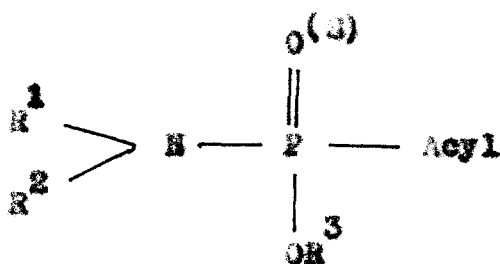


PART -I

CHAPTER - I

General Introduction:

One of the most important classes of pesticides is the organophosphorus compounds. Substances with a great variety of pesticidal properties are found among the organophosphorus compounds with insecticidal, acaricidal, nematocidal, fungicidal, herbicidal, anthelmintic, insect sterilising and rodenticidal properties. The development of organophosphorus pesticides resulted from the research of Professor Schrader⁽¹⁾ in Germany and Professor Saunders⁽²⁾ in England. Saunders prepared some nerve poisons, including O, O-diisopropyl phosphorofluoridate (DFP). In 1937, Schrader found a contact insecticidal activity in some organophosphorus compounds of the general formula:



where R¹, R² and R³ are alkyl groups, and "acyl" is an inorganic, or organic acid radical such as Cl, F, SO₂ and CH₃COO. Since this time, extensive research in this field

has resulted in the discovery of thousands of compounds with pesticidal properties of every description. Thus there are compounds with very short residual action such as TSP and chlorzin or with prolonged activity such as Diazinon and Guthion. There are broad spectrum insecticides such as Parathion and materials with highly selective action such as Schradan. The unique properties of compounds such as systox have resulted in successful plant systemic insecticides, and this has been still further refined in seed and soil treatments with compounds such as chlorate, which will protect newly developed seedlings from insect attack. Compounds such as nonnel can be fed to cattle and will kill cattle grubs living in the animals' bodies, while others such as Dipterex have pronounced stomach-poison action but virtually no contact activity and are especially useful in poison baits. Nitazin has fungicidal activity. Many aziridine derivatives of phosphoric acid are actively studied for insect chemosterilants (tepa, thiotepa). The great advancement in agricultural practice, scientific knowledge on the structure-activity relationship, and mode of action of organophorus pesticides were achieved by the discovery of Parathion, diethyl P-nitrophenyl phosphorothionate by Schrader in 1944⁽³⁾. Parathion is extremely toxic to mammals as well as to insects. Many less toxic pesticides have been synthesised by slight structural modifications of parathion; for example, chlorthion (in 1952), Fenithion (in 1958), and Fenitrothion (in

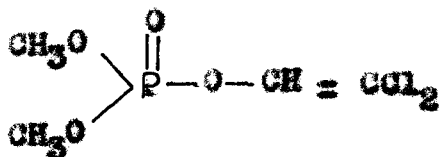
1959) were discovered (3). Malathion was discovered in 1950, and Demeton in 1951. In 1952, the Perkow reaction was discovered, and many important vinyl phosphate esters have been introduced as practical pesticides; since then several new compounds have been developed and are in commercial use.

The trade or common names, Toxicological properties and other properties of some of the organophosphorus compounds are listed below (3-3).

Names and Structure
of the pesticides

Properties of the pesticides

1. Dichlorvos, D.D.V.P.,
Vapona (R), Nuvan (Shell
Oil Co.).



O,O, dimethyl O(2,2
dichlorovinyl) phosphate.

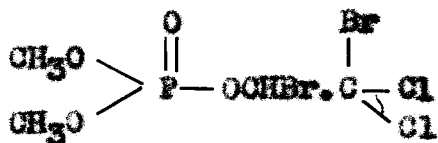
liquid, non-systemic, con-
tact and stomach insecti-
cide with fumigant action
and low residual activity,
has also acaricidal and
anthelmintic property;
LD₅₀ . 90 mg/kg.

Names and Structure of the pesticides

Properties of the pesticides.

2. Dibrom^(R), Maled,

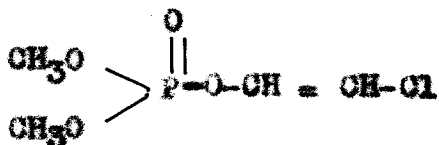
liquid (m.p. of pure compd. is 26°), non systemic insecticide and acaricide, LD₅₀: 430 mg/kg.



O,O-dimethyl O-(1,2-dibromo-2,2-dichloroethyl) phosphate

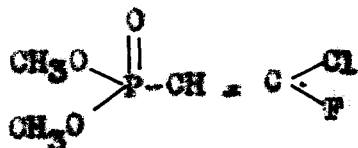
3. O,O-dimethyl O-(2-chlorovinyl) phosphate

liquid, insecticide; LD₅₀ . 50 mg/kg



4. O,O-dimethyl O-(2,2-chlorofluorovinyl) phosphate

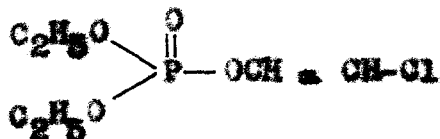
liquid, low toxicity to fish.



