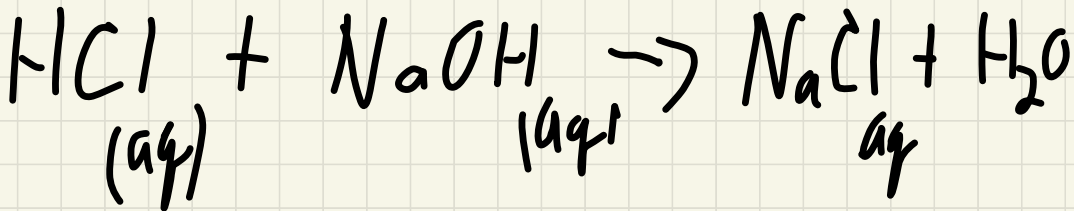
$$\underline{[NaOH]} = 0.015 \underline{M}$$

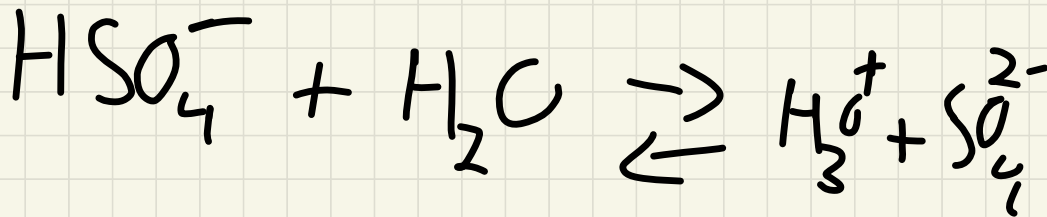
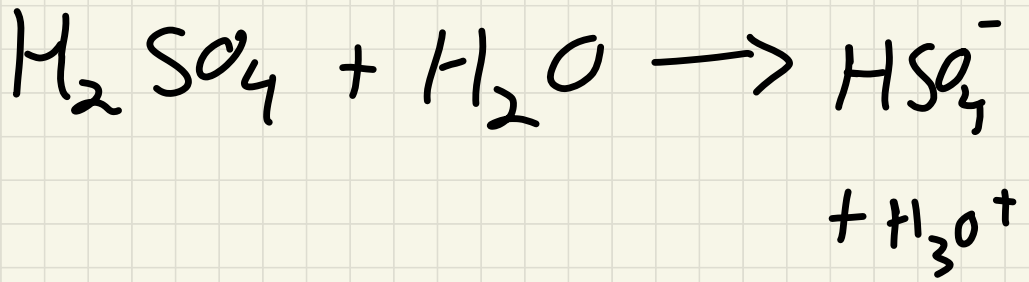
what is the pH

