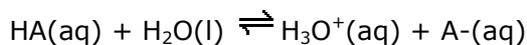


Exercise 7.41 – Strong and weak acids and bases

Q741-01 Consider a weak acid HA dissolved in water.



Which of the following statements is/are correct?

- I $\text{A}^-(\text{aq})$ is a much stronger base than $\text{H}_2\text{O(l)}$
- II HA dissociates only to a very small extent in aqueous solution.
- III The concentration of H_3O^+ is much greater than the concentration of HA(aq)

- A. I, II and III
- B. II and III only
- C. I and II only
- D. I and III only

Q741-02 Which compound will produce a solution with a pH of greater than 7 when added to water?

- A. $\text{NaHCO}_3(\text{s})$
- B. $\text{SiO}_2(\text{s})$
- C. $\text{SO}_3(\text{g})$
- D. $\text{CH}_3\text{CO}_2\text{H}(\text{aq})$

Q741-03 When the following 0.10 mol dm^{-3} solutions are arranged in order of increasing pH (lowest first) what is the correct order?

- A. $\text{NH}_3(\text{aq})$, $\text{NaOH}(\text{aq})$, $\text{HCl}(\text{aq})$, $\text{CH}_3\text{COOH}(\text{aq})$
- B. $\text{NaOH}(\text{aq})$, $\text{NH}_3(\text{aq})$, $\text{CH}_3\text{COOH}(\text{aq})$, $\text{HCl}(\text{aq})$
- C. $\text{HCl}(\text{aq})$, $\text{CH}_3\text{COOH}(\text{aq})$, $\text{NH}_3(\text{aq})$, $\text{NaOH}(\text{aq})$
- D. $\text{HCl}(\text{aq})$, $\text{CH}_3\text{COOH}(\text{aq})$, $\text{NaOH}(\text{aq})$, $\text{NH}_3(\text{aq})$
- E. $\text{NaOH}(\text{aq})$, $\text{NH}_3(\text{aq})$, $\text{HCl}(\text{aq})$, $\text{CH}_3\text{COOH}(\text{aq})$

Q741-04 When the following 1.0 mol dm^{-3} solutions are listed in increasing order of pH (lowest first) what is the correct order?

- A. $\text{HNO}_3 < \text{H}_2\text{CO}_3 < \text{NH}_3 < \text{Ba}(\text{OH})_2$
- B. $\text{NH}_3 < \text{Ba}(\text{OH})_2 < \text{H}_2\text{CO}_3 < \text{HNO}_3$
- C. $\text{Ba}(\text{OH})_2 < \text{H}_2\text{CO}_3 < \text{NH}_3 < \text{HNO}_3$
- D. $\text{HNO}_3 < \text{H}_2\text{CO}_3 < \text{Ba}(\text{OH})_2 < \text{NH}_3$

Q741-05 Four flasks labelled A, B, C and D each contain equal volumes of hydrochloric acid of different concentrations. When equal volumes of 1M sodium hydroxide are added to each flask the pH values below are produced.

Flask	A	B	C	D
pH	1	5	7	13

Which flask contained the most concentrated hydrochloric acid initially?

Exercise 7.41 – Strong and weak acids and bases

Q741-06 Aqueous solutions of each of the following have a concentration of $0.100 \text{ mol dm}^{-3}$. Which has the highest pH?

- A. HCl
- B. CH_3COOH
- C. NaOH
- D. NH_3

Q741-07 Separate 20.0 cm^3 solutions of a weak acid and a strong acid of the same concentration are titrated with NaOH solution. Which will be the same for these two titrations?

- I. Initial pH
 - II. pH at equivalence point
 - III. Volume of NaOH required to reach the equivalence point
- A. I only
 - B. III only
 - C. I and II only
 - D. II and III only

Q741-08 Four aqueous solutions I, II, III and IV are listed below:

- I - $0.100 \text{ mol dm}^{-3}$ HCl
- II - $0.010 \text{ mol dm}^{-3}$ HCl
- III - $0.100 \text{ mol dm}^{-3}$ NaOH
- IV - $0.010 \text{ mol dm}^{-3}$ NaOH

What is the correct order of increasing pH of these solutions?

- A. I, II, III, IV
- B. II, IV, III, I
- C. IV, III, II, I
- D. I, II, IV, III

Q741-09 Solutions of hydrochloric acid (HCl(aq)) and ethanoic acid ($\text{CH}_3\text{COOH(aq)}$) of the same concentration reacted completely with 5.0 g of calcium carbonate in separate containers. Which of the following statements is correct?

- A. $\text{CH}_3\text{COOH(aq)}$ reacted slower because it has a lower pH than HCl(aq)
- B. A smaller volume of $\text{CO}_2(\text{g})$ was produced with $\text{CH}_3\text{COOH(aq)}$ than with HCl(aq) .
- C. A greater volume of $\text{CO}_2(\text{g})$ was produced with $\text{CH}_3\text{COOH(aq)}$ than with HCl(aq) .
- D. The same volume of $\text{CO}_2(\text{g})$ was produced with both $\text{CH}_3\text{COOH(aq)}$ and HCl(aq) .

Q741-10 A household cleaner contains aqueous ammonia. A 2.447 g sample of the cleaner is diluted with water to 20.00 cm^3 . This solution requires 28.51 cm^3 of $0.404 \text{ mol dm}^{-3}$ sulphuric acid to reach the equivalence point.

- a) Write a balanced equation for the reaction between sulphuric acid and ammonia.
 - b) Calculate the moles of sulphuric acid required for this reaction and the moles, mass and percentage mass of ammonia in the household cleaner.
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