**Names and Structure
of the pesticides**

Properties of the pesticides

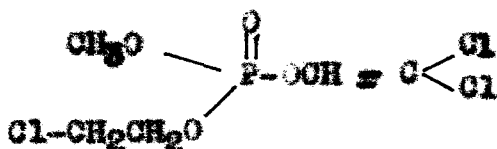
**5. O,O-diethyl O-(2-chloro
vinyl) phosphate**



liquid, relatively stable
systemic insecticide

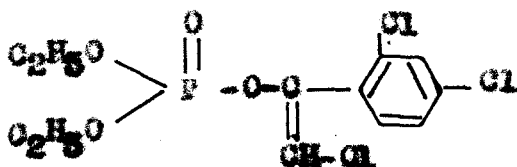
LD₅₀: 7.4 mg/kg.

**6. O-methyl O-(2-chloro-
ethyl) O-(2,2 dichloro-
vinyl) phosphate**



systemic insecticide.

**7. Chlorfenvinphos,
Dapona (R), Birlana (R)**



Liquid, non-systemic insecticide, used in soil and seed treatment; moderately

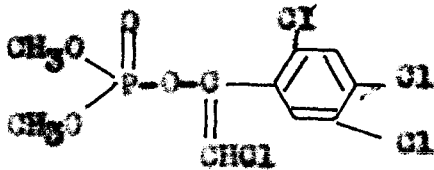
persistent; LD₅₀: 10-40 mg/kg

**O,O-diethyl O-(2-chloro-
1-(2'-4'-dichlorophenyl)
vinyl) phosphate.**

**Names and structure
of the pesticides**

Properties of the pesticides

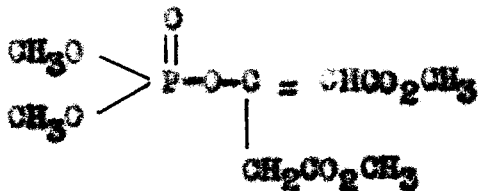
8. Tetrachlorvinphos,
Gardona (R), Sabon (R)



O,O-dimethyl O-(2-chloro-
1-(2',4',5'-trichlorophenyl)
vinyl) phosphate

Solid, m.p. 62°C (α -isomer)
93°C (β -isomer), non-
systemic, brief persistence
selective insecticide, used
to control diptera, lepi-
doptera and coleoptera and
other pests, LD₅₀:
4,000 μ g/kg.

9. Bonyl (R)



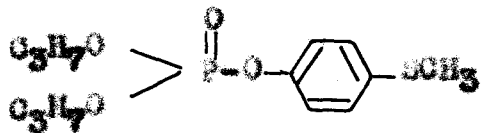
1,3-di(methoxy carbonyl)-1-
propan-2-yl-dimethyl
phosphate.

Liquid, used for contact-
residual treatment of
insects and mites LD₅₀:
32 μ g/kg (R)

**Names and structure
of the pesticides**

Properties of the pesticides

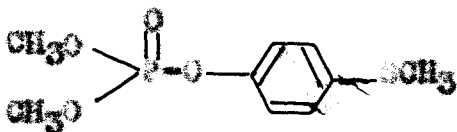
10. **Kayaphos** ^(R), **Propaphos**



**Di-n-propyl p-methylthio-
phenyl phosphate**

Liquid, selective contact
insecticide for rice stem-
borers and green rice leaf
hoppers; synergists of
other organophosphorus
insecticide. LD₅₀, 70 mg/kg.

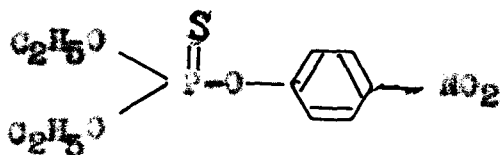
11. **GC-6506**



**Dimethyl homolog of propa-
phos.**

Insecticide and acaricide
for use in cotton; LD₅₀
7 mg/kg. Dimethyl homolog
is most toxic to mammals.

12. **Parathion**, **Folidol** ^(R)



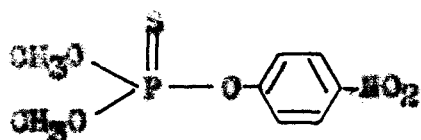
**O,O-diethyl O-paranitro-
phenyl phosphorothionate.**

Liquid, wide spectrum
insecticide LD₅₀, 7 mg/kg.

**Names and structure
of the pesticides**

Properties of the pesticides

13. Methyl parathion,

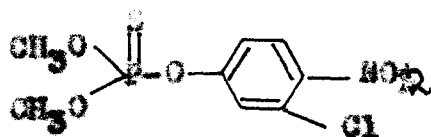


**O,O-dimethyl O-paranitro-
phenyl phosphorothionate**

Liquid, broad spectrum;

LD₅₀ 25-50 mg/kg.

14. Chlorthion^(R)

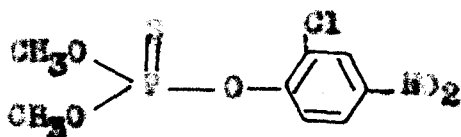


**O,O-dimethyl O-(3-chloro-
4-nitrophenyl) phosphoro-
thionate**

**Crystalline powder, for
control of beetles, aphids,
caterpillars**

LD₅₀ 300 mg/kg.

15. Bi-captan^(R), Dicapthon



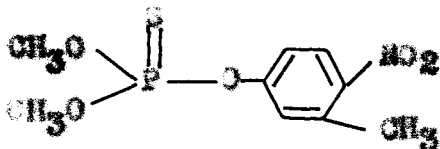
**O,O-dimethyl O-(2-chloro-4-
nitrophenyl) phosphorothionate**

**Crystalline powder; for
controlling household
insects, aphids, and ball
weevils.**

Names and structure
of the pesticides

Properties of the pesticides

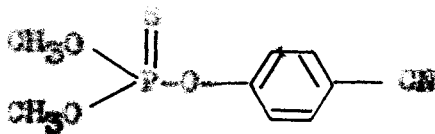
16. Sumithion^(R), Polithion^(R),
Penitrothion



O,O-dimethyl O-(3-methyl-
4-nitrophenyl) phosphoro-
thionate

Liquid, broad-spectrum
(as methyl parathion),
specially for rice-steam
borers, flies and mosquitoes
in public health programmes
LD₅₀: 250-300 mg/kg.

