

## Acids : Test 1-155

- 1) Give three properties of acids.
- 2) Give three properties of bases.
- 3) Water is an example of an amphiprotic substance. Give another example of an amphiprotic substance.
- 4)a) Is  $\text{HNO}_2$  a strong acid?  
b) Is  $\text{Ba}(\text{OH})_2$  a strong base?
- 5) Write the dissociation equations.
  - a)  $\text{HCl} \rightarrow$
  - b)  $\text{Sr}(\text{OH})_2 \rightarrow$
  - c)  $\text{H}_2\text{PO}_4^- \rightarrow$
  - d)  $\text{Li}_2\text{O} \rightarrow$  two steps
- 6)a) Name any strong acid and an important use for it.  
b) Name any strong base and an important use for it.
- 7)a) Give the conjugate acid for  $\text{NH}_3$ .  
b) Give the conjugate base for  $\text{HCO}_3^-$ .
- 8) Given the following reaction:
$$\text{CH}_3\text{COOH} + \text{PO}_4^{3-} \rightleftharpoons \text{CH}_3\text{COO}^- + \text{HPO}_4^{2-}$$
  - a) Which acid is strongest?
  - b) Are the reactants or products favored?

- 9)a) Find  $K_a$  for carbonic acid.  
 b) Find  $K_b$  for the conjugate base of carbonic acid.
- 10)a) Find  $K_a$  for  $\text{HSO}_3^-$ .  
 b) Find  $K_b$  for  $\text{HSO}_3^-$ .
- 11) Give the numerical value:  $K_a \times K_b = \underline{\hspace{2cm}}$  .
- 12) Calculate  $[\text{OH}^-]$  and  $[\text{H}_3\text{O}^+]$  for a 0.55M solution of  $\text{NH}_3$ .
- 13) Give the numerical value:  $\text{pH} + \text{pOH} = \underline{\hspace{2cm}}$
- 14) If the pH of a solution is 8.5, find  $[\text{H}_3\text{O}^+]$
- 15) Find the pH of the following solutions.
- a) 0.50 M  $\text{HNO}_3$
- b) 2.0 M  $\text{HCN}$
- 16) If 40. mL of a 5.0 pH solution is added to 65 mL of an 8.0 pH solution, find the pH for the new solution.

Answer: 1) tastes sour, turns litmus red, proton donor, 2) feels soapy, turns litmus blue, proton acceptor, 3)  $\text{HSO}_3^-$ ,  $\text{HC}_2\text{O}_4^-$ ,.....4)a) No, b) Yes, 5)a)  $\text{HCl} \rightarrow \text{H}^+ + \text{Cl}^-$ , b)  $\text{Sr}(\text{OH})_2 \rightarrow \text{Sr}^{2+} + 2\text{OH}^-$ , c)  $\text{H}_2\text{PO}_4^- \rightarrow \text{H}^+ + \text{HPO}_4^{2-}$ , d)  $\text{Li}_2\text{O} \rightarrow 2\text{Li}^+ + \text{O}^{2-}$ ;  $\text{O}^{2-} + \text{H}_2\text{O} \rightarrow 2\text{OH}^-$ , 6)a)  $\text{H}_2\text{SO}_4$  (used in car batteries), b)  $\text{NaOH}$  (used in drain cleaner), 7)a)  $\text{NH}_4^+$ , b)  $\text{CO}_3^{2-}$ , 8)a)  $\text{CH}_3\text{COOH}$ , b) products, 9)a)  $4.3 \times 10^{-7}$ , b)  $2.3 \times 10^{-8}$ , 10)a)  $1.0 \times 10^{-7}$ , b)  $6.7 \times 10^{-13}$ , 11)  $1.0 \times 10^{-14}$ , 12)  $[\text{OH}^-] = 3.1 \times 10^{-3} \text{ M}$ ,  $[\text{H}_3\text{O}^+] = 3.2 \times 10^{-12} \text{ M}$ , 13) 14, 14)  $3.2 \times 10^{-9} \text{ M}$ , 15)a) 0.30, b) 4.5, 16) 5.5.