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ESTABLISHMENT OF A MULTIPURPOSE PESTICIDE PILOT PLANT

DP/EGY/81/006

ARAB REPUBLIC OF EGYPT

Technical report: Findings and recommendations*

Prepared for the Government of the Arab Republic of Egypt
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of R. Sales Barquets, consultant
in pesticide production technology

Backstopping officer: B. Sugavanam, Chemical Industries Branch

United Nations Industrial Development Organization
Vienna

* This document has not been edited.

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Contents :

1.- Working plan during the present visit

In a previous meeting with Mr. Said, it was prepared the working plan according to the objectives and target dates. Previous consultation with the Chairman, it was booked the day 29th for the visit of Mr. Sugavanam. It is attached as Anex No. 1 Minute of Meetings issued by DCC.

2.- Progresses done from June 1988

After inspection of the plant during the DIMETHOATE production, and analyzing the consumption and production figures given by Mr. Fathy and Mr. Hany, it is deduced that the quality and quantity produced until the date is according to the specifications of the project.

Nevertheless, most of the recomendations given during my last visit have not been followed up, specially the ones related with the prompt repair of small damages, avoiding spillages, preventive maintenance, painting of structures and other metallic parts exposed to the corrosion efects, improving the operative conditions of the control laboratory of the plant installing at least one socket for plugging in each instrument as pH-meter, KF and analytical scale, to replace broken glassware and also they would have at hand consulting elemental books as : Handbook of Chemistry and Physics, The Merk Index, and Toxic and Hazardous Industrial Chemicals Safety Manual, at least.

I emphazise that although the production is running now according to the project, if such recommendations are forgotten very soon the problems will increase and the production will decrease.

3.- Safety aspects

I consider the safety in the plant as acceptable, let us say in the inferior acceptable margin, then they must take care to improve this aspect, following the reccomendations of the report of the expert Mr. R. Gardon, that was shown to me by Mr. Said. Regarding the destruction of important spillages of phosphorus pentasulfide, I consider it essential to prevent spillages, because it is a solid powdered product, packed

in metallic drums. If they need more information on the subject, I reccomend them to contact the supplier of the product.

4.- Comments on the production of DIMETHOATE

During the process of production it is normal that some troubles are produced. The way to minimize such troubles is to follow carefully the directions of the project and to correct quickly any small damage produced, before such damage grows to one of more importance.

4.1.- Increase of production

During the steps of formation of DIMETHOATE there are produced by-reactions that makes the yield fall to the value of the project. In the practice, in some batches have been obtained some kg more of the product; with a more carefully work, this circumstance will be repeated more frequently.

If they decide to increase the production installing new equipments, they must also enlarge the plant area, because now it is already a little scarce, specially the dryer and centrifugues zone.

4.2.- Formation of impurities, reasons and how to avoid it

Any bad operation or distraction of the workers can increase the contents of the impurities of the product or of the residual waters. They must have special care in not overflowing the centrifuges and to controll carefully the separations.

Surely, a bad separation of the phases was the cause of the obstruction of the glass discharge pipe of R-101. Few liters of sodium salt/soda sent with the toluene to this reactor, could produce : sodium sulfide, sodium phosphates, sodium sulfate and other insoluble impurities in the reaction medium.

Regarding TK-126 the best way to avoid obstruction is to keep its content in agitation by recycling by its pump and to empty and wash with water daily.

4.3.- Specifications of raw materials and final product

Obviously to obtain a final product of good quality. raw materials must be used according to the specifications of the project. I think that a small variation on the water contents of methanol until for example Ø.3 pct would not affect the quality of the product, but this is something that could only be tested under their own responsability.

As general rule. if they use good quality raw materials and are working carefully. the concentration of the final product must be between 95 and 97 pct.

4.4.- Using of explosion proof tool for charging P255

The device for this purpose must be explosion proof as indicated in the project. Occassionally. a conventional hoist could be acceptable in a very ventiled area. but not reccomended.

4.5.- Using of AISI 316 L instead of glass pipes.

This is only possible in the following conditions : welding must agree with the good norms and after the shut downs. the pipes must be cleaned with solvents.

