



## CHEMICAL FOG

### PATTER

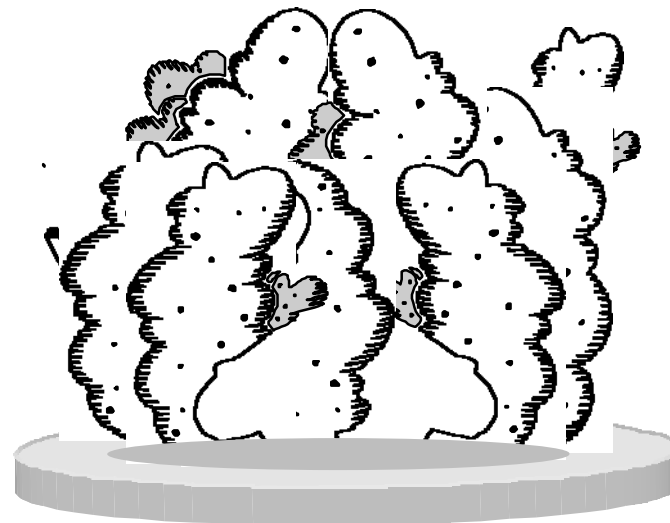
Fine water clusters scatter light to produce fog. In a laboratory reaction, the exact conditions needed to produce fog are very difficult to achieve. We would be generating such a fog and make ourselves disappear, temporarily of course!

### MAGIC

In a metal trench of dimensions 24x1x1 inches, layer 20 g of KOH pellets and cover with 20 g of hydroxylamine hydrochloride. Mix rapidly with a glass rod. In a couple of minutes intense fog will be generated, which in a draught-less room will rise vertically along the dimensions of the trench.

### TRUTH/EXPLANATION/SCIENCE

As shown in the adjoining page, this is a beautiful dis-proportionation of hydroxylamine to nitrogen and ammonia, producing copious amounts of water. Here a gram of hydroxylamine hydrochloride will produce more than a liter of fog! The KOH-HCl neutralization produces energy to transform the water to particles that have a great resemblance to that in a fog.



### HINTS/SAFETY

The reaction produces a white residue and makes the trench very hot!



## FIRE IGNITED WITH WATER

### PATTER

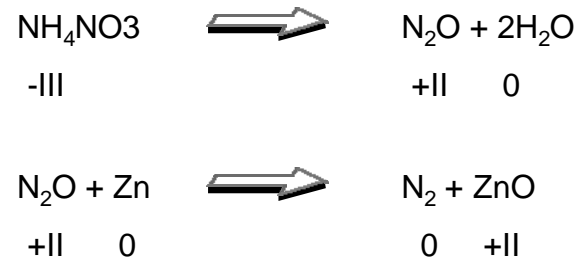
Water can put out fire, provided among other things, it is not a player in the game. There are also examples where fire can be started with water, where again water being not a direct party in the process. We will see one of these!

### MAGIC

Mix 20 g of ammonium nitrate, 5 g of ammonium chloride and 25g of barium nitrate. Make a heap on a resistant sheet, cover uniformly with 20 g of zinc dust. Add two drops of water at the top. Green jet of spray emitting flame!

### TRUTH/EXPLANATION/SCIENCE

Ammonium nitrate is the major player in this reaction, which is cleverly modulated, by auxiliary donors like barium nitrate and ammonium chloride. All the salts used are very soluble in water. Their concentrated solution arising from the drops of water, sets the reaction shown in the adjoining page. Here the initial cold reactions become very exothermic.



### HINTS/SAFETY

The success of the experiment totally depends on the quality of zinc. Good zinc dust would be grey and free flowing. A rehearsal with the sample zinc is mandatory. If the zinc is not active it must be activated.