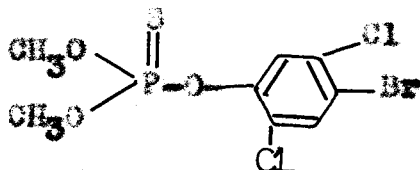
17. Cyanox^(R), Cyanophos, CHAc



O,O-dimethyl O-paracyanophenyl
phosphorothionate

Liquid; rice-steam borers
and also useful for pests
of vegetables, fruits and
ornamentals.

18. Bromophos, Mexin^(R),
Brofens



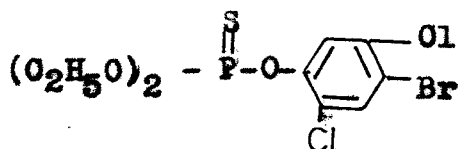
O,O-dimethyl O-(4-bromo-2,5-
dichlorophenyl) phosphorothionate

Crystalline solid, m.p.
54° non-systemic persistent
insecticide and acaricide,
particularly effective
against diptera; ectopara-
site control in livestock,
LD₅₀: 3750 to 6100 mg/kg.

**Names and structure
of the pesticides**

Properties of the pesticides

19. Bromophos ethyl

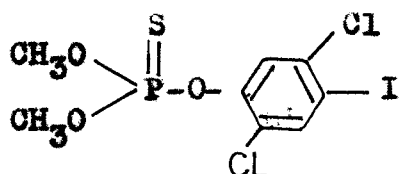


O,O-diethyl O-(4-bromo-2-
5-dichlorophenyl) phosphoro-
thionate

Insecticide and acaricide,

LD₅₀, 238 mg/kg.

**20. Iodofenphos, Alfaaron^(R),
Nuvanol N^(R), Elocril**



O,O-dimethyl O-(4-iodo-
2-5-dichlorophenyl)
phosphorothionate

Colourless crystalline

solid, m.p. 76° C non-

systemic contact and stomach

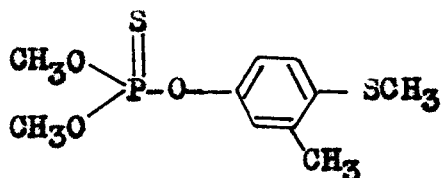
insecticide and acaricide

effective against a wide

range of insect pests,

LD₅₀, 2100 mg/kg.

**21. Baytex, Lebayacid^(R),
Fenthion**



O,O-dimethyl O-(3-methyl-
4-methylthiophenyl) phos-
phorothionate

Liquid, general purpose

insecticide with systemic

action; particularly for

fly and mosquito; LD₅₀,

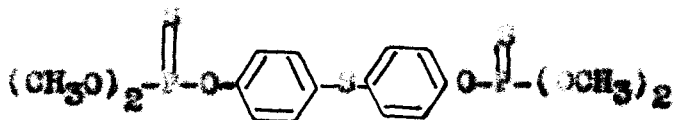
215 mg/kg (Male R) 615 mg/kg

(Female R)

Names and structure of the pesticides

Properties of the pesticides

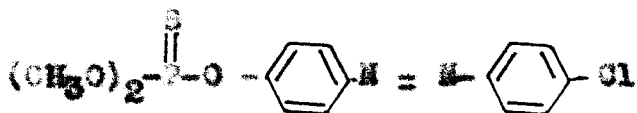
22. Abate^(R), Biothion^(R)



0,0,0',0'-tetramethyl
0,0'-thiodi-p-phenylene
phosphorothionate

white solid; m.p. 30°C
control of mosquito
larvae, LD₅₀: 2000-
4000 mg/kg

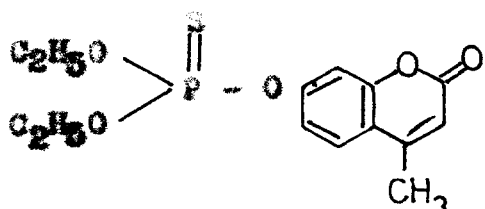
23. Alamos^(R), Slam^(R),
Azothate



0,0-dimethyl 0-[p-(p-chlorophenyl-
azo) phenyl] phosphorothionate

experimental insecti-
cide and acaricide,
particularly non toxic
to mammals.

24. Potasan^(R)



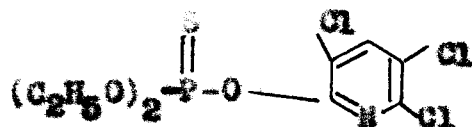
0,0-dimethyl 0-(4-methyl-7-
coumarinyl) phosphorothionate.

Colourless crystalline
solid, m.p. 33°C, stomach
insecticide with weak
contact activity, parti-
cularly effective against
Colorado potato beetles,
LD₅₀: 42 mg/kg.