5.- Treatment for spent toluene

The best is to burn it in an adequate incinerator. The other possibility is to mix in small proportion with some industrial fuel. The information on incinerators will be sent to DCC.

6.- MALATHION start up

From the beginning there have been problems with the steam supply and vacuum to R 1Ø5 because these facilities donot meet the specifications of the project. In the last trials it has been observed that there was enough steam (more than 3ØØ kg/h) but that the vacuum was insufficient.

Regarding the steam, I would like to mention that the design from Aragonesas is right. because at a diameter

25 pipe allows a steam flow rate of 500 kg/h at 3.5 kg/cm2 as shown in the diagram attached as Anex No. 2. This diagram proceeds from the GESTRA STEAM MANUAL.

DCC has changed the original steam pipe by other of diameter 40 that has branched the general pipe of supply of steam and this will be surely the reason of having more steam. At the entrance of the plant, the steam is at 4 kg/cm2 and not at 6 Kg/cm2 as specified in the project, but if we have as minimum 300 kg/h at 3-4 Kg/cm2 in that point, this will be acceptable.

As conclusion it is agreed that when the vacuum facility will be sufficient and this demonstred with a blank trial, then we could proceed to the start up in a next visit.

7.- METHYL CHLOROACETATE PROJECT

The technology for that product hereafter referred to as MECA has been discussed in detail step by step. According to the project the yield is 90 - 95 pct. In the DCC Laboratory Ms. Eda has done synthesis trials arriving to yields superior than 90 pct in working conditions not so good as the ones of the industrial process. Also there have been done washing and stability trials with good results, perhaps better than the ones indicated in the project.

The feasibility study ellaborated by Mr. Hady (1988-6-12) shows very promising results.

In the case of going on with the project after the approval from UNIDO, R. Sales will give as addendum to the project a detailed revision including improved designs, more detailed description of the process and in general all the needful specifications for its performance.

The design of this plant is also useful to develop other esterifications or related reactions.

7.1.- Equipment design

Discussions have been held on that point with Mr. Said, Mr. Fawzy and Mr. Sayed.

I propose a change in the glass equipments that will improve the efficiency and the cost of the installation. They show me their designs for the plot plan refered to the place chosen for the installation, besides the existing pesticide plant, and after visiting the zone I found the place adequate.

Pipe lists and equipments are revised, as well as some offers received from the suppliers. I have given some specifications, in order to advance in the field.

I reccomend them to obtain complete and updated catalogue, from the main equipment and accessoires suppliers, because that is an important working tool in this step of the project.

7.2.- Instrumentation

The point is discussed with Mr. Zakaria and I give him the specifications for each instrument. In the original project, the control of instrumentation is done by hand. Mr. Zakaria proposes to automatize some controls. I agree with him, that it will be very interesting to regulate automatically the steam entrance in the esterification reactor in function of the jacket temperature and also to put a controll to stop the metering pump in case of shut down in the steam supply.

Of course, all automatic controls are recommendable only if they are of very good quality and if there is good maintenance service in the plant.

8.- Meetings held at DCC offices on 29-1-89.

Preliminary conversations were held with Mr. Said, Mr. Fawzy and Mr. Hakan, a finnish expert that came to discuss about the production of MONOCHLOROACETIC ACID.

Finally a meeting was held with Mr. Sugavanam, Mr. Khatab, Mr. Tawfik and members of the staff of DCC to expose a general summary of the conversations. I propose DCC to ellaborate a chronological programm relative to the MECA project and I insist in the importance of an organized and coordinated action in the project management.

9.- Final conclusions regarding MECA project

I consider that this project is very interesting to DCC after analyzing the existent circumstances and having in account the experience accquired handling the pesticide plant.

I also consider secure that if the new plant is built up following the project indications and operated according to such project. the result will be exactly as indicated on it.

