




D4: Egg-splosion

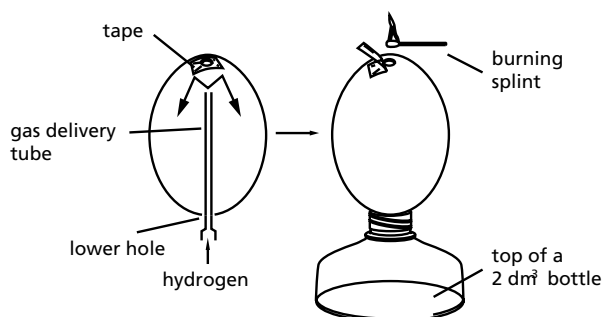
- Preparation time 30-60 minutes
- Demonstration time less than 5 minutes

Requirements

one raw egg	source of hydrogen (e.g. granulated Zn and
sharp nail	4.0 mol dm ⁻³ HCl, in a conical flask fitted with a
10-15 cm wire	delivery tube)
masking tape	ethanol
capillary tube	
top portion of a 2 dm ³ plastic	safety screens
disposable lemonade bottle	eye protection

Method

- 


 Wash the egg thoroughly, rinsing with ethanol as a disinfectant.
- Using the nail gently tap a small hole 2-3 mm in diameter in the top (narrower) end of the egg and a slightly larger hole 3-4mm diameter in the bottom.
- Insert the wire and stir up the yolk.
- Over a large bowl, blow into the small hole to force the egg's contents out through the larger hole. You could use a straw to do this.
- Rinse the inside of the eggshell several times with ethanol and leave the egg to dry for at least 2 minutes.
- Cover the top hole of the eggshell with a piece of tape and introduce hydrogen gas through the bottom hole via a long capillary tube extending upward almost to the top of the egg. The eggshell must be completely filled with hydrogen gas. Use a generous volume of hydrogen.
- Place the egg on the top of the plastic lemonade bottle (see diagram) and put it between two safety screens arranged to protect you and the pupils.
- Remove the tape and hold a burning splint, briefly, to the hole. Stand back!



eye protection must be worn



**HIGHLY
FLAMMABLE**

hydrogen
ethanol



there may a risk of
Salmonella infection
from raw eggs



IRRITANT
hydrochloric acid

D4: Egg-splosion (contd)

Chemical background

The initial pop is probably caused by a small portion of the hydrogen leaking out, mixing with the air immediately above the hole and forming a minute combustible mixture.

As more hydrogen escapes through the top hole, it continues to react with oxygen in the air and burns with an invisible and silent flame.

At the same time, oxygen-containing air is drawn into the egg through the bottom hole and mixes with the remaining hydrogen. When enough air has entered to form a combustible mixture inside the egg, the flame backfires down through the hole and ignites the mixture. Since the reaction is very exothermic, and since the holes in the egg are not large enough to accommodate the rapid expansion of the gases, the pressure inside the egg increases rapidly and it explodes into several small pieces.