

## Activity Series

### List

- compare the activity of metals to hydrogen

### Notes

- ★ More active metals can replace less active metals
- ★ Metals that are more active than hydrogen can replace hydrogen
- ★ Hydrogen is used as a standard for comparing the activity of metals
  - ☆ Lithium (*MOST ACTIVE*)
  - ☆ Rubidium
  - ☆ Potassium
  - ☆ Cesium
  - ☆ Barium
  - ☆ Strontium
  - ☆ Calcium
  - ☆ Sodium
  - ☆ Magnesium
  - ☆ Aluminum
  - ☆ Titanium
  - ☆ Manganese
  - ☆ Zinc
  - ☆ Chromium
  - ☆ Iron
  - ☆ Nickel
  - ☆ Tin
  - ☆ Lead
  - ☆ **HYDROGEN**
  - ☆ Copper
  - ☆ Mercury
  - ☆ Silver
  - ☆ Platinum
  - ☆ Gold (*LEAST ACTIVE*)
- ★ Acids release hydrogen when they react with active metals
- ★ Active metals corrode easily
  - ☆ Definition: CORROSION — loss of metallic properties due to action of air, water, and chemicals
  - ☆ Examples
    - ★ Rust:  $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$
    - ★ Action of Acids:  $2\text{Fe} + 6\text{HCl} \rightarrow 2\text{FeCl}_3 + 3\text{H}_2$
- ★ Spontaneous reactions - replacement of a less active metal by a more active metal occurs spontaneously

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**Answer the questions below by circling the number of the correct response**

- Which element is used as a standard for comparing the activity of metals? (1) gold (2) iron (3) francium (4) hydrogen
- In which of the following pairs of metals is the more active metal listed first? (1) iron/sodium (2) copper/tin (3) lithium/platinum (4) zinc/magnesium
- Based on the activity series, which of the following reactions is likely to occur? (1)  $2\text{Fe} + 6\text{HCl} \rightarrow 2\text{FeCl}_3 + 3\text{H}_2$   
(2)  $\text{MgSO}_4 + \text{Zn} \rightarrow \text{ZnSO}_4 + \text{Mg}$   
(3)  $3\text{BaCl}_2 + 2\text{Al} \rightarrow 2\text{AlCl}_3 + 3\text{Ba}$  (4)  $\text{H}_2 + 2\text{LiOH} \rightarrow 2\text{Li} + 2\text{H}_2\text{O}$
- Based on the activity series, which of the following metals could **NOT** replace any of the others?  
(1) Calcium (2) Sodium (3) Magnesium (4) Aluminum
- The standard on which the activity series is based is (1) fluorine, (2) lithium, (3) hydrogen, (4) oxygen.
- Of the following, which is **NOT** a way to prevent corrosion?  
(1) painting (2) galvanizing (3) electroplating (4) coating with acid.
- During a single displacement reaction, which of the following is true? (1) The more active metal steals electrons from the less active metal. (2) The more active metal is oxidized. (3) The more active metal is reduced. (4) The less active metal loses electrons.
- During the reaction  
 $\text{AgNO}_3(\text{aq}) + \text{NaCl}(\text{aq}) \rightarrow \text{NaNO}_3(\text{aq}) + \text{AgCl}(\text{s})$ ,  
which ion was reduced? (1)  $\text{Ag}^+$  (2)  $\text{Na}^+$  (3)  $\text{Cl}^-$  (4) none of these
- Which metal will react with 1.0 M  $\text{Pb}^{+2}(\text{aq})$  but not with 1.0 M  $\text{Mg}^{+2}$ ? 1. Ba 2. Al 3. Cu 4. Ag
- If the reaction  $\text{X} + \text{Zn}^{+2} \rightarrow \text{X}^{+2} + \text{Zn}$  is spontaneous, then X may be 1. Mg 2. Pb 3. Cu 4. Sn
- Which metal can reduce  $\text{Pb}^{+2}$ ? (1) Cu (2) Hg (3) Fe (4) Ag
- Which ion can be most easily reduced?  
1.  $\text{Cu}^{+2}$  2.  $\text{Zn}^{+2}$  3.  $\text{Ni}^{+2}$  4.  $\text{Ca}^{+2}$