

**GCSE Chemistry A (Gateway Science)**

**J248/01** Chemistry A C1-C3 and C7 (Foundation Tier)

**Question Set 8**

1 Two students, **A** and **B**, want to make some solid zinc sulfate. They make some predictions.

You can react sulfuric acid with zinc metal or zinc carbonate to make zinc sulfate. Both reactions make hydrogen.

Student **A** says

You can react hydrochloric acid with zinc metal or zinc carbonate to make zinc sulfate. The reaction with zinc metal makes hydrogen and the reaction with zinc carbonate makes carbon dioxide.

Student **B** says

(a) Comment on how correct **both** predictions are.

**CORRECT** : - sulfuric acid reacts with zinc or zinc carbonate to make zinc sulfate  
- zinc reacts with acid to make hydrogen  
- zinc carbonate reacts with acid to make  $\text{CO}_2$

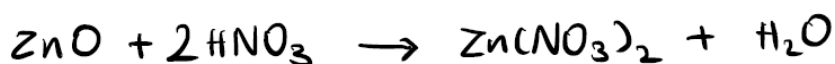
**INCORRECT** : - both reactions do not make hydrogen  
- zinc or zinc carbonate will not react with  $\text{HCl}$  to make zinc sulfate  
- zinc carbonate does not make hydrogen when it reacts with acid

[4]

(b) (i) Zinc oxide,  $\text{ZnO}$ , is reacted with nitric acid,  $\text{HNO}_3$ .

The reaction makes zinc nitrate,  $\text{Zn}(\text{NO}_3)_2$ , and water,  $\text{H}_2\text{O}$ .

Write a **balanced symbol** equation for this reaction.



[2]

(ii) A student suggests this method for preparing zinc nitrate.

1. Measure  $50 \text{ cm}^3$  of dilute nitric acid into a beaker.
2. Add one spatula measure of zinc oxide.
3. Heat the mixture until crystals of zinc nitrate are made.

Her method will **not** make a pure dry sample of zinc nitrate.

What improvements should she make to the method to make sure that:

- the reaction is complete
- the zinc nitrate can be separated from the nitric acid and the zinc oxide?

Explain your answer.

[4]

- Add zinc oxide (one spatula each time) and stir
- Continue adding zinc oxide until it is in excess (does not dissolve anymore)
- Filter to remove excess zinc oxide
- Pour the filtrate into evaporating basin
- Heat the zinc nitrate solution until half of the water is evaporated
- Leave the solution to allow all the water to evaporate

**Total Marks for Question Set 8: 10**

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