

Separation of Mixtures

Characteristics of Pure Substances

- Fixed composition
- Cannot be separated into simpler substances by physical methods (physical changes)
- Can only be changed in identity and properties by chemical methods
- Properties do not vary- Unique Density, Constant Boiling and Melting Points

What is a pure substance?

Elements

- Cannot be decomposed into simpler substances by chemical changes

Compounds

- Chemically joined elements- Can be decomposed into simpler substances by chemical changes, always in a definite ratio

Characteristics of Mixtures

- Variable composition
- Components **retain** their characteristic properties
- May be separated into pure substances by physical methods sifting, evaporation, magnetism, etc...
- Mixtures of different compositions may have widely different properties
- Do NOT have definite boiling/melting points

Homogenous Mixtures

Homogenous mixtures look the same throughout but can be separated by physical means

Examples: salt water, soda



Indicators of Homogenous Mixtures

- Have the same composition throughout
- Components are indistinguishable
- Can exist between all phases of matter:
air (gases) brass (alloy- blend of multiple metals -solids)
soda (gas, solid, liquid)



Adding Liquids Together



- Miscible- will mix- water and alcohol
- Immiscible- wont mix water and oil

Parts of a solution



- Solvent- part that does the dissolving- water is our universal solvent
- Solute- part that was dissolved (salt)

Heterogenous Mixtures

Heterogeneous mixtures are composed of large pieces that are easily separated by physical means (ie. density, polarity, metallic properties, size).

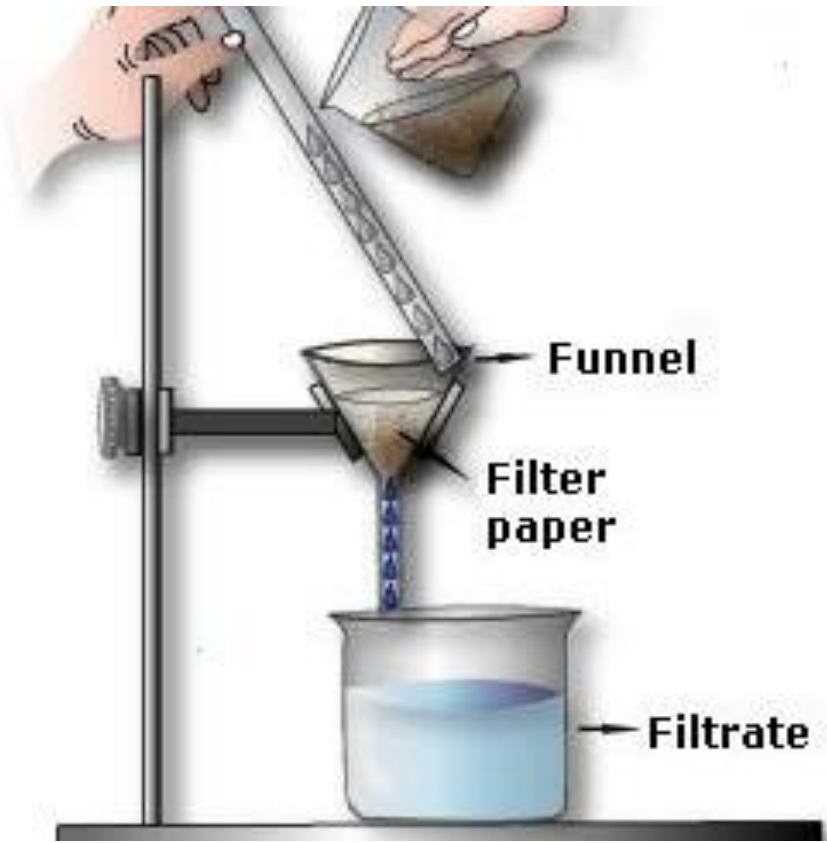
**Pond Water, Vegetable Soup- Suspensions
Visible particles**

Starch Water: invisible to the eye :colloid

Physical Methods of Separation

- Sieve – separates solids based on size
- Filtering – separates solids from liquids
- Decanting – separates solids from liquids
- Chromatography – separates 2 or more liquids
- Evaporation – separates dissolved solids from liquids
- Magnetism – separates magnetic from nonmagnetic materials
ex. (iron from non-metals)
- Activated Charcoal- Activated charcoal is carbon that has been treated with oxygen. The carbon adsorbs a wide range of impurities and contaminants, including chlorine, odors, and pigments.

