Teacher Reflection

# Classifying matter into elements, compounds and mixtures

**Objectives of the session:**

- Distinguish between a pure substance (element and compound) and mixture
- Classify elements based on their physical properties

**Assessing prior knowledge**

A questionnaire was used to assess the prior knowledge of students.

A. *State whether the following statements are true or false.*

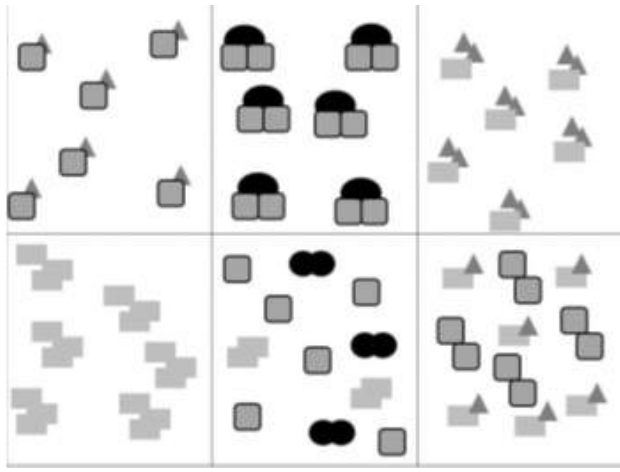
1. Anything which has mass and occupies space is called as matter.
2. Oxygen is matter.
3. Air has no mass.
4. Air is not matter.
5. Light and sound are examples of matter.
6. Matter can be classified into solid, liquid and gas.
7. Solids, liquids and gaseous matter have same physical properties.
8. Matter is made of tiny particles.
9. Air is a pure substance.
10. Milk without water is a pure substance.

B. *State which among the following are solid, liquid or gas* – oxygen, chair, milk, smoke

During the discussion, students were shown a single sheet of paper and asked whether it had mass. The instinctive response was - paper does not have mass. I quoted the example of how tiny gold ornaments are weighed in the jewellery shop. This made them realise the fact that just because something weighs very less, it doesn't mean that it has no mass at all. The question on whether substances are made of tiny particles, created confusion among students. To clarify this, the example of the chalk piece, which gets smaller and powdery on usage was given. I also pointed out that the basic constituent of all matter, which is a tiny atom, also has mass and occupies space. The question on whether light and sound has mass and the discussion that ensued clarified the distinction between energy and matter. Students had clarity about the differences between solids, liquids and gases. For certain questions, although the students were able to come up with the right response of 'true or false', they had some misconceptions regarding the reason for the same.

*Some other misconceptions that were addressed in the discussion.*

| Misconception / incomplete understanding | Clarification |
|---|---|
| Air is a not a pure substance because it has a lot of dust, smoke and pollutants. | Although the statement and common understanding is correct, the students were reminded of how air is constituted of different types of gases. They were also told that the criteria for a substance to be pure is that it should have only one type of constituent. The concept of mixture was introduced. |
| Water is impure because it is made up of hydrogen and oxygen. | This misconception opened up the discussion on the distinction between elements and compounds. The fact that water is a compound, which has properties that are different from its constituents and how compounds are classified as pure substances were discussed. |
| Unadulterated milk is a pure substance. | Students were asked about the different types of materials that can be extracted from milk. Children were able to come up with answers like butter, ghee. They were questioned about the other constituents nutritionally and students were able to say proteins, fat and water. When they were asked whether milk is a compound or mixture, students gave the correct response as mixture. |



More examples were provided for students to classify matter - like seawater, salt, sugar, iron nail, non-alloyed silver ornaments. A specific example of water was used to elaborate it further. Water, as a compound remains the same at all places at all time in contrast to air whose composition differs at various places like forest, city, around factories etc.

**Conclusion with an activity:**

The class was split into groups. Flash cards that diagrammatically represent the concept of elements,

compounds and mixtures were distributed to each group and they were asked to classify them.

Many groups were able to successfully segregate the flash cards. Others were able to do it with a little support.

**Classifying elements based on their physical properties:**

The students were divided into seven groups and provided the materials (copper, aluminium, zinc, graphite, iron and sulfur) to find out the similarities/differences in properties (ductility, conducting heat and electricity, produces sound, malleability) of the provided materials. Their initial findings were that some materials are hard and difficult to break. Graphite was easily broken and is not hard.

Initially the groups of students were asked to do the activity. Since the class was noisy with the activities and the students were more curious about collecting materials form the other groups, I decided to show them the activities one by one.

*Misconceptions that were addressed in this discussion.*

| **Misconception / incomplete understanding** | **Clarification** |
|---|---|
| As a whole class, they said, graphite also produces sound. | I asked them to compare the intensity of the sound with other materials. |
| A few students said that air is a mixture so it is a non- metals | Though it is true to say that air is a non-metal, they need to understand that air is a mixture of gases and gases are non-metals.<br><br>We discussed the constituents of air and its properties to determine whether they are metals or non-metals – Can air produce sound, is it ductile or malleable, does it conduct electricity etc. |

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