

CANS OF JAM²

Issue 3, May 2010

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From the editors

Lucky you! You are holding in your hands the third issue of Cans of Jam², the science magazine made **by** Paul Langevin High School pupils **for** Paul Langevin High School pupils!

This month, with the end-of-the-year exams in sight, the pupils and reporters seem to have naturally turned their minds to games, relaxing and sunny weather... All in all, that makes a rather slim issue, ideal for a quick read on the beach...

The great chemistry word search

Find the words in the grid! Words can be horizontal, vertical, diagonal and in right or reverse order.

Methylbenzoate. Methanol. Reaction. Funnel. Ester. Purifying. Mass. Esterification. Equilibrium.

Ethanol. Aldehydes. Polystyrene. Chain. Hydrogen. Hydrocarbon. Atoms. Hydroxyl. Alcohol.

Halogeno. Halide. Amino. Amine. High. Salt. Low. Ethyl.

S	H	P	O	L	Y	S	T	Y	R	E	N	E	E	B	R	A	M	A
A	Y	M	E	T	H	Y	L	B	E	N	Z	O	A	T	E	L	U	L
L	O	A	O	S	T	H	A	L	I	D	E	I	E	N	T	D	I	C
O	R	S	N	O	I	T	A	C	I	F	I	R	E	T	S	E	R	O
N	O	S	I	G	I	M	T	L	A	S	L	C	L	I	E	H	B	H
A	C	A	M	P	I	I	O	E	O	R	R	H	E	A	F	Y	I	O
H	A	N	A	N	T	O	M	I	N	G	E	A	U	U	H	D	L	L
T	R	I	E	N	C	E	S	L	O	W	E	I	N	N	G	E	I	L
E	B	P	U	R	I	F	Y	I	N	G	R	N	A	N	I	S	U	Y
M	O	L	E	C	U	L	E	T	B	R	E	I	O	C	H	L	Q	H
F	N	O	I	T	C	A	E	R	O	L	O	N	A	H	T	E	E	T
N	E	G	O	R	D	Y	H	Y	D	R	O	X	Y	L	U	I	S	E

Wind Energy Or Solar ?

Solar energy is to replace wind energy. The increase of the manufacturing costs of wind turbines makes the electricity which they produce less interesting financially. More profitable in theory, the photovoltaic technology seems more promising.

The manufacturing of solar panels produces chemical waste such as halocarbons and toxic products. Most panels and boilers require space to be stored at the end of their lives. Nevertheless, these effects on the environment are about to be solved thanks to the improvement of technologies and methods of recycling whereas the effects of the wind energy are more damaging for the environment than solar energy. Indeed, regarding numerous complaints, the wind energy happens to be too noisy, which engenders major consequences on the health of the inhabitants because hearing inconveniences were noticed. Besides, wind turbines require much space, in particular for wind farms if we want the power production to be profitable, and then constitute a visual inconvenience for the surrounding populations.

On the other hand, the companies of clean energy more and more tend to replace wind energy with solar energy. For example, EDF new energies concentrate their investments on photovoltaic solar energy. This technology, which allows to transform sun ray energy into electricity, is approximately three times as expensive as wind energy. But, with higher price rates of repurchase, and a guaranteed duration of twenty years, it offers superior benefits. One euro invested brings 85 % to 90 % of operational raw profit in solar energy, against 80 % in wind energy.

Also, the forecasts of sunny periods are more reliable than those of the wind; in warm countries, the sun is at its topmost efficiency during the peak of consumption of electricity,

between noon and two, when air conditioners blow at top full capacity; and, unlike wind turbines, the photovoltaic panels can be installed on the roof of buildings, where the electricity is consumed, which reduces the costs of transporting the power. Besides, the technological evolutions and the increase of the volumes needed should trigger a decline of the production costs of the photovoltaic panels.



Finally, although the production of photovoltaic cells requires some energy, a study by Energy and Environmental Economics, Inc., and Siemens Solar Industries, published in 2000 shows that, on average, a solar panel produces 5 times more energy than what was necessary for its production. So, wind energy is not the remedy to the energy crisis to come, even though wind farms haven't spoken their last word yet.

Mirages

Mirages are phenomena of optics due to the refraction of the light. To understand mirages, it is first of all necessary to understand the principle of the rectilinear propagation of light, the laws of Descartes on refraction, reflection and the characterization of the optical mediums. An optical medium is characterized by an index called “index of refraction” which “measures” the speed of light in this medium ($N = C/v$, with N : index of the medium; C : speed of light in vacuum; v : speed of light in this medium). Thus the higher this index is, the slower the light is propagated in this medium. The index of refraction of the air depends on its density and thus on its temperature. The higher the temperature is, the weaker the index is, and thus, the faster the light is in this medium.

For example, when one plunges a

stick in water, it appears to be “broken”. The luminous rays which come from it are deviated when they pass from water to the air, because the index of the air is different from that of water.

The mirage is a phenomenon of reflection of the light coming from an area where the air is fresh and penetrating in an area where the air is hotter, or the reverse.

In general, mirages are observed when the index of refraction of the atmospheric air varies according to altitude, in particular due to temperature variations. In this case, the ways of the luminous rays become curved. One can especially observe mirages on great sandy and desert extents as on roads and certain places deprived of vegetation.

