Single pellet model – MATLAB code

```
%Everything is in SI units"
function Single_pellet_model
clear all

%Initial geometry
R0=300E-6;  Rb0=300E-6+6E-6; Ra0=Rb0-2E-9; Rc0=Rb0+30E-6;

%Dissolution Time [s]
TIME=80*3600;
%Densities [kg/m^3]
rho10=1000; rho20=1200; rho30=1200; rho40=1200;

%Diffusivities [m^2/s]
D2b=1.5E-10;    % from doi:10.1016/j.ijpharm.2015.03.054
D1b=2.2E-9;     % from doi:10.1016/j.ijpharm.2015.03.054
D2c=2*3.2E-13;  % from Kazlauske et al. (submitted)
D1c=1.99E-12;   % from Kazlauske et al. (submitted)
D2d=8.21E-10;   % from doi:10.1016/S0168-3659(01)00424-2
D1self=3E-9;    % from doi:10.1039/B005319H
%See the Transport coefficients definition

%Initial mass fractions
%Domain A
w2sat=0.0115;   % from doi:10.1002/jps.2600740209
w2a0=0.9; w3a0=1-w2a0;
%Domain B
w2b0=0;
w3b0=0;
%Domain C
w4c0=1;
w2c0=0;
rhoc0=((1-w2c0-w4c0)/rho10+w2c0/rho20+w4c0/rho40)^(-1);
%Domain D
w2d0=0; %w1d0=1-w2d0;


Omegad0=1E-3; % Initial dissolution medium [m^3]
Np=5000; % Total number of pellets

function dy = odesystem (t,y)
dy=zeros(9,1); %Initialization

Ra=y(1);
w2b=y(2);
Rb=y(3);
w2c=y(4);
Rc=y(5);
w2d=y(6);
Omegad=y(7);
w3b=y(8);
w4c=y(9);
rhoa=(w2a0/rho20+w3a0/rho30)^(-1); %Density of domain A
rhob=((1-w2b-w3b)/rho10+w2b/rho20+w3b/rho30)^(-1); %Density of domain B
rhoc=((1-w2c-w4c)/rho10+w2c/rho20+w4c/rho40)^(-1); %Density of domain C
rhod=((1-w2d)/rho10+w2d/rho20)^(-1); %Density of domain D
```

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```
w1b=1-w2b-w3b; %
w1c=1-w2c-w4c; %
w1d=1-w2d; %

%////Stop condition when Ra reach R0 or when there is not enough water
w2bStar=w2b/(w1b+w2b);
kdiss0=D2b/Ra;
if Ra>R0 && (w2sat-w2bStar)>0
   kdiss=kdiss0;
else
   kdiss=0;
end
%//////////////////////////////////

%///////Transport coefficients//////////
   k2b=D2b/(Rb-Ra);
   k2c=D2c/(Rc-Rb);
   k2d=D2d/Rc;
   U2b=(1/(k2b)+1/(k2c))^(-1);
   U2c=(1/(k2c)+1/(k2d))^(-1);
   k1b=D1b/(Rb-Ra);
   k1c=D1c/(Rc-Rb);
   m1=4.95; %w1b=m1*w1c
   U1b=(1/(k1b)+m1/(k1c))^(-1);
   k1d=D1self/Rc;
   m2=0.2; %w1c=m2*w1d
   K1c=(1/(k1c)+m2/(k1d))^(-1);

%////////////////////////////////////////////////////


%////////Parameters defined during the ODEs rearrangement//////////////////////////////////
rho2b3=rho10*rho20-rho20*rho30; %
rho2b2=rho10*rho30-rho20*rho30; %
rhostar=(rho20*rho30*(1-w2b-w3b)+rho10*rho30*w2b+rho10*rho20*w3b)^2/(rho10*rho20*rho30); %
alfa=w3b*(rho2b2/rhostar)/(rhob-w3b*rho2b3/rhostar); %
beta=-rhob*w3b*3*Rb^2/((Rb^3-Ra^3)*(rhob-w3b*rho2b3/rhostar)); %
gamma=rhob*w3b*3*Ra^2/((Rb^3-Ra^3)*(rhob-w3b*rho2b3/rhostar));  %
delta=3*Ra^2*rhob*kdiss*w3a0*(w2sat-w2bStar)/(w2a0*(Rb^3-Ra^3)*(rhob-w3b*rho2b3/rhostar)); %
lambda=3*Rb^2*rhob-(Rb^3-Ra^3)*beta*rho2b3/rhostar; %
chsi=3*Ra^2*rhob+gamma*(Rb^3-Ra^3)*rho2b3/rhostar; %
eps=rho2b2/rhostar*(Rb^3-Ra^3)+rho2b3*alfa*(Rb^3-Ra^3)/rhostar; %
zeta=(Rb^3-Ra^3)*rho2b3*delta/rhostar+3*Rb^2*U1b*(m1*w1c*rhoc-w1b*rhob)-3*Rb^2*U2b*(w2b*rhob-
w2c*rhoc)+3*Ra^2*kdiss*rhob*(w2sat-w2bStar)/w2a0; %
fi=rhob*(Rb^3-Ra^3)-w2b*(Rb^3-Ra^3)*(rho2b2/rhostar+rho2b3*alfa/rhostar)+eps/lambda*(rhob*w2b*3*Rb^2-w2b*(Rb^3-
Ra^3)*beta*rho2b3/rhostar); %
eta=-(-rhob*w2b*3*Ra^2-w2b*(Rb^3-Ra^3)*rho2b3*gamma/rhostar+chsi/lambda*(rhob*w2b*3*Rb^2-w2b*(Rb^3-
Ra^3)*rho2b3*beta/rhostar)); %
tau=-zeta/lambda*(rhob*w2b*3*Rb^2-w2b*(Rb^3-Ra^3)*rho2b3*beta/rhostar)+w2b*(Rb^3-
Ra^3)*rho2b3*delta/rhostar+3*Ra^2*kdiss*rhob*(w2sat-w2bStar)-3*Rb^2*U2b*(w2b*rhob-w2c*rhoc); %
a=rho40*(rho10-rho20); %
b=rho20*(rho10-rho40); %
rhocstar=(rho20*rho40*(1-w2c-w4c)+rho10*rho40*w2c+rho10*rho20*w4c)^2/(rho10*rho20*rho40); %
A1=rhoc*(Rc^3-Rb^3)-b*w4c*(Rc^3-Rb^3)/rhocstar; %
B1=-rhoc*w4c*3*Rc^2; %
C1=3*Rb^2*rhoc*w4c/lambda*(chsi+eps*eta/fi); %
D1=a*w4c*(Rc^3-Rb^3)/rhocstar; %
E1=3*Rb^2*rhoc*w4c/lambda*(eps*tau/fi+zeta); %
F1=3*rhoc*Rc^2-(Rc^3-Rb^3)*b*B1/(rhocstar*A1); %
```

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```
G1=rhoc*3*Rb^2*(chsi/lambda+eps*eta/(lambda*fi))+(Rc^3-Rb^3)*b*C1/(rhocstar*A1); %
H1=(Rc^3-Rb^3)*(b*D1/(rhocstar*A1)+a/rhocstar); %
I1=(Rc^3-Rb^3)*b*E1/(rhocstar*A1)+3*Rc^2*K1c*(m2*w1d*rhod-w1c*rhoc)-3*Rb^2*U1b*(m1*w1c*rhoc-
w1b*rhob)+3*Rb^2*U2b*(w2b*rhob-w2c*rhoc)-3*Rc^2*U2c*(w2c*rhoc-
w2d*rhod)+rhoc*3*Rb^2*(eps*tau/(lambda*fi)+zeta/lambda); %
L1=rhoc*w2c*3*Rc^2*H1/F1+rhoc*(Rc^3-Rb^3)+w2c*(Rc^3-Rb^3)*(-a/rhocstar-b*(D1+B1*H1/F1)/(rhocstar*A1)); %
M1=-(rhoc*w2c*(3*Rc^2*G1/F1-3*Rb^2*chsi/lambda-3*Rb^2*eta*eps/(lambda*fi))-w2c*(Rc^3-
Rb^3)*b*(C1+B1*G1/F1)/(rhocstar*A1)); %
N1=-rhoc*w2c*(3*Rc^2*I1/F1-3*Rb^2*(zeta+eta*tau/fi)/lambda)+w2c*(Rc^3-
Rb^3)*b/(rhocstar*A1)*(E1+B1*I1/F1)+3*Rb^2*U2b*(w2b*rhob-w2c*rhoc)-3*Rc^2*U2c*(w2c*rhoc-w2d*rhod); %
rhodstar=rho10*rho20*(rho20-rho10)/(rho20*(1-w2d)+rho10*w2d)^2; %


dRa=-kdiss*rhob/(rhoa*w2a0)*(w2sat-w2bStar);  %
dw2b=(eta*dRa+tau)/fi; %
dRb=(chsi*dRa+eps*dw2b+zeta)/lambda; %
dw3b=alfa*dw2b+beta*dRb+gamma*dRa+delta; %
dw2c=(M1*dRa+N1)/L1; %
dRc=(G1*dRa+H1*dw2c+I1)/F1; %
dw4c=(B1*dRc+C1*dRa+D1*dw2c+E1)/A1; %
dw2d=Np*4*pi*Rc^2/(rhod*Omegad)*(w2d*K1c*(m2*w1d*rhod-w1c*rhoc)+(1-w2d)*U2c*(w2c*rhoc-w2d*rhod)); %
dOmegad=-Omegad*rhodstar*dw2d/rhod+1/rhod*(-Np*4*pi*Rc^2*K1c*(m2*w1d*rhod-
w1c*rhoc)+Np*4*pi*Rc^2*U2c*(w2c*rhoc-w2d*rhod)); %
%////////////////////////////////////////////////////////////////////////////////////////

%//////System of ODEs//////
dy(1) = dRa;
dy(2) = dw2b;
dy(3) = dRb;
dy(4) = dw2c;
dy(5) = dRc;
dy(6) = dw2d;
dy(7) = dOmegad;
dy(8) = dw3b;
dy(9) = dw4c;
%//////////////////////////
end

y0=[Ra0,w2b0,Rb0,w2c0,Rc0,w2d0,Omegad0,w3b0,w4c0]; %Initial conditions
options=odeset('RelTol',1e-9);
[t,y] = ode15s(@odesystem,[0 TIME],y0,options); %ODEs solver

%Results
%Domain A
Ra=y(:,1);
%Domain B
w2b=y(:,2);
w3b=y(:,8);
w1b=1-w3b-w2b;
Rb=y(:,3);
%Domain C
w2c=y(:,4);
w4c=y(:,9);
w1c=1-w2c-w4c;
Rc=y(:,5);
%Domain D
w2d=y(:,6);
w1d=1-y(:,6);
Omegad=y(:,7);
```

```
dsfilm=Rc-Rb;
swelling=(Rc-Rc0)/Rc0*100;

rhod=((1-w2d)/rho10+w2d/rho20).^(-1);
rhob=((1-w2b-w3b)/rho10+w2b/rho20+w3b/rho30).^(-1);

Omegaa0=4/3*pi*(Ra0^3-R0^3);
m20a=w2a0*rho20*Omegaa0*Np;
m20=m20a;

m2d=w2d.*rhod.*Omegad;
m2d0=w2d0*((1-w2d0)/rho10+w2d0/rho20)^(-1)*Omegad0;

Omegab=4/3*pi.*(Rb.^3-Ra.^3);
m2b=(w2b.*rhob.*Omegab).*Np;

Omegaa=4/3*pi.*(Ra.^3-R0^3);
m2a=(w2a0*rho20.*Omegaa).*Np;

release=(m2d-m2d0)/m20;

%//////////Figures//////////////////////////////

figure
plot(t/3600,Ra*10^6,'-',t/3600,Rb*10^6,'--',t/3600,Rc*10^6,'.')
title('Radii evolution')
xlabel('Time [h]')
ylabel('Radius [um]')
legend('Ra','Rb','Rc')

figure
%plot(t/3600,w1b,'-',t/3600,w2b,'-',t/3600,w3b,'-')
plot(t/3600,w2b,'-')
title('Mass fractions in OmegaB')
xlabel('Time [h]')
ylabel('Mass fraction [-]')
legend('w2b')

figure
%plot(t/3600,w1c,'-',t/3600,w2c,'-',t/3600,w4c,'-')
plot(t/3600,w2c,'-')
title('Mass fractions in OmegaC')
xlabel('Time [h]')
ylabel('Mass fraction [-]')
legend('w2c')

figure
%plot(t/3600,w1d,'-',t/3600,w2d,'-')
plot(t/3600,w2d,'-')
title('Mass fractions in OmegaD')
xlabel('Time [h]')
ylabel('Mass fraction [-]')
legend('w2d')


figure
plot(t/3600,m2a*10^6,'-r',t/3600,m2b*10^6,'-g',t/3600,m2d*10^6,'-b')
title('Drug Mass in the system')
```