**Names and structure
of the pesticides**

Properties of the pesticides

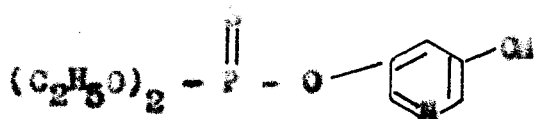
25. Dursban^(R), Chlorpyrifos



O,O-diethyl O-(3,5,6-
trichloro-2-pyridyl)
phosphorothionate

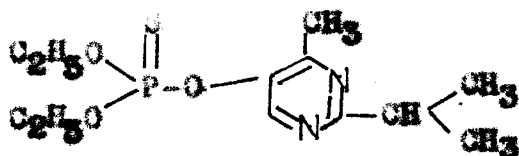
white crystalline solid,
m.p. 43° moderately persis-
tent insecticide, effective
for controlling mosquito and
fly-larvae.

26. O,O-diethyl-O-(5-Cyano-
2-pyridyl) phosphorothionate



Effective against various
insects and mites.

27. Diazinon, Basudin^(R),
Drolex^(R)



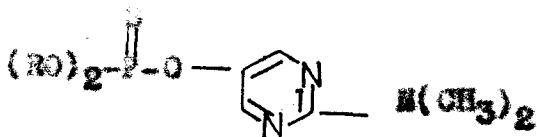
O,O-diethyl O-(2-isopropyl-4-
methylpyridin-6-yl) phosphoro-
thionate

liquid, it has long residual
action and effective against
soil, fruit, vegetable and
rice insects; LD₅₀: 103-
250 mg/kg.

**Names and structure
of the pesticides**

Properties of the pesticides

28. Priniphos-ethyl



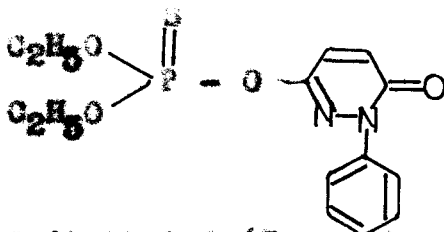
R = C₂H₅ priniphos-ethyl

R = CH₃ priniphos-methyl

O,O-diethyl O-(2-diaethyl-
amino-4-methylpyridine-
6-yl) phosphorothionate

Priniphos-ethyl is a liquid, with broad insecticidal spectrum, particularly effective against diptera and Coleoptera; it has also fungicidal activity; LD₅₀ 140-200 mg/kg seed use. Priniphos-methyl is a liquid; it is an insecticide and acaricide with contact and fumigant activity.

29. Pyridafenthion, Ofnack^(R)
AC-12, 503.



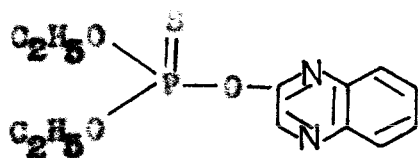
O,O-diethyl O-(3-oxo-2-
phenyl-2H-pyridine-6-yl)
phosphorothionate

Used for the control of rice stem borers.

**Names and structure
of the pesticides**

Properties of the pesticides

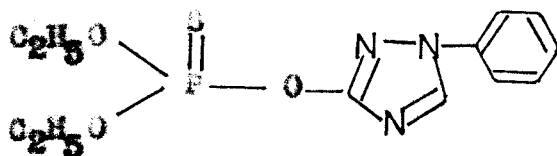
**30. Quinalphos, Bayrucil^(R),
Diethquinalphion.**



**O,O-diethyl O-(2-quinoxalyl)
phosphorothionate**

white crystalline powder,
m.p. 36°C, contact and
stomach activity, effective
against both biting and
sucking pests, especially
against diamond-back moth,
for control of mosquitoes
and mites, LD₅₀ 66 mg/kg.

**31. Hostathion^(R), Triasophos,
HDS 2960;**



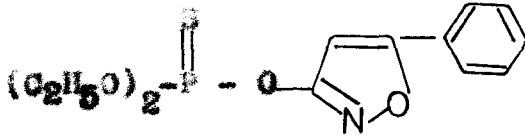
**O,O-diethyl O-(1-phenyl-1,
2,4-triazol-3-yl) phosphoro-
thionate.**

liquid; a non systemic
insecticide and acaricide,
acting as a contact and
stomach poison; LD₅₀
32 mg/kg

**Names and structure
of the pesticides**

Properties of the pesticides

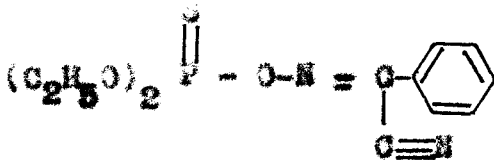
32. Isoxathion, Karphos^(R)



**O,O-diethyl O-(5-phenyl-
3-isoxazolyl) phosphoro-
thioate**

Liquid; a broad spectrum
insecticide including scale
insects and soil insects;
LD₅₀: 112 mg/kg.

**33. Phoxin, Baythion^(R),
Valeron**



**Diethoxy(phosphinothioyl oxy-
imino) phenylacetonitrile**

Liquid; broad spectrum,
contact and stomach poison;
most useful against soil
insects and stored products
pests; LD₅₀: 2000 mg/kg.

70200

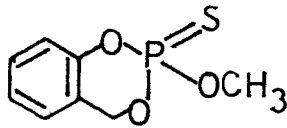
27 JUN 1981



**Names and structure
of the pesticides**

Properties of the pesticides

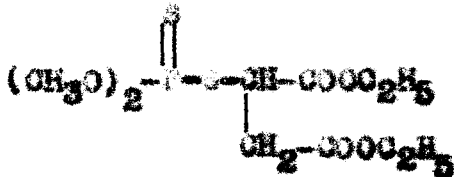
34. Malathion



**2-methoxy-4H-1,2,3-
benzodioxaphosphorin-
2-sulphide**

White crystalline powder,
m.p. 56° C; a short-lived
insecticide for protection
of fruits and vegetables,
LD₅₀ 102 mg/kg.

