The following percentages of three pesticides added to a soil remained after increasing times.

Time (days) Diazinon % Benefin % Terbutol %

0 100 100 100

15 18.7 no data no data

30 1.50 57.5 94.3

60 0.30 29.0 80.2

90 0.01 14.5 73.7

180 0.01 7.50 51.3

1) Fit the decomposition data for each of these pesticides to a standard exponential decay function (linear form) and show results graphically.

Nt = N0(1/2)t/t1/2

2) Calculate the decomposition half-life of each pesticide.

3) Draw the chemical structures of each pesticide and suggest a chemical explanation for the relative persistence of these chemicals in soil.

4) Calculate diazinon Kd for a soil with 5% organic matter assuming soil minerals have no tendency to absorb this pesticide.

5) Use this Kd to determine how many years it would take for diazinon to migrate from soil surface into shallow groundwater at 2 m depth (bulk density 1.3 g/cm3, porosity 0.45). Rainfall is 90 cm and evapotransiration is 40 cm.