## THE EIGHT ELECTRON SHUTTLE

### PATTER

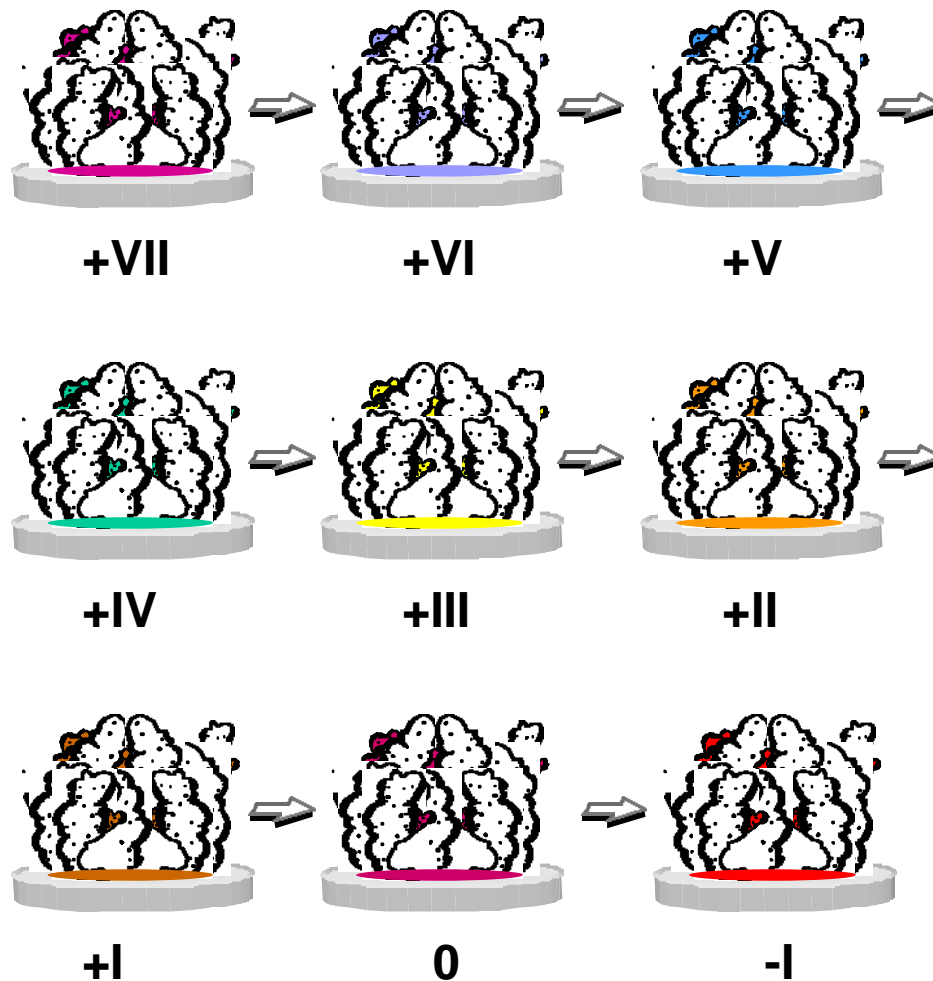
Good old Sisyphus used to roll up a huge stone, expending muscular energy to create potential gradient. Once on the top he pushed it down! All he got out of the energy was cheerful whoop, just like the chemical reactions that you see here. Light and sound, but not much gain. But in life the return trip is carefully regulated to produce gradients that can create energy! For example ATP that fires the system arises from a proton gradient! Carefully modulated electron gradient drives the modern civilization in the form of electricity. Here we will show the mother of all electron gradients! Eight electrons down the hill in one go!

### MAGIC

On a resistant sheet, make a heap of a mixture of 10 g of sodium metaperiodate and 10g of sugar. Add two drops of con. sulfuric acid at the top. Brilliant flare ejecting colored fumes!

### TRUTH/EXPLANATION/SCIENCE

The complete spectrum of the 8 oxidation states of iodine can be seen with a range of colors, in a vigorous reaction which ignites the sugar, which is transformed to carbon dioxide and water, like in life systems, the difference being, while here it is a show, in real life it is running the life!





