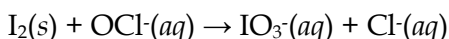


AP Worksheet 4e (ACID-BASE and REDOX)

- Identify the acid, base, conjugate acid, and conjugate base in:
 - $\text{HNO}_3(aq) + \text{H}_2\text{O}(l) \leftrightarrow \text{NO}_3^-(aq) + \text{H}_3\text{O}^+(aq)$
 - $\text{CH}_3\text{COO}^-(aq) + \text{H}_3\text{O}^+(aq) \leftrightarrow \text{CH}_3\text{COOH}(aq) + \text{H}_2\text{O}(l)$
 - $\text{CH}_3\text{COOH}(aq) + \text{HS}^-(aq) \leftrightarrow \text{CH}_3\text{COO}^-(aq) + \text{H}_2\text{S}(g)$
- Give the conjugate base of the following acids:
 - HCOOH
 - HPO_4^{2-}
- Give the conjugate acid of the following bases:
 - SO_4^{2-}
 - CH_3NH_2
- Calculate the concentration (molarity) of the ion indicated in each of the following solutions. The use of square brackets, [], denotes concentration in mol L^{-1} .
 - $[\text{K}^+]$ in 0.238 M KNO_3
 - $[\text{Al}^{3+}]$ and $[\text{SO}_4^{2-}]$ in 0.080 M $\text{Al}_2(\text{SO}_4)_3$
- What is the oxidation number of each of the underline atoms in each of the following species? Think carefully about the rules that are being applied and write a brief, simple explanation of your answer in each case.
 - C aI_2
 - Ge O_2
 - K O_2
 - N H_3
- For each of the following reactions write two separate half-reactions, one showing the oxidation and one showing the reduction. Then use the half-reactions to write the balanced full REDOX equation.
 - $\text{Na} + \text{Cl}_2 \rightarrow \text{NaCl}$
 - $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$
 - $\text{BrO}^- \rightarrow \text{BrO}_3^- + \text{Br}^-$
 - $\text{Zn} + \text{FeSO}_4 \rightarrow \text{ZnSO}_4 + \text{Fe}$
- Complete and balance this equation by the method of half-reactions. The reaction takes place in acidic solution.



8. A 0.347 g sample of the hydrated "double salt", ammonium iron(II) sulfate hexahydrate, $\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$, was dissolved in water. The solution had some acid added to it and then it reacted completely with 12.6 mL of potassium permanganate, KMnO_4 , solution. Calculate $[\text{KMnO}_4]$ given the full REDOX equation below.

