FORMULA SHEET

COLOR CODE SF-10 DATE 5/8/42 NAME LEAD NITRATE SOL'N. K- 1720 (plt)

OBJECT REFORMULATION OF K-8983

BASED ON PLANT PRACTICE AND SICK LIST STUDY OCTOBER, 1941 - MARCH, 1942.

BATCH SIZE-MOLS. 11.43x BATCH No. OF "K" SAMPLE NONE

LBS. OR GMS.	MATERIAL	100% WT.	GAL.	C. C.	MANIPULATION	Nf
					Start agitator on make tank #400 and run in all the recovered acid - from the receiving tank #416.	
	Nitric Acid - 100% (± 0.75% sol'n.)	±50	±850			
			1585		Stop the agitator and make to - (26" in Vat 400) with water.	
					Turn on water on absorption tower and start fan.	
					Start agitator on make tank #400 and heat to 138° - 142°F on hand thermometer.	
					Immediately on starting to heat up, run to the make tank #400 -	
1550	Nitric Acid - 100% (± 60% sol'n.)	1500			(36" at 60% in measuring tank #415).	33
					After adding the strong acid, shovel in - as follows:	63
±2365	Pig Lead - 100% (feathered)	±2365			(1) Add the first box of feathered lead while heating to 138° - 142°F. (2) Add another box of feathered lead beginning 20 minutes (see notes in regard to elapsed operating time) after reaching 138°-142°F. (3) Add the balance of the feathered lead (± 1/2 box) beginning 55 minutes after reaching 138°-142°F.	
					Stir until the batch is completely finished - i.e. Test Point #1; or yellow in color; no Effect on Congo Red paper; and no visible signs of reaction.	
					Stop ag itator, insert hose, and pump to settling tank #409 near #19 Bldg.	
					Start the agitator in settling tank #409 and, if below 163°F, heat to 163°-167°F.	
					Adjust to pH 3.80-4.20 with Nitric Acid - This normally will take about one pail.	
±53	Nitric Acid - 100% (±60% sol'n.)	±53				33

PACKAGE LBS. PER COST GROUP TYPE COLOR SIGNATURE

GOAL YIELD

x based on lead.

N37960

K-13398

FORMULA SHEET #2

COLOR CODE SF-10 DATE 5/8/42 NAME LEAD NITRATE SOL'N. K- 1720 (plt)

OBJECT

BASED ON

BATCH SIZE-MOLS. BATCH No. OF "K" SAMPLE

LBS. OR GMS.	MATERIAL	100% WT.	GAL.	C. C.

MANIPULATION

Wait at least 2 minutes after adding the acid, sample, filter and test for copper and iron by KGR-120. If more than the maximum allowable impurities are found, notify the foreman.

Stop agitator on the settling tank #409 and allow to settle at least 30 minutes.

Run by gravity thru the standpipe in bottom of the settling tank #409 to one of the lead nitrate storage tanks (#410 or #411).

Test Point #1

The pH at this point should be 4.4 - 4.6

PACKAGE LBS. PER COST GROUP TYPE COLOR SIGNATURE L. STEWART

EST. ~~GROSS~~ YIELD 3785 lbs. - 100% lead nitrate (±20% sol'n.)

L. Stewart

DUP050149856

SF-10

NOTES - LEAD NITRATE MANUFACTURE K-1720

K-8983 has been revised to include the changes made in the lead nitrate operation as a result of the installation of equipment to increase the nitric acid yield. At the same time, changes arising from the elimination of the purification and filtering steps have also been incorporated. The resulting process, K-1720, was found to be satisfactory during a trial run in February, 1942.

The time cycles specified are to be considered the minimum and should not be shortened. A batch of lead nitrate can be made under these conditions in approximately 2-1/4 hrs. However, the time cycles may be lengthened when necessary but when this is done it will be necessary to delay the subsequent operations accordingly.

Time is saved and smoother operation obtained by having about 3/4 of a box of lead left in the make tank at the end of each batch. However, there should never be more than 1-3/4 boxes of lead in the make tank at any one time because of danger to the agitator, and because the reaction is apt to become too violent resulting in loss of acid thru the stack. For this reason, it may at times be necessary to reverse the order of operations #2 and #3 (see addition of lead) i.e. add 1/2 box of lead after 20 minutes and a full box after 55 minutes elapsed time.

Strict observance of the following conditions will eliminate any possibility of quality difficulties:-

1. Use a good grade of pig lead (see specifications) as a source of lead. Scrap lead, sludges, and tank cleanings of unknown composition should not be used in the manufacture of lead nitrate as long as there is no means of purification provided.

2. Each batch should be completely finished (above pH 4.4) in the make tank before pumping to the settling tank. If the lead nitrate is below pH 4.0 it will pick up an appreciable amount of iron during the pumping operation.

3. The pH should be adjusted within the range 3.8 - 4.2 before settling. Above pH 4.2 difficulty will be encountered with crystallization while below pH 3.8 there will be an appreciable pick up of iron.

4. Each batch should be settled for at least 30 minutes and inspected for clarity before running to storage. Obviously such conditions as vibrations, heavy wind and rain storms (the tank is open to the atmosphere), etc., will prevent complete settling.

5. The following tank cleaning schedule should be followed:

(a) Make tank - clean every 30 days.
(b) Settling tank - clean every 3 days
(c) Storage tanks - clean every 30 days
(d) Scale tanks - clean every 7 days

L. STEWART

MPH

STANDARD PROCESSING DATA

CODE : SF-10 DATE : 5/8/42 NAME: Lead Nitrate sol'n.K-1720

Melting Pot

Material - Welded firebox steel.
Size - hemispherical - 42" diameter.
Capacity - about 9,000 lbs. molten lead.
Type heat- oil burner mounted in brick furnace.
Temperature - held 1000°-1200°F. on thermocouple located in molten lead. Bristol recorder used.

Feathering Box

Material - 1/4" sheet iron.
Size - 36" wide, 60" long, and 30" deep.
Capacity - about 1000 lbs. feathered lead.
Fittings - bottom outlet for draining.
- 2" water line for filling.

Lead Nitrate Make Tank - #400

Material - Stainless steel (KA2S-Cb) lined with acidproof brick bonded with Pennchlor cement.
Size - 43" deep and 134" in diameter (61 gals./in.)
Capacity - about 2500 gals.
Agitation- single paddle type, located 6" above bottom of tank, and traveling at 10 RPM.
Fittings - 2" water line.
- 1-1/2" open end steam line for heating.
Temperature - measured by Bristol recorder.
Cleaning schedule - every 30 days.

Nitric Acid Measuring Tank - #415

Material - Stainless steel (KA2S-Cb)
Size - 40" deep and 43" in diameter (6.27 gals./in.)
Capacity - about 250 gals.
Fittings - 1-1/2" outlet for draining.

Absorption Tower

Material - Stainless steel (KA2S-Cb)
Size - 20-1/2 ft. height and 33" in diameter.
Packing - 1" Raschig rings
Fan - produces air velocity of about 240 cu.ft./min.thru tower.
Fittings - water supplied by spray nozzle located at top of tower.

Receiving Tank - #416

Material - Stainless steel (KA2S-Cb)
Size - 68" deep and 78" in diameter (20.7 gals./in.)
Capacity - about 1200 gals.
Fittings - 3" outlet valve for draining.

Transfer Pump

Material - anticiron
Size - 2"
Type - Worthington centrifugal
Impeller - closed type.

Settling Tank - #409

Material - wood
Size - 61" deep and 120" in diameter (46.2 gals./in.)
Capacity - about 2900 gals.
Agitation - 24" turbine, 6" above bottom, traveling at 71 RPM
Fittings - noiseless type heater (1-1/2" steam line).
- 5" standpipe, 1-1/2" in diameter, for draining.
Cleaning Schedule - every three days.

Large Storage Tank - #410

Material - Stainless steel (KA2S) with wooden cover.
Size - 9 ft. deep and 14 ft. in diameter.
Capacity - about 10,000 gals.
Fittings - duriron air sparger for agitation.
Cleaning Schedule - every 30 days.

Small Storage Tank - #411

Material - Stainless steel (KA2S) - tank and cover.
Size - 9 ft. deep and 10 ft. in diameter.
Capacity - about 5,000 gals.
Cleaning Schedule - every 30 days.

L. STEWART

5/26/42

MPH

SUPPLEMENT TO NOTES ON LEAD NITRATE MANUFACTURE

SF-10. K-1720

The present standard formula is based on a study made during the Winter of 1942. It has been found that for Summer operation, when the heat loss is noticeably less, it is necessary to use a starting temperature of 128°-132°F (by hand thermometer) instead of 138°-142°F, in order to avoid exceeding the maximum of 160°F.

It has also been noticed that certain types of pig lead react more violently than other types. Where the more active types of lead are used it is also better to use the lower starting temperature as the temperature may exceed the maximum allowable.

L. STEWART

6/29/42