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```
xlabel('Time [h]') % x-axis label
ylabel('Mass [mg]') % y-axis label
legend('m2a','m2b','m2d')

%//////////End Figures////////////////////////////////

end
```


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Whole dose of pellets (CELLETS SD) – MATLAB code

```
%Everything is in SI units"
function Whole_dose_Cellets_PSD
clear all

%Initial geometry

R0=[242E-6, 275E-6, 313E-6, 356E-6, 404E-6, 459E-6];
Rb0=R0+6.3E-6;
Ra0=Rb0-1E-8;
filmt=30E-6;
Rc0=Rb0+filmt;

%Dissolution Time [s]
TIME=80*3600;
%Densities [kg/m^3]
rho10=1000; rho20=1200; rho30=1200; rho40=1200;

%Diffusivities [m^2/s]
D2b=1.5E-10;    % from doi:10.1016/j.ijpharm.2015.03.054
D1b=2.2E-9;     % from doi:10.1016/j.ijpharm.2015.03.054
D2c=2*3.2E-13;  % from Kazlauske et al. (submitted)
D1c=1.99E-12;   % from Kazlauske et al. (submitted)
D2d=8.21E-10;   % from doi:10.1016/S0168-3659(01)00424-2
D1self=3E-9;    % from doi:10.1039/B005319H
%See the Transport coefficients definition

%Initial mass fractions
%Domain A
w2sat=0.0115;   % from doi:10.1002/jps.2600740209
w2a0=0.9; w3a0=1-w2a0;
%Domain B
w2b0=0;
w3b0=0;
%Domain C
w4c0=1;
w2c0=0;
rhoc0=((1-w2c0-w4c0)/rho10+w2c0/rho20+w4c0/rho40)^(-1);
%Domain D
w2d0=0; %w1d0=1-w2d0;

Omegad0=1E-3; % Initial dissolution medium [m^3]
Ntot=5000; % Total Number of pellets
Np=[0.079, 0.334, 0.410, 0.154, 0.020, 0.001]*Ntot; %Number of pellets in each class

function dy = odesystem (t,y)
dy=zeros(44,1); %Initialization
Ra= [y(1),y(8), y(15),y(22),y(29),y(36)];
w2b=[y(2),y(9), y(16),y(23),y(30),y(37)];
Rb= [y(3),y(10),y(17),y(24),y(31),y(38)];
w2c=[y(4),y(11),y(18),y(25),y(32),y(39)];
Rc= [y(5),y(12),y(19),y(26),y(33),y(40)];
w3b=[y(6),y(13),y(20),y(27),y(34),y(41)];
w4c=[y(7),y(14),y(21),y(28),y(35),y(42)];
w2d=y(43);
Omegad=y(44);
```

```
rhoa=(w2a0/rho20+w3a0/rho30)^(-1); %Density of domain A
rhob=((1-w2b-w3b)/rho10+w2b/rho20+w3b/rho30).^(-1); %Density of domain B
rhoc=((1-w2c-w4c)/rho10+w2c/rho20+w4c/rho40).^(-1); %Density of domain C
rhod=((1-w2d)/rho10+w2d/rho20).^(-1); %Density of domain D
w1b=1-w2b-w3b; %
w1c=1-w2c-w4c; %
w1d=1-w2d; %

%////Stop condition when Ra reach R0 or when there is not enough water
w2bStar=w2b./(w1b+w2b);
kdiss0=D2b./Ra;
kdiss=[0,0,0,0,0,0]; %initialization kdiss

   if Ra(1)>R0(1) && (w2sat-w2bStar(1))>0
      kdiss(1)=kdiss0(1);
   else
      kdiss(1)=0;
   end

   if Ra(2)>R0(2) && (w2sat-w2bStar(2))>0
      kdiss(2)=kdiss0(2);
   else
      kdiss(2)=0;
   end

   if Ra(3)>R0(3) && (w2sat-w2bStar(3))>0
      kdiss(3)=kdiss0(3);
   else
      kdiss(3)=0;
   end

   if Ra(4)>R0(4) && (w2sat-w2bStar(4))>0
      kdiss(4)=kdiss0(4);
   else
      kdiss(4)=0;
   end

   if Ra(5)>R0(5) && (w2sat-w2bStar(5))>0
      kdiss(5)=kdiss0(5);
   else
      kdiss(5)=0;
   end

   if Ra(6)>R0(6) && (w2sat-w2bStar(6))>0
      kdiss(6)=kdiss0(6);
   else
      kdiss(6)=0;
   end
%////////////////////////////////

%///////Transport coefficients//////////
   k2b=D2b./(Rb-Ra);
   k2c=D2c./(Rc-Rb);
   k2d=D2d./Rc;
   U2b=(1./(k2b)+1./(k2c)).^(-1);
   U2c=(1./(k2c)+1./(k2d)).^(-1);
   k1b=D1b./(Rb-Ra);
   k1c=D1c./(Rc-Rb);
   m1=4.95; %w1b=m1*w1c
```

```
U1b=(1./(k1b)+m1./(k1c)).^(-1);
k1d=D1self./Rc;
m2=0.2; %w1c=m2*w1d
K1c=(1./(k1c)+m2./(k1d)).^(-1);

