Cytochrome c to oxygen- steady state program, MatLab
This is a research level program and has not been “cleaned up” so it contains information and calculations that may not be needed is a particular application. The values for the individual parameters are after extending the model to include the high turnover numbers observed in flight muscles.

```
k1 = 5*10^10;
k1r = 5*10^8;
k2 = 3.5*10^8;
k2r = 1*10^1;
K3 = 2*10^6;
K5 = 1*10^25;
k4a = 2.4*10^8;
k4b = 8*10^7;
a3t = 1*10^-6;              % cytochrome a3 concentration
ct = 2*10^-6;               % cytochrome c concentration (2 x cyt a3t)
x = (1:100)';               % used to generate 100 levels for cytochrome c reduction
for q = 1:10;               % used to generate 10 levels for the energy state (volts)
   cr = x.*1.6.* 10.^-8;    % cr is reduced cytochrome c
   co = ct - cr;            % co is oxidized cytochrome c
   W = 7.1;                 % W = pH of the medium
   H = 10^-W;               % H = hydrogen ion concentration
   Q = 0.27 + q.*0.003      % energy state in volts
   O = 1 *10.^-4;           % O is the oxygen concentration
   G = Q .* 46.183;         % Gibb's free energy in kcal for 2 electron transfer
   S = Q./0.059;            % coupling value for energy conservation
   z = 10.^S;
   kf1 = k1 ./z.^0.5;       % couples k1 to energy state
   kr1 = k1r .*z.^0.5;      % couples k1r to energy state
   A = (k2r + k4a.*cr + k4b.*cr.* K3.*H)./(k2.*O);      % variable A in SS exp
   B = (k2.*O.*A + kr1.*co.* A -k2r)./(kf1 .* cr);      % var. B in SS rate exp
   C = K5.^-1 .* (1/H)^2.*(co./cr).^2 .* z.^2 .* B;     % var. C in SS rate exp
   III = a3t./(1 + K3.*H + A + B + C);                  % concentration of intermediate III
   I = B .* III;            % concentration of intermediate I
   II = A .* III;           % concentration of intermediate II
   IV = K3 .*H.* III;       % concentration of intermediate IV
   V = C.*III;              % concentration of intermediate V
   y(q,x) = (k4a.*cr + k4b.*cr.*K3.*H) .* III .*4./ct;  % rate as cyt c TN
end
 plot (x,y)                 % plots cyt c TN vs x value
 axis([0 100 0 35])         % sets graph x and y axis limits
```