

# EXPERIMENT 1.1

## Flame tests of metal cations

### STUDENT LABORATORY NOTES

#### Introduction

When vaporised in the flame of a Bunsen burner, some metallic elements produce a characteristic colour. The flame colour is the result of electrons moving from a higher energy level or electron shell to their normal shell.

Everyday applications of flame colours can be seen in 'neon' advertising signs (neon itself is red), and the mercury vapour and sodium vapour lamps used in street lighting.

Students will complete flame tests for different metal cations (as metal chlorides), and then identify an unknown metal ion (chosen from those metals examined, or another metal that was not used).

#### Aim

To observe the characteristic flame colours of the metal ions  $K^+$ ,  $Na^+$ ,  $Li^+$ ,  $Sr^{2+}$ ,  $Cu^{2+}$ ,  $Ca^{2+}$ ,  $Ba^{2+}$ , and to identify an unknown metal ion.

#### Hypothesis

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#### Preparation for task

##### Location to conduct this task

In the laboratory

##### Duration

30 minutes

##### Group size

Two or three students

#### Methodology

##### Materials (per group)

- 9 watch glasses
- 8 nichrome or platinum wires, each attached to a holder (the wires must be clean)
- Bunsen burner

# Flame Tests For Metals Lab Report

**AN Whitehead**



## Flame Tests For Metals Lab Report:

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 $\text{H}_2\text{O} \text{ g} + \text{H}_2 \text{ g} \rightarrow \text{C}_2\text{H}_6 \text{ g}$   $\Delta h = 71.2 \text{ kJ}$   
 $\text{C}_2\text{H}_6 \text{ g} + \frac{7}{2} \text{O}_2 \text{ g} \rightarrow 2 \text{ CO}_2 \text{ g} + 3 \text{ H}_2\text{O} \text{ g}$   $\Delta h = 283 \text{ kJ}$   
 $\text{C}_2\text{H}_6 \text{ g}$

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 $\text{C}_2\text{H}_4 \text{ g} + 3 \text{ O}_2 \text{ g} \rightarrow 2 \text{ CO}_2 \text{ g} + 2 \text{ H}_2\text{O} \text{ l}$   $\Delta h = 1411 \text{ kJ}$  mole  
 $\text{C}_2\text{H}_6 \text{ g} + \frac{7}{2} \text{ O}_2 \text{ g} \rightarrow 2 \text{ CO}_2 \text{ g} + 3 \text{ H}_2\text{O} \text{ l}$   $\Delta h = 1560 \text{ kJ}$  mole  
 $\text{H}_2 \text{ g} + \frac{1}{2} \text{ O}_2 \text{ g} \rightarrow \text{H}_2\text{O} \text{ l}$   $\Delta h = 285 \text{ kJ}$  mole

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web thus for reaction 9 2 in which 1 mole of h<sub>3</sub>o and 1 mole of oh combine to form 2 moles of h<sub>2</sub>o h 55 8 kj as shown note that the enthalpy change h<sub>products</sub> h<sub>reactants</sub> is positive if heat is absorbed that is if h<sub>products</sub>

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