## BENGAL FLARE

### PATTER

Good schools to learn chemical magic are places of worship, which abound in this country. These usually create the appropriate atmosphere. When I was a boy, it awed me to no end to see people getting into a trance and hitting their head with evil looking swords and the resulting copious flow of blood! Elders told me because the man is pious it does not hurt him. I have seen ugly, angry red welts on the backs of people who thrash themselves with chains and thorns, in a religious frenzy. Now I know that a good smearing or ferric chloride on the weapon (!) and a paste of ammonium thiocyanate on a sweaty surface can indeed draw, what looks like blood!

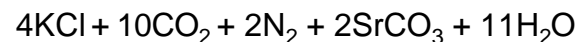
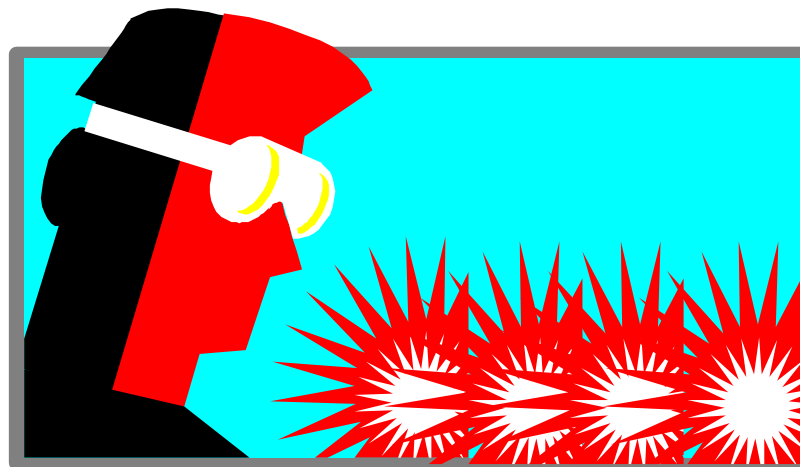
In days of yore, the priests were pretty good psychologists. They knew what would awe the pilgrim. One common trick was to invoke the atavistic influences. This was achieved in temples of Kali in Bengal by burning balls of chemicals that produced intense bright red light in closed confines. The bright red tongue of flame was compared to that of this ferocious Goddess! We are now going to cast you under this spell!

### MAGIC

Weigh out 10 g of potassium chlorate, 10 g of icing sugar and 20g of strontium nitrate in a paper and gently mix by rotating paper (caution!). Make an elongated heap and add few drops of conc. sulfuric acid along the top. Intense bright red flare!

### TRUTH/EXPLANATION/SCIENCE

As graphically shown in the adjoining page, chlorate and nitrate oxidize sugar to carbon dioxide and water in a highly exothermic reaction.



### HINTS/SAFETY

Potassium chlorate and sugar can react violently. The mixing order should be potassium chlorate with potassium nitrate followed by sugar on a paper by tilting the edges. Do not use a spatula!



## VOLCANO

### PATTER

The eruption of a volcano is an awe-inspiring spectacle. History records total devastation in many parts of the world. Although such calamities are now rare, the capricious and unpredictable nature of volcano still casts a spell. Whilst one dreads earthquakes we look forward to seeing a volcano in action! Volcanic eruptions need high temperatures, upward draft of hot gases and molten silicates. They spew, froth and hiss, creating a crater and a big mess around. We will chemically simulate these requirements!

### MAGIC

Ignite on a resistant sheet, a heap of ammonium dichromate embedded with magnesium turnings and the top of which has been wetted with ~1 ml of acetone. The mass will erupt, with a loud hiss, emanating hot gases, white flashes with huge outflow of dirty green lava!

### TRUTH/EXPLANATION/SCIENCE

The neat equalization of the electron gradient (ammonium = -3, dichromate = +6; see adjoining graphic representation) leads to the evolution of huge amounts of nitrogen and water (75 g of ammonium dichromate can produce 45 liters of gases). The redox reaction produces extremely light dirty green chromium trioxide, which is blown out from the core. These effects produce close impressions of a volcano.



### HINTS/SAFETY

Chromium trioxide is thought to be carcinogenic. The dust should not be inhaled and must be swept away immediately after the demonstration.

