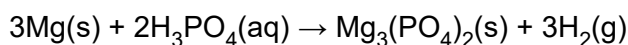


**AS Level Chemistry A**  
**H032/01** Breadth in chemistry

**Question Set 14**

1. This question is about compounds of magnesium and phosphorus.

(a) A student plans to prepare magnesium phosphate using the redox reaction of magnesium with phosphoric acid,  $\text{H}_3\text{PO}_4$ .



(i) In terms of the number of electrons transferred, explain whether magnesium is being oxidised or reduced. [1]

(ii) The student plans to add magnesium to  $50.0 \text{ cm}^3$  of  $1.24 \text{ mol dm}^{-3} \text{ H}_3\text{PO}_4$ .

Calculate the mass of magnesium, in g, that the student should add to react exactly with the phosphoric acid.

Give your answer to **three** significant figures. [3]

(iii) How could the student obtain a sample of magnesium phosphate after reacting magnesium with phosphoric acid? [2]

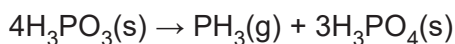
(iv) Magnesium phosphate can also be prepared by reacting phosphoric acid with a compound of magnesium.

Choose a suitable magnesium compound for this preparation and write the equation for the reaction.

Formula of compound .....

Equation .....

(d) Phosphine,  $\text{PH}_3$ , is a gas formed by heating phosphorous acid,  $\text{H}_3\text{PO}_3$ , in the absence of air. [2]



(i)  $3.20 \times 10^{-2} \text{ mol}$  of  $\text{H}_3\text{PO}_3$  is completely decomposed by this reaction.

Calculate the volume of phosphine gas formed, in  $\text{cm}^3$ , at  $100 \text{ kPa}$  pressure and  $200^\circ\text{C}$ . [4]

(ii) When exposed to air, phosphine spontaneously ignites, forming  $\text{P}_4\text{O}_{10}$  and water.

Construct an equation for this reaction. [1]

**Total Marks for Question Set 14: 13**

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