

# Part 3: Operating a Blending Facility

## Session 3.4 Checking Compatibility of Raw Materials

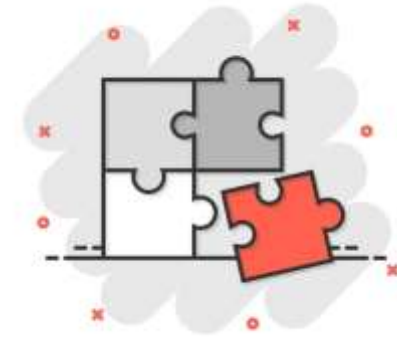
# Fertilizer Compatibility



- 1. Chemical compatibility:** The stability of a material when blended with another material.
- 2. Physical compatibility:** You check the physical properties of the materials you want to blend.

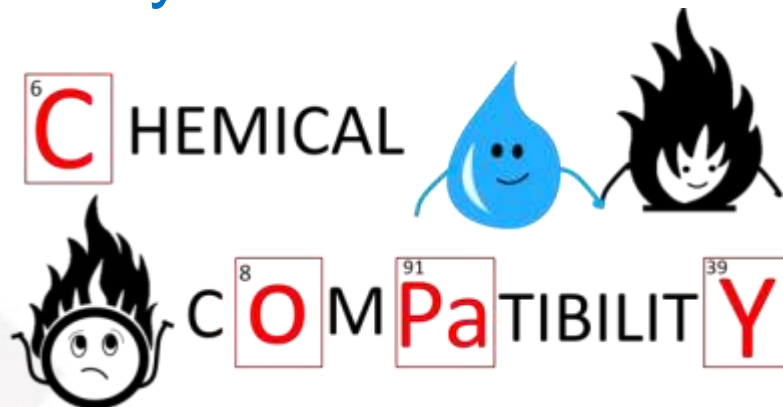
# Consequences of non-compatible materials

- The use of **incompatible material** can result in the creation of
  - Insoluble salts
  - Unwanted precipitates
  - Caking
  - Clogging issues
  - Explosions
  - Segregation
- **Delay in production** because of caking and clogging issues
- **Damage** to equipment
- **Bad quality** blends
- **Loss of money**