Filtering

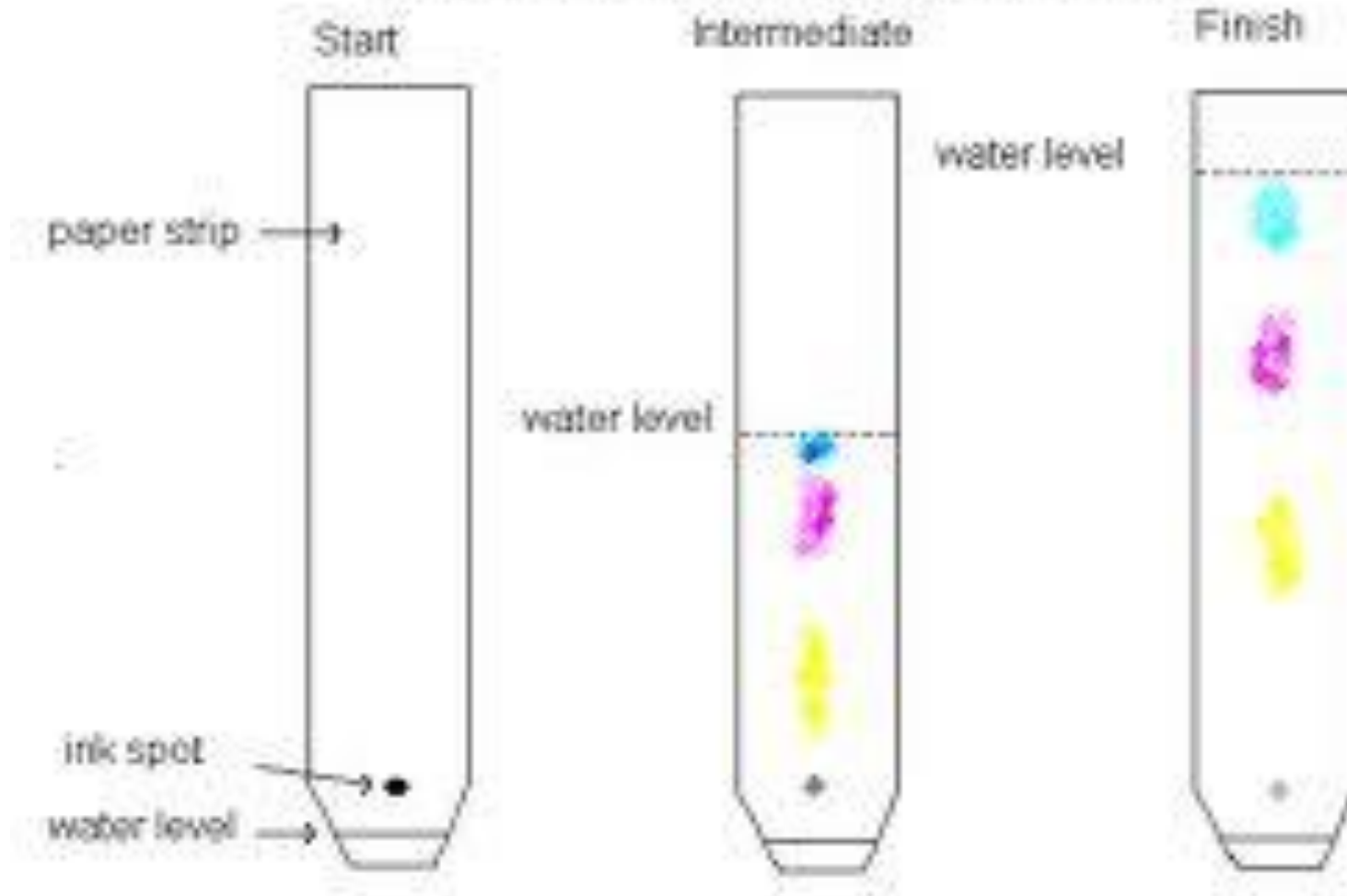


Decanting

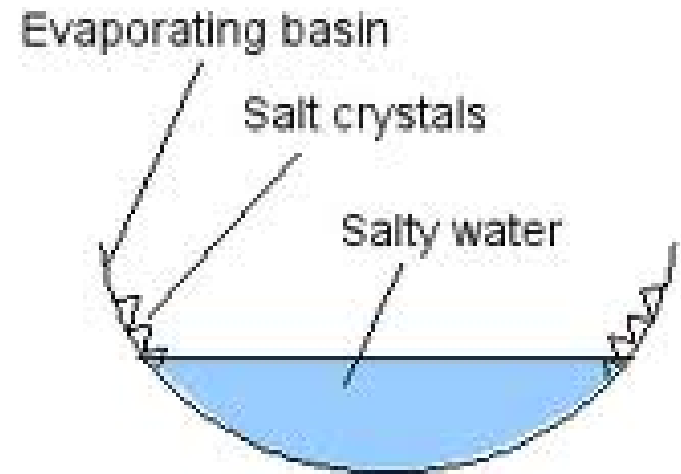


Chromatography

Chromatographic Separation of Black Ink



Evaporating



We can use physical properties to separate mixtures:

Please determine a method to separate the following and determine the type of matter:

Oil and Water

Iron and Sand

Sand and Salt

Sulfur (not soluble) and Sugar

Water and Dye

Calculations

Actual Amount

Percent Yield = ----- X 100%

Theoretical Amount

(actual - theoretical)

Percent Error = ----- X 100%

theoretical