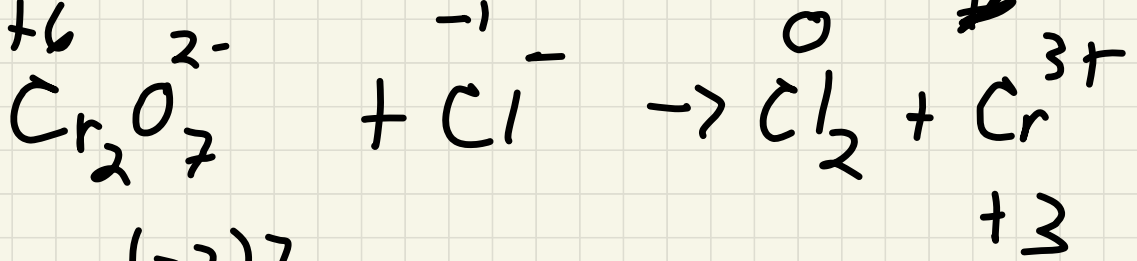
12 17609

12 18

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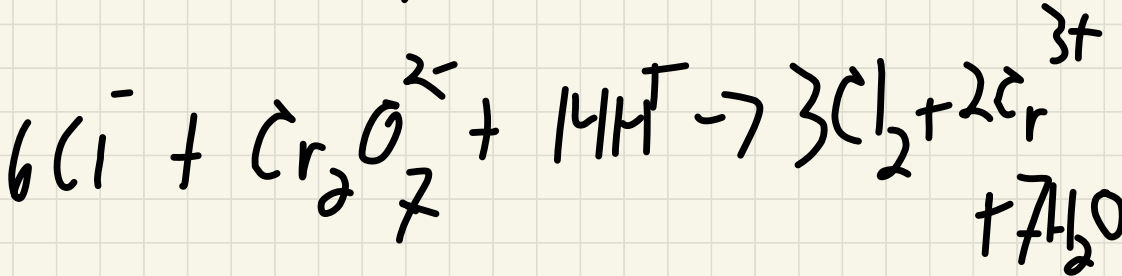
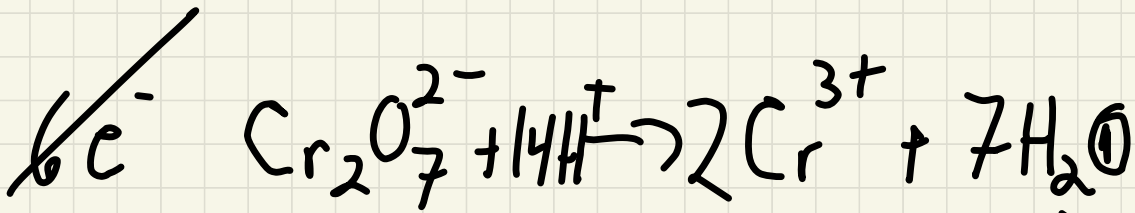
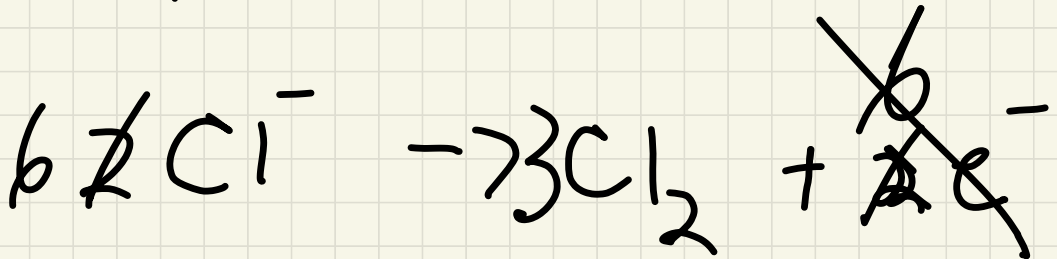




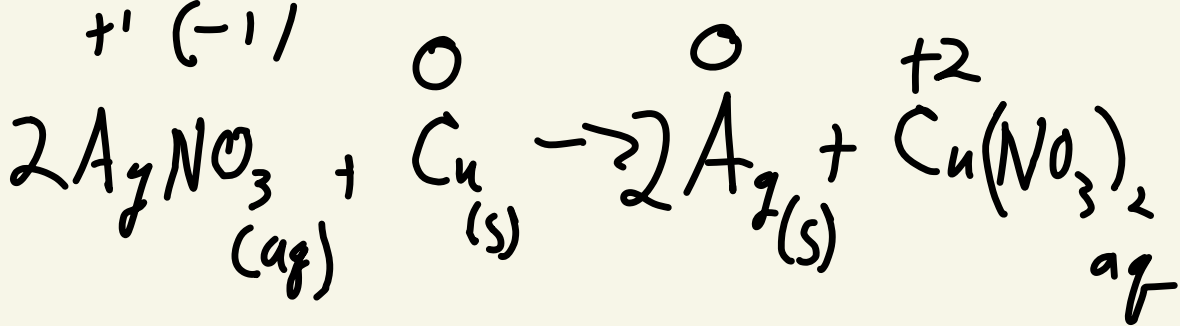


$$(-2)7$$

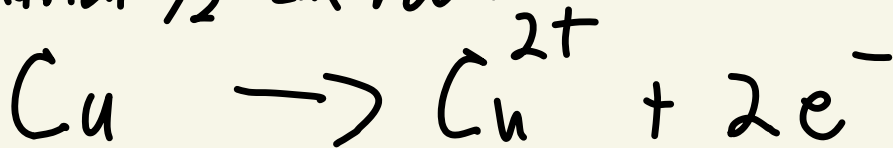
$$2(x) - 14 = -2$$







$\begin{array}{c} +5 \\ \text{NO}_3^- \end{array}$   
 oxidation  $\frac{1}{2}$  reaction



reduction  $\frac{1}{2}$  reaction

