

Introduction

Sci-Files: Human Torch is an educational computer game, developed specifically for Science Year. It aims to make learning about combustion reactions, safety and risk more exciting, by harnessing pupils' enthusiasm for games and the paranormal, as in the X Files. In this television series, investigators solve cases using the same process as pupils do in a school science investigation. They think up hypotheses, test them, and analyse results. We hope *Human Torch* will show pupils that science is also about solving fascinating mysteries.

Pupils take the role of MI5 Special Projects investigators. They will:

- Watch video sequences that set the plot and develop it during the game in dramatic ways.
- Complete structured multimedia activities with clear learning outcomes, where they find clues, analyse them in a cartoon laboratory and interview experts.
- Carry out exciting experiments on combustion to reconstruct the crime, and learn about risk assessments and working safely.

Experiment 1: Wick effect

Aim: To test whether fat in the human body can burn with a wick.

Requirements per group:

- Film canister lid or similar
- 1g margarine (for example, Clover)
- 2 cotton buds
- Thermometer
- Timer
- Pin
- Heat proof mat

Access to:

- Balance
- Matches/splints

Experiment 2: Burning methane

Aim: To test how well methane burns.

Requirements per group:

- Large sandwich bag (for collecting gas), with seal
- 50ml syringe without needle
- 250ml evaporating basin
- Sheet of paper
- 2 splints
- 30cm ruler

Access to:

- 100ml of 20% tepol (or fairy liquid) solution, in tap water, plus 1ml of glycerol
- Sellotape

Expt 3: Burning hydrogen)

Aim: To produce hydrogen by electrolysis water, and test how well it burns.

Requirements per group:

- 250ml beaker
- 2 leads with croc clips
- 2 carbon rods (electrodes)
- Test tube
- Splint
- 12V power pack

Access to:
Acidified tap water.

Expt 4: Spreading flame

Aim: To observe how the heat from a burning candle travels sideways compared to upwards.

Requirements per group:

- Candle on base
- Thermometer
- Timer
- Clamp
- Bunsen burner
- Heat proof mat

Expt 5: Burning in oxygen

Aim: To test whether substances burn longer in oxygen than air.

Requirements per group:

- Test/boiling tube filled with oxygen
- Test/boiling tube filled with air

Access to:

- Splints/matches

(optional) If pupils are generating their own oxygen:

- Conical flask, bung and delivery tube
- 10ml of 20 vol hydrogen peroxide solution
- 1 level spatula of manganese dioxide
- Boiling tube
- Boiling tube rack

Expt 6: Burning alcohol

Aim: To test whether alcohol can burn without affecting the material it is soaked into.

Requirements per group:

- Petri dish with lid
- 2 pieces of 2cm x 5cm blotting paper
- Clamp and stand

Access to:

- 'Victim's rum': A solution of 40% ethanol in water (optionally made to look like 'Rum bottle')
- Splints

Safety

- Pupils should wear eye protection for all the experiments.
- Pupils are shown how to carry out their own risk assessment, as part of the activity, before doing the experiments.
- 'Model answers' to the risk assessment activity are provided (in the Teacher's Notes).
- In Experiment 2, extreme care should be taken with the bag of methane. The gas is highly flammable.
- Hydrogen peroxide is an irritant to the eyes and skin.