

The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. These shapes are primarily located on the left and right sides of the frame, leaving a large white central area. The shapes are layered, creating a sense of depth and movement.

**FERTILIZER**

**NITROGEN N**

**PHOSPHORUS P**

**POTASSIUM K**

Leaf maker

Root maker

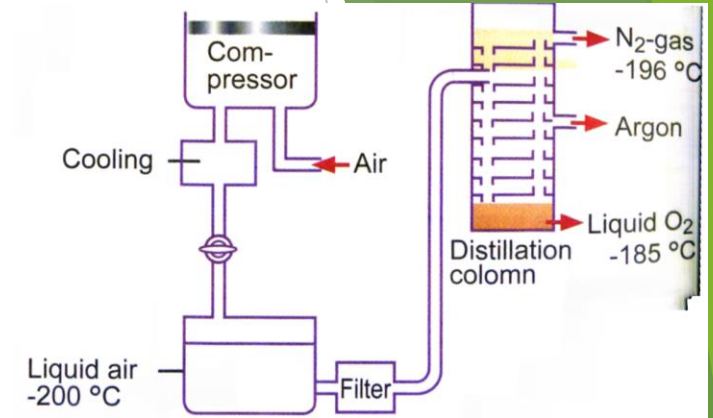
Fruit and flower maker

### **N:P:K fertilizer ratio**

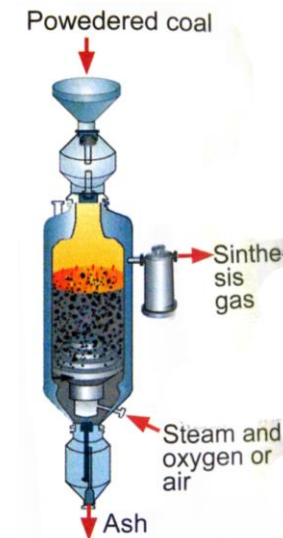
- 6:1:5 (22) Total 12 parts
- $N = \frac{6}{12}$        $P = \frac{1}{12}$        $K = \frac{5}{12}$
- All together 22% of total mass
- % N  $\frac{6}{12} \times 22 = 11\%$
- % P  $\frac{1}{12} \times 22 = 1,83\%$
- % K  $\frac{5}{12} \times 22 = 9,17\%$

# Production of basic reactants

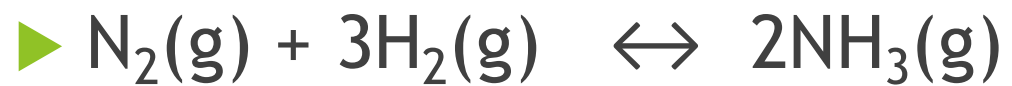
► N<sub>2</sub> production: fractional distillation of air



► H<sub>2</sub> production: steam reforming coal  $C_{(s)} + H_2O_{(g)} \longrightarrow CO + H_2$

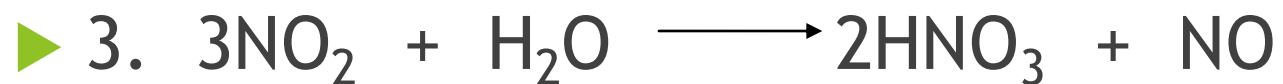


# HABER PROCESS



(Catalyst Fe/ FeO)

# OSTWALD PROCESS



# CONTACT PROCESS

- ▶ 1.  $S + O_2 \longrightarrow SO_2$
- ▶ 2.  $2SO_2 + O_2 \rightleftharpoons 2SO_3$  ( $V_2O_5$  catalyst)
- ▶ 3.  $SO_3 + H_2O \longrightarrow H_2S_2O_7$  (Oleum)
- ▶ 4.  $H_2S_2O_7 + H_2O \longrightarrow 2H_2SO_4$

# FERTILIZERS

Ammonium nitrate	Ammonium sulphate	Urea	Potassium nitrate
$\text{NH}_3 + \text{HNO}_3$	$\text{NH}_3 + \text{H}_2\text{SO}_4$	$2\text{NH}_3 + \text{CO}_2 \leftrightarrow \text{H}_2\text{NCOONH}_4$  $\text{H}_2\text{NCOONH}_4 \leftrightarrow (\text{NH}_2)_2\text{CO} + \text{H}_2\text{O}$	$\text{KCl} + \text{HNO}_3$

# PHOSPHORIC ACID- super phosphates



Both **MAP** and **DAP** are good phosphate fertilizers. South Africa mainly makes use of **MAP**.



# FERTILIZERS INFLUENCE ON ENVIRONMENT

- ▶ Contaminate ground water
- ▶ Eutrophication
- ▶ Excess run into rivers and dams
- ▶ Extra nutrients
- ▶ Excessive growth of plants and algae
- ▶ Oxygen depletion

# ALTERNATIVES

- ▶ Kraal manure
- ▶ Chicken manure
- ▶ Earth worm tea
- ▶ compost