

**GEEK  
& CO.  
SCIENCE!**



PROJECT KIT **Ages  
8+**

# PLaSMa REACTOR



## Warning.

Not suitable for children under 8 years. For use under adult supervision. Contains some chemicals which present a hazard to health. Read the instructions before use, follow them and keep them for reference. Do not allow chemicals to come into contact with any part of the body, particularly the mouth and eyes. Keep small children and animals away from experiments. Keep the experimental set out of reach of children under 8 years old. Eye protection for supervising adults is not included.

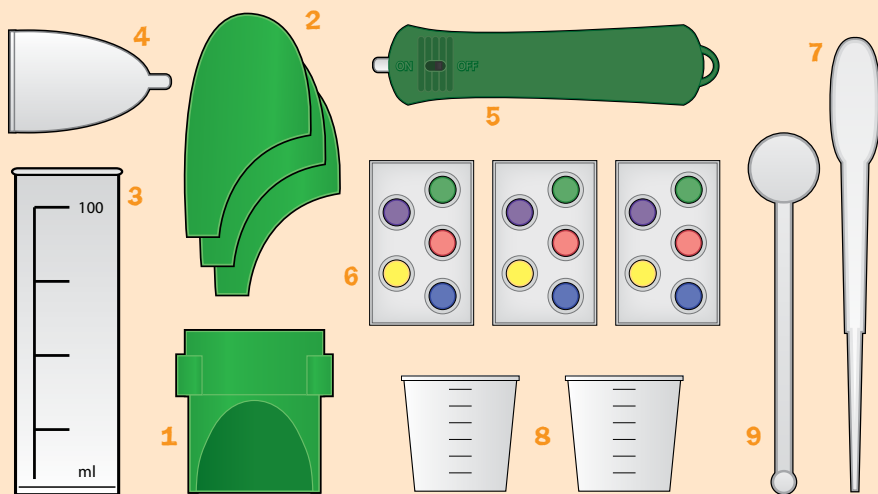
**WARNING** — This set contains chemicals and/or parts that may be harmful if misused. Read cautions on individual containers and in manual carefully. Not to be used by children except under adult supervision.

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# KIT CONTENTS



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| 1 | Rocket base stand             | 6 | Five colored fizzing tablets (3) |
| 2 | Rocket base feet (3)          | 7 | Pipette                          |
| 3 | Rocket beaker (measuring cup) | 8 | Small measuring cups (2)         |
| 4 | Rocket nose (funnel)          | 9 | Stirring rod                     |
| 5 | LED light                     |   |                                  |

**YOU WILL ALSO NEED:** *Small Phillips (cross-head) screwdriver, one AAA battery (1.5-volt, type LR03), inexpensive cooking oil (such as sunflower oil), aluminum foil, scissors, dishwashing liquid (clear), inexpensive effervescent tablets (such as fizzing vitamin or antacid tablets), sugar, jar of preserved red cabbage, food coloring, paprika, paper towels, water*

## Hey Rocket Scientists!

Want to make a cool, bubbling lamp and learn some chemistry in the process? With this kit, you can build a fun, oozing, fizzing lamp that uses oil, water, and carbon dioxide gas from fizzing tablets. Learn about the different states of matter: solid, liquids, gases, and plasma! Stretch the Geeker will be your guide!

Hi! I'm Stretch!



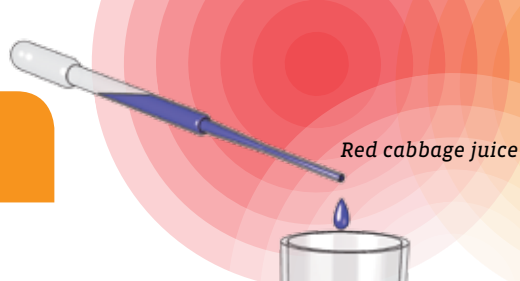
## Color-changing light rocket

### You will need:

Light, rocket base, rocket beaker, rocket nose, measuring cup, stirring rod, pipette, cooking oil, colorless effervescent tablet, red cabbage juice (from jar of preserved red cabbage or made by boiling fresh red cabbage), water, aluminum foil ring from second experiment

### Here's how:

- 1 Pour 30 ml of cold water into the beaker, add a little cabbage juice (which is probably a purple color), and add oil up to the 90 ml mark.
- 2 Line the inside of the rocket base with the aluminum foil ring.
- 3 Break off a piece of the effervescent tablet, switch on the light, and slide it into its docking station at the bottom of the rocket base. Darken the room.
- 4 Drop the piece of effervescent tablet to the rocket beaker and place the nose on top.



1



3



**GEEK  
OUT!**

### WHAT'S HAPPENING?

As in the last experiment, the water starts to fizz and bubbles rise up. But soon the bubbles start to change color! It might turn red, indicating an acid, or blue, indicating a base. This happens because the cabbage juice contains an indicator pigment that changes color depending on how acidic something is. Depending on what type of effervescent tablet you are using, it will yield a slightly acidic or basic reaction. That's where the impressive color change comes from!

THE FOUR  
STATES OF MATTER

Yes, FOUR!

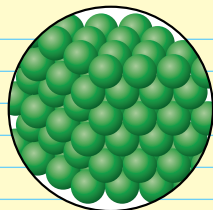
You've probably heard of the three **states of matter**: **solid**, **liquid**, and **gas**. Pretty much all the stuff you see in the world can be characterized as being in either a solid, liquid, or gas state. But there is a fourth state of matter that can be observed in everyday life: **plasma**! There are other, more exotic states of matter, but they are not commonly observed in everyday life or are still only theoretical.

The atoms of solids are packed together densely and have fixed positions in space relative to each other (like bricks in a wall), which makes solids rigid.

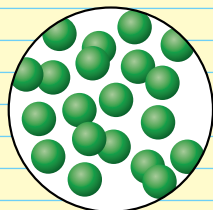
Liquids have atoms that are packed less densely than are those of solids, and while solids form a rigid shape, liquids move freely. But when liquids are poured into a container, they must conform to the shape of the container, except for possibly one surface (like the surface of water in a fish tank).

This is not the case for gases, which must conform to the shape of the container entirely (like water vapor in a fish tank, which would have no surface different from the walls of the tank). The atoms of gases are packed the least densely of all three states, and are in relatively random motion. Gases have no definite shape or volume, can expand and contract greatly with changes in temperature and pressure, and spread easily to distribute themselves evenly throughout a container.

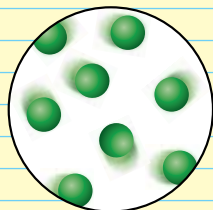
Plasma forms when air or another gas is charged, or ionized. Amazingly, this gives it properties similar to metals. It conducts electricity and reacts to magnetic fields. You can see plasma in lightning, neon signs, and decorative plasma globes. Plasma is actually the most abundant state of matter in the universe, because all stars are mostly plasma!



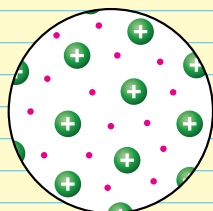
Solid



Liquid



Gas



Plasma