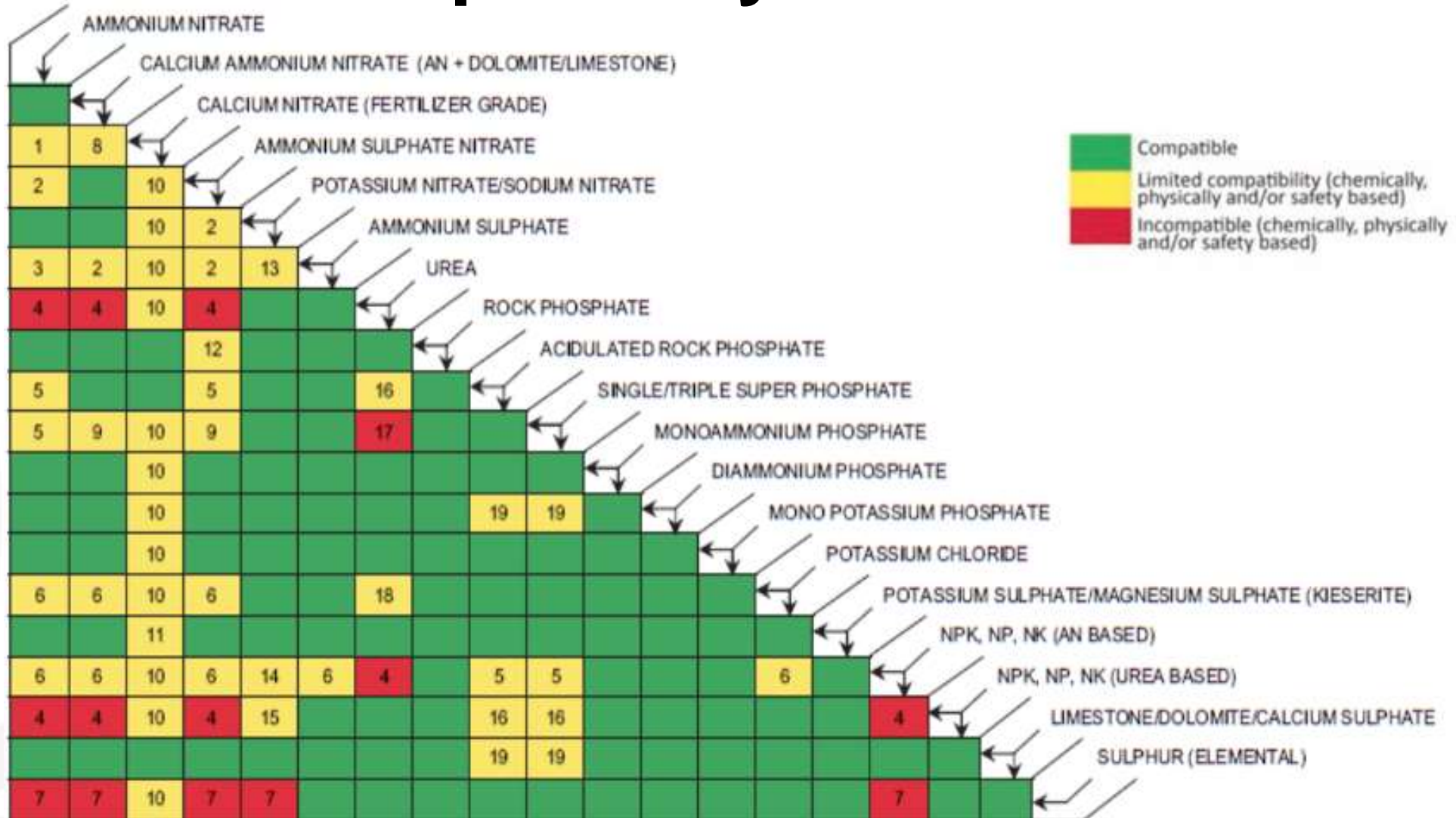


# 1. Chemical Compatibility

- The measure of **how stable** the raw material is when blended with another raw material.
- If two or more fertilizer ingredients can be blended and their **characteristics remain stable** individually and collectively, they are chemically compatible.
- Use the **fertilizer compatibility chart** to check the chemical compatibility.



# Fertilizer Compatibility Chart





# Chemical Compatibility

- *What if you want to mix more than 2 materials?*

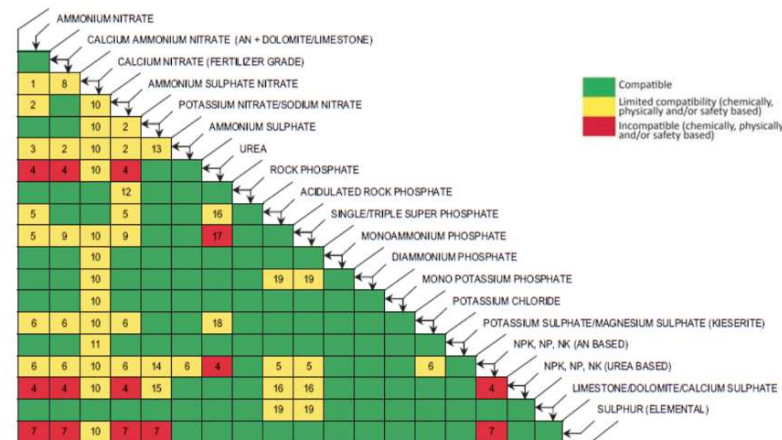
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- *What should you do if the materials are limited compatible?*

Use the materials cautiously

- *What should you do if the materials are not compatible?*

Do not blend them!



## 2. Critical Relative Humidity (CRH)

- Chemical fertilizers are **hygroscopic products**.
- In hygroscopic products, moisture exchanges between the particles and the surrounding air.
- The moisture exchange is defined by the **critical relative humidity (CRH)**.
- You need a **temperature and humidity reader** within the facility.



## 3. Physical compatibility

Check physical properties of raw materials such as

- Particle size and particle size distribution
- Bulk density
- Shape
- Hardness
- Solubility
- Dust content
- Flow rate
- Level of contamination

**The main objective of checking physical compatibility is to avoid segregation of materials**



# Particle size and particle size distribution

- Sieve or screen raw materials **before** blending and bagging operations commence.
- It is **poor practice** to sieve or screen raw materials **after** blending because unmixing of the raw materials and the loss of some of its particles may occur thus changing the nutrient composition of the mixture.
- In addition, you need lump and fines screeners in the blending and bagging lines.



# Physical properties

There are **two main methods of determining particle size of fertilizer raw materials:**

1. The jar test, and
2. The size guide number (SGN) / Uniformity Index (UI)
  - a. Using the graph method
  - b. Using the mathematical method
  - c. Using the SGN Scale



# Physical properties – Jar test

## Method 1: The jar test

1. Measure an equal volume of each raw material
2. Pass each raw materials through both screens
3. Put materials retained on each screen in different jars
4. Put materials that passed through each screen in different jars
5. Compare all jars visually



# Summary: Fertilizer Compatibility

1. **Chemical compatibility** using the fertilizer compatibility chart
2. **Critical relative humidity (CRH)** using the CRH curve
3. **Physical compatibility** using the
  - a. The jar test
  - b. The size guide number (SGN) / Uniformity Index (UI)
    - Using the graph method
    - Using the mathematical method
    - Using the SGN Scale

# Part 3: Operating a Blending Facility

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