1.

V_P=K3[ES]
V_ES=K1[E][S]-K2[ES]-K3[ES]
V_E=K2[ES]+K3[ES]-K1[E][S]
V_S=K2[ES]-K1[E][S]

2.

The final concentrations of E,S,ES,P are as follows:
0.9999999442186893
4.083027543005182e-07
5.5781308424341286e-08
9.999999535915999

The code in python:

```
import matplotlib.pyplot as plt


def FP(E,S,ES):
    return 150*ES
def FES(E,S,ES):
    return 100*E*S-750*ES
def FE(E,S,ES):
    return 750*ES-100*E*S
def FS(E,S,ES):
    return 600*ES-100*E*S
ans=[-100,-1];
t=[0]
P=[0]
ES=[0]
E=[1]
S=[10]
h=0.00001
N=100000

def main():
    for i in range(N):


        A1 = FE(E[-1], S[-1], ES[-1])
        B1 = FS(E[-1], S[-1], ES[-1])
        C1 = FES(E[-1],S[-1], ES[-1])
```

```
        D1 = FP(E[-1], S[-1], ES[-1])

        A2 = FE(E[-1]+h*A1/2, S[-1]+h*B1/2, ES[-1]+h*C1/2)
        B2 = FS(E[-1]+h*A1/2, S[-1]+h*B1/2, ES[-1]+h*C1/2)
        C2 = FES(E[-1]+h*A1/2,S[-1]+h*B1/2, ES[-1]+h*C1/2)
        D2 = FP(E[-1]+h*A1/2, S[-1]+h*B1/2, ES[-1]+h*C1/2)

        A3 = FE(E[-1]+h*A2/2, S[-1]+h*B2/2, ES[-1]+h*C2/2)
        B3 = FS(E[-1]+h*A2/2, S[-1]+h*B2/2, ES[-1]+h*C2/2)
        C3 = FES(E[-1]+h*A2/2,S[-1]+h*B2/2, ES[-1]+h*C2/2)
        D3 = FP(E[-1]+h*A2/2, S[-1]+h*B2/2, ES[-1]+h*C2/2)

        A4 = FE(E[-1]+h*A3, S[-1]+h*B3,ES[-1]+h*C3)
        B4 = FS(E[-1]+h*A3, S[-1]+h*B3,ES[-1]+h*C3)
        C4 = FES(E[-1]+h*A3,S[-1]+h*B3,ES[-1]+h*C3)
        D4 = FP(E[-1]+h*A3, S[-1]+h*B3,ES[-1]+h*C3)

        E.append(E[-1]+h*(A1+2*A2+2*A3+A4)/6)
        S.append(S[-1]+h*(B1+2*B2+2*B3+B4)/6)
        ES.append(ES[-1]+h*(C1+2*C2+2*C3+C4)/6)
        P.append(P[-1]+h*(D1+2*D2+2*D3+D4)/6)

        t.append(FP(E[-1],S[-1],ES[-1]))
        if(t[-1]>ans[0]):
            ans[0]=t[-1]
            ans[1]=S[-1]
main()
print(ans[0])
plt.figure()
plt.scatter(S,t)
plt.show()
```

3.

Vm: 82.64786379513252

The graph:

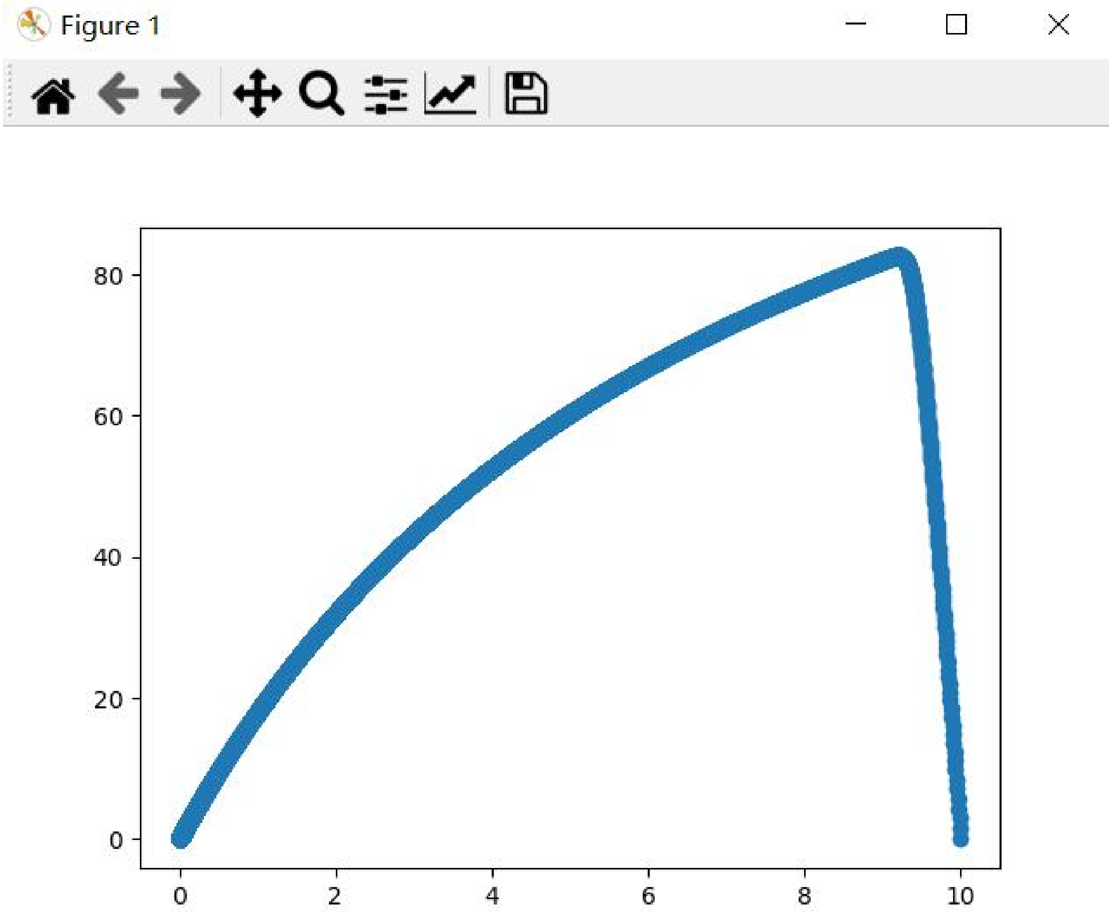

Figure 1
80
60
40
20
0
0
2
4
6
8
10