CHEMICAL PROPERTIES OF METALS

Expriment 1. Reactions of metals with acids

Equipment: - test tubes in rack

Chemicals: - diluted acids; HCl, HNO_3, H_2SO_4
- concentrated acids; HCl, HNO_3, H_2SO_4
- metal samples: Al, Zn, Fe, Cu

Attention! All experiments should be performer under the fume cupboard!

Description of the experiment:

Clean the metal sample with sand paper up to 2 cm height. Wash it with distilled water. Pour app. 1 cm^3 of each of the diluted acids into the test tube in order: HCl, HNO_3 and H_2SO_4. Then pour app. 1 cm^3 of each of the concentrated acids into the test tube in the same order. Put the metal sample to the solution for 30 sec. and note the observations (eg. bubbles, precipitate). Rinse the sample in distilled water after each reaction.

Remember! Copper metal does not react with dilute acids. It reacts only with concentrated oxy-acids. **There is no hydrogen evolution!** Sulfur or nitrogen are reduced to a lower oxidation state (NO, NO_2, SO_2) and appearing bubbles are the nitrogen or sulphur oxides.

Experiment 2. Reactions of metals of various activity

Equipment: - test tubes in rack
- metal samples: Mg, Al, Zn, Fe, Cu

Chemicals: - solutions of salts: $FeSO_4$, $CuSO_4$, $AgNO_3$

Description of the experiment:

Clean the metal sample with sand paper up to 2 cm height. Wash it with distilled water. Pour app. 1 cm^3 of each of solution to the test tube. Put the metal sample to the solution for 30 sec. and note the observations (eg. bubbles, dissolution or reduction of metal, precipitate). Rinse the sample in distilled water after each reaction.

20..../.... **WIMiR** **Gr.**	*Name, surname* *Subject:* **CHEMICAL PROPERTIES OF METALS**	*Assistant signature*

Expriment 1. Reactions of metals with acids

	Reaction course	Change inoxidation state	Observations, conclusions
1	**Zn + HCl =**		
2	**Zn + HNO_3 =**		
3	**Zn + H_2SO_4 =**		
4	**Zn + HCl $_{conc.}$ =**		
5	**Zn + $HNO_{3\ conc.}$ =**		
6	**Zn + $H_2SO_{4\ conc.}$ =**		
7	**Cu+ HCl =**		
8	**Cu + HNO_3 =**		
9	**Cu + H_2SO_4 =**		
10	**Cu + HCl $_{conc.}$=**		
11	**Cu + $HNO_{3\ conc.}$ =**		
12	**Cu + $H_2SO_{4\ conc.}$ =**		
13	**Al + HCl =**		
14	**Al + HNO_3 =**		
15	**Al + H_2SO_4 =**		
16	**Al + HCl $_{conc.}$ =**		
17	**Al + $HNO_{3\ conc.}$ =**		
18	**Al + $H_2SO_{4\ conc.}$ =**		
19	**Fe + HCl =**		
20	**Fe + HNO_3 =**		
21	**Fe + H_2SO_4 =**		
22	**Fe + HCl $_{conc.}$ =**		
23	**Fe + $HNO_{3\ conc.}$ =**		
24	**Fe + $H_2SO_{4conc.}$ =**		

Experiment 2. Reactions of metals of various activity

	Reaction course	Change inoxidation state	Observations, conclusions
1	**$Mg + FeSO_4 =$**		
2	**$Mg + CuSO_4 =$**		
3	**$Mg + AgNO_3 =$**		
4	**$Zn + FeSO_4 =$**		
5	**$Zn + CuSO_4 =$**		
6	**$Zn + AgNO_3 =$**		
7	**$Al + FeSO_4 =$**		
8	**$Al + CuSO_4 =$**		
9	**$Al + AgNO_3 =$**		
10	**$Fe + FeSO_4 =$**		
11	**$Fe + CuSO_4 =$**		
12	**$Fe + AgNO_3 =$**		
13	**$Cu + FeSO_4 =$**		
14	**$Cu + CuSO_4 =$**		
15	**$Cu + AgNO_3 =$**		