

IFA TECHNICAL SYMPOSIUM

**VILNIUS LITHUANIA
25-28TH APRIL 2006**

**GRANULATION OF NP AND NPK
PRODUCTS BASED ON
SUPERPHOSPHATES PRODUCED
FROM IGNEOUS PHOSPHATE ROCKS.**

J. SINDEN
JSA Ltda
R. Ministro Xavier de Toledo,143
11070-300, Santos, SP. Brazil

INGNEOUS PHOSPHATES

- **THERE ARE MANY REASONS FOR USING IGNEOUS PHOSPHATES**
- **HIGH LEVELS OF P₂O₅- Lower Unit Transport Cost**
- **LEVELS OF “HEAVY METALS”**
- **LOW CaO:P₂O₅ RATIO- Lower Acid Consumption**
- **LOW LEVELS OF ORGANIC”C”- Better for production of “PPA”**

IGNEOUS PHOSPHATES

- **FINE ROCK GRIND AS RECIEVED- No Grinding Required for Phosphoric Acid. Needs to be Ground for SSP and TSP**

IGNEOUS PHOSPHATES

- **ALL THE CITED ADVANTAGES ARE ASSOCIATED WITH THE PRODUCTION OF PHOSPHORIC ACID**
- **LIMITED DIFFERENCES IN THE PROCESSING OF IGNEOUS PHOSPHATES X SEDIMENTARY PHOSPHATES FOR PHOSPHORIC ACID OR (NITROPHOSPHATES)**
- **LOW FREE SULPHATE LEVELS**
- **LOWER ACID CONCENTRATION**

PHOSPHORIC ACID

- **PHOSPHORIC ACID PRODUCTION INFLUENCED BY IMPURITIES IN ROCK**
- **FEW EFFECTS ON PROPERTIES OF MGA FROM THE PHOSPHATE ROCK ORIGIN**
- **LESS EFFECTS OF ORIGIN OF PHOSPHORIC ACID IN THE PRODUCTION OF MAP / DAP/ NITRO-PHOSPHATE.**

PRODUCTION OF SSP - TSP

- **IFLUENCE OF THE GEOLOGICAL ORIGIN OF THE PHOSPHATE ROCK HIGH – CRITICAL**
- **COMPARISON
IGNEOUS PHOSPHATES- GLASS BRICK
SEDIMENTARY PHOSPHATE – BATH
SPONGE**
- **IGNEOUS EXTERNAL SURFACE AREA**
- **SEDIMENTARY MUCH LARGER
INTERNAL AREA**

PHYSICAL PROPERTIES

- | | |
|-----------------------------|----------------------------|
| • IGNEOUS | • SEDIMENTARY |
| • SURFACE AREA | • SURFACE AREA |
| • M²/Gram | • M²Gram |
| • 0.6 - 2.0 | • 9.5 -19.4 |
| • Apparent Density | • Apparent Denity |
| • Gram/cc | • Gram/cc |
| • 3.19 | • 2.75 – 2.90 |

PROCESS CONDITIONS

- **SSP -ROP**
- **ROCK GRIND**
- **SEDIMENTARY - $< 80 \pm 2\%$ - 74μ**
- **IGNEOUS - $< 90 \pm 2\%$ - 43μ**
- **SULPHURIC ACID CONCENTRATION**
- **SEDIMENTARY - $68- 72\%$**
- **IGNEOUS - $58- 65\%$**
- **BELT DEN RESIDENCE TIME**
- **SEDIMENTARY - $6-8$ MINUTES**
- **IGNEOUS- $7 -10$ MINUTES**

PROCESS CONDITIONS

- **TSP – ROP**
- **ROCK GRIND**
- **SEDIMENTARY- $< 80 \pm 2\%$ - 74μ**
- **IGNEOUS - $< 90 \pm 2\%$ - 43μ**
- **PHOSPHORIC ACID TEMPERATURE**
- **SEDIMENTARY – $AMBIENT - 60^{\circ}C$**
- **IGNEOUS - $50 - 80^{\circ}C$**
-

CHEMICAL ANALYSIS

- **SEDIMENTARY PHOSPHATES**
- **CaO : P2O5 RATIO- 1.52- 1.66+ : 1.0**
- **LATTICE CO2 – 1.3 – 5.5%**

- **IGNEOUS PHOSPHATES**
- **CaO : P2O5 RATIO- 1.34 – 1.46**
- **LATTICE CO2 – 0.1- 0.3**

TYPICAL “CURED” SSP

	SEDIMENTARY	IGNEOUS
• P2O5		
• TOTAL	19.1	19.7
• APA	18.6	19.1
• W/S	16.3	15,9
• ACIDITY	3.8	7.1
• MOISTURE	8.5	11.8

GRANULATION

- **IGNEOUS SUPERPHOSPHATES**
- **“STRAIGHT SSP – TSP**
- **CHARACTERISTICS-**
- **OVERGRANULATION –HIGH FREE ACIDITY**
- **NEED TO NEUTRALIZES**
- **USE LIMESTONE – SLAKED LIME**
- **PREFERENCE FOR DOLOMITIC MATERIALS**
- **AMMONIA AT LOW LEVELS NOT EASY TO CONTROL**
- **PROBLEMS TO ACHEIVE ZERO LIQUID EFFLUENTS**

