

Name : _____ Date : _____

Acids and Bases Strength

Write True (T) or False (F).

- i. Stronger acids have weaker conjugate bases and weaker acids have stronger conjugate bases. _____
- ii. Stronger bases have stronger conjugate acids and weaker bases have weaker conjugate acids. _____

Write equations that show how the following reactions occur in water.

- i. F^- acts as a base. _____
- ii. HNO_2 acts as an acid. _____
- iii. $Fe(H_2O)_6^{3+}$ acts as an acid. _____
- iv. HCO_3^- acts as a base. _____
- v. HCO_3^- acts as an acid. _____
- vi. $Al(H_2O)_5(OH)^{2+}$ acts as a base. _____

What volume of 0.45 M LiOH would be needed to neutralize 60.0 mL of 0.15 M HI?

Calculate the pH values of the following solutions of strong acids and bases.

- i. 0.001 M HCl
- ii. 0.76 M KOH
- iii. 2.8×10^{-4} M $Ba(OH)_2$

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Acids and Bases Strength

Answers

Write True (T) or False (F).

- i. Stronger acids have weaker conjugate bases and weaker acids have stronger conjugate bases. T
- ii. Stronger bases have stronger conjugate acids and weaker bases have weaker conjugate acids. F

Write equations that show how the following reactions occur in water.

- i. F^- acts as a base. $F^- + H_2O \rightleftharpoons HF + OH^-$
- ii. HNO_2 acts as an acid. $HNO_2 + H_2O \rightleftharpoons NO_2^- + H_3O^+$
- iii. $Fe(H_2O)_6^{3+}$ acts as an acid. $Fe(H_2O)_6^{3+} + H_2O \rightleftharpoons Fe(H_2O)_5(OH)^{2+} + H_3O^+$
- iv. HCO_3^- acts as a base. $HCO_3^- + H_2O \rightleftharpoons H_2CO_3 + OH^-$
- v. HCO_3^- acts as an acid. $HCO_3^- + H_2O \rightleftharpoons CO_3^{2-} + H_3O^+$
- vi. $Al(H_2O)_5(OH)^{2+}$ acts as a base. $Al(H_2O)_5(OH)^{2+} + H_2O \rightleftharpoons Al(H_2O)_6^{3+} + OH^-$

What volume of 0.45 M LiOH would be needed to neutralize 60.0 mL of 0.15 M HI?



$$M_1 V_1 = M_2 V_2 \Rightarrow (60 \text{ mL})(0.15 \text{ M}) = M_2 (0.45 \text{ M}) \Rightarrow M_2 = \frac{(60 \text{ mL})(0.15 \text{ M})}{(0.45 \text{ M})} = 20 \text{ mL}$$

Calculate the pH values of the following solutions of strong acids and bases.

- i. 0.001 M HCl

$$pH = -\log(1 \times 10^{-3}) = 3$$

- ii. 0.76 M KOH

$$pOH = -\log(7.6 \times 10^{-3}) = 0.119$$

$$pH = 14 - pOH = 14 - 0.119 = 13.88$$

- iii. 2.8×10^{-4} M $Ba(OH)_2$

$$pOH = -\log(2 \times 2.8 \times 10^{-4}) = 3.25$$

$$pH = 14 - pOH = 10.75$$