**35. Malathion, Cythion (R),
Karbofos,**



**O,O-dimethyl S-[1,2-di
(ethoxy-carbonyl) ethyl]
phosphorothiothionate**

Liquid; safe general
purpose insecticide with
low mammalian toxicity,
LD₅₀ 1375 mg/kg; contact
and stomach poison.

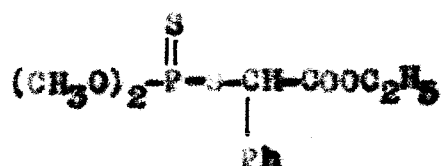
Names and structure
of the pesticide

Properties of the pesticides

36. **Fenthion**, **Cidial**^(R),

dimepenthionate,

Fapthion^(R), **Slean**^(R)



O,O-dimethyl-S-[α-(ethoxy-carbonyl) benzyl] phosphorothioethionate.

Liquid, broad spectrum

insecticide and acaricide;

LD₅₀, 4700 mg/kg.

37. **Acethion**



O,O-diethyl-S-(ethoxy-carbonyl methyl) phosphorothioethionate.

Liquid, selective insecti-

cide, LD₅₀, 1100 mg/kg.

it is not used practically.

38. **Chlorophos**



O,O-diethyl S-chloromethyl phosphorothioethionate

liquid; non systemic soil

insecticide, particularly

for control of larvae of

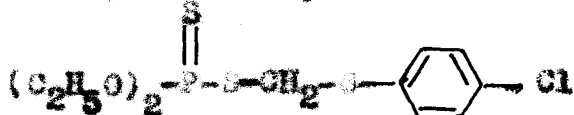
coleoptera (wire worms);

LD₅₀, 7 mg/kg.

Names and structure
of the pesticides

Properties of the pesticides

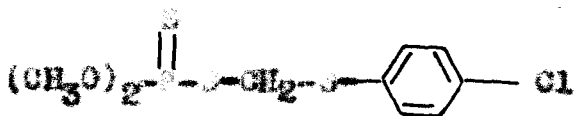
39. Trithion^(R) Garrathion^(R),
Carbophenothion, Akarithion^(R)



O,O-diethyl S-(p-chlorophenyl
thiomethyl) phosphorothiole-
thionate

Liquid, insecticide and
acaricide with long residual
action, used for sucking
plant pests, particularly
mites, useful as a dip for
cattletick; LD₅₀, 30 mg/kg.

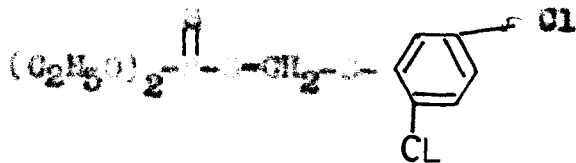
40. Methyl trithion^(R),
Methyl Carbophenothion



O,O-dimethyl-S-(p-chloro-
phenyl thiomethyl) phosphoro-
thiothionate.

Liquid; for control of
variety of insects and
mites, particularly cotton
boll weevil, LD₅₀, 150 mg/kg.

41. Phencapton, Phencapton^(R)



O,O-diethyl S-(2,5-dichloro-
phenylthiomethyl) phosphoro-
thiothionate.

Liquid, non systemic,
selective acaricide with
prolonged action and effective
against all development
stages including eggs,
LD₅₀, 200 mg/kg.

**Names and structure
of the pesticides**

Properties of the pesticides

42. Azothion



O,O-diethyl S-(M,S-dimethyl-
thiocarbonylthioethyl)
phosphorothiolothionate.

Insecticide and acaricide,

LD₅₀: 150 mg/kg.

43. Ethion, Nialate (R)

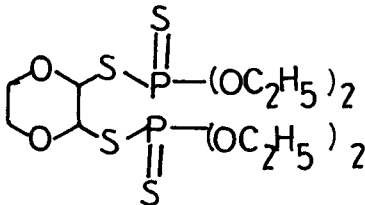


O,O,O',O'-tetraethyl, S,S'-
methylene bis-(phosphorothio-
thionate).

Liquid, for control of
aphids, scales, and mites,

LD₅₀: 200 mg/kg.

**44. Bioxathion, Delnav (R),
Novadel (R)**



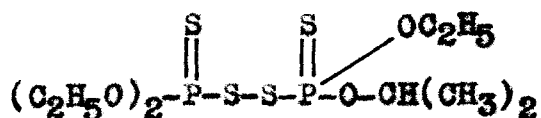
1-4, dioxan-2-3-ylidene
bis(O,O-diethyl phosphoro-
thiolothionate).

Liquid, non-systemic
acaricide and insecticide
with a long residual effect
and is particularly useful
to control mites on cotton
and fruits and ticks, lice
and horn fly on cattle;
The methyl ester homolog
has high insecticidal acti-
vity but low mammalian
toxicity, LD₅₀: 300 mg/kg.

Names and structure
of the pesticides

Properties of the pesticides

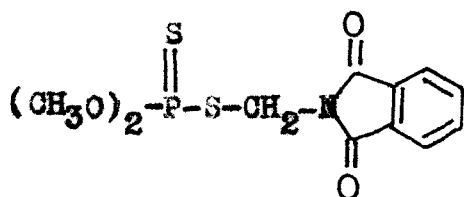
45. Phostex^(R)



Diethoxyphosphinothonyl
ethoxy isopropoxyphosphino-
thionyl disulphide.