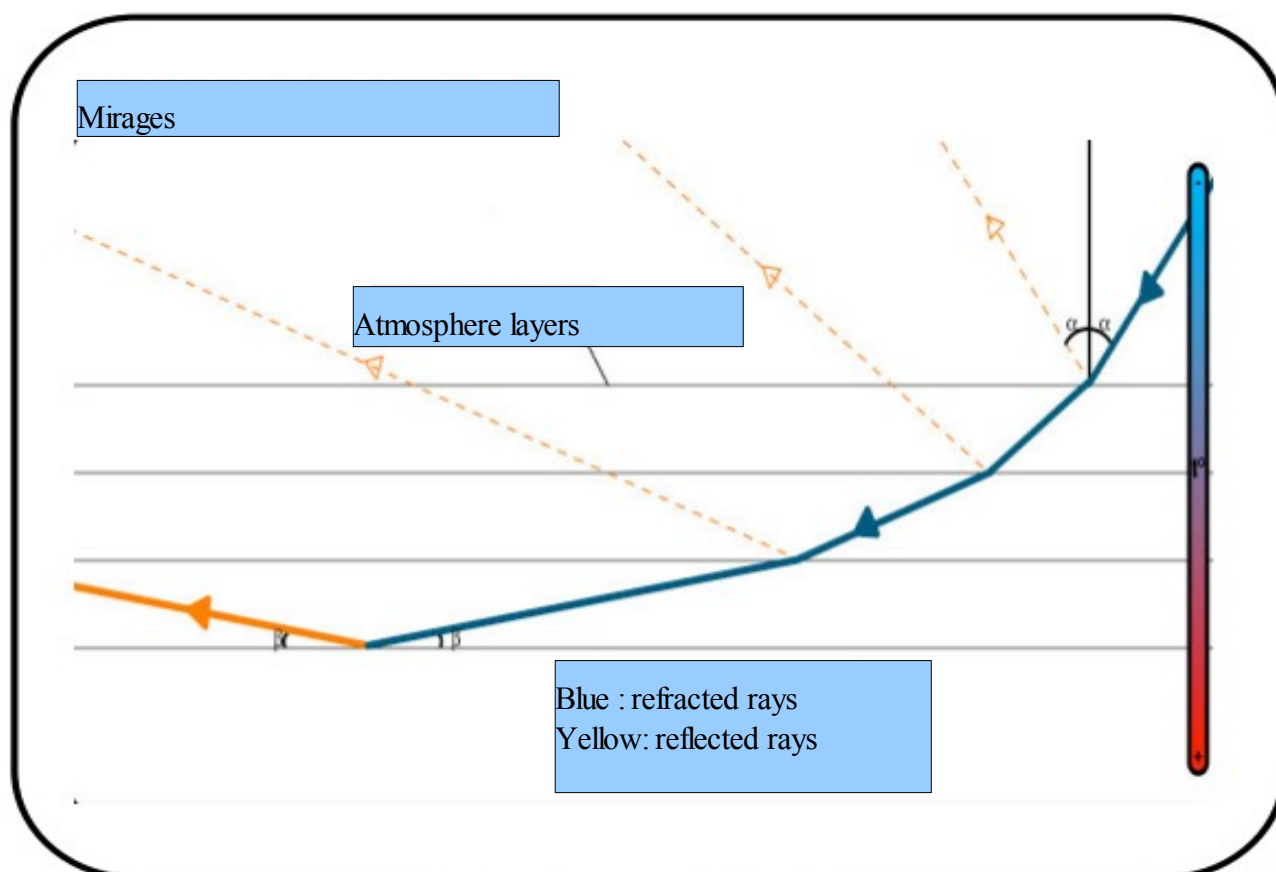


There exist two types of mirages, the hot mirage (or inferior) and the cold mirage (or superior).

The principle of the mirage is simple. The air in which we live is composed of various layers of air of various temperatures. The hotter layers are located close to the ground while the colder layers are located higher in the

sky. According to the temperature of the layers, the index of refraction changes, which modifies the angle of deviation of the light. The mirage occurs when the ray of the sun is deviated so much that there occurs a reflection in the eye of the person. This person sees only the rays of the sun which appear like a mirror.

Mirages (continued from page 3)



!! Readers' letters !!

All the team of cans of jam² is **REALLY** proud to announce that the first readers' letters (well, emails, actually) have arrived to our offices from all parts of France (even as far as Brittany and Savoy, if you must know!), so here are some of them (kindly translated for you by the editors) :

Thanks for this email! It really is super... What class level is it ?? *Isabelle, from Amiens, 80*

Not bad at all! Good team (in English in the email!). *Pierre, from Beauvais, 60*

Eus ar c'hantañ! (which means 'first class', 'first-rate', in Breton). *Martine, from Hengoat, 22*

Great! But could we have it in pdf, please, and with some vocabulary help? *Guillaume, from Faverges, 74*

Well, and all these messages are genuine (that is, authentic)! So thank you, all those who took time to write to us!

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Electric crosswords

Check your knowledge!

Across

- 1- The reverse of the temporal period.
- 2- U/R.
- 3- A measuring instrument intended to visualize an electric signal, mostly variable in time.
- 4- Symbolized by “ i ”, it is the circulation of electrons in a circuit.
- 5- A receptor which can charge and discharge, composed of two metal plates separated by an insulator.
- 6- The representation of a set of points.

Down

- 7- A receptor which opposes the current.
- 8- Must be closed for the current to circulate.
- 9- A luminous discharge in the gap between two electrodes of high potential difference.
- 10- An electric measuring device used to measure voltage.
- 11- Can close or open the circuit.
- 12- The insulator between the metal plates in a capacitor.
- 13- An electric measuring device used to measure intensity.

