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CHEMISTRY LAB 5.6**REACTION OF METALS WITH ACIDS AND WATER****Introduction**

Some metals, but not all metals, react with acids.

A small number of metals react with water.

Metal-acid and metal-water reactions are examples of redox reactions.

The extent to which these reactions take place depends on the reactivity of the metal.

Procedure**Part 1 – group 2 metals and d-block metals**

1. Watch these videos: [metal-acid reactions](#) and [metal-water reactions](#)
2. Complete the following table: (6 points)

| Metal | observations on addition of HCl | Observations on addition of H ₂ O |
|-----------|---|---|
| calcium | Very vigorous reaction, bubbles, overflows | Fast reaction, bubbles, turns pink |
| copper | No reaction | No reaction |
| iron | No reaction/maybe a few bubbles | No reaction |
| magnesium | Vigorous reaction, lots of bubbles, magnesium dissolves | Slight reaction at surface, mixture turns slightly pink |
| tin | No reaction | No reaction |
| zinc | Steady reaction with bubbles | No reaction |

3. Answer the following questions: (5 points)

| | |
|-----|--|
| (a) | Write an equation for the reaction between Mg and HCl. $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$ |
| (b) | Which atom is oxidized in these reactions and which atom is reduced in these reactions? The metal is oxidized; H is reduced |
| (c) | Why do these reactions produce bubbles? Hydrogen gas is being made |
| (d) | Why are the reactions with acids much faster than the reactions with water? Acids have a much higher concentration of H ⁺ ions than water does |
| (e) | In the metal-water video, something was added to the water before the water was added to the metals. What was it, and why was it added? |

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|-----|---|
| | Phenolphthalein; it was added so you can the solution will turn pink if an alkali is made |
| (g) | Based on these observations, rank the six metals above in order of reactivity, starting with the most reactive. If you cannot choose between them based on the above observations, rank them equally. |
| | calcium > magnesium > zinc > iron = tin = copper |

Part 2 – Group 1 metals

- Watch these videos: [alkali metals 1](#), [alkali metals 2](#)
- Answer these questions: (4 points)

| | |
|-----|---|
| (a) | Write an equation for the reaction between a Group 1 metal and water (choose any Group 1 metal). |
| | $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$ |
| (b) | How does the reactivity of Group 1 metals compare with the reactivity of Group 2 metals and d-block metals? |
| | Group 1 metals are more reactive |
| (c) | How does the reactivity of Group 1 metals change as you go down the group? |
| | They get more reactive |
| (d) | Why are Group 1 metals often called “alkali metals”? |
| | When they react with water they produce hydroxide ions |

- Answer these questions for extra credit: (5 points)

| | |
|-----|--|
| (a) | Why is potassium more reactive than sodium? Why is calcium more reactive than magnesium? |
| | K/Ca has more shells than Na/Mg so there is more shielding, so the valence electron is less attracted to the nucleus and is lost more easily |
| (b) | You won't find any videos for the reaction between francium and water on Youtube. Why not? |
| | Francium is extremely rare and highly radioactive, so impossible to get hold of |