Weak contact insecticide,
but a highly effective
miticide with a good ovicidal
activity; LD₅₀, 2,500 mg/kg.

46. Phosnet, Imidan^(R),
phthalophos, Prolate^(R)



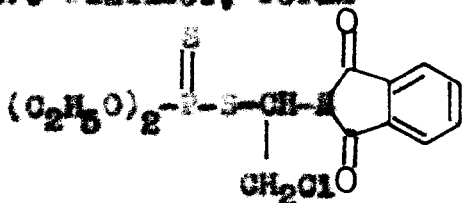
O,O-dimethyl S-(phthalimido-
methyl) phosphorothiole-
thionate.

White crystalline solid,
m.p. 72° acaricide and
broad spectrum insecticide
for sucking and chewing
insects, LD₅₀, 230 mg/kg

**Names and structure
of the pesticides**

Properties of the pesticides

47. Dialifor, Torak

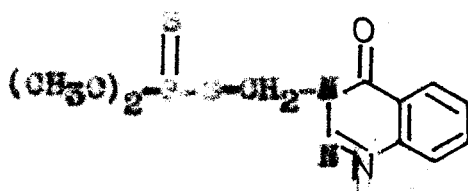


O,O-diethyl S-(2-chloro-1-phthalimidoethyl phosphorothiothionate.

Crystalline solid, m.p. 67-69° insecticide and acaricide; LD₅₀: 5-27 mg/kg (depending on species and sex).

48. Azinphosmethyl,

Guthion^(R), Gusathion^(R)



O,O-dimethyl S-(3,4-dihydro-4-oxobenzo [d]-[1,2,3]-triazin-3 yl methyl) phosphorothiothionate

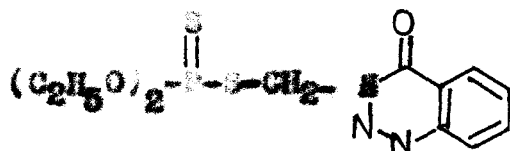
white crystalline solid, m.p. 73-74°, LD₅₀: 15 mg/kg.

non systemic insecticides and acaricides with long residual activity under neutral conditions.

**Names and structures
of the pesticides**

Properties of the pesticides

49. Azinphosethyl, Ethyl
guthion, Gusathion A (k)

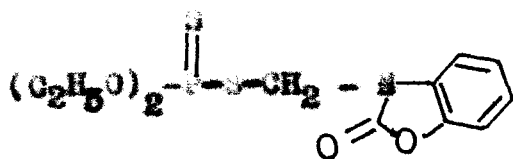


O,O-diethyl-S-(3,4-
dihydro-4-oxobenz[e]
[1,2,3]-triazin-3-yl
methyl) phosphorothiole-
thionate.

Colourless needles, m.p.
53°C. LD₅₀ 17.5 mg/kg.

Non systemic insecticides
and acaricides with long
residual activity under
neutral conditions.

50. Zolone (R), Phosalone



O,O-diethyl-S-(6-chloro-
2-benzoxazole-3-yl
methyl) phosphorothiole-
thionate.

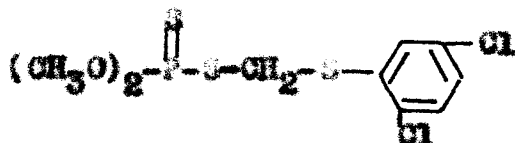
Solid, m.p. 47-48°C

Broad spectrum, non systemic
insecticide and acaricide;
sap-feeding pests, LD₅₀
120 mg/kg

**Names and structures
of the pesticides**

Properties of the pesticides

53. Methyl phenkapton



Acaricide and insecticide

LD₅₀ 375 mg/kg.

**O,O, dimethyl S-(2,5-dichloro-
phenyl thiomethyl) phosphoro-
thiolethionate.**

54. Acetoxon



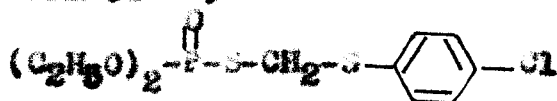
Liquid contact insecticide,

LD₅₀ 300-700 mg/kg.

**O,O-diethyl S-ethoxy
carbonyl methyl phosphoro-
thiolate.**

**Methyl acetophos (dimethyl
homolog) LD₅₀ 1000 mg/kg.**

55. Danifos^(R), PTAD



**Liquid, acaricide, for
control of spider mites,
aphids and scale on citrus,**

LD₅₀ 165 mg/kg⁽¹⁾

**O,O-diethyl S-(p-chlorophenyl
thiomethyl) phosphorothiolate.**

Names and structures of the pesticides

properties of the pesticides

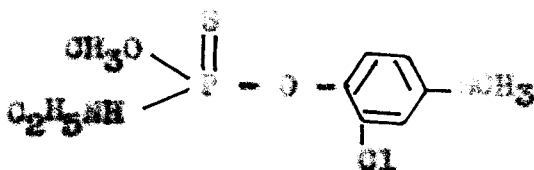
56. Fujithion^(R), DMCP



O,O-dimethyl-O-(p-chlorophenyl) phosphorothiolates

Liquid, insecticide, for control of leaf-hoppers and plant hoppers which transmit rice virus diseases; LD₅₀ 100 mg/kg.