%////////////////////////////////////////////////////////

%./././/./././Parameters defined during the ODEs rearrangement./././././././././././././././././././././././././././././././
rho2b3=rho10.*rho20-rho20.*rho30; %
rho2b2=rho10.*rho30-rho20.*rho30; %
rhostar=(rho20.*rho30.*(1-w2b-w3b)+rho10.*rho30.*w2b+rho10.*rho20.*w3b).^2./(rho10.*rho20.*rho30); %
alfa=w3b.*(rho2b2./rhostar)./(rhob-w3b.*rho2b3./rhostar); %
beta=-rhob.*w3b.*3.*Rb.^2./((Rb.^3-Ra.^3).*(rhob-w3b.*rho2b3./rhostar)); %
gamma=rhob.*w3b.*3.*Ra.^2./((Rb.^3-Ra.^3).*(rhob-w3b.*rho2b3./rhostar));  %
delta=3.*Ra.^2.*rhob.*kdiss.*w3a0.*(w2sat-w2bStar)./(w2a0.*(Rb.^3-Ra.^3).*(rhob-w3b.*rho2b3./rhostar)); %
lambda=3.*Rb.^2.*rhob-(Rb.^3-Ra.^3).*beta.*rho2b3./rhostar; %
chsi=3.*Ra.^2.*rhob+gamma.*(Rb.^3-Ra.^3).*rho2b3./rhostar; %
eps=rho2b2./rhostar.*(Rb.^3-Ra.^3)+rho2b3.*alfa.*(Rb.^3-Ra.^3)./rhostar; %
zeta=(Rb.^3-Ra.^3).*rho2b3.*delta./rhostar+3.*Rb.^2.*U1b.*(m1.*w1c.*rhoc-w1b.*rhob)-3.*Rb.^2.*U2b.*(w2b.*rhob-
w2c.*rhoc)+3.*Ra.^2.*kdiss.*rhob.*(w2sat-w2bStar)./w2a0; %
fi=rhob.*(Rb.^3-Ra.^3)-w2b.*(Rb.^3-Ra.^3).*(rho2b2./rhostar+rho2b3.*alfa./rhostar)+eps./lambda.*(rhob.*w2b.*3.*Rb.^2-
w2b.*(Rb.^3-Ra.^3).*beta.*rho2b3./rhostar); %
eta=-(-rhob.*w2b.*3.*Ra.^2-w2b.*(Rb.^3-Ra.^3).*rho2b3.*gamma./rhostar+chsi./lambda.*(rhob.*w2b.*3.*Rb.^2-w2b.*(Rb.^3-
Ra.^3).*rho2b3.*beta./rhostar)); %
tau=-zeta./lambda.*(rhob.*w2b.*3.*Rb.^2-w2b.*(Rb.^3-Ra.^3).*rho2b3.*beta./rhostar)+w2b.*(Rb.^3-
Ra.^3).*rho2b3.*delta./rhostar+3.*Ra.^2.*kdiss.*rhob.*(w2sat-w2bStar)-3.*Rb.^2.*U2b.*(w2b.*rhob-w2c.*rhoc); %
a=rho40.*(rho10-rho20); %
b=rho20.*(rho10-rho40); %
rhocstar=(rho20.*rho40.*(1-w2c-w4c)+rho10.*rho40.*w2c+rho10.*rho20.*w4c).^2./(rho10.*rho20.*rho40); %
A1=rhoc.*(Rc.^3-Rb.^3)-b.*w4c.*(Rc.^3-Rb.^3)./rhocstar; %
B1=-rhoc.*w4c.*3.*Rc.^2; %
C1=3.*Rb.^2.*rhoc.*w4c./lambda.*(chsi+eps.*eta./fi); %
D1=a.*w4c.*(Rc.^3-Rb.^3)./rhocstar; %
E1=3.*Rb.^2.*rhoc.*w4c./lambda.*(eps.*tau./fi+zeta); %
F1=3.*rhoc.*Rc.^2-(Rc.^3-Rb.^3).*b.*B1./(rhocstar.*A1); %
G1=rhoc.*3.*Rb.^2.*(chsi./lambda+eps.*eta./(lambda.*fi))+(Rc.^3-Rb.^3).*b.*C1./(rhocstar.*A1); %
H1=(Rc.^3-Rb.^3).*(b.*D1./(rhocstar.*A1)+a./rhocstar); %
I1=(Rc.^3-Rb.^3).*b.*E1./(rhocstar.*A1)+3.*Rc.^2.*K1c.*(m2.*w1d.*rhod-w1c.*rhoc)-3.*Rb.^2.*U1b.*(m1.*w1c.*rhoc-
w1b.*rhob)+3.*Rb.^2.*U2b.*(w2b.*rhob-w2c.*rhoc)-3.*Rc.^2.*U2c.*(w2c.*rhoc-
w2d.*rhod)+rhoc.*3.*Rb.^2.*(eps.*tau./(lambda.*fi)+zeta./lambda); %
L1=rhoc.*w2c.*3.*Rc.^2.*H1./F1+rhoc.*(Rc.^3-Rb.^3)+w2c.*(Rc.^3-Rb.^3).*(-a./rhocstar-b.*(D1+B1.*H1./F1)./(rhocstar.*A1)); %
M1=-(rhoc.*w2c.*(3.*Rc.^2.*G1./F1-3.*Rb.^2.*chsi./lambda-3.*Rb.^2.*eta.*eps./(lambda.*fi))-w2c.*(Rc.^3-
Rb.^3).*b.*(C1+B1.*G1./F1)./(rhocstar.*A1)); %
N1=-rhoc.*w2c.*(3.*Rc.^2.*I1./F1-3.*Rb.^2.*(zeta+eta.*tau./fi)./lambda)+w2c.*(Rc.^3-
Rb.^3).*b./(rhocstar.*A1).*(E1+B1.*I1./F1)+3.*Rb.^2.*U2b.*(w2b.*rhob-w2c.*rhoc)-3.*Rc.^2.*U2c.*(w2c.*rhoc-w2d.*rhod); %
rhodstar=rho10.*rho20.*(rho20-rho10)./(rho20.*(1-w2d)+rho10.*w2d).^2; %


dRa=-kdiss.*rhob./(rhoa.*w2a0).*(w2sat-w2bStar);  %
dw2b=(eta.*dRa+tau)./fi; %
dRb=(chsi.*dRa+eps.*dw2b+zeta)./lambda; %
dw3b=alfa.*dw2b+beta.*dRb+gamma.*dRa+delta; %
dw2c=(M1.*dRa+N1)./L1; %
dRc=(G1.*dRa+H1.*dw2c+I1)./F1; %
dw4c=(B1.*dRc+C1.*dRa+D1.*dw2c+E1)./A1; %
dw2d= ...
   Np(1)*4*pi*Rc(1)^2/(rhod*Omegad)*(w2d*K1c(1)*(m2*w1d*rhod-rhoc(1)*w1c(1))+(1-w2d)*U2c(1)*(rhoc(1)*w2c(1)-
w2d*rhod))+...
```

```
   Np(2)*4*pi*Rc(2)^2/(rhod*Omegad)*(w2d*K1c(2)*(m2*w1d*rhod-rhoc(2)*w1c(2))+(1-w2d)*U2c(2)*(rhoc(2)*w2c(2)-
w2d*rhod))+...
   Np(3)*4*pi*Rc(3)^2/(rhod*Omegad)*(w2d*K1c(3)*(m2*w1d*rhod-rhoc(3)*w1c(3))+(1-w2d)*U2c(3)*(rhoc(3)*w2c(3)-
w2d*rhod))+...
   Np(4)*4*pi*Rc(4)^2/(rhod*Omegad)*(w2d*K1c(4)*(m2*w1d*rhod-rhoc(4)*w1c(4))+(1-w2d)*U2c(4)*(rhoc(4)*w2c(4)-
w2d*rhod))+...
   Np(5)*4*pi*Rc(5)^2/(rhod*Omegad)*(w2d*K1c(5)*(m2*w1d*rhod-rhoc(5)*w1c(5))+(1-w2d)*U2c(5)*(rhoc(5)*w2c(5)-
w2d*rhod))+...
   Np(6)*4*pi*Rc(6)^2/(rhod*Omegad)*(w2d*K1c(6)*(m2*w1d*rhod-rhoc(6)*w1c(6))+(1-w2d)*U2c(6)*(rhoc(6)*w2c(6)-
w2d*rhod));

dOmegad=-Omegad*rhodstar*dw2d/rhod+1/rhod*(...
   Np(1)*4*pi*Rc(1)^2*(-K1c(1)*(m2*w1d*rhod-w1c(1)*rhoc(1))+U2c(1)*(w2c(1)*rhoc(1)-w2d*rhod))+...
   Np(2)*4*pi*Rc(2)^2*(-K1c(2)*(m2*w1d*rhod-w1c(2)*rhoc(2))+U2c(2)*(w2c(2)*rhoc(2)-w2d*rhod))+...
   Np(3)*4*pi*Rc(3)^2*(-K1c(3)*(m2*w1d*rhod-w1c(3)*rhoc(3))+U2c(3)*(w2c(3)*rhoc(3)-w2d*rhod))+...
   Np(4)*4*pi*Rc(4)^2*(-K1c(4)*(m2*w1d*rhod-w1c(4)*rhoc(4))+U2c(4)*(w2c(4)*rhoc(4)-w2d*rhod))+...
   Np(5)*4*pi*Rc(5)^2*(-K1c(5)*(m2*w1d*rhod-w1c(5)*rhoc(5))+U2c(5)*(w2c(5)*rhoc(5)-w2d*rhod))+...
   Np(6)*4*pi*Rc(6)^2*(-K1c(6)*(m2*w1d*rhod-w1c(6)*rhoc(6))+U2c(6)*(w2c(6)*rhoc(6)-w2d*rhod)));
%////////////////////////////////////////////////////////////////////////////////////////////

%//////System of ODEs//////
dy(1)=dRa(1);  dy(8)=dRa(2);   dy(15)=dRa(3);  dy(22)=dRa(4);  dy(29)=dRa(5);  dy(36)=dRa(6);
dy(2)=dw2b(1); dy(9)=dw2b(2);  dy(16)=dw2b(3); dy(23)=dw2b(4); dy(30)=dw2b(5); dy(37)=dw2b(6);
dy(3)= dRb(1); dy(10)=dRb(2);  dy(17)=dRb(3);  dy(24)=dRb(4);  dy(31)=dRb(5);  dy(38)=dRb(6);
dy(4)= dw2c(1);dy(11)= dw2c(2);dy(18)= dw2c(3);dy(25)= dw2c(4);dy(32)= dw2c(5);dy(39)= dw2c(6);
dy(5)= dRc(1); dy(12)=dRc(2);  dy(19)=dRc(3);  dy(26)=dRc(4);  dy(33)=dRc(5);  dy(40)=dRc(6);
dy(6)=dw3b(1); dy(13)=dw3b(2); dy(20)=dw3b(3); dy(27)=dw3b(4); dy(34)=dw3b(5); dy(41)=dw3b(6);
dy(7)=dw4c(1); dy(14)=dw4c(2); dy(21)=dw4c(3); dy(28)=dw4c(4); dy(35)=dw4c(5); dy(42)=dw4c(6);

dy(43)=dw2d;
dy(44)=dOmegad;
%//////////////////////////
end

y0=[Ra0(1),w2b0,Rb0(1),w2c0,Rc0(1),w3b0,w4c0,...
   Ra0(2),w2b0,Rb0(2),w2c0,Rc0(2),w3b0,w4c0,...
   Ra0(3),w2b0,Rb0(3),w2c0,Rc0(3),w3b0,w4c0,...
   Ra0(4),w2b0,Rb0(4),w2c0,Rc0(4),w3b0,w4c0,...
   Ra0(5),w2b0,Rb0(5),w2c0,Rc0(5),w3b0,w4c0,...
   Ra0(6),w2b0,Rb0(6),w2c0,Rc0(6),w3b0,w4c0,...
   w2d0,Omegad0]; %Initial conditions

options=odeset('RelTol',1e-10);
tspan=0:60:TIME;
[t,y] = ode15s(@odesystem,tspan,y0,options); %ODEs solver

