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1. In the reaction



A conjugate acid-base pair is

- A)  $\text{H}_2\text{O}$  and  $\text{OH}^-$       B)  $\text{H}_2\text{O}$  and  $\text{NH}_4^+$   
 C)  $\text{NH}_3$  and  $\text{H}_2\text{O}$       D)  $\text{NH}_3$  and  $\text{OH}^-$

2. Which is the conjugate acid of  $\text{HSO}_4^-$ ?

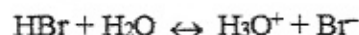
- A)  $\text{H}_3\text{O}^+$       B)  $\text{HSO}_3^-$   
 C)  $\text{SO}_4^{2-}$       D)  $\text{H}_2\text{SO}_4$

3. What are the bases that accept protons in the reaction?



- A)  $\text{HS}^-$  and  $\text{H}_3\text{O}^+$       B)  $\text{H}_2\text{S}$  and  $\text{H}_3\text{O}^+$   
 C)  $\text{HS}^-$  and  $\text{H}_2\text{O}$       D)  $\text{H}_2\text{S}$  and  $\text{H}_2\text{O}$

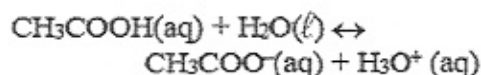
4. In the reaction:



Which is a conjugate acid-base pair?

- A)  $\text{HBr}$  and  $\text{H}_2\text{O}$       B)  $\text{H}_3\text{O}^+$  and  $\text{HBr}$   
 C)  $\text{H}_3\text{O}^+$  and  $\text{Br}^-$       D)  $\text{HBr}$  and  $\text{Br}^-$

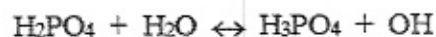
5. Given the reaction:



In this reaction, which substances are accepting protons?

- A)  $\text{H}_2\text{O}(\ell)$  and  $\text{H}_3\text{O}^+(\text{aq})$   
 B)  $\text{H}_2\text{O}(\ell)$  and  $\text{CH}_3\text{COO}^-(\text{aq})$   
 C)  $\text{CH}_3\text{COOH}(\text{aq})$  and  $\text{CH}_3\text{COO}^-(\text{aq})$   
 D)  $\text{CH}_3\text{COOH}(\text{aq})$  and  $\text{H}_2\text{O}(\ell)$

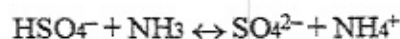
6. In the reaction:



Which pair represents an acid and its conjugate base?

- A)  $\text{H}_2\text{O}$  and  $\text{H}_2\text{PO}_4$   
 B)  $\text{H}_3\text{PO}_4$  and  $\text{OH}^-$   
 C)  $\text{H}_2\text{O}$  and  $\text{H}_3\text{PO}_4$   
 D)  $\text{H}_3\text{PO}_4$  and  $\text{H}_2\text{PO}_4^-$

7. Given the reaction at equilibrium:



What are the two species that are acids?

- A)  $\text{NH}_3$  and  $\text{SO}_4^{2-}$       B)  $\text{NH}_3$  and  $\text{NH}_4^+$   
 C)  $\text{HSO}_4^-$  and  $\text{SO}_4^{2-}$       D)  $\text{HSO}_4^-$  and  $\text{NH}_4^+$

8. In the reaction:



The water is

- A) a proton donor, only  
 B) a proton acceptor, only  
 C) both a proton donor and a proton acceptor  
 D) neither a proton donor nor a proton acceptor

9. The compound  $\text{HNO}_3$  can be described as an

- A) Arrhenius base and a nonelectrolyte  
 B) Arrhenius acid and a nonelectrolyte  
 C) Arrhenius acid and an electrolyte  
 D) Arrhenius base and an electrolyte

10. Which compound releases hydroxide ions in an aqueous solution?

- A)  $\text{KOH}$       B)  $\text{CH}_3\text{OH}$   
 C)  $\text{HCl}$       D)  $\text{CH}_3\text{COOH}$

