

These problems are intended to *supplement* the problems in the textbook, not *replace* them.

Questions

Write a balanced net ionic equation for the equilibrium reaction that occurs when each of the following is added to water.

1. nitrous acid, HNO_2
2. iodic acid, HIO_3
3. lactic acid, $\text{HC}_3\text{H}_5\text{O}_3$
4. ammonia, NH_3
5. dimethylamine, $(\text{CH}_3)_2\text{NH}$
6. aniline, $\text{C}_6\text{H}_5\text{NH}_2$
7. cyanide ion, CN^-
8. benzoate ion, $\text{C}_7\text{H}_5\text{O}_2^-$
9. hypobromite ion, BrO^-
10. ethylammonium ion, $\text{C}_2\text{H}_5\text{NH}_3^+$
11. dimethylammonium ion, $(\text{CH}_3)_2\text{NH}_2^+$
12. triethylammonium ion, $(\text{C}_2\text{H}_5)_3\text{NH}^+$

Write a balanced net ionic equation for the aqueous neutralization reaction between each of the following pairs.

13. benzoic acid, $\text{HC}_7\text{H}_5\text{O}_2$ + potassium hydroxide
14. formic acid, HCHO_2 + barium hydroxide
15. oxalic acid, $\text{H}_2\text{C}_2\text{O}_4$ + sodium hydroxide
16. ethylamine, $\text{C}_2\text{H}_5\text{NH}_2$ + hydrochloric acid
17. trimethylamine $(\text{CH}_3)_3\text{N}$ + nitric acid
18. ammonia, NH_3 + hydroiodic acid
19. dimethylammonium ion, $(\text{CH}_3)_2\text{NH}_2^+$ + calcium hydroxide
20. anilinium ion, $\text{C}_6\text{H}_5\text{NH}_3^+$ + lithium hydroxide
21. ethylammonium ion, $\text{C}_2\text{H}_5\text{NH}_3^+$ + potassium hydroxide
22. cyanate ion, CNO^- + hydrobromic acid
23. chlorite ion, ClO_2^- + perchloric acid
24. lactate ion, $\text{C}_3\text{H}_5\text{O}_3^-$ + nitric acid

Answers

If you can't figure out how to get the correct answer, go to your instructor, Science Tutoring Center, etc.

1. $\text{HNO}_2(aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{H}_3\text{O}^+(aq) + \text{NO}_2^-(aq)$ or $\text{HNO}_2(aq) \rightleftharpoons \text{H}^+(aq) + \text{NO}_2^-(aq)$
2. $\text{HIO}_3(aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{H}_3\text{O}^+(aq) + \text{IO}_3^-(aq)$ or $\text{HIO}_3(aq) \rightleftharpoons \text{H}^+(aq) + \text{IO}_3^-(aq)$
3. $\text{HC}_3\text{H}_5\text{O}_3(aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{H}_3\text{O}^+(aq) + \text{C}_3\text{H}_5\text{O}_3^-(aq)$ or $\text{HC}_3\text{H}_5\text{O}_3(aq) \rightleftharpoons \text{H}^+(aq) + \text{C}_3\text{H}_5\text{O}_3^-(aq)$
4. $\text{NH}_3(aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{OH}^-(aq) + \text{NH}_4^+(aq)$
5. $(\text{CH}_3)_2\text{NH}(aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{OH}^-(aq) + (\text{CH}_3)_2\text{NH}_2^+(aq)$
6. $\text{C}_6\text{H}_5\text{NH}_2(aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{OH}^-(aq) + \text{C}_6\text{H}_5\text{NH}_3^+(aq)$
7. $\text{CN}^-(aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{OH}^-(aq) + \text{HCN}(aq)$
8. $\text{C}_7\text{H}_5\text{O}_2^-(aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{OH}^-(aq) + \text{HC}_7\text{H}_5\text{O}_2(aq)$
9. $\text{BrO}^-(aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{OH}^-(aq) + \text{HBrO}(aq)$
10. $\text{C}_2\text{H}_5\text{NH}_3^+(aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{H}_3\text{O}^+(aq) + \text{C}_2\text{H}_5\text{NH}_2(aq)$ or $\text{C}_2\text{H}_5\text{NH}_3^+(aq) \rightleftharpoons \text{H}^+(aq) + \text{C}_2\text{H}_5\text{NH}_2(aq)$
11. $(\text{CH}_3)_2\text{NH}_2^+(aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{H}_3\text{O}^+(aq) + (\text{CH}_3)_2\text{NH}(aq)$ or $(\text{CH}_3)_2\text{NH}_2^+(aq) \rightleftharpoons \text{H}^+(aq) + (\text{CH}_3)_2\text{NH}(aq)$
12. $(\text{C}_2\text{H}_5)_3\text{NH}^+(aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{H}_3\text{O}^+(aq) + (\text{C}_2\text{H}_5)_3\text{N}(aq)$ or $(\text{C}_2\text{H}_5)_3\text{NH}^+(aq) \rightleftharpoons \text{H}^+(aq) + (\text{C}_2\text{H}_5)_3\text{N}(aq)$
13. $\text{HC}_7\text{H}_5\text{O}_2(aq) + \text{OH}^-(aq) \rightarrow \text{H}_2\text{O}(l) + \text{C}_7\text{H}_5\text{O}_2^-(aq)$
14. $\text{HCHO}_2(aq) + \text{OH}^-(aq) \rightarrow \text{H}_2\text{O}(l) + \text{CHO}_2^-(aq)$
15. $\text{H}_2\text{C}_2\text{O}_4(aq) + 2 \text{OH}^-(aq) \rightarrow 2 \text{H}_2\text{O}(l) + \text{C}_2\text{O}_4^{2-}(aq)$
16. $\text{C}_2\text{H}_5\text{NH}_2(aq) + \text{H}^+(aq) \rightarrow \text{C}_2\text{H}_5\text{NH}_3^+(aq)$
17. $(\text{CH}_3)_3\text{N}(aq) + \text{H}^+(aq) \rightarrow (\text{CH}_3)_3\text{NH}^+(aq)$
18. $\text{NH}_3(aq) + \text{H}^+(aq) \rightarrow \text{NH}_4^+(aq)$
19. $(\text{CH}_3)_2\text{NH}_2^+(aq) + \text{OH}^-(aq) \rightarrow \text{H}_2\text{O}(l) + (\text{CH}_3)_2\text{NH}(aq)$
20. $\text{C}_6\text{H}_5\text{NH}_3^+(aq) + \text{OH}^-(aq) \rightarrow \text{H}_2\text{O}(l) + \text{C}_6\text{H}_5\text{NH}_2(aq)$
21. $\text{C}_2\text{H}_5\text{NH}_3^+(aq) + \text{OH}^-(aq) \rightarrow \text{H}_2\text{O}(l) + \text{C}_2\text{H}_5\text{NH}_2(aq)$
22. $\text{CNO}^-(aq) + \text{H}^+(aq) \rightarrow \text{HCNO}(aq)$
23. $\text{ClO}_2^-(aq) + \text{H}^+(aq) \rightarrow \text{HClO}_2(aq)$
24. $\text{C}_3\text{H}_5\text{O}_3^-(aq) + \text{H}^+(aq) \rightarrow \text{HC}_3\text{H}_5\text{O}_3(aq)$