%Results
%Domain A
Ra=[y(:,1),y(:,8),y(:,15),y(:,22),y(:,29),y(:,36)];
%Domain B
w2b=[y(:,2),y(:,9),y(:,16),y(:,23),y(:,30),y(:,37)];
w3b=[y(:,6),y(:,13),y(:,20),y(:,27),y(:,34),y(:,41)];
w1b=1-w3b-w2b;
Rb=[y(:,3),y(:,10),y(:,17),y(:,24),y(:,31),y(:,38)];
rhob=((1-w2b-w3b)/rho10+w2b/rho20+w3b/rho30).^(-1);
%Domain C
w2c=[y(:,4),y(:,11),y(:,18),y(:,25),y(:,32),y(:,39)];
w4c=[y(:,7),y(:,14),y(:,21),y(:,28),y(:,35),y(:,42)];
w1c=1-w2c-w4c;
```

```
Rc=[y(:,5),y(:,12),y(:,19),y(:,26),y(:,33),y(:,40)];
rhoc=((1-w2c-w4c)/rho10+w2c/rho20+w4c/rho40).^(-1);
%Domain D
w2d=y(:,43);
w1d=1-w2d;
Omegad=y(:,44);
rhod=((1-w2d)/rho10+w2d/rho20).^(-1);
dsfilm=Rc-Rb;
%swelling=(Rc-Rc0)./Rc0*100;

m20=4/3*pi*rhoa*w2a0*(...
    Np(1)*(Ra0(1)^3-R0(1)^3)+...
    Np(2)*(Ra0(2)^3-R0(2)^3)+...
    Np(3)*(Ra0(3)^3-R0(3)^3)+...
    Np(4)*(Ra0(4)^3-R0(4)^3)+...
    Np(5)*(Ra0(5)^3-R0(5)^3)+...
    Np(6)*(Ra0(6)^3-R0(6)^3));

release=w2d.*rhod.*Omegad./m20;

m2a=4/3*pi*rhoa*w2a0*(...
    Np(1)*(Ra(:,1).^3-R0(1).^3)+...
    Np(2)*(Ra(:,2).^3-R0(2).^3)+...
    Np(3)*(Ra(:,3).^3-R0(3).^3)+...
    Np(4)*(Ra(:,4).^3-R0(4).^3)+...
    Np(5)*(Ra(:,5).^3-R0(5).^3)+...
    Np(6)*(Ra(:,6).^3-R0(6).^3));

m2b=4/3*pi*(...
    Np(1).*w2b(:,1).*rhob(:,1).*(Rb(:,1).^3-Ra(:,1).^3)+...
    Np(2).*w2b(:,2).*rhob(:,2).*(Rb(:,2).^3-Ra(:,2).^3)+...
    Np(3).*w2b(:,3).*rhob(:,3).*(Rb(:,3).^3-Ra(:,3).^3)+...
    Np(4).*w2b(:,4).*rhob(:,4).*(Rb(:,4).^3-Ra(:,4).^3)+...
    Np(5).*w2b(:,5).*rhob(:,5).*(Rb(:,5).^3-Ra(:,5).^3)+...
    Np(6).*w2b(:,6).*rhob(:,6).*(Rb(:,6).^3-Ra(:,6).^3));

m2c=4/3*pi*(...
    Np(1)*w2c(:,1).*rhoc(:,1).*(Rc(:,1).^3-Rb(:,1).^3)+...
    Np(2)*w2c(:,2).*rhoc(:,2).*(Rc(:,2).^3-Rb(:,2).^3)+...
    Np(3)*w2c(:,3).*rhoc(:,3).*(Rc(:,3).^3-Rb(:,3).^3)+...
    Np(4)*w2c(:,4).*rhoc(:,4).*(Rc(:,4).^3-Rb(:,4).^3)+...
    Np(5)*w2c(:,5).*rhoc(:,5).*(Rc(:,5).^3-Rb(:,5).^3)+...
    Np(6)*w2c(:,6).*rhoc(:,6).*(Rc(:,6).^3-Rb(:,6).^3));

%//////////Release from the ith%class//////////////////////////////////
m201=4/3*pi*rhoa*w2a0*(Np(1)*(Ra0(1)^3-R0(1)^3));
m2a1=4/3.*pi.*rhoa.*w2a0.*(Np(1)*(Ra(:,1).^3-R0(1).^3));
m2b1=4/3*pi*(Np(1).*w2b(:,1).*rhob(:,1).*(Rb(:,1).^3-Ra(:,1).^3));
m2c1=4/3*pi*(Np(1)*w2c(:,1).*rhoc(:,1).*(Rc(:,1).^3-Rb(:,1).^3));
release1=(m201-(m2a1+m2b1+m2c1))/m201;

m202=4/3*pi*rhoa*w2a0*(Np(2)*(Ra0(2)^3-R0(2)^3));
m2a2=4/3*pi*rhoa*w2a0*(Np(2)*(Ra(:,2).^3-R0(2).^3));
m2b2=4/3*pi*(Np(2).*w2b(:,2).*rhob(:,2).*(Rb(:,2).^3-Ra(:,2).^3));
m2c2=4/3*pi*(Np(2)*w2c(:,2).*rhoc(:,2).*(Rc(:,2).^3-Rb(:,2).^3));
release2=(m202-(m2a2+m2b2+m2c2))/m202;

m203=4/3*pi*rhoa*w2a0*(Np(3)*(Ra0(3)^3-R0(3)^3));
m2a3=4/3*pi*rhoa*w2a0*(Np(3)*(Ra(:,3).^3-R0(3).^3));
```

```
m2b3=4/3*pi*(Np(3).*w2b(:,3).*rhob(:,3).*(Rb(:,3).^3-Ra(:,3).^3));
m2c3=4/3*pi*(Np(3)*w2c(:,3).*rhoc(:,3).*(Rc(:,3).^3-Rb(:,3).^3));
release3=(m203-(m2a3+m2b3+m2c3))/m203;

m204=4/3*pi*rhoa*w2a0*(Np(4)*(Ra0(4)^3-R0(4)^3));
m2a4=4/3*pi*rhoa*w2a0*(Np(4)*(Ra(:,4).^3-R0(4).^3));
m2b4=4/3*pi*(Np(4).*w2b(:,4).*rhob(:,4).*(Rb(:,4).^3-Ra(:,4).^3));
m2c4=4/3*pi*(Np(4)*w2c(:,4).*rhoc(:,4).*(Rc(:,4).^3-Rb(:,4).^3));
release4=(m204-(m2a4+m2b4+m2c4))/m204;

m205=4/3*pi*rhoa*w2a0*(Np(5)*(Ra0(5)^3-R0(5)^3));
m2a5=4/3*pi*rhoa*w2a0*(Np(5)*(Ra(:,5).^3-R0(5).^3));
m2b5=4/3*pi*(Np(5).*w2b(:,5).*rhob(:,5).*(Rb(:,5).^3-Ra(:,5).^3));
m2c5=4/3*pi*(Np(5)*w2c(:,5).*rhoc(:,5).*(Rc(:,5).^3-Rb(:,5).^3));
release5=(m205-(m2a5+m2b5+m2c5))/m205;

m206=4/3*pi*rhoa*w2a0*(Np(6)*(Ra0(6)^3-R0(6)^3));
m2a6=4/3*pi*rhoa*w2a0*(Np(6)*(Ra(:,6).^3-R0(6).^3));
m2b6=4/3*pi*(Np(6).*w2b(:,6).*rhob(:,6).*(Rb(:,6).^3-Ra(:,6).^3));
m2c6=4/3*pi*(Np(6)*w2c(:,6).*rhoc(:,6).*(Rc(:,6).^3-Rb(:,6).^3));
release6=(m206-(m2a6+m2b6+m2c6))/m206;
%//////////End Release from the ith class////////////////////////////////

%//////////Figures//////////////////////////////

figure
plot(t/3600,Ra*10^6,'-',t/3600,Rb*10^6,'--',t/3600,Rc*10^6,'.')
title('Radii evolution')
xlabel('Time [h]')
ylabel('Radius [um]')
legend('Ra','Rb','Rc')


figure
plot(t/3600,w2b,t/3600,w2c)
title('Drug fractions')
xlabel('Time [h]')
ylabel('Mass fraction [-]')
legend('w2b','w2c')


figure
plot(t/3600,release,'-',t/3600,release1,'-',t/3600,release2,'-',t/3600,release3,'-',t/3600,release4,'-',t/3600,release5,'-',t/3600,release6,'-')
title('Release from the ith classes')
xlabel('Time [h]')
ylabel('Release [-]')
legend('release TOT', 'release I','release II','release III','release IV','release V','release VI')

   % %//////Experimental data////////////////////


texp=[0.016666667,0.5,1,1.5,2,3,4,5,6,7,9,11,13,15,17,19,21,23,25,27,29,32,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63,65,67,
69,71,73,75,77];

y20=[1.90240316,6.488009571,10.08250555,14.05554622,18.29947852,25.96874285,33.43354749,40.61199147,47.65716631,54.01
040045,66.1672172,75.91891377,82.43046676,87.50249762,91.68557423,92.94562351,96.34256413,92.04639665,98.43055252,100
.7490821,99.97138893,100.1995253,101.4802649,99.89193702,98.99139666,100.8077398,100,100,100,100,100,100,100,100,100,10
0,100,100,100,100,100,100,100,100,100]; %Global TP release with film thickness of 20 um
```

