

## 12 Chemistry Acid-Base Revision

- In which one of the following reactions is the hydrogen carbonate (bicarbonate) ion acting as an acid?
  - $\text{HCO}_3^- + \text{H}_3\text{O}^+ \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
  - $\text{HCO}_3^- + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3 + \text{OH}^-$
  - $\text{HCO}_3^- + \text{HSO}_4^- \rightarrow \text{H}_2\text{CO}_3 + \text{SO}_4^{2-}$
  - $\text{HCO}_3^- + \text{PO}_4^{3-} \rightarrow \text{CO}_3^{2-} + \text{HPO}_4^{2-}$
  - $\text{HCO}_3^- + \text{CH}_3\text{COOH} \rightarrow \text{H}_2\text{O} + \text{CO}_2 + \text{CH}_3\text{COO}^-$
- The reaction:  $\text{HClO}_4 + \text{CH}_3\text{COO}^- \rightarrow \text{CH}_3\text{COOH} + \text{ClO}_4^-$  occurs because:
  - $\text{CH}_3\text{COOH}$  is a stronger acid than  $\text{HClO}_4$
  - $\text{HClO}_4$  is a stronger acid than  $\text{CH}_3\text{COOH}$
  - $\text{CH}_3\text{COOH}$  is a weaker acid than  $\text{CH}_3\text{COO}^-$
  - $\text{HClO}_4$  is a weaker acid than  $\text{CH}_3\text{COOH}$
  - The statement in the question is false as the reaction does not occur in the direction shown.
- An unknown solid acid is to be analysed by the usual method of addition of a weighed amount to a conical flask and titration.  
Which of sentences a) to e) would you expect to find in the detailed instructions for the exercise?
  - Dry the conical flask thoroughly before commencing work.
  - Read the burette to the nearest 0.1 mL.
  - Add a few drops of phenolphthalein to the conical flask.
  - As the alkali is pure, standard acid is not needed.
  - The burette should be filled exactly to the zero mark.
- The hydrochloric acid concentration in the gastric juice of a patient with an ulcer is 0.09M. What volume of medicine which contains 0.3 mole of aluminium hydroxide in suspension per litre must the patient take each day to neutralise the 2 litres of gastric juice produced each day?
  - 200 mL
  - 300 mL
  - 600 mL
  - 3333 mL
  - 5000 mL
- The oxide of phosphorus  $\text{P}_4\text{O}_{10}$  is said to be an acidic oxide. Why is this?
  - Because it reacts with  $\text{H}^+$  and not  $\text{OH}^-$
  - Because it reacts with  $\text{OH}^-$  and not  $\text{H}^+$
  - Because it is formed by burning phosphorus in air
  - Because it cannot be formed by burning phosphorus in air
  - Because the only basic oxides are those of the group I and group II elements: all other oxides are acidic

6. Sodium carbonate is the most common alkali in chemical industry.  
It is basic because
- the carbonate ion is hydrolysed by water forming bicarbonate ion.
  - the sodium ion is always associated with bases because it occurs in sodium hydroxide.
  - it contains sodium hydroxide as an impurity.
  - the ionisation constant of carbonic acid is smaller than that of water.
  - it has a low solubility product.
7. Which of the following equations represents a reaction in which water acts as an acid?
- $\text{CH}_3\text{COOH} + \text{H}_2\text{O} \rightarrow \text{CH}_3\text{CO}_2^- + \text{H}_3\text{O}^+$
  - $\text{NH}_3 + \text{H}_2\text{O} \rightarrow \text{NH}_4^+ + \text{OH}^-$
  - $\text{Zn}^{2+} + 4\text{H}_2\text{O} \rightarrow \text{Zn}(\text{H}_2\text{O})_4^{2+}$
  - $\text{NaOH}(\text{s}) \rightarrow \text{Na}^+(\text{aq}) + \text{OH}^-(\text{aq})$
  - None of these
8. Which of the following statements is FALSE?
- The pH of a solution of a strong acid is less than the pH of an equimolar solution of a weak acid.
  - The pH of a solution of a strong base is more than the pH of an equimolar solution of a weak base.
  - Weak acids and weak bases do not react with each other.
  - It is possible for water to act either as an acid or as a base.
  - When an acid and a base react the products consist of a new acid and a new base.

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### ANSWERS

- d
- b
- c
- a
- b
- a
- b
- c