“STRAIGHT SSP / TSP”

- **ANY FREE ACIDITY IN THE PRODUCT MAKES IT INCOMPATIBLE WITH DAP AND UREA**
- **USED MAINLY IN BULK BLENDS FOR SOYBEANS**
- **SOYBEAN FERTILIZERS TYPICALLY:-**
- **NITROGEN : 0 – 2**
- **PHOSPHOROUS : 18 – 25**
- **POTASH : 15 – 25**
- **SULPHUR : 3 - 5**
- **BLEND COMPONENTS:- KCl; MAP;SSG;STG.**

“NP” PRODUCTS

- **IGNEOUS SUPERPHOSPHATES**
- **SSP BASED**
- **TYPICAL PRODUCT 03- 17 – 00 +12 S**
- **RAW MATERIALS: SSP; H₂SO₄; NH₃**
- **PROPERTIES:**
- **NO ACIDITY**
- **COMPATIBLE W/ DAP AND UREA**
- **SOURCE OF SOLUBLE – MOBILE “Ca” and “S”**
- **DILUENT IN BULK BLENDS.**

“NP” PRODUCTS

- **IGNEOUS SUPERPHOSPHATES**
- **SSP BASED “HYBRID”**
- **TYPICAL PRODUCT: 07- 40 -00+ 3 S**
- **RAW MATERIALS:- PHOSPHORIC ACID; SSP AND AMMONIA**
- **COMPATIBLE WITH DAP AND UREA**
- **HIGHER CONCENTRATION – LOWER UNIT TRANSPORT COSTS**

“NP” PRODUCTS

- **IGNEOUS SUPERPHOSPHATES**
- **TSP BASED**
- **TYPICAL PRODUCT – 03- 44 – 00**
- **RAW MATERIALS:- TSP; NH₃; PHOS ACID**
- **COMPATIBLE WITH UREA and DAP**
- **MAIN USE IN BULK BLENDS FOR SOYBEAN**
- **NOT NORMALLY COMPETATIVE WITH MAP**

“NPK S”

- **IGNEOUS SUPERPHOSPHATES**
- **3 NITROGEN SOURCES**
- **AMMONIACAL – NH₃ – AM. SULPHATE**
- **UREA**
- **AMMONIUM NITRATE**
- **ALL NEED DIFFERENT TREATMENTS**

“NPK`S”

- **AMMONICAL NITROGEN**
- **NO SIGNIFICANT DIFFERENCE BETWEEN SUPERPHOSPHATES FROM IGNEOUS OR SEDIMENTARY PHOSPHATE ROCKS**
- **NO pH CONTROLLED REQUIRED**

“NPK`S”

- **NITROGEN SOURCE UREA**
- **A MAJOR DIFFERENCE SEDIMENTARY ROCKS CAN PRODUCE THE “USP”PRODUCTFROM THE UREA- SULPHURIC ACID ADDUCT.**
- **IGNEOUS PHOSPHATES DO NOT**
- **GRANULATOR TEMPERATURES MINIMUM OF 82+°C THIS MELTS THE UREA PRILLS.**
- **BOTH TYPES OF SUPERS NEED pH CONTROL**
- **SO NO ESSENTIAL DIFFERENCES**

“NPK`S”

- **NITROGEN SOURCE –AMMONIUM NITRATE**
- **MOST CRITICAL SINCE ACIDITY IS ONE OF THE FACTORS INVOLVED IN THE DECOMPOSITION OF “AN”**
- **pH CONTROL CRITICAL AT ALL STAGES OF PRODUCTION AND STORAGE.**

CONCLUSIONS

- **THERE ARE DIFFERENCE IN THE BEHAVOIR OF SUPERPHOSPHATES PRODUCED FROM SEDIMENTARY AND IGNEOUS PHOSPHATES.**
- **IT IS POSSIBLE TO IDENTIFY AND ADAPT TO THESE DIFFERENCES IN THE GRANULATION PLANTS**
- **WITH THEIR HIGHER ANALYSIS THE IGNEOUS ROCKS WILL NORMALLY BE USED TO PRODUCE PHOSPHORIC ACID**
- **WHERE THE CROPS NEED “Ca” AND “S” THEREWILL BE A MARKET FOR SSP**