```
y30=[1.310134018,5.100524125,7.501053805,10.1312529,13.43881706,17.69370403,22.73221795,27.66044764,32.35499387,36.98
307846,46.18394602,55.09346624,62.83360535,69.7154417,75.46837038,78.27760034,86.41201019,89.42124639,92.19890086,95.
74649776,95.51165956,99.26835398,99.19284621,101.168998,99.65818819,99.97996757,100,100,100,100,100,100,100,100,100,10
0,100,100,100,100,100,100,100,100,100];

y60=[1.981569582,5.115953377,6.765312431,8.137103313,9.353900156,11.22879192,13.79075693,16.71703661,18.902185,21.616
99951,26.00686318,30.75278334,35.28025299,39.22761513,43.25815544,47.05651527,50.97411896,55.24559284,58.80588289,62.
18060217,65.82993692,68.66016577,71.95850492,74.53939,76.75124643,78.92388318,82.16850129,84.34895295,85.95549981,87.
87383053,89.39914511,90.28398997,90.62647986,92.40681804,93.39578489,94.66340375,94.54008634,96.17876151,96.59720818,
97.49118014,97.11047724,97.55955686,98.22587734,99.96597617,98.83363928]; %Global TP release with film thickness of 60 um
    % %//////End Experimental data//////////////////

figure
plot(texp,y20,'o',texp,y30,'+',texp,y60,'x',t/3600,release*100,'-');
xlabel('Time [h]');
ylabel('Release %');
legend('Exp 20um','Exp 30um','Exp 60um','Mod 20um')

%//////////End Figures////////////////////////////////

end
```

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Whole dose of pellets (film thickness SD) – MATLAB code

```
%Everything is in SI units"

function Whole_dose_Film_thickness

%//////////Assign a film thickness with a normal distribution///////////////
mu=13.3E-6;
sigma=5E-6;
pd = makedist('Normal','mu',mu,'sigma',sigma);
upper=mu*3;
x=linspace(0,upper,11);
for j=1:10
   filmt(j)=(x(j)+x(j+1))/2;
end
z = cdf(pd,x);
for i=2:11
      ni_on_ntot(i-1)=(z(i)-z(i-1));
end
plot(x,z)
%//////////End Assign a film thickness with a normal distribution/////////

%//////////Parameters//////////////////////////////////////////////////////

%Initial geometry
R0=[300E-6,300E-6,300E-6,300E-6,300E-6,300E-6,300E-6,300E-6,300E-6,300E-6];
Rb0=R0+6.3E-6;
Ra0=Rb0-1E-8;
Rc0=Rb0+filmt;
Ntot=5000; %Total Number of pellets
Np=ni_on_ntot*Ntot; %Number of pellets in each class

%Dissolution Time [s]
TIME=80*3600;
%Densities [kg/m^3]
rho10=1000; rho20=1200; rho30=1200; rho40=1200;

%Diffusivities [m^2/s]
D2b=1.5E-10;  % from doi:10.1016/j.ijpharm.2015.03.054
D1b=2.2E-9;   % from doi:10.1016/j.ijpharm.2015.03.054
D2c=3.2E-13;  % from Kazlauske et al. (submitted)
D1c=1.99E-12; % from Kazlauske et al. (submitted)
D2d=8.21E-10; % from doi:10.1016/S0168-3659(01)00424-2
D1self=3E-9;  % from doi:10.1039/B005319H
%See the Transport coefficients definition

%Initial mass fractions
%Domain A
w2sat=0.0115; % from doi:10.1002/jps.26007402091
w2a0=0.9; w3a0=1-w2a0;
%Domain B
w2b0=0;
w3b0=0;
%Domain C
w4c0=1;
w2c0=0;
rhoc0=((1-w2c0-w4c0)/rho10+w2c0/rho20+w4c0/rho40)^(-1);
%Domain D
w2d0=0; %w1d0=1-w2d0;
```

```
Omegad0=1E-3; % Initial dissolution medium [m^3]

%//////////End Parameters//////////////////////////////////////////////////

function dy = odesystem (t,y)
dy=zeros(72,1); %Initialization
Ra= [y(1),y(8), y(15),y(22),y(29),y(36),y(43),y(50),y(57),y(64)];
w2b=[y(2),y(9), y(16),y(23),y(30),y(37),y(44),y(51),y(58),y(65)];
Rb= [y(3),y(10),y(17),y(24),y(31),y(38),y(45),y(52),y(59),y(66)];
w2c=[y(4),y(11),y(18),y(25),y(32),y(39),y(46),y(53),y(60),y(67)];
Rc= [y(5),y(12),y(19),y(26),y(33),y(40),y(47),y(54),y(61),y(68)];
w3b=[y(6),y(13),y(20),y(27),y(34),y(41),y(48),y(55),y(62),y(69)];
w4c=[y(7),y(14),y(21),y(28),y(35),y(42),y(49),y(56),y(63),y(70)];
w2d=y(71);
Omegad=y(72);

   rhoa=(w2a0/rho20+w3a0/rho30)^(-1); %Density of domain A
   rhob=((1-w2b-w3b)/rho10+w2b/rho20+w3b/rho30).^(-1); %Density of domain B
   rhoc=((1-w2c-w4c)/rho10+w2c/rho20+w4c/rho40).^(-1); %Density of domain C
   rhod=((1-w2d)/rho10+w2d/rho20).^(-1); %Density of domain D
   w1b=1-w2b-w3b; %
   w1c=1-w2c-w4c; %
   w1d=1-w2d; %

   %////Stop condition when Ra reach R0 or when there is not enough water/////
   w2bStar=w2b./(w1b+w2b);
   kdiss0=D2b./Ra;
   kdiss=[0,0,0,0,0,0,0,0,0,0]; %initialization kdiss

      if Ra(1)>R0(1) && (w2sat-w2bStar(1))>0
         kdiss(1)=kdiss0(1);
      else
         kdiss(1)=0;
      end

      if Ra(2)>R0(2) && (w2sat-w2bStar(2))>0
         kdiss(2)=kdiss0(2);
      else
         kdiss(2)=0;
      end

      if Ra(3)>R0(3) && (w2sat-w2bStar(3))>0
         kdiss(3)=kdiss0(3);
      else
         kdiss(3)=0;
      end

      if Ra(4)>R0(4) && (w2sat-w2bStar(4))>0
         kdiss(4)=kdiss0(4);
      else
         kdiss(4)=0;
      end

      if Ra(5)>R0(5) && (w2sat-w2bStar(5))>0
         kdiss(5)=kdiss0(5);
      else
         kdiss(5)=0;
      end
```

```
    if Ra(6)>R0(6) && (w2sat-w2bStar(6))>0
       kdiss(6)=kdiss0(6);
    else
       kdiss(6)=0;
    end
    if Ra(7)>R0(7) && (w2sat-w2bStar(7))>0
       kdiss(7)=kdiss0(7);
    else
       kdiss(7)=0;
    end
    if Ra(8)>R0(8) && (w2sat-w2bStar(8))>0
       kdiss(8)=kdiss0(8);
    else
       kdiss(8)=0;
    end
    if Ra(9)>R0(9) && (w2sat-w2bStar(9))>0
       kdiss(9)=kdiss0(9);
    else
       kdiss(9)=0;
    end
    if Ra(10)>R0(10) && (w2sat-w2bStar(10))>0
       kdiss(10)=kdiss0(10);
    else
       kdiss(10)=0;
    end
  %////End Stop condition when Ra reach R0 or when there is not enough water/

  %//////////Transport coefficients/////////////////////////////////////////
    k2b=D2b./(Rb-Ra);
    k2c=D2c./(Rc-Rb);
    k2d=D2d./Rc;
    U2b=(1./(k2b)+1./(k2c)).^(-1);
    U2c=(1./(k2c)+1./(k2d)).^(-1);
    k1b=D1b./(Rb-Ra);
    k1c=D1c./(Rc-Rb);
    m1=4.95; %w1b=m1*w1c
    U1b=(1./(k1b)+m1./(k1c)).^(-1);
    k1d=D1self./Rc;
    m2=0.2; %w1c=m2*w1d
    K1c=(1./(k1c)+m2./(k1d)).^(-1);
  %//////////End Transport coefficients/////////////////////////////////////

  %//////////Parameters defined during the ODEs rearrangement/////////////////
  rho2b3=rho10.*rho20-rho20.*rho30; %
  rho2b2=rho10.*rho30-rho20.*rho30; %
  rhostar=(rho20.*rho30.*(1-w2b-w3b)+rho10.*rho30.*w2b+rho10.*rho20.*w3b).^2./(rho10.*rho20.*rho30); %
  alfa=w3b.*(rho2b2./rhostar)./(rhob-w3b.*rho2b3./rhostar); %
  beta=-rhob.*w3b.*3.*Rb.^2./((Rb.^3-Ra.^3).*(rhob-w3b.*rho2b3./rhostar)); %
  gamma=rhob.*w3b.*3.*Ra.^2./((Rb.^3-Ra.^3).*(rhob-w3b.*rho2b3./rhostar));  %
  delta=3.*Ra.^2.*rhob.*kdiss.*w3a0.*(w2sat-w2bStar)./(w2a0.*(Rb.^3-Ra.^3).*(rhob-w3b.*rho2b3./rhostar)); %
  lambda=3.*Rb.^2.*rhob-(Rb.^3-Ra.^3).*beta.*rho2b3./rhostar; %
  chsi=3.*Ra.^2.*rhob+gamma.*(Rb.^3-Ra.^3).*rho2b3./rhostar; %
  eps=rho2b2./rhostar.*(Rb.^3-Ra.^3)+rho2b3.*alfa.*(Rb.^3-Ra.^3)./rhostar; %
  zeta=(Rb.^3-Ra.^3).*rho2b3.*delta./rhostar+3.*Rb.^2.*U1b.*(m1.*w1c.*rhoc-w1b.*rhob)-3.*Rb.^2.*U2b.*(w2b.*rhob-
w2c.*rhoc)+3.*Ra.^2.*kdiss.*rhob.*(w2sat-w2bStar)./w2a0; %
  fi=rhob.*(Rb.^3-Ra.^3)-w2b.*(Rb.^3-Ra.^3).*(rho2b2./rhostar+rho2b3.*alfa./rhostar)+eps./lambda.*(rhob.*w2b.*3.*Rb.^2-
w2b.*(Rb.^3-Ra.^3).*beta.*rho2b3./rhostar); %
```