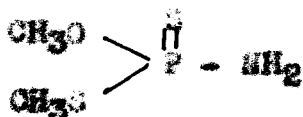
57. Amidothionate, Mitamate^(R)



O-methyl O-(2-chloro-4-methylthiophenyl) S-ethyl phosphoramidothionate.

Yellow oil, acaricide; long residual activity and can be mixed with Bordeaux mixture kills both eggs and active mites. LD₅₀ 33 mg/kg (d)

58. Monitor^(R) Tamaron^(R), Methamidophos



O,O-dimethyl phosphoramidothiolate.

Solid, m.p. 44.5°C acaricide and broad spectrum insecticide with contact and systemic action, LD₅₀ 30 mg/kg.

**Names and structures
of the pesticides**

Properties of the pesticides

59. **TEPP, tepp, Tetron^(R),
Bladan^(R), Nifos T,
Vapotons.**



tetraethyl pyrophosphate

**Liquid, contact insecticide
and acaricide, LD₅₀: 1,2-
2.0 mg/kg. For homologs
insecticidal activity
decreases ethyl > methyl >
propyl.**

60. **Sulfotep, sulfotepp,
Bladafum^(R)**

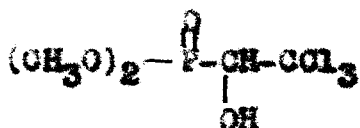


O,O,O',O'-tetraethyl

dithiopyrophosphate.

**Liquid insecticide and
acaricide with high contact
and fumigant activity,
LD₅₀: 5 mg/kg.**

61. **Trichlorfon, Dipterex^(R),
Seguvon^(R), Tugon^(R),
trichlorphon, metrifonate**

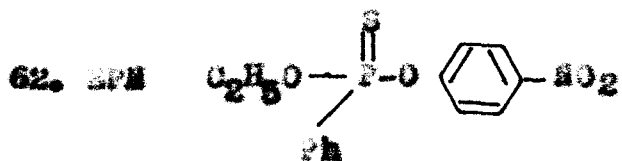


**Dimethyl-1-hydroxy-2,2,
2-trichloro ethyl phos-
phonate.**

**Crystalline powder, m.p.
33-34° high insecticidal
activity, particularly
against Diptera; useful
for sucking and chewing
insects of public health
and animal ectoparasites
LD₅₀: 630 mg/kg.**

Names and structures
of the pesticides

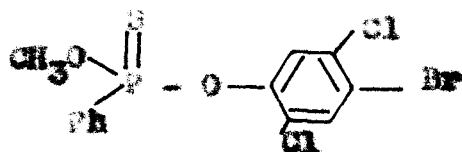
Properties of the pesticides



Ethyl p-nitrophenyl phenyl
phosphorothionates.

Light yellow crystalline
solid, m.p. 36°C, insecti-
cide and acaricide, poten-
tiates the toxicity of
malathion, shows delayed
neurotoxicity; LD₅₀:
40 mg/kg (male rat),
12 mg/kg (female rat)

63. Phosvel^(R) Leptophos,
VCS-506.



4-bromo-2,5-dichlorophenyl
methyl phenyl phosphoro-
thionate.

white solid, m.p. 70.2°C
insecticide, controlling
Lepidopteran such as tobacco
beetworms, cotton leafworms,
rice stem borers, has also
fungicidal effect, LD₅₀:
30 mg/kg.

**Names and structures
of the pesticides**

Properties of the pesticides

64. Dimethoate, Rogor^(R),
Cygon^(R),



O,O-dimethyl S-(M-methyl
carbamoyl methyl) phos-
phorothiothionate

Solid, m.p. 51-52°C.

Systemic and contact
broad range insecticide
and acaricide;

LD₅₀, 600 mg/kg (pure compd.)
150-300 mg/kg (technical
product)

65. Morphethion, Skatin M^(R),
Skatia F^(R), Morphotex^(R)



O,O-dimethyl-S-(morpholino
carbonyl methyl) phosphore-
thiothionate.

Crystalline solid, m.p.

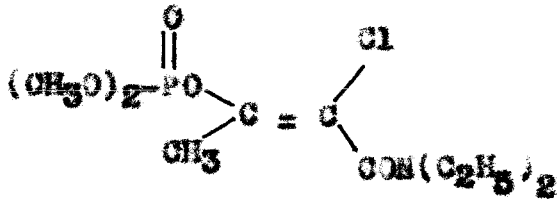
63-64°C a systemic and
contact insecticide,

LD₅₀, 190 mg/kg.

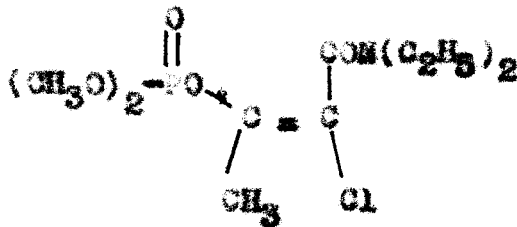
**Names and structures
of the pesticides**

Properties of the pesticides

**66. Phosphamidon, Dimecron^(R),
Dicon^(R)**



cis-(β) isomer



trans(α) isomer

**O,O-dimethyl O-(1-methyl-
2-chloro-2-diethylcarbamoyl
vinyl) phosphate.**

Liquid, systemic insecti-
cide and acaricide with
a little contact action;
useful against sap-feeding
and leaf-eating insects,
particularly aphids, bugs,
caterpillars (not Noctuidae),
thrips, rice stem borers
etc. LD₅₀: 15-28 mg/kg.

