Module 4: Classifying Matter and Its Changes

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July 19, 2025

1 Overview

1. **Mixtures** contain multiple types of elements and/or compounds

2 Classifying Matter

Definition 1 (Pure Substance) *A substance that contains only one element and/or compound*

Definition 2 (Mixture) *A substance that contains different elements and/or compounds*

- a mixture contains multiple elements and/or compounds, but they haven't lost their individual identities and properties
- *e.g.* air is a mixture of many different gases[1]: each gas in air is still whatever kind of gas it would be without the others... air is not a compound
- it's possible to separate parts of a mixture *physically* (*e.g.* by filtering)

Definition 3 (Homogenous Mixture) *A mixture with a composition that is always the same, regardless of which part of the sample you are observing*

Definition 4 (Heterogenous Mixture) *A mixture with a composition that differs depending on which part of the sample you are observing*

- air *seems like* a homogeneous mixture: it pretty much looks the same everywhere... if you go past a dairy farm, you'll realize it's actually heterogeneous on a large enough scale

[1] See the table in the textbook, p. 105

Name	Phase Change	Beginning Phase	Ending Phase
freeze	add heat	liquid	solid
melt	take heat away	solid	liquid
evaporate	add heat	liquid	gas
condense	take heat away	gas	liquid
sublimate[5]	change pressure	solid	gas

Table 1: Phase Changes for Matter

- paint is a heterogenous mixture, which is why you have to mix it up before you can use it

3 Classifying Changes in Matter

Definition 5 (Chemical Change) *a change that affects the type of atoms or molecules in a substance*

Definition 6 (Physical Change) *a change in which the atoms or molecules in a substance stay the same*

- the idea here is that if we physically alter a substance, that's not a chemical change
- dissolving one substance into another is a physical change[2], because we haven't actually changed the kinds of atoms and/or molecules involved
- chewing a steak is a physical change, but digesting a steak is a chemical change

4 Phase Changes

- one interesting type of physical change is the *phase change*
- in general, there are three phases of matter: solid, liquid, and gas[3].
- we can convert matter between these phases with heat [4] (see Table)

References

[Wile, 2003] Wile, D. J. L. (2003). *Exploring Creation with Chemistry*. Apologia Educational Ministries, Inc., 2 edition.

[2] I realize we could argue differently based on our definitions, but let's just go with it. Check out p. 107 for more.

[3] Let's not get hung up on plasma right now.

[4] And pressure!