```
eta=-(-rhob.*w2b.*3.*Ra.^2-w2b.*(Rb.^3-Ra.^3).*rho2b3.*gamma./rhostar+chsi./lambda.*(rhob.*w2b.*3.*Rb.^2-w2b.*(Rb.^3-Ra.^3).*rho2b3.*beta./rhostar)); %
tau=-zeta./lambda.*(rhob.*w2b.*3.*Rb.^2-w2b.*(Rb.^3-Ra.^3).*rho2b3.*beta./rhostar)+w2b.*(Rb.^3-Ra.^3).*rho2b3.*delta./rhostar+3.*Ra.^2.*kdiss.*rhob.*(w2sat-w2bStar)-3.*Rb.^2.*U2b.*(w2b.*rhob-w2c.*rhoc); %
a=rho40.*(rho10-rho20); %
b=rho20.*(rho10-rho40); %
rhocstar=(rho20.*rho40.*(1-w2c-w4c)+rho10.*rho40.*w2c+rho10.*rho20.*w4c).^2./(rho10.*rho20.*rho40); %
A1=rhoc.*(Rc.^3-Rb.^3)-b.*w4c.*(Rc.^3-Rb.^3)./rhocstar; %
B1=-rhoc.*w4c.*3.*Rc.^2; %
C1=3.*Rb.^2.*rhoc.*w4c./lambda.*(chsi+eps.*eta./fi); %
D1=a.*w4c.*(Rc.^3-Rb.^3)./rhocstar; %
E1=3.*Rb.^2.*rhoc.*w4c./lambda.*(eps.*tau./fi+zeta); %
F1=3.*rhoc.*Rc.^2-(Rc.^3-Rb.^3).*b.*B1./(rhocstar.*A1); %
G1=rhoc.*3.*Rb.^2.*(chsi./lambda+eps.*eta./(lambda.*fi))+(Rc.^3-Rb.^3).*b.*C1./(rhocstar.*A1); %
H1=(Rc.^3-Rb.^3).*(b.*D1./(rhocstar.*A1)+a./rhocstar); %
I1=(Rc.^3-Rb.^3).*b.*E1./(rhocstar.*A1)+3.*Rc.^2.*K1c.*(m2.*w1d.*rhod-w1c.*rhoc)-3.*Rb.^2.*U1b.*(m1.*w1c.*rhoc-w1b.*rhob)+3.*Rb.^2.*U2b.*(w2b.*rhob-w2c.*rhoc)-3.*Rc.^2.*U2c.*(w2c.*rhoc-w2d.*rhod)+rhoc.*3.*Rb.^2.*(eps.*tau./(lambda.*fi)+zeta./lambda); %
L1=rhoc.*w2c.*3.*Rc.^2.*H1./F1+rhoc.*(Rc.^3-Rb.^3)+w2c.*(Rc.^3-Rb.^3).*(-a./rhocstar-b.*(D1+B1.*H1./F1)./(rhocstar.*A1)); %
M1=-(rhoc.*w2c.*(3.*Rc.^2.*G1./F1-3.*Rb.^2.*chsi./lambda-3.*Rb.^2.*eta.*eps./(lambda.*fi))-w2c.*(Rc.^3-Rb.^3).*b.*(C1+B1.*G1./F1)./(rhocstar.*A1)); %
N1=-rhoc.*w2c.*(3.*Rc.^2.*I1./F1-3.*Rb.^2.*(zeta+eta.*tau./fi)./lambda)+w2c.*(Rc.^3-Rb.^3).*b./(rhocstar.*A1).*(E1+B1.*I1./F1)+3.*Rb.^2.*U2b.*(w2b.*rhob-w2c.*rhoc)-3.*Rc.^2.*U2c.*(w2c.*rhoc-w2d.*rhod); %
rhodstar=rho10.*rho20.*(rho20-rho10)./(rho20.*(1-w2d)+rho10.*w2d).^2; %


dRa=-kdiss.*rhob./(rhoa.*w2a0).*(w2sat-w2bStar);  %
dw2b=(eta.*dRa+tau)./fi; %
dRb=(chsi.*dRa+eps.*dw2b+zeta)./lambda; %
dw3b=alfa.*dw2b+beta.*dRb+gamma.*dRa+delta; %
dw2c=(M1.*dRa+N1)./L1; %
dRc=(G1.*dRa+H1.*dw2c+I1)./F1; %
dw4c=(B1.*dRc+C1.*dRa+D1.*dw2c+E1)./A1; %
dw2d= ...
    Np(1)*4*pi*Rc(1)^2/(rhod*Omegad)*(w2d*K1c(1)*(m2*w1d*rhod-rhoc(1)*w1c(1))+(1-w2d)*U2c(1)*(rhoc(1)*w2c(1)-w2d*rhod))+...
    Np(2)*4*pi*Rc(2)^2/(rhod*Omegad)*(w2d*K1c(2)*(m2*w1d*rhod-rhoc(2)*w1c(2))+(1-w2d)*U2c(2)*(rhoc(2)*w2c(2)-w2d*rhod))+...
    Np(3)*4*pi*Rc(3)^2/(rhod*Omegad)*(w2d*K1c(3)*(m2*w1d*rhod-rhoc(3)*w1c(3))+(1-w2d)*U2c(3)*(rhoc(3)*w2c(3)-w2d*rhod))+...
    Np(4)*4*pi*Rc(4)^2/(rhod*Omegad)*(w2d*K1c(4)*(m2*w1d*rhod-rhoc(4)*w1c(4))+(1-w2d)*U2c(4)*(rhoc(4)*w2c(4)-w2d*rhod))+...
    Np(5)*4*pi*Rc(5)^2/(rhod*Omegad)*(w2d*K1c(5)*(m2*w1d*rhod-rhoc(5)*w1c(5))+(1-w2d)*U2c(5)*(rhoc(5)*w2c(5)-w2d*rhod))+...
    Np(6)*4*pi*Rc(6)^2/(rhod*Omegad)*(w2d*K1c(6)*(m2*w1d*rhod-rhoc(6)*w1c(6))+(1-w2d)*U2c(6)*(rhoc(6)*w2c(6)-w2d*rhod))+...
    Np(7)*4*pi*Rc(7)^2/(rhod*Omegad)*(w2d*K1c(7)*(m2*w1d*rhod-rhoc(7)*w1c(7))+(1-w2d)*U2c(7)*(rhoc(7)*w2c(7)-w2d*rhod))+...
    Np(8)*4*pi*Rc(8)^2/(rhod*Omegad)*(w2d*K1c(8)*(m2*w1d*rhod-rhoc(8)*w1c(8))+(1-w2d)*U2c(8)*(rhoc(8)*w2c(8)-w2d*rhod))+...
    Np(9)*4*pi*Rc(9)^2/(rhod*Omegad)*(w2d*K1c(9)*(m2*w1d*rhod-rhoc(9)*w1c(9))+(1-w2d)*U2c(9)*(rhoc(9)*w2c(9)-w2d*rhod))+...
    Np(10)*4*pi*Rc(10)^2/(rhod*Omegad)*(w2d*K1c(10)*(m2*w1d*rhod-rhoc(10)*w1c(10))+(1-w2d)*U2c(10)*(rhoc(10)*w2c(10)-w2d*rhod));

dOmegad=-Omegad*rhodstar*dw2d/rhod+1/rhod*(...
    Np(1)*4*pi*Rc(1)^2*(-K1c(1)*(m2*w1d*rhod-w1c(1)*rhoc(1))+U2c(1)*(w2c(1)*rhoc(1)-w2d*rhod))+...
    Np(2)*4*pi*Rc(2)^2*(-K1c(2)*(m2*w1d*rhod-w1c(2)*rhoc(2))+U2c(2)*(w2c(2)*rhoc(2)-w2d*rhod))+...
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    Np(3)*4*pi*Rc(3)^2*(-K1c(3)*(m2*w1d*rhod-w1c(3)*rhoc(3))+U2c(3)*(w2c(3)*rhoc(3)-w2d*rhod))+...
    Np(4)*4*pi*Rc(4)^2*(-K1c(4)*(m2*w1d*rhod-w1c(4)*rhoc(4))+U2c(4)*(w2c(4)*rhoc(4)-w2d*rhod))+...
    Np(5)*4*pi*Rc(5)^2*(-K1c(5)*(m2*w1d*rhod-w1c(5)*rhoc(5))+U2c(5)*(w2c(5)*rhoc(5)-w2d*rhod))+...
    Np(6)*4*pi*Rc(6)^2*(-K1c(6)*(m2*w1d*rhod-w1c(6)*rhoc(6))+U2c(6)*(w2c(6)*rhoc(6)-w2d*rhod))+...
    Np(7)*4*pi*Rc(7)^2*(-K1c(7)*(m2*w1d*rhod-w1c(7)*rhoc(7))+U2c(7)*(w2c(7)*rhoc(7)-w2d*rhod))+...
    Np(8)*4*pi*Rc(8)^2*(-K1c(8)*(m2*w1d*rhod-w1c(8)*rhoc(8))+U2c(8)*(w2c(8)*rhoc(8)-w2d*rhod))+...
    Np(9)*4*pi*Rc(9)^2*(-K1c(9)*(m2*w1d*rhod-w1c(9)*rhoc(9))+U2c(9)*(w2c(9)*rhoc(9)-w2d*rhod))+...
    Np(10)*4*pi*Rc(10)^2*(-K1c(10)*(m2*w1d*rhod-w1c(10)*rhoc(10))+U2c(10)*(w2c(10)*rhoc(10)-w2d*rhod)));
  %//////////End Parameters defined during the ODEs rearrangement////////////

