

BREVET DE TECHNICIEN SUPÉRIEUR**ANGLAIS****✧ GROUPE 14 ✧**

<i>Spécialités</i>	<i>Durée</i>	<i>Coefficient</i>
<i>Chimiste</i>	<i>2 heures</i>	<i>1</i>
<i>Techniques physiques pour l'industrie et le laboratoire</i>	<i>2 heures</i>	<i>2</i>

DICTIONNAIRE BILINGUE AUTORISÉ.

L'USAGE DE LA CALCULATRICE EST INTERDIT.

Tout autre matériel est interdit.

***Avant de composer, le candidat s'assurera que le sujet comporte bien
2 pages numérotées de 1/2 à 2/2.***

I - TRANSLATE INTO FRENCH**(8 points)**

Translate the article from line 18 "*Given the ease of...*" to line 24 "*...overcome the difference*".

II - ANSWER THE FOLLOWING QUESTIONS IN ENGLISH**(12 points)**

- a) What are the two major problems with hydrocarbon fuels?
(60 words minimum) **(3 points)**
- b) What are the two different sorts of hydrogen-powered cars. Describe and compare them.
(70 words minimum) **(4 points)**
- c) What are the short and long-term solutions to the problem of car fumes emissions?
(80 words minimum) **(5 points)**
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Replacing gas with a gas

BMW wants to make internal-combustion engines that run on hydrogen

ONE way that global warming might be reduced is by powering cars with something that does not release carbon dioxide when it is burned. That is part of the idea behind a "hydrogen economy"—a future in which hydrogen, which can be produced from renewable sources, takes over from hydrocarbons as the world's principal fuel.

5 Given this possibility (and also given the more immediately pressing need to produce vehicles that can comply with the exacting emissions standards of California), several of the world's car makers—notably Ford, DaimlerChrysler and Honda—are studying fuel cells. These react hydrogen and oxygen together in a controlled process, extracting energy in the form of electricity. Fuel cells, which are an old technology, certainly work, but they are still some years
10 from commercial viability in cars. There is, however, an alternative: burn the hydrogen in a conventional internal-combustion engine. And that is what BMW proposes to do. This week it unveiled a prototype version of its 7-Series saloon car that has a hydrogen-powered engine.

Converting an engine to run on hydrogen is relatively simple. It requires a bit of new plumbing and a few extra lines of code for the engine's control computer. With a little jiggling,
15 the motor can be made "dual-fuel", so that it can still run on petrol as well. That would allow the infrastructure of a hydrogen-delivery network to be introduced gradually, rather than being put in place more-or-less instantly.

Given the ease of conversion, and the possibility of a piecemeal transition to a full-scale hydrogen economy, this would seem the logical way to proceed. There are, however, two
20 catches. The first is that fuel cells are a far more efficient way to use hydrogen than burning it. When the sums are done, a fuel-cell-powered vehicle would manage 60% more kilometres per litre than a hydrogen-powered internal-combustion engine. The second is that gram for gram, hydrogen contains significantly less energy than petrol. Performance will reflect that, unless those clever engineers at BMW can somehow overcome the difference. If they cannot, then
25 BMW, whose prestige and independence rely largely on its engine-making ability, may be in trouble. Were fuel cells to become the standard, the firm's future could be bleak.

From The Economist, July 21st 2001