

Acids and Bases

Question Paper

Level	Pre U
Subject	Chemistry
Exam Board	Cambridge International Examinations
Topic	Acids and Bases- Equilibria
Booklet	Question Paper

Time Allowed: 18 minutes

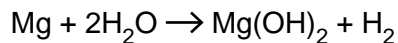
Score: /15

Percentage: /100

Grade Boundaries:

1. Magnesium powder is used to generate heat for battlefield soldiers wanting a hot drink.

9.0 g of magnesium powder is added to 30.0 g, an excess, of water.



- (a) Calculate the amount, in mol, of magnesium.

..... mol [1]

- (b) Calculate the mass of water that is in excess.

..... g [2]

- (c) Calculate the volume of hydrogen gas, in dm^3 , produced at room temperature and pressure.

..... dm^3 [1]

- (d) Use the standard enthalpy change of formation data in Table 1.1 to calculate the standard enthalpy change of reaction for magnesium reacting with water.

Table 1.1

substance	$\Delta_f H^\ominus / \text{kJ mol}^{-1}$
H_2O	-285.8
$\text{Mg}(\text{OH})_2$	-924.5

..... kJ mol^{-1} [2]

- (e) Calculate the heat energy, in kJ, released when 9.0g of magnesium powder is added to 30.0g of water.

..... kJ [1]

- (f) When the magnesium powder and water are mixed, the temperature of the drink being heated can rise to 60°C in about 10 minutes.
Calculate how much energy, in kJ, is required to heat 150g of the drink from 15°C to 60°C. Assume that the specific heat capacity of the drink is $4.2\text{Jg}^{-1}\text{K}^{-1}$.

..... kJ [1]

- (g) How would using 9.0g of magnesium **granules** affect the amount of energy released and the temperature reached of the drink? Explain your answer.

.....
.....
..... [2]

- (h) Exothermic reactions that do **not** produce hydrogen gas are being explored.

- (i) One example is mixing calcium oxide with water. Write an equation for this reaction and give the approximate pH of the resulting solution.

..... pH..... [2]

- (ii) Another example is the reaction of phosphorus(V) oxide with water. Write an equation for this reaction and give the approximate pH of the resulting solution.

..... pH..... [2]

- (iii) Calcium oxide reacts with phosphorus(V) oxide to make calcium phosphate. Write an equation for this reaction.

..... [1]

[Total: 15]