

Practical activity that forms part of the Gr 10 Physical Sciences 3-in-1  
Class text and Study Guide. See p. 141 MODULE 3 TOPIC 3 Unit 4 for the theory.



## PRACTICAL EXPERIMENT

## PART 2

## Gas-forming reactions in aqueous solutions

## Materials

○ 4 test tubes with the following:

- 1 –  $\text{NaHCO}_3$  solution      ○ 2 –  $\text{HCl}$  solution      ○ 3 –  $\text{HCl}$  solution      ○ 4 – Zn granules or powder

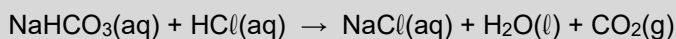
## Method

- 1 Add the contents of the test tubes together as follows:  
○ experiment A: test tube 1 to test tube 2      ○ experiment B: test tube 3 to test tube 4
- 2 Compile a table to record your results and note any chemical reactions that occur. Write an equation for these reactions where applicable.

## Observations and discussion

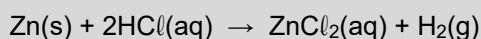
| Experiment | Test tubes 1 & 3 | Test tubes 2 & 4 | Reaction (Yes/No) |
|------------|------------------|------------------|-------------------|
| A          | $\text{NaHCO}_3$ | $\text{HCl}$     | Yes               |
| B          | $\text{HCl}$     | Zn               | Yes               |

- When the contents of test tubes 1 and 2 (experiment A) and 3 and 4 (experiment B) are added together **bubbles** are observed.
- This indicates that is **gas** is formed and that a **chemical reaction** is taking place.
- In reaction A, an **ion exchange** takes place and a soluble salt, i.e. sodium chloride ( $\text{NaCl}$ ), as well as carbonic acid ( $\text{H}_2\text{CO}_3$ ) is formed.
- $\text{H}_2\text{CO}_3$  acid is an unstable product and immediately breaks down into  $\text{H}_2\text{O}$  and  $\text{CO}_2$  gas.



Refer to the practical investigation on p. xx for ionic and net ionic equations.

- In experiment B, an **electron transfer** takes place.
- Hydrogen gas ( $\text{H}_2$ ) is one of the products.



Refer to redox  
reactions on  
p. 143.



## Conclusion

- When the two solutions in experiment A are added together, an ion exchange (**transfer** of a **proton**, i.e.  $\text{H}^+$ ) occurs. The new combination of ions forms a gas. Therefore, it is known as an acid-base reaction, as well as a gas forming reaction.
- When dilute acid ( $\text{HCl}$ ) is added to the metal (Zn) in experiment B, **electron transfer** takes place. Hydrogen gas ( $\text{H}_2$ ) forms. Therefore, it is also known as a redox reaction, as well as a gas forming reaction.