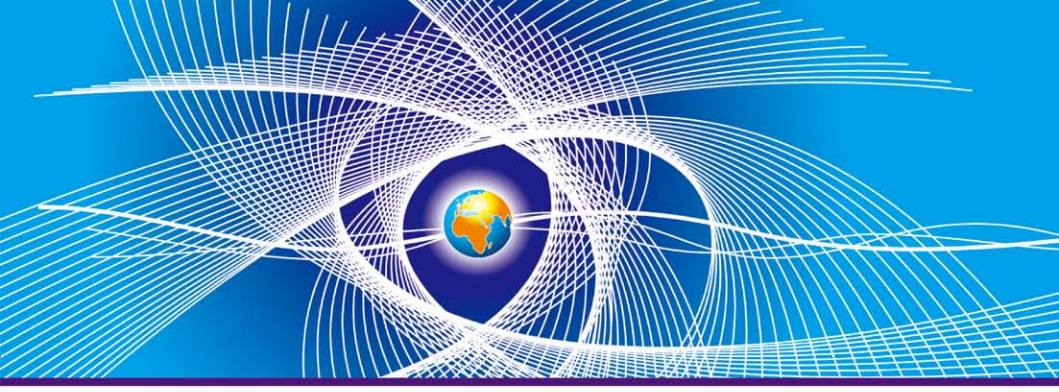

ZHIHUI JIAOYU HUODONG CONGSHU

智慧教育活动丛书

星宇迷尘

这里有阅读的眷恋、深情、体悟；
这里我们一起分享，让阅读与学习相长，思维共智慧齐飞……

仝艳娜◎主编

[英汉对照]

远方出版社

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前言

许多教育专家都认同这样的观点：教育的一半是知识教育，另一半是智慧教育。智慧教育对学生的未来发展起着决定性作用。但如今，我们往往重视知识教育，却忽视了智慧教育。

很多人都看见过苹果落地，看见过吊灯的自然摆动，都觉得这是正常的。结果，苹果还是苹果，吊灯还是吊灯。但拥有智慧的牛顿、伽利略却能从中看到事物的本质，产生联想。从而发现了地球的引力作用，发明钟表。由此，我们不仅要推崇知识，更要启迪智慧。

生活本是智慧之源，当我们倡导教育要回归智慧的时候，理所当然呼唤教育也要回归生活。我们应该把书本中的智慧和生活中的智慧结合起来。引导这种结合，本身需要一种悟性，这种悟性只有热爱智慧的人在实践中才能获得；只有热爱智慧才能从书本中、生活中去汲取智慧、获得智慧，才能把对学习、生活水平的理想转化为现实生活中的实践智慧，从而走向智慧的优化和创新。可以说，热爱智慧——获得智慧——优化智慧，这就是智慧教育生成的三

部曲。

因此，我们精心组织编写了《智慧教育活动丛书》，让学生在阅读中，在获得知识的同时，积极思考，提高阅读能力，养成良好的阅读习惯，提升学生整体的阅读素养与人文素养，优化智慧。本套丛书选材广泛，内容丰富，体裁灵活多变，选入的主题有语言学习、体育运动、文化生活、环境保护、文学艺术、音乐影视、风俗礼仪、自然科学、饮食文化、兴趣爱好、科学技术、地球、电脑、情感、成长、诗歌、幽默、名人、旅游、交际、演讲等，从各个层面分主题介绍。并采取中英文对照的形式编排，让学生在学习过程中，体会、认识两种语言与文化的差异，增强跨文化意识；同时，本套书也可作为各种英语活动、竞赛的教材、参考资料。

限于编者水平有限，时间仓促，难免有纰漏之处，恳请读者批评指正。

编 者

目 录

Harvest from the Mars

Scientists are learning how to use carbon dioxide—the main gas in Mars′ atmosphere—to harvest rocket fuel and water from the red planet.

When astronauts first go to Mars, it′ll be difficult for them to bring everything they need to survive. Even the first tentative explorations could last as long as two years—but spaceships can only carry a limited amount.