MINUTES OF MEETINGS HELD AT DCC
OFFICES 16-29 JAN. 1989 BETWEEN MR. SALES AND
DCC REPRESENTATIVES

PARTICIPANTS	: MR. RODOLFO SALES	SPANISH EXPERT
	MR. SAID ATTIA	DCC
	MR. FAWZI ABDEL MADY	DCC
PARTIALLY	: MR. SAYED KASEM	DCC
	MR. ZAKARIA TAWFIK	DCC
	MR. FATHY EL ZOEM	DCC

A. DYMETHOATE PRODUCTION:

THE FOLLOWING POINTS HAVE BEEN DISCUSSED:

1. PRODUCTION FIGURES AND HOW TO ACHIEVE FURTHER PROGRESS.
2. FORMATION OF IMPURITIES, REASONS AND HOW TO AVOID.
3. SPECS. OF RAW MATERIALS AND PRODUCT.
4. USING OF EXPLOSION PROOFE TOOL FOR CHARGING P25.
5. USING OF AISI 316 L INSTEAD OF GLASS PIPES.
6. PREVENTIVE MAINTENANCE OF THE PLANT SPECIALLY THE STEEL STRUCTURES.

B. MALATHION PRODUCTION:

1. THE PROBLEM OF STEAM QUANTITY INTRODUCED TO RI 105 HAS BEEN SOLVED, EFFICIENT VACUUM SHOULD BE AVAILABLE BEFORE STARTING PRODUCTION TRIALS.
2. MALATHION PRODUCTION WILL BE THE SUBJECT OF THE NEXT VISIT OF MR. SALES.
3. MR. SALES WILL SEND DCC DATA ABOUT A SPANISH COMPANY DEALING WITH SPENT TOLUENE BURNING OVEN.

C. METHYL CHLOROACETATE PRODUCTION (MECA):

1. THE TECHNOLOGY HAS BEEN DISCUSSED IN DETAILS SPECIALLY THE ESTERIFICATION STEP.
2. MR. SALES WILL SEND DCC:
   - FURTHER DETAILS.
   - SPECS. AND ANALITICAL PROCEDURES FOR THE CATALYST.
   - FREE ACIDITY DETERMINATIONS IN (MECA).

D. INSTRUMENTATION:

IT HAS BEEN REVIEWED IN DETAILS:

1. ALL FLOW INDICATORS ARE ROTAMETERS
2. ALL THERMOMETERS ARE NORMAL EXCEPT THAT ON B 202 IS (PT 100) TYPE
3. ALL THE MANOMETERS ARE NORMAL TYPES.
4. SPECIAL INTEREST WAS GIVEN TO B 202 AND IT'S LEVEL INDICATOR
5. PH METER FOR B 203 COULD BE PORTABLE OR EVEN PAPER STRIPS.
6. MR. SALES WILL SEND DCC SOME DETAILS SPECIALLY FOR P 201 AID AND RELATED CONNECTIONS.

E. EQUIPMENT DESIGN:

ALL THE BASIC EQUIPMENT DESIGN HAS BEEN DEALT WITH:

1. THE MODELS OF THE GLASS LINED REACTORS, GLASS LINED TANKS AND GLASS HEAT EXCHANGERS HAVE BEEN ISSUED, BUT WITH SOME RECOMMENDATIONS.
2. THE NEW DESIGN OF THE AISI TK 201, TK 204 IS ACCEPTABLE.
3. SOME CHANGES IN OTHER EQUIPMENTS WERE PROPOSED.
4. SOME DETAILS WILL BE SENT BY MR. SALES.