%/////////System of ODEs/////////////////////////////////////////////////////
dy(1)=dRa(1);  dy(8)=dRa(2);   dy(15)=dRa(3);  dy(22)=dRa(4);  dy(29)=dRa(5);  dy(36)=dRa(6);  dy(43)=dRa(7);  dy(50)=dRa(8);
dy(57)=dRa(9);  dy(64)=dRa(10);
dy(2)=dw2b(1); dy(9)=dw2b(2);  dy(16)=dw2b(3); dy(23)=dw2b(4); dy(30)=dw2b(5); dy(37)=dw2b(6); dy(44)=dw2b(7);
dy(51)=dw2b(8); dy(58)=dw2b(9); dy(65)=dw2b(10);
dy(3)=dRb(1);  dy(10)=dRb(2);  dy(17)=dRb(3);  dy(24)=dRb(4);  dy(31)=dRb(5);  dy(38)=dRb(6);  dy(45)=dRb(7);  dy(52)=dRb(8);
dy(59)=dRb(9);  dy(66)=dRb(10);
dy(4)=dw2c(1); dy(11)=dw2c(2); dy(18)=dw2c(3); dy(25)=dw2c(4); dy(32)=dw2c(5); dy(39)=dw2c(6); dy(46)=dw2c(7);
dy(53)=dw2c(8); dy(60)=dw2c(9); dy(67)=dw2c(10);
dy(5)=dRc(1);  dy(12)=dRc(2);  dy(19)=dRc(3);  dy(26)=dRc(4);  dy(33)=dRc(5);  dy(40)=dRc(6);  dy(47)=dRc(7);  dy(54)=dRc(8);
dy(61)=dRc(9);  dy(68)=dRc(10);
dy(6)=dw3b(1); dy(13)=dw3b(2); dy(20)=dw3b(3); dy(27)=dw3b(4); dy(34)=dw3b(5); dy(41)=dw3b(6); dy(48)=dw3b(7);
dy(55)=dw3b(8); dy(62)=dw3b(9); dy(69)=dw3b(10);
dy(7)=dw4c(1); dy(14)=dw4c(2); dy(21)=dw4c(3); dy(28)=dw4c(4); dy(35)=dw4c(5); dy(42)=dw4c(6); dy(49)=dw4c(7);
dy(56)=dw4c(8); dy(63)=dw4c(9); dy(70)=dw4c(10);

dy(71)=dw2d;
dy(72)=dOmegad;
%/////////End System of ODEs///////////////////////////////////////////////
end

y0=[Ra0(1),w2b0,Rb0(1),w2c0,Rc0(1),w3b0,w4c0,...
   Ra0(2),w2b0,Rb0(2),w2c0,Rc0(2),w3b0,w4c0,...
   Ra0(3),w2b0,Rb0(3),w2c0,Rc0(3),w3b0,w4c0,...
   Ra0(4),w2b0,Rb0(4),w2c0,Rc0(4),w3b0,w4c0,...
   Ra0(5),w2b0,Rb0(5),w2c0,Rc0(5),w3b0,w4c0,...
   Ra0(6),w2b0,Rb0(6),w2c0,Rc0(6),w3b0,w4c0,...
   Ra0(7),w2b0,Rb0(7),w2c0,Rc0(7),w3b0,w4c0,...
   Ra0(8),w2b0,Rb0(8),w2c0,Rc0(8),w3b0,w4c0,...
   Ra0(9),w2b0,Rb0(9),w2c0,Rc0(9),w3b0,w4c0,...
   Ra0(10),w2b0,Rb0(10),w2c0,Rc0(10),w3b0,w4c0,...
   w2d0,Omegad0]; %Initial conditions

options=odeset('RelTol',1e-10);
tspan=0:60:TIME;
[t,y] = ode15s(@odesystem,tspan,y0,options); %ODEs solver

%Results
%Domain A
Ra=[y(:,1),y(:,8),y(:,15),y(:,22),y(:,29),y(:,36),y(:,43),y(:,50),y(:,57),y(:,64)];
%Domain B
w2b=[y(:,2),y(:,9),y(:,16),y(:,23),y(:,30),y(:,37),y(:,44),y(:,51),y(:,58),y(:,65)];
w3b=[y(:,6),y(:,13),y(:,20),y(:,27),y(:,34),y(:,41),y(:,48),y(:,55),y(:,62),y(:,69)];
w1b=1-w3b-w2b;
Rb=[y(:,3),y(:,10),y(:,17),y(:,24),y(:,31),y(:,38),y(:,45),y(:,52),y(:,59),y(:,66)];
rhob=((1-w2b-w3b)/rho10+w2b/rho20+w3b/rho30).^(-1);
%Domain C
w2c=[y(:,4),y(:,11),y(:,18),y(:,25),y(:,32),y(:,39),y(:,46),y(:,53),y(:,60),y(:,67)];
w4c=[y(:,7),y(:,14),y(:,21),y(:,28),y(:,35),y(:,42),y(:,49),y(:,56),y(:,63),y(:,70)];
```

```
w1c=1-w2c-w4c;
Rc=[y(:,5),y(:,12),y(:,19),y(:,26),y(:,33),y(:,40),y(:,47),y(:,54),y(:,61),y(:,68)];
rhoc=((1-w2c-w4c)/rho10+w2c/rho20+w4c/rho40).^(-1);
%Domain D
w2d=y(:,71);
w1d=1-w2d;
Omegad=y(:,72);
rhod=((1-w2d)/rho10+w2d/rho20).^(-1);
dsfilm=Rc-Rb;
%swelling=(Rc-Rc0)./Rc0*100;

m20=4/3*pi*rhoa*w2a0*(...
    Np(1)*(Ra0(1)^3-R0(1)^3)+...
    Np(2)*(Ra0(2)^3-R0(2)^3)+...
    Np(3)*(Ra0(3)^3-R0(3)^3)+...
    Np(4)*(Ra0(4)^3-R0(4)^3)+...
    Np(5)*(Ra0(5)^3-R0(5)^3)+...
    Np(6)*(Ra0(6)^3-R0(6)^3)+...
    Np(7)*(Ra0(7)^3-R0(7)^3)+...
    Np(8)*(Ra0(8)^3-R0(8)^3)+...
    Np(9)*(Ra0(9)^3-R0(9)^3)+...
    Np(10)*(Ra0(10)^3-R0(10)^3));

release=w2d.*rhod.*Omegad./m20;


m2a=4/3*pi*rhoa*w2a0*(...
    Np(1)*(Ra(:,1).^3-R0(1).^3)+...
    Np(2)*(Ra(:,2).^3-R0(2).^3)+...
    Np(3)*(Ra(:,3).^3-R0(3).^3)+...
    Np(4)*(Ra(:,4).^3-R0(4).^3)+...
    Np(5)*(Ra(:,5).^3-R0(5).^3)+...
    Np(6)*(Ra(:,6).^3-R0(6).^3)+...
    Np(7)*(Ra(:,7).^3-R0(7).^3)+...
    Np(8)*(Ra(:,8).^3-R0(8).^3)+...
    Np(9)*(Ra(:,9).^3-R0(9).^3)+...
    Np(10)*(Ra(:,10).^3-R0(10).^3));

m2b=4/3*pi*(...
    Np(1).*w2b(:,1).*rhob(:,1).*(Rb(:,1).^3-Ra(:,1).^3)+...
    Np(2).*w2b(:,2).*rhob(:,2).*(Rb(:,2).^3-Ra(:,2).^3)+...
    Np(3).*w2b(:,3).*rhob(:,3).*(Rb(:,3).^3-Ra(:,3).^3)+...
    Np(4).*w2b(:,4).*rhob(:,4).*(Rb(:,4).^3-Ra(:,4).^3)+...
    Np(5).*w2b(:,5).*rhob(:,5).*(Rb(:,5).^3-Ra(:,5).^3)+...
    Np(6).*w2b(:,6).*rhob(:,6).*(Rb(:,6).^3-Ra(:,6).^3)+...
    Np(7).*w2b(:,7).*rhob(:,7).*(Rb(:,7).^3-Ra(:,7).^3)+...
    Np(8).*w2b(:,8).*rhob(:,8).*(Rb(:,8).^3-Ra(:,8).^3)+...
    Np(9).*w2b(:,9).*rhob(:,9).*(Rb(:,9).^3-Ra(:,9).^3)+...
    Np(10).*w2b(:,10).*rhob(:,10).*(Rb(:,10).^3-Ra(:,10).^3));

m2c=4/3*pi*(...
    Np(1)*w2c(:,1).*rhoc(:,1).*(Rc(:,1).^3-Rb(:,1).^3)+...
    Np(2)*w2c(:,2).*rhoc(:,2).*(Rc(:,2).^3-Rb(:,2).^3)+...
    Np(3)*w2c(:,3).*rhoc(:,3).*(Rc(:,3).^3-Rb(:,3).^3)+...
    Np(4)*w2c(:,4).*rhoc(:,4).*(Rc(:,4).^3-Rb(:,4).^3)+...
    Np(5)*w2c(:,5).*rhoc(:,5).*(Rc(:,5).^3-Rb(:,5).^3)+...
    Np(6)*w2c(:,6).*rhoc(:,6).*(Rc(:,6).^3-Rb(:,6).^3)+...
    Np(7)*w2c(:,7).*rhoc(:,7).*(Rc(:,7).^3-Rb(:,7).^3)+...
    Np(8)*w2c(:,8).*rhoc(:,8).*(Rc(:,8).^3-Rb(:,8).^3)+...
```