Explorers on Earth could usually count on finding what they needed. The animals might be strange, but they′d be there, and they′d be edible[①]. Mars is barren. But the challenge is the same.

Astronauts will want to pull what they need from the planet itself. And although that goal seems improbable, it is believed that it can be achieved. The key lies in the Martian

atmosphere.

It's a meager[2] atmosphere, compared to Earth's, and it's about 95 percent carbon dioxide (CO_2). But that turns out to be an advantage. The carbon dioxide can be used to harvest almost everything else.

Inside Martian rocks and soil lies a bounty[3] of useful elements: magnesium and hydrogen for rocket fuel, oxygen to breathe, water to drink. What's needed is a solvent to get them out, and that's where the carbon dioxide comes in handy.

When CO_2 is compressed to a pressure of 73 atm and heated to 31.1 degrees Celsius, it becomes a supercritical fluid—and a marvelous solvent[4].

A supercritical fluid is a high-pressure, high-temperature state of matter perhaps best described as a liquid—like gas. Almost anything can become supercritical. Water, for instance, becomes a supercritical[5] fluid in the high pressures and temperatures of steam turbines. Ordinary water is a good solvent. Supercritical water is a great solvent—maybe even a little too good. It dissolves the tips of the turbine[6]

blades⑦.

Supercritical carbon dioxide behaves much the same. CO_2 molecules flow into solid matter, surrounding atoms, pulling them apart and away.

On Earth, supercritical CO_2 is not used much to dissolve things because there are less expensive, more effective solvents close at hand. It is, however, used to remove the caffeine from coffee beans, and sometimes to dry—clean clothes. On Mars, Debelak believes, supercritical CO_2 will play a much more important role.

For example: Magnesium can be dissolved quite easily by supercritical CO_2. Magnesium, which is likely to be found in Martian soil, ignites easily and can be used to fuel rockets. In fact, one Mars exploration scenario called for a lander to be made of magnesium—when the astronauts were ready to go home, he could chop it up, pack it into a rocket engine, and then add some other oxidizer to fire it off. Using CO_2 as solvent, magnesium could instead be harvested directly from Mars.

Supercritical CO_2 might also be used to generate water.

Certain Martian rocks (like some of Earth's rocks) contain hydrogen. When these rocks are submerged in supercritical carbon dioxide, a chemical reaction takes place. The CO_2's carbon becomes "fixed" in the rock, leaving the oxygen free to find another partner: hydrogen. The process kicks out water, and you can actually use it to form water.

Pulling water from rocks will probably have the biggest payoff, at least in the short term. In addition to drinking, you can split water into hydrogen for fuel, and oxygen for breathing—or as an oxidizer for some sort of engine. Eventually, colonists could set up plants that use CO_2 from the Martian atmosphere to process hundreds of kilograms of raw material a day.

A supercritical fluid has some advantages over other solvents: it solubility® changes dramatically when you alter the temperature or the pressure. You can control it, so that sometimes it's a solvent for a particular substance, and sometimes it's not. That makes it easy to recover the material that has been dissolved. Let's say you have caffeine dissolved in supercritical carbon dioxide. To recover the caffe-

ine (caffeine recovered from coffee beans is often put in soft drinks), you just lower the pressure of the CO_2 and the caffeine[9] drops out.

Scientists are trying to pin down the way a variety of substances behave in supercritical CO_2. They're looking at which minerals are easily soluble and which are not. And if they're not, They're trying to determine how their solubility can be improved. Adding other substances to the CO_2 sometimes helps.

Carbon dioxide is often spotlighted[10] because of its damaging role in global warming. But as a solvent, it's benign. Many solvents common in industry are toxic. They cause cancer, and if they get into the water system, they stay for a long time. So there's interest in learning how to use CO_2 as a 'green' alternative.

Carbon dioxide plays widely different roles on Earth and on Mars. And that's what's intriguing. Mars is a totally foreign environment to us. The rules are different.

So that's what we're doing—trying to figure out the rules. And then we can figure out how to play the game…on

both planets.