**Names and structures
of the pesticides**

Properties of the pesticides

57. Phosdria^(R), Mevinphos,



2-methoxy carbonyl-1-methylvinyl dimethyl phosphate.

Liquid, a contact and systemic insecticide and acaricide of short persistence, effective against sucking and chewing insects and mites, LD₅₀: 4-7 mg/kg.

58. Demeton, Systox^(R),
mercaptophos



demeton-S



demeton-O

O,O-diethyl S-ethylthioethyl phosphorothiolate.

Liquid, technical product contains 70% thiono-isomer and 30% thio-isomer, LD₅₀: 30 mg/kg (demeton-O) and LD₅₀: 1.5 mg/kg (demeton-S) it is a systemic insecticide and acaricide with some fumigant action, effective especially against sap-sucking insects and mites.

**Names and structures
of the pesticides**

Properties of the pesticides

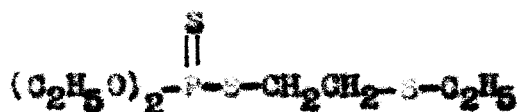
69. Thioneton, Skatin^(R),
Dithionetaxtox^(R)



O,O-dimethyl S-(2-ethyl-
thioethyl) phosphorothio-
thionate.

Liquid, a systemic insecti-
cide and acaricide with
contact action; effective
against aphids, sawflies,
Thrips, and mites, LD₅₀:
70-120 mg/kg.

70. Disulfoton, Thiodemeton,
Disyston^(R), Dithiosystox.



O,O-diethyl, S-(2-ethylthio-
ethyl) phosphorothio-
thionate.

Liquid, a systemic
insecticide and acaricide,
used mainly for soil pests,
seed dressing or granules
to protect seedlings,
effective against aphids
or vegetables and fruits
and carrot fly, leaf-
hoppers or rice, vegetables,
cotton and for some other
pests.

Names and structures
of the pesticides

Properties of the pesticides

71. Phorate, Thimet^(R),

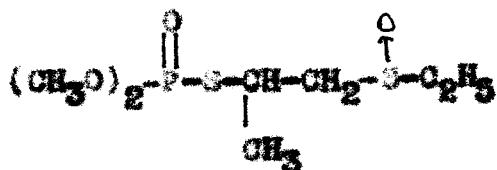
Finet,



O,O-diethyl S-(ethylthio-
methyl) phosphorothio-
thionate.

Liquid, a persistent
systemic insecticide,
used for the protection
seedling from sap-feeding
and soil insects. It has
also some contact and
fumigant action; LD₅₀:
2-4 mg/kg.

72. Metasystox-S^(R), Systox^(R)



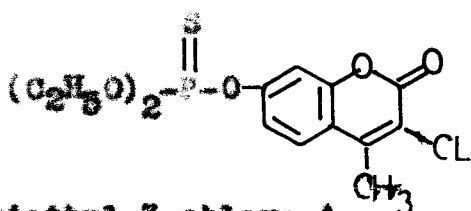
O,O-dimethyl S-(2-ethyl-
sulfonyl isopropyl)
phosphorothiolate.

Liquid, a systemic and
contact insecticide, like
oxydemeton-methyl,
LD₅₀: 105 mg/kg.

**Names and structures
of the pesticides**

Properties of the pesticides

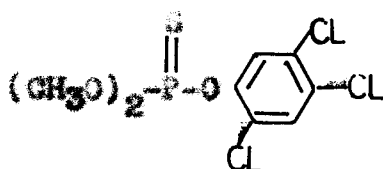
73. Coumaphos, Co-Nal^(R),
Asuntol^(R) Muscatox^(R)



Diethyl 3 chloro-4-
methyl coumarin-7 yl
phosphorothionate

Solid, m.p. 36° insecti-
cides useful to control
ectoparasites on cattle,
goat etc. by feed or
spray, effective against
flies.

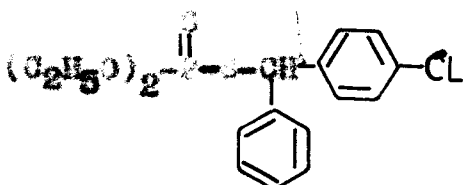
74. Honnel, Irolene^(R)
Fenchorphos. Sankor^(R),
Berlan^(R)



O,O-dimethyl O-(2,4,
5-trichlorophenyl)
phosphorothionate

Solid, m.p. 40-42°
animal systemic insecti-
cide, effect to control
cattle grub, lice, housefly,
screwworm.

75. H-3,928
(Stauffer Chem Co.)



O,O-diethyl S-(p-chloro-α-
phenyl α-phenylbenzyl)
phosphorothiothionate.

animal systemic insecticide
LD₅₀: 10000 mg/kg

The most important advantages of the organophosphorus compounds as pesticides are : (i) high pesticidal activity (ii) broad spectrum of action on pests, (iii) low persistence and breakdown to form products non-toxic to man and animals, (iv) systematic action of a number of compounds, (v) highly selective systematic insecticidal activity, (vi) low dosage of compound per unit of area treated, (vii) rapidity of action on plant pests, (viii) relatively rapid metabolism in vertebrates and absence of accumulation in their bodies and (ix) also comparatively low chronic toxicity, etc.

With this general introduction, a discussion on IR, NMR, Mass spectra, anticholinesterase activity, chemical hydrolysis etc. of some organophosphorus compounds have been given in the appendix II-VI.

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