

Demonstration corner

CHIP PAN FIRE

This is a spectacular demonstration which lends itself to quite a few teaching points. Not least it is an excellent demonstration of the dangers associated with oil fires, which still injure about 4,000 people each year in the UK.

It is extremely important not to exceed the quantities suggested here.

Before carrying out this experiment, read the more detailed information and the risk assessment that can be found at <http://www.sserc.org.uk/index.php/chemistry-resources/chemistry-demonstrations/3866-chip-pan-fire>.

- Do not do carry this experiment out in a fume cupboard (doing so may ignite the filter).
- The teacher/demonstrator should wear a face shield and heat resistant gloves. **Pupils must not attempt this activity.**
- All those present should wear eye protection and must be kept not less than 4 metres back.
- Safety screens must be positioned and secured to protect both students and the demonstrator.
- The experiment must not be carried out below a light fitting.
- Set out some heatproof mats to protect the bench from hot burning oil.
- Tape a small test tube to one end of a 1 m rule.
- Set up a tall form nickel crucible as shown in Figure 1. (Porcelain ones might crack and squat ones might spray the flaming liquid sideways). It should be firmly held and not tip over when the flame is put out.

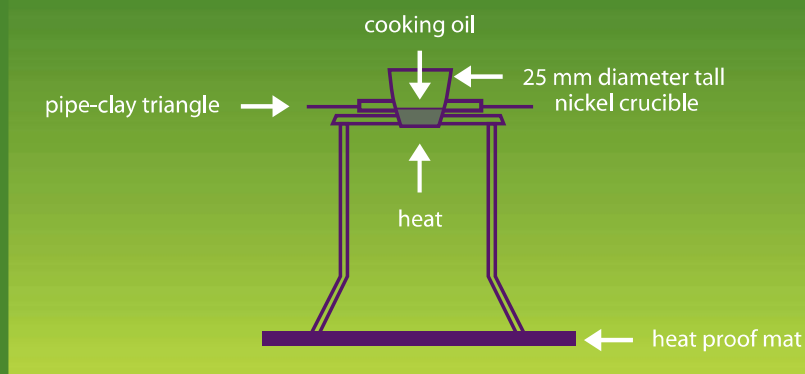


Figure 1 - Set up.

The demonstration

- 1) Place about 5 cm³ of water in the test-tube ready for use
- 2) Pour 3 cm³ of cooking oil into the crucible and place a lighted Bunsen burner beneath it.
- 3) Once the oil catches fire, switch off the gas, allow it to burn for a minute or two and then extinguish the flame by placing

a small square of hardboard or aluminium over the crucible. This shows how you can safely put out this sort of fire.

- 4) Re-light the Bunsen burner and re-heat the oil until it re-ignites.
- 5) Switch off the gas supply again and let it burn again for a couple of minutes.
- 6) Hold the metre stick with the test-tube containing water at arm's length and pour the water to the burning oil. This will cause a ball of fire to rise about a metre, effectively demonstrating the hazard of attempting to put out a fat-pan fire with water.

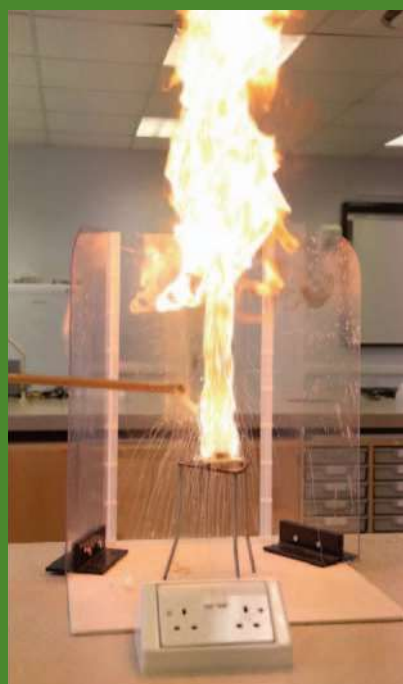


Figure 2 - Fireball.

What is happening?

In order to burn, oil needs to be close to or at its boiling point, around 220°C. (This will vary depending on the oil).

When the water is added, it sinks to the bottom as it is more dense than the oil. It then turns to steam, as the temperature is far above boiling point (100°C). The steam erupts out from under the burning oil, carrying it along too. As the burning oil is spread out into smaller droplets and mixes with the air, it burns much faster, hence the fireball (Figure 2). ◀