Notes

① edible　adj. 可食的，食用的

② meager　adj. 粗劣的，不足的，贫乏的

③ bounty　n. 收成，物产[C]

④ solvent　n. 溶剂

⑤ supercritical　adj. 吹毛求疵的

⑥ turbine　n. 涡轮(机)，叶轮(机)

⑦ blade　n. 刀身，剑身，刀片

⑧ solubility　n. 可溶性，溶解度

⑨ caffeine　n. 咖啡因，咖啡碱

⑩ spotlight　v. 使公众注意，使突出醒目

在火星上收获

科学家正在研究怎样利用火星大气层中的主要气体——二氧化碳，就地取材地生产出火箭燃料和水。

当宇航员首次奔向火星时，他们很难带足生存所需的所有物品。因为，即使是最初步的试验性探测也需要持续两年，而宇宙飞船的装载能力却有限。

地球上的探险者通常靠山吃山，靠水吃水。如在地球上，动物可能是奇怪的，但它们真实存在，可以被食用，而火星却是贫瘠的不毛之地。可是，这种挑战是相似的，

宇航员将在火星上就地取材各取所需。虽然要达到此目的似乎不可能，但人类总能做到这点的。成功的关健在于火星大气。

与地球相比，火星的大气层十分贫乏，其中大约 95％为二氧化碳。但这反而成了一个优点。用二氧化碳几乎能收获所有的东西。

在火星的岩石和土壤中含有丰富的实用元素:镁和氢可用于火箭燃料,氧用于呼吸,水用于饮用。但需要一种溶剂把它们提取出来,这就使二氧化碳有了用武之地。

当二氧化碳被压缩到73个大气压和加热到摄氏31.1度时,它成为一种超临界液体,并且成为一种奇妙的溶剂。

超临界液体是一种高压和高温的物质状态,最恰当的描述应该是液体性的气体。几乎每一样东西都可能成为超临界的。例如,水在蒸气涡轮机中的高压和高温下可成为超临界液体。普通的水是好溶剂。超临界水是非常好的溶剂,甚至好过了头。它可以溶解蒸气涡轮机轮片的顶端。

超临界二氧化碳有类似的行为,二氧化碳分子流进固体物质里,包围里面的原子,并使它们分崩离析。

在地球上,超临界二氧化碳较少用于作溶剂,这是因为有比它价廉和有效的其它溶剂垂手可得。但是,它被用来从咖啡豆中萃取咖啡因,有时用来干洗衣服。在火星上,超临界二氧化碳将发挥重要得多的作用。

例如,用超临界二氧化碳非常容易溶解镁。在火星土壤中很可能发现镁,镁是易燃的,可用作火箭燃料。事实上,有一火星探测计划建议用镁制作登陆器。当宇航员准备返回地球时,可以把镁剁碎,装入火箭发动机中,然后装入某种其它

氧化剂去点燃它。用二氧化碳作为溶剂，却可以从火星直接获取镁。

超临界二氧化碳也可用于产生水。某些火星岩石（就象某些地球的岩石）含有氢。当这些岩石浸泡在超临界二氧化碳中时，就会发生一种化学反应。二氧化碳中的碳“固定”在岩石中，使氧逸出寻找新的伴侣—氢。这一化学过程产生了水分子，实际上可用此法生成水。”

至少在短期以内，从岩石中取水可能是这一用途的最大回报。除了饮用外，能用从水中分离出的氢做燃料，氧用于呼吸，或作为某种发动机的氧化剂。最终，登陆者们可以建立起工厂，利用来自于火星大气的二氧化碳，这些工厂每天可以处理几百公斤的原材料。

与其它溶剂相比，超临界液体有如下长处：当你改变压力或温度时，它的可溶性可变化很大。由此，你可以控制它，使其有时可作为一种特别物质的溶剂，而有时又不能。这也使它容易回复已溶解的物质。如你已有了溶解在超临界二氧化碳中的咖啡因，你只要降低二氧化碳的压力，咖啡因就能分离出来，从咖啡豆中回收的咖啡因通常用于软饮料中。

科学家正致力于找出一系列物质在超临界二氧化碳中的表现。他想看看哪些物质易溶解，哪些物质不易溶解。如果