HW25

Oxides are chemical compounds that have two elements in their composition. One of these two elements must be oxygen.
There are acidic and basic oxides. Most acidic oxides are soluble in water:
$CO_2 + H_2O \rightarrow H_2CO_3$
$SO_2 + H_2O \rightarrow H_2SO_3$
Some are not:
$SiO_2 + H_2O \rightarrow$ no reaction

All acidic oxides are soluble in bases:
$SiO_2 + 2NaOH \rightarrow Na_2SiO_3 + H_2O$
$Na_2SiO_3 + 2\ HCl \rightarrow H_2SiO_3$ (metasilicic acid) + 2NaCl
To each acidic oxide corresponds an acid.
General definition of acidic oxides is:
"Oxides that interact with bases forming salt and water are called acidic oxides"
Acidic oxides are mostly formed by non-metals. Some metals can form acidic oxides in their highest oxidation state: $Cr(VI) \rightarrow H_2CrO_4$ chromic acid; $Mn\ (VII) \rightarrow HMnO_4$ permanganic acid. Basic oxides are formed only by metals. Some react with water, some don't. All basic oxides react with acids.
$CaO + H_2O \rightarrow Ca(OH)_2$
$ZnO + H_2O \rightarrow$ no reaction
$ZnO + 2HCl \rightarrow ZnCl_2 + H_2O$
$ZnCl2 + NaOH \rightarrow Zn(OH)_2 + 2NaCl$
To each basic oxide corresponds a base:
$MgO \rightarrow Mg(OH)_2$
$Fe_2O_3 \rightarrow Fe(OH)_3$
$Na_2O \rightarrow NaOH$

Oxides that react with acids forming salt and water are called basic oxides. In their lowest oxidation state Cr(II) and Mn (II) form basic oxides: $CrO \rightarrow Cr(OH)_2$ (unstable, transforms to Cr(III))
$MnO \rightarrow Mn(OH)_2$

Questions

1. Write chemical equations for the following transformations: $Ca \rightarrow CaO \rightarrow Ca(OH)_2$;

   $S \rightarrow SO_2 \rightarrow SO_3 \rightarrow H_2SO_4$

2. Basic oxide CaO reacts with hydrochloric acid (HCl) forming the salt of calcium chloride $CaCl_2$ and water. Write the chemical reaction, balance the equation, and calculate how many grams of this salt will form from 73 g HCl.