**Decoding the properties of matter**

Attention all students …

The following coded message was found in a container made of an unknown material, and written in an unknown language. The container was reportedly dropped from a flying saucer which flew over the school last night. It is a matter of urgency that the message be decoded as soon as possible. All students are to cease whatever they are doing and to concentrate on breaking the code.

We are given to understand that if you can decode the words in the coded statements on the next two pages, then the code can be broken. Please attempt to do so!

*The CODED message:*

APUUR PIZXAUWFHB. HZPPXWFHB YZRC XAP TUIFPX OPFRB. DP FRXWEP XAIX GRK

AISP TRUUKXPL GRKZ IXCRBTAPZP BR CKEA XAIX DP EIFFRX BKZSWSP WF WX. BRRF GRK

DWUU FRX IUBR. GRK CKBX BXRT NKZFWFH YRBBWU YKPUB!

*Use this decoder to assist your code-breaking efforts.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Our alphabet letter | **A** | **B** | **C** | **D** | **E** | **F** | **G** | **H** | **I** | **J** | **K** | **L** | **M** |
| Code Letter |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Our alphabet letter | **N** | **0** | **P** | **Q** | **R** | **S** | **T** | **U** | **V** | **W** | **X** | **Y** | **z** |
| Code Letter |  |  |  |  |  |  |  |  |  |  |  |  |  |

*Write your DECODED message:*

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

*Coded statements*

By replacing the coded word in the passage with the correct English word, you will be able to break the code in the message. As you decode each word, write the code letter for each English letter in the decoding boxes on the previous page.

Good luck!

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | | | | C | | | I | | | | X | | | | | X | | | P | | | | Z | | | |
| (a) | Everything around you is made up of | | | | | |  | | |  | | | |  | | | | |  | | |  | | | |  | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | | | C | | | I | | | | B | | | | B | | | |  | | | | | | | | B | | | T | | | | I | | | E | | | P | |
| (b) | All matter has two properties in common: it has | | | | | | | | | | | |  | | |  | | | |  | | | |  | | | | and takes up | | | | | | | |  | | |  | | | |  | | |  | | |  | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | | | | | | | | T | | | Z | | | | R | | | | T | | | P | | Z | | | X | | | W | | P | | | B | | |
| (c) | The difference we use to classify matter are called its | | | | | | | | | | | | | | | | |  | | |  | | | |  | | | |  | | |  | |  | | |  | | |  | |  | | |  | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | B | | R | | | U | | W | | | | L | | | | | , | | | U | | | | W | | | | J | | K | | W | | | L | | | and | | | H | | | I | | | B | |
| (d) | The three states of matter are | | |  | |  | | |  | |  | | | |  | | | | |  | | | |  | | | |  | |  | |  | | |  | | |  | | |  | | |  | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | B | A | | I | | | T | | | | P | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (e) | Solids have constant |  |  | |  | | |  | | | |  | | | | | and cannot be poured. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | |  | | L | | | W | | | | Y | | | | | Y | | | | | | | K | | | | | | | | B | | | | | | | | P | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | E | | | | | | R | | | | | | | C | | | | | | | T | | | | | Z | | | | | | | P | | | | | B | | | | | | B | | | | P | | | | | | | L | | | | | |
| (f) | | | | Solids do not | |  | | |  | | | |  | | | | |  | | | | | | |  | | | | | | | |  | | | | | | | |  | | | | | | | |  | | | | | |  | | | | | | |  | | | | | | |  | | | | |  | | | | | | |  | | | | |  | | | | | |  | | | |  | | | | | | |  | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | T | | | | | R | | | | | K | | | | Z | | | | | | P | | | | | | | | L | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (g) | | | | Liquids take the shape of their container and can be | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | |  | | | | |  | | | |  | | | | | |  | | | | | | | |  | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | |  | | | | | | | | | | | W | | | | F | | | | | E | | | | | | R | | | | | | C | | | | | T | | | | Z | | | | | | P | | | | | | | B | | | | B | | | W | | | | N | | | | | | U | | | | P | | | | | | | and diffuse | | | | | | | | | | | | | | | | | | | | | B | | | | | U | | | | R | | | | D | | | | | | U | | | | G | | | | | |
| (h) | | | | Liquids, like solids, are also | | | | | | | | | | |  | | | |  | | | | |  | | | | | |  | | | | | |  | | | | |  | | | |  | | | | | |  | | | | | | |  | | | |  | | |  | | | |  | | | | | |  | | | |  | | | | | | |  | | | | |  | | | |  | | | |  | | | | | |  | | | |  | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | |  | | | | | | | | | | | | | | | | B | | | | | | | A | | | | | I | | | | | | | T | | | | | | | | P | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Y | | | | | W | | | | | U | | | | | U | | | | | |  | | | | | | | | | | | | | | |
| (i) | | | | Gases not only take the | | | | | | | | | | | | | | | |  | | | | | | |  | | | | |  | | | | | | |  | | | | | | | |  | | | | | | of their containers, they also | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | |  | | | | |  | | | | |  | | | | | | them. | | | | | | | | | | | | | | |
|  | | | | Gases can be poured | | | | | | | | | | | | | | | |  | | | | | | |  | | | | |  | | | | | | |  | | | | | | | |  | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | |  | | | | |  | | | | |  | | | | | |  | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | |  | | P | | I | | | | B | | | | | | W | | | | | | | | | U | | | | | | | | | G | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | J | | | | | | | | K | | | | | | W | | | | | E | | | | | | Q | | | | | U | | | | G | | | |  | | | | | | |
| (j) | | | Gases are | |  | |  | | | |  | | | | | |  | | | | | | | | |  | | | | | | | | |  | | | | | | | | compressed and diffuse | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | | |  | | | | | |  | | | | |  | | | | | |  | | | | |  | | | |  | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | |  | | | | | | | | | | | | P | | | | | | | | O | | | | | | | T | | | | | | | | I | | | | | | | | | F | | | | | | | | L | | | | | | | | | when heated, solids | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | U | | | | | | | P | | | | | | | B | | | | | | B | | | | | | | than | | | | | | | | | |
| (k) | | All three states of matter | | | | | | | | | | | |  | | | | | | | |  | | | | | | |  | | | | | | | |  | | | | | | | | |  | | | | | | | |  | | | | | | | | |  | | | | | | |  | | | | | | |  | | | | | |  | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | |  | | | | | | U | | | | P | | | | | | | | | B | | | | | | | B | | | | | | | | | | than gases. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | liquids and liquids | | | | | |  | | | |  | | | | | | | | |  | | | | | | |  | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | L | | | | | | | | | W | | | | | | | | Y | | | | | | | Y | | | | | | P | | | | | | | Z | | | | | because the particles in them | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (l) | | Properties of solids, liquids and gases | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | | | |  | | | | | | | |  | | | | | | |  | | | | | |  | | | | | | |  | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | |  | | | | | | | | Y | | | | | | R | | | | | | | Z | | | | | | | | | | | E | | | | | | | | P | | | | | | | | B | | | | | | | | |  | | | | | | | | | | | | | | | S | | | | | | | I | | | | | | | | | Z | | | | | | | | | G | | | | | | | in strength. | | | | | | | | | | | | | | | | | | | | |
|  | | are held together by | | | | | | | |  | | | | | |  | | | | | | |  | | | | | | | | | | |  | | | | | | | |  | | | | | | | |  | | | | | | | | | which | | | | | | | | | | | | | | |  | | | | | | |  | | | | | | | | |  | | | | | | | | |  | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | B | | | | | | | | X | | | | | | | | Z | | | | | | R | | | | | | F | | | | | | | | H | | | | | | | | P | | | | | | | Z | | | | | | | than those | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (m) | The forces holding solid particles together are | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | | |  | | | | | | | |  | | | | | |  | | | | | |  | | | | | | | |  | | | | | | | |  | | | | | | |  | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | holding liquid particles together, and the particles of gases are only very weakly attracted to each other. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | We describe the particles in solids as being in | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Y | | | | | | | | | | | | W | | | | | | | | O | | | | | | | | P | | | | | | | | | | | L | | | | | | | | | | positions and simply | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (n) |  | | | | | | | | | | | |  | | | | | | | |  | | | | | | | |  | | | | | | | | | | |  | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Z | | | | | | | | | | | | R | | | | | | | | U | | | | | | | | U | | | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | vibrating, and those in liquids as being able to | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | | |  | | | | | | | |  | | | | | | | |  | | | | | | | | | | | over one another. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Y | | | | | | | | Z | | | | | | | | | P | | | | | | | P | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (o) | In gases, the particles are only very weakly held together and are | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | | |  | | | | | | | | |  | | | | | | |  | | | | | | | | to move. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |