

enough to become steam. Nickel, however, will replace hydrogen in acids but will not react with steam at all. And gold will not react with individual acids or water, either as a liquid or as steam. Such experimental observations are the basis for the activity series shown in **Table 3**.

TABLE 3 Activity Series of the Elements

Activity of metals		Activity of halogen nonmetals
Li		F ₂
Rb	React with cold H ₂ O and acids, replacing hydrogen.	Cl ₂
K		Br ₂
Ba	React with oxygen, forming oxides.	I ₂
Sr		
Ca		
Na		
Mg		
Al	React with steam (but not cold water) and acids, replacing hydrogen.	
Mn		
Zn	React with oxygen, forming oxides.	
Cr		
Fe		
Cd		
Co	Do not react with water.	
Ni	React with acids, replacing hydrogen.	
Sn		
Pb	React with oxygen, forming oxides.	
H ₂		
Sb	React with oxygen, forming oxides.	
Bi		
Cu		
Hg		
Ag	Fairly unreactive, forming oxides only indirectly.	
Pt		
Au		

SAMPLE PROBLEM F

Using the activity series shown in Table 3, explain whether each of the possible reactions listed below will occur. For those reactions that will occur, predict what the products will be.

- $\text{Zn(s)} + \text{H}_2\text{O(l)} \xrightarrow{50^\circ\text{C}} \underline{\hspace{2cm}}$
- $\text{Sn(s)} + \text{O}_2\text{(g)} \longrightarrow \underline{\hspace{2cm}}$
- $\text{Cd(s)} + \text{Pb(NO}_3)_2\text{(aq)} \longrightarrow \underline{\hspace{2cm}}$
- $\text{Cu(s)} + \text{HCl(aq)} \longrightarrow \underline{\hspace{2cm}}$