```
   Np(9)*w2c(:,9).*rhoc(:,9).*(Rc(:,9).^3-Rb(:,9).^3)+...
   Np(10)*w2c(:,10).*rhoc(:,10).*(Rc(:,10).^3-Rb(:,10).^3));

%//////////Release from the ith class//////////////////////////////////////
m201=4/3*pi*rhoa*w2a0*(Np(1)*(Ra0(1)^3-R0(1)^3));
m2a1=4/3.*pi.*rhoa.*w2a0.*(Np(1)*(Ra(:,1).^3-R0(1).^3));
m2b1=4/3*pi*(Np(1).*w2b(:,1).*rhob(:,1).*(Rb(:,1).^3-Ra(:,1).^3));
m2c1=4/3*pi*(Np(1)*w2c(:,1).*rhoc(:,1).*(Rc(:,1).^3-Rb(:,1).^3));
release1=(m201-(m2a1+m2b1+m2c1))/m201;

m202=4/3*pi*rhoa*w2a0*(Np(2)*(Ra0(2)^3-R0(2)^3));
m2a2=4/3*pi*rhoa*w2a0*(Np(2)*(Ra(:,2).^3-R0(2).^3));
m2b2=4/3*pi*(Np(2).*w2b(:,2).*rhob(:,2).*(Rb(:,2).^3-Ra(:,2).^3));
m2c2=4/3*pi*(Np(2)*w2c(:,2).*rhoc(:,2).*(Rc(:,2).^3-Rb(:,2).^3));
release2=(m202-(m2a2+m2b2+m2c2))/m202;

m203=4/3*pi*rhoa*w2a0*(Np(3)*(Ra0(3)^3-R0(3)^3));
m2a3=4/3*pi*rhoa*w2a0*(Np(3)*(Ra(:,3).^3-R0(3).^3));
m2b3=4/3*pi*(Np(3).*w2b(:,3).*rhob(:,3).*(Rb(:,3).^3-Ra(:,3).^3));
m2c3=4/3*pi*(Np(3)*w2c(:,3).*rhoc(:,3).*(Rc(:,3).^3-Rb(:,3).^3));
release3=(m203-(m2a3+m2b3+m2c3))/m203;

m204=4/3*pi*rhoa*w2a0*(Np(4)*(Ra0(4)^3-R0(4)^3));
m2a4=4/3*pi*rhoa*w2a0*(Np(4)*(Ra(:,4).^3-R0(4).^3));
m2b4=4/3*pi*(Np(4).*w2b(:,4).*rhob(:,4).*(Rb(:,4).^3-Ra(:,4).^3));
m2c4=4/3*pi*(Np(4)*w2c(:,4).*rhoc(:,4).*(Rc(:,4).^3-Rb(:,4).^3));
release4=(m204-(m2a4+m2b4+m2c4))/m204;

m205=4/3*pi*rhoa*w2a0*(Np(5)*(Ra0(5)^3-R0(5)^3));
m2a5=4/3*pi*rhoa*w2a0*(Np(5)*(Ra(:,5).^3-R0(5).^3));
m2b5=4/3*pi*(Np(5).*w2b(:,5).*rhob(:,5).*(Rb(:,5).^3-Ra(:,5).^3));
m2c5=4/3*pi*(Np(5)*w2c(:,5).*rhoc(:,5).*(Rc(:,5).^3-Rb(:,5).^3));
release5=(m205-(m2a5+m2b5+m2c5))/m205;

m206=4/3*pi*rhoa*w2a0*(Np(6)*(Ra0(6)^3-R0(6)^3));
m2a6=4/3*pi*rhoa*w2a0*(Np(6)*(Ra(:,6).^3-R0(6).^3));
m2b6=4/3*pi*(Np(6).*w2b(:,6).*rhob(:,6).*(Rb(:,6).^3-Ra(:,6).^3));
m2c6=4/3*pi*(Np(6)*w2c(:,6).*rhoc(:,6).*(Rc(:,6).^3-Rb(:,6).^3));
release6=(m206-(m2a6+m2b6+m2c6))/m206;

m207=4/3*pi*rhoa*w2a0*(Np(7)*(Ra0(7)^3-R0(7)^3));
m2a7=4/3*pi*rhoa*w2a0*(Np(7)*(Ra(:,7).^3-R0(7).^3));
m2b7=4/3*pi*(Np(7).*w2b(:,7).*rhob(:,7).*(Rb(:,7).^3-Ra(:,7).^3));
m2c7=4/3*pi*(Np(7)*w2c(:,7).*rhoc(:,7).*(Rc(:,7).^3-Rb(:,7).^3));
release7=(m207-(m2a7+m2b7+m2c7))/m207;

m208=4/3*pi*rhoa*w2a0*(Np(8)*(Ra0(8)^3-R0(8)^3));
m2a8=4/3*pi*rhoa*w2a0*(Np(8)*(Ra(:,8).^3-R0(8).^3));
m2b8=4/3*pi*(Np(8).*w2b(:,8).*rhob(:,8).*(Rb(:,8).^3-Ra(:,8).^3));
m2c8=4/3*pi*(Np(8)*w2c(:,8).*rhoc(:,8).*(Rc(:,8).^3-Rb(:,8).^3));
release8=(m208-(m2a8+m2b8+m2c8))/m208;

m209=4/3*pi*rhoa*w2a0*(Np(9)*(Ra0(9)^3-R0(9)^3));
m2a9=4/3*pi*rhoa*w2a0*(Np(9)*(Ra(:,9).^3-R0(9).^3));
m2b9=4/3*pi*(Np(9).*w2b(:,9).*rhob(:,9).*(Rb(:,9).^3-Ra(:,9).^3));
m2c9=4/3*pi*(Np(9)*w2c(:,9).*rhoc(:,9).*(Rc(:,9).^3-Rb(:,9).^3));
release9=(m209-(m2a9+m2b9+m2c9))/m209;

m2010=4/3*pi*rhoa*w2a0*(Np(10)*(Ra0(10)^3-R0(10)^3));
```

```
m2a10=4/3*pi*rhoa*w2a0*(Np(10)*(Ra(:,10).^3-R0(10).^3));
m2b10=4/3*pi*(Np(10).*w2b(:,10).*rhob(:,10).*(Rb(:,10).^3-Ra(:,10).^3));
m2c10=4/3*pi*(Np(10)*w2c(:,10).*rhoc(:,10).*(Rc(:,10).^3-Rb(:,10).^3));
release10=(m2010-(m2a10+m2b10+m2c10))/m2010;

%//////////End Release from the ith class////////////////////////////////

%//////////Figures//////////////////////////////
figure
plot(t/3600,Ra*10^6,'-',t/3600,Rb*10^6,'--',t/3600,Rc*10^6,'.')
title('Radii evolution')
xlabel('Time [h]')
ylabel('Radius [um]')
legend('Ra','Rb','Rc')


figure
plot(t/3600,w2b,t/3600,w2c)
title('Drug fractions')
xlabel('Time [h]')
ylabel('Mass fraction [-]')
legend('w2b','w2c')

figure
plot(t/3600,release,'-',t/3600,release1,'-',t/3600,release2,'-',t/3600,release3,'-',t/3600,release4,'-',t/3600,release5,'-',t/3600,release6,'-
',t/3600,release7,'-',t/3600,release8,'-',t/3600,release9,'-',t/3600,release10,'-')
title('Release from the ith classes')
xlabel('Time [h]')
ylabel('Release [-]')
legend('release TOT', 'release I','release II','release III','release IV','release V','release VI','release VII','release VIII','release IX','release
X')

   % %//////Experimental data////////////////////


texp=[0.016666667,0.5,1,1.5,2,3,4,5,6,7,9,11,13,15,17,19,21,23,25,27,29,32,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63,65,67,
69,71,73,75,77];

y20=[1.90240316,6.488009571,10.08250555,14.05554622,18.29947852,25.96874285,33.43354749,40.61199147,47.65716631,54.01
040045,66.1672172,75.91891377,82.43046676,87.50249762,91.68557423,92.94562351,96.34256413,92.04639665,98.43055252,100
.7490821,99.97138893,100.1995253,101.4802649,99.89193702,98.99139666,100.8077398,100,100,100,100,100,100,100,100,100,10
0,100,100,100,100,100,100,100,100,100,100]; %Global TP release with film thickness of 20 um

y30=[1.310134018,5.100524125,7.501053805,10.1312529,13.43881706,17.69370403,22.73221795,27.66044764,32.35499387,36.98
307846,46.18394602,55.09346624,62.83360535,69.7154417,75.46837038,78.27760034,86.41201019,89.42124639,92.19890086,95.
74649776,95.51165956,99.26835398,99.19284621,101.168998,99.65818819,99.97996757,100,100,100,100,100,100,100,100,100,10
0,100,100,100,100,100,100,100,100,100,100];

y60=[1.981569582,5.115953377,6.765312431,8.137103313,9.353900156,11.22879192,13.79075693,16.71703661,18.902185,21.616
99951,26.00686318,30.75278334,35.28025299,39.22761513,43.25815544,47.05651527,50.97411896,55.24559284,58.80588289,62.
18060217,65.82993692,68.66016577,71.95850492,74.53939,76.75124643,78.92388318,82.16850129,84.34895295,85.95549981,87.
87383053,89.39914511,90.28398997,90.62647986,92.40681804,93.39578489,94.66340375,94.54008634,96.17876151,96.59720818,
97.49118014,97.11047724,97.55955686,98.22587734,99.96597617,98.83363928]; %Global TP release with film thickness of 60 um
   % %//////End Experimental data////////////////////

figure
plot(texp,y20,'o',texp,y30,'+',texp,y60,'x',t/3600,release*100,'-');
xlabel('Time [h]');
ylabel('Release %');
```

```
legend('Exp 20um','Exp 30um','Exp 60um','Mod')

%//////////End Figures////////////////////////////

end
```

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