

Was it within your knowledge that first celluloid billiard balls were very unstable chemically and they'd occasionally explode when they're impacted?

Or did you know that there is as much engineering in making chocolate melt in our mouth as there is in building several of our most intricate structures?

Here you're, in the absurd captivating universe of materials, in which you constantly find a story and some more profound sense beyond what human eyes can perceive. These blinks include a glimpse into the mystically intricate universe of molecules, cultures, and the things that form the planet Earth.

## Chapter 1 - Which materials are daily objects comprised of? It hinges on the scale at which you carry out research on them.

From the pencils we write with to the steel utensils we use to eat, There are numerous artificial items that people came into contact with, such as pencils that are used to write, and cutleries used to eat food, and so forth. However, which materials are these items really comprised of? Actually, the response to this question hinges on the scale at which you carry out research on the item.

On the surface, these objects might look as if they were made up of one piece only, however, if you examine them further, you'll notice that the things used in its creation often constitute a complex organization of smaller components that interlock excellently. For instance, sweaters are comprised of neatly-woven strings. Should you look at those smaller components more closely, you'll see these strings are also comprised of even tinier components, quite similar to the traditional nesting dolls of the Russians.

Sadly, our bare eyes cannot go further when it comes to seeing more about your sweater, however, a potent microscope would demonstrate each fiber constituting these strings. Should you examine further, it'll possible to notice that the fibers are made up of innumerable molecules, and, ultimately, atoms.

Molecular and atomic details matter a lot since alterations in them can have a huge impact.

To illustrate, think about the discrepancy between the appearance of diamonds and the graphite in pencil, both of their main element is carbon. The diversity in their look is the result of distinct patterns of the carbon atoms on a molecular level in every material: graphite includes atoms whose pattern is like that of sheets. However, the carbon atoms that form diamonds have the pattern of a cubic structure.

Thus, when we think about the materials involved, keep in mind that a lot of things go on behind the curtains, which bare human eye is unable to discern.

## Chapter 2 - Even the tiny substructures in what our eyes perceive to be hard materials do, actually, change their places.

You've learned that all materials, even the ones that we perceive as the hardest compositions, include countless tinier components.

To illustrate, think of metals, which are in fact comprised of minute crystals whose number exceeds millions. You may think this is impossible since we often imagine crystals as an almost transparent precious stone on rings, however, we can see this is a fact by means of potent microscopes.

How densely these tinier formations are gathered in the material defines their movement limit, which consequently defines how the material behaves if it is pressed.

When we talk about such a metal item as a paperclip, the metal crystals aren't much densely gathered, which enables them to move, and therefore it is possible to bend paper clips. The crystals just shift to another place.

When the metal of the paper clip was made up of more densely arranged crystals, which is how steel is arranged, for instance, the paperclip would be unbendable. Instead, it would suddenly fracture in the middle since the crystals would not have enough place to move.

Therefore, to describe in simpler terms, flexible materials are flexible due to having less densely assembled substructures.

## Chapter 3 - Living and non-living matter are different usually in their reaction to stimuli.

People might see themselves as the climax of evolution, however, the reality is that the atoms and molecules that form all the things surrounding them also constitute themselves. In terms of the atoms involved, we are made up of several of the most prevalent elements on the planet: carbon, hydrogen, oxygen, and nitrogen.

It's just tiny changes in the patterns of these elements that form our bodies, and also several more uncommon elements, such as calcium, that are responsible for our physical being: our body, hair, skin, eyes, and many other parts of our bodies.

Thus, evidently, should you only examine the atoms and molecules, you'll see there is no separation between the things that can breathe and that cannot breathe. We can see where they differ if we examine the way the atoms and molecules react to stimuli:

The materials that can breathe react a lot more than those that cannot breathe.

Think about what comes about if a material meets an outside stimulus, such as fire, for instance. Certainly, non-living materials can exhibit reactivity to this stimulus by twisting, breaking, or resonating, however, this is just a passive reaction: the fire can play with them instead of vice versa.

The layers of molecules in the materials that can breathe, however, have the ability to interact: cells deployed within your skin can feel when they're near somewhere that is hot, which might cause a reaction such as dispatches a nerve signal that generates a reflex to keep the skin away from where the heat comes.

The difference in reactivity between living and non-living matter isn't an indicator that both are comprised of separate "stuff"; instead, the many parts of living matter are interlocked in a lot more intricate form, which enables it to react.

## Chapter 4 - People's selection of materials usually has both emotional and practical parts.

Has it ever occurred to you what the reason for the high value we give to material possessions in today's society is?

People fall in love with items since we don't just find them valuable thanks to their practical use, but we find social purposes in them as well.

Actually, archeological proof demonstrates to us that once early humans devised tools, people started to create objects whose reason for existence is their social value, such as decorative jewelry, art, and clothing, too.

Moreover, occasionally what an item symbolizes can surpass the significance of its practical use, as indicated by the materials people employ for particular objects.

Think about this: stainless steel is inexpensive, very solid, and it is simple to clean it. Then what is the reason for not using it for dishware or toilet bowls? What is the reason for choosing fragile ceramics in the dining room, and in toilets and baths?

Evidently, there's an illogical, sentimental part in our selection of materials: the thought of joining the cold, solid quality of steel with our tender and intimate eating routine doesn't appeal to us. What's more, people don't want steel to have a place in the passing of our most private wastes.

Then what is the source of these sentimental connections with materials?

The meanings people attribute to materials are affected by the place people see them in their daily surroundings. To illustrate, should our manager have a rosewood table, it is probable for us to see that material as showing prestige.

Furthermore, people usually encircle themselves with materials that exhibit what we give value: a person for whom luxury and images are valuable might put on silk dresses and have their kitchen made of marble. In contrast, a person for whom the utility of an item matters more might rather select polyester and granite, respectively.

To sum up, a person's selection of materials reveals much about them. So, don't undervalue the materials' value!

## Stuff Matters: Exploring the Marvelous Materials That Shape Our Man-Made World by Mark Miodownik Book Review

Examine more profoundly the items you see around, and it'll be possible for you to learn that they are not made up of one single piece; in fact, those items are made up of minute substructures and substructures beyond those. After examining these minute components on a smaller scale, it'll be possible for us to better comprehend their features, and start to produce even further amazing materials in the future.

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