Annex II

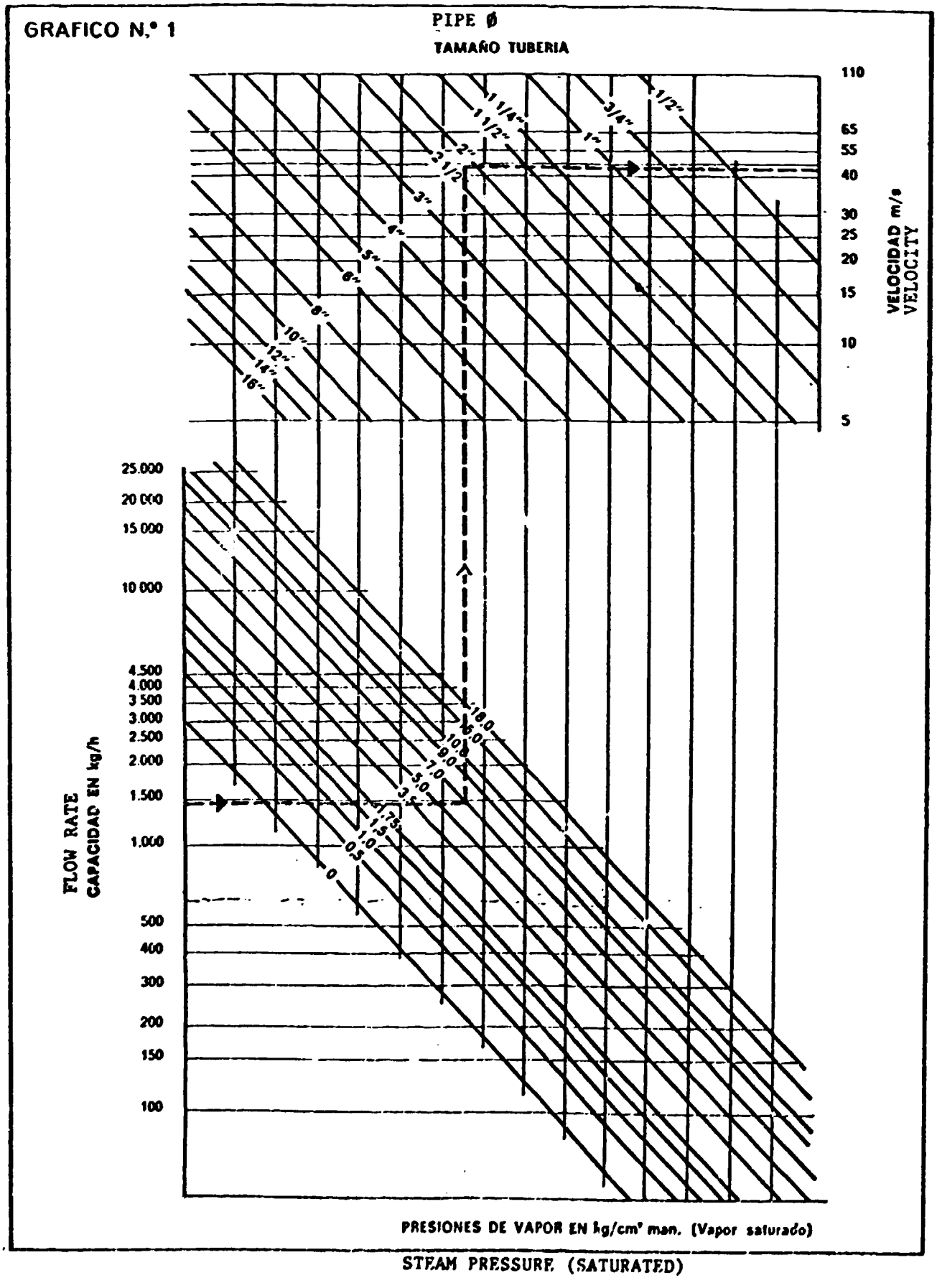
GRAFICO N.° 1
PIPE Ø
TAMAÑO TUBERIA
1 1/4"
1 1/2"
2"
2 1/2"
3"
4"
5"
6"
8"
10"
12"
14"
16"
3/4"
1"
1/2"
110
65
55
40
30
25
20
15
10
5
VELOCIDAD m/s
VELOCITY
25.000
20 000
15 000
10 000
4.500
4.000
3 500
3.000
2.500
2.000
1.500
1.000
500
400
300
200
150
100
FLOW RATE
CAPACIDAD EN kg/h
18.0
16.0
14.0
12.0
10.0
9.0
7.0
5.0
3.5
2.5
1.5
1.0
0.5
0
PRESIONES DE VAPOR EN kg/cm² man. (Vapor saturado)
STEAM PRESSURE (SATURATED)