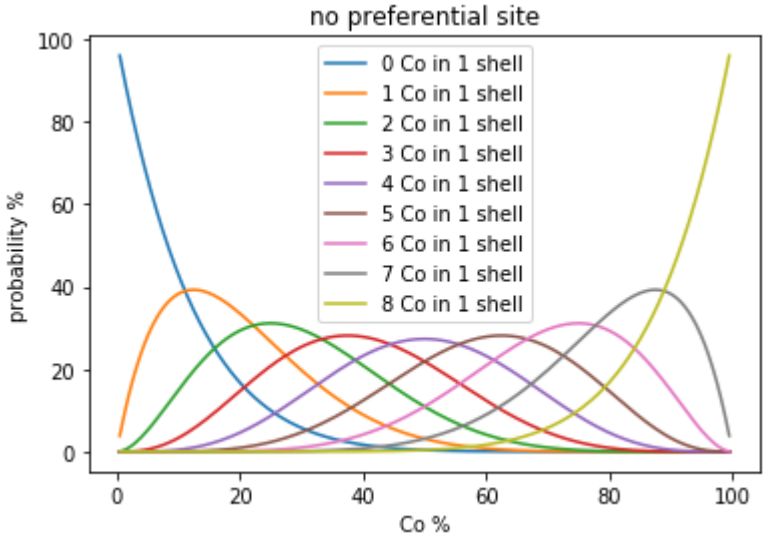
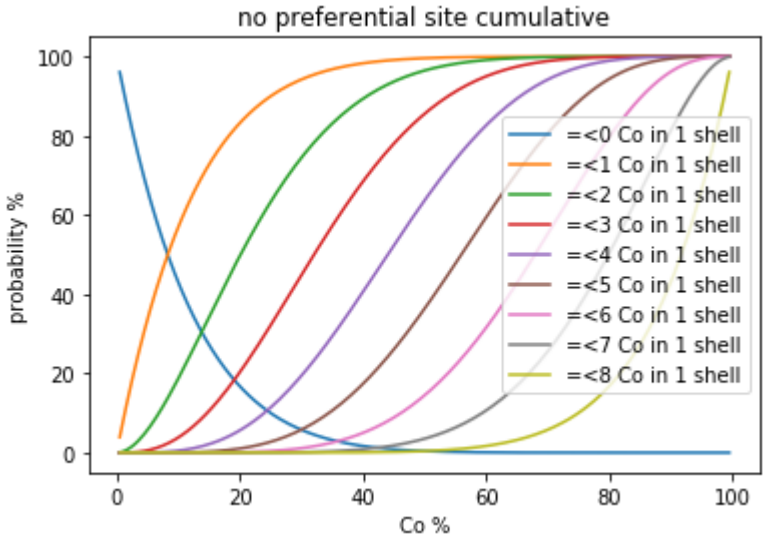
In [2]:

```
import numpy as np
from matplotlib import pylab

factorial= lambda x: x*factorial(x-1) if x>1 else 1
def binomial(C_occ, n_site, k):
    """k =  occurrences
       C_occ=mean occurence
       n_site =number of trial
       https://en.wikipedia.org/wiki/Binomial_distribution
    """
    prefix= factorial(n_site)/(factorial(k)*factorial(n_site - k))/1.0
    return prefix * C_occ**k *(1-C_occ)**(n_site - k)


percent= np.arange(1,200,1)/200.
xlen=len(percent)



def makefig(matrix, title='no preferential site', xlab='Co %', ylab='probabil
            preLab='', postLab=''):
    pylab.figure()
    pylab.title(title)
    pylab.xlabel(xlab)
    pylab.ylabel(ylab)
    for i in range(matrix.shape[0]):
        pylab.plot(percent*100,matrix[i]*100, label='{:s}{:d}{:s}'.format(pre
    pylab.legend()
    pylab.show()


def makecum(matrix):
    cum=np.array(matrix)
    for i in range(matrix.shape[0]):
        if i==0: continue
        cum[i]= matrix[i:].sum(axis=0)
    return cum
```

In [3]:

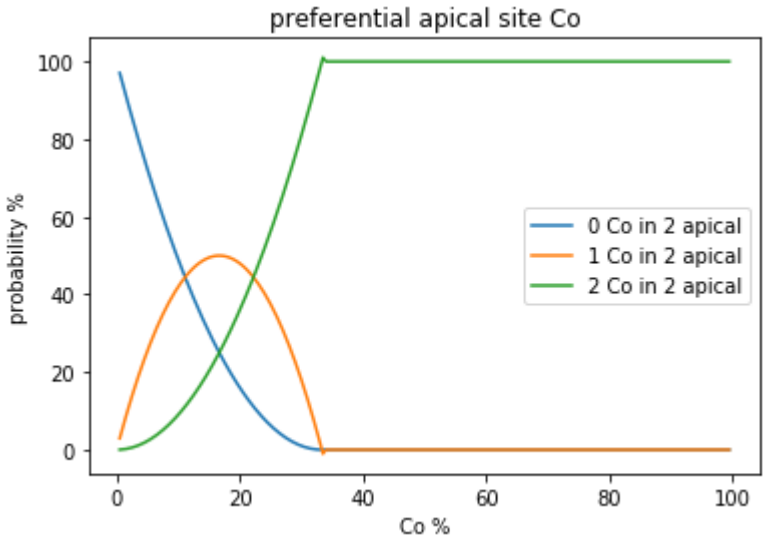
```
##########################################################################
eight_s= np.zeros((9,xlen))
#binomial(C_occ, n_site, k)
for i in range(9):
    eight_s[i]=map(lambda C_occ: binomial(C_occ, 8, i), percent)
makefig(eight_s,title='no preferential site', preLab='', postLab=' Co in 1 sh
#savemat('eight_s.dat',eight_s, '#no preferential site cumulative')


eight_s_cum= makecum(eight_s)
makefig(eight_s_cum,title='no preferential site cumulative', preLab='=<', pos
#savemat('eight_s_cum.dat',eight_s_cum,'#no preferential site cumulative')
##########################################################################
```

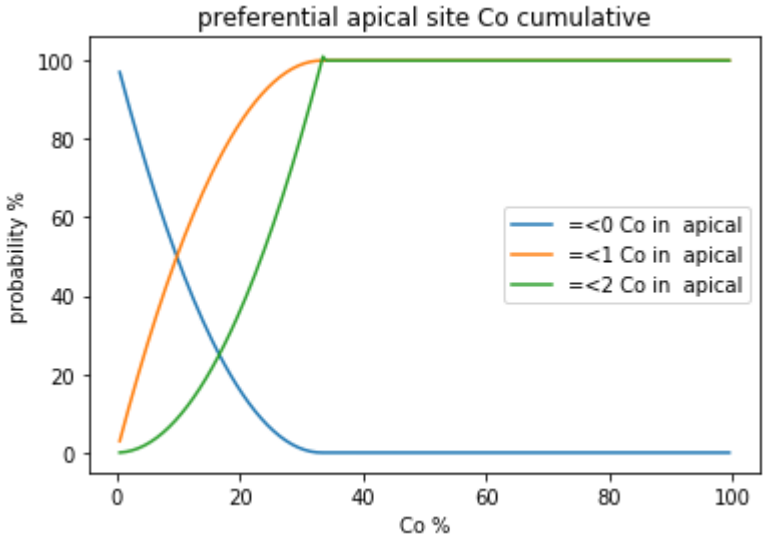




In [5]:

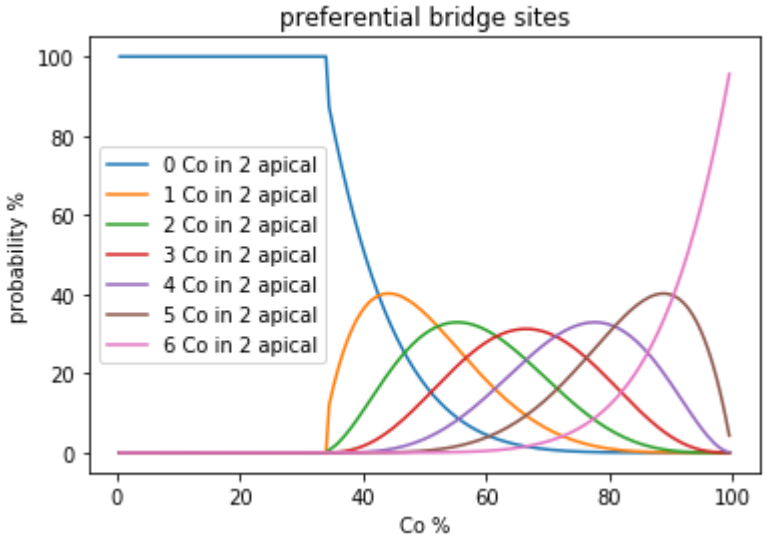
```
#########################################################################
p_2site= np.zeros((3,xlen))
for i in range(3):
    p_2site[i]=map(lambda C_occ: binomial(C_occ*3, 2, i) if C_occ < 0.34 else
makefig(p_2site,title='preferential apical site Co', preLab='', postLab=' Co
#savemat('p_2site.dat',p_2site,'#preferential apical site Co')

p_2site_cum=makecum(p_2site)
makefig(p_2site_cum,title='preferential apical site Co cumulative', preLab='=
#savemat('p_2site_cum.dat',p_2site_cum,'#preferential apical site Co cumulati
#########################################################################
```

