The Elements of Groups 1 and 2 - Questions by Topic

Q1.

A colourless solid, Q, was warmed with sodium hydroxide solution. A gas was evolved which turned damp red litmus paper blue. What is solid Q?

(1)

☒ **A** $NaNO_3$

☒ **B** NH_4Cl

☒ **C** NaCl

☒ **D** $Ca(NO_3)_2$

(Total for question = 1 mark)

Q2.

Ethanedioic acid is a solid diprotic acid. A student used ethanedioic acid in a titration to find the concentration of a potassium hydroxide solution.

The equation for the reaction is:

$$2KOH + (COOH)_2 \rightarrow (COOK)_2 + 2H_2O$$

(a) Calculate the mass of ethanedioic acid that should be used to make 1000 cm^3 of a 0.0500 mol dm^{-3} solution in water.

Give your answer to an appropriate number of significant figures.

[Molar mass of ethanedioic acid = 90.0 g mol^{-1}].

(2)

(b) A student decided to check to see if phenolphthalein was a suitable indicator for this titration. The student measured 400 cm^3 of the 0.0500 mol dm^{-3} ethanedioic acid into a beaker and added a few drops of phenolphthalein indicator.

Calculate the minimum mass of solid potassium hydroxide that should be added to produce a colour change.

(2)

*(c) A student used a 0.0500 mol dm^{-3} solution of ethanedioic acid to find an accurate concentration of a potassium hydroxide solution which was known to have an approximate concentration of 0.1 mol dm^{-3}.

Describe a procedure to obtain reliable titration results using standard laboratory equipment.

(6)

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(Total for question = 10 marks)

Q3.

Which statement is **not** explained by hydrogen bonding?

(1)

- ☐ **A** all Group 1 hydroxides are soluble in water
- ☐ **B** many simple alcohols are soluble in water
- ☐ **C** the density of ice is less than the density of liquid water at 0 °C
- ☐ **D** the melting temperature of water is abnormally high

(Total for question = 1 mark)

Q4.

Compound X gives a red flame test colour and a white precipitate on addition of dilute hydrochloric acid followed by barium chloride solution. Which compound is X?

(1)

- ☐ **A** calcium chloride
- ☐ **B** lithium sulfate
- ☐ **C** potassium sulfate
- ☐ **D** strontium chloride

(Total for question = 1 mark)

Q5.

Which process explains the flame colour produced by the compounds of Group 1 elements?

(1)

- ☐ **A** absorption of visible light energy as electrons are promoted to higher energy levels
- ☐ **B** absorption of visible light energy as electrons are removed from gaseous atoms
- ☐ **C** emission of visible light energy as electrons return to lower energy levels
- ☐ **D** emission of visible light energy as electrons are added to gaseous ions

(Total for question = 1 mark)

Q6.

A student made the following statements about trends going **down** Group 2.
Which statement is correct?

(1)

☒ **A** the thermal stability of the nitrates decreases

☒ **B** the thermal stability of the carbonates decreases

☒ **C** the solubility of hydroxides increases

☒ **D** the solubility of sulfates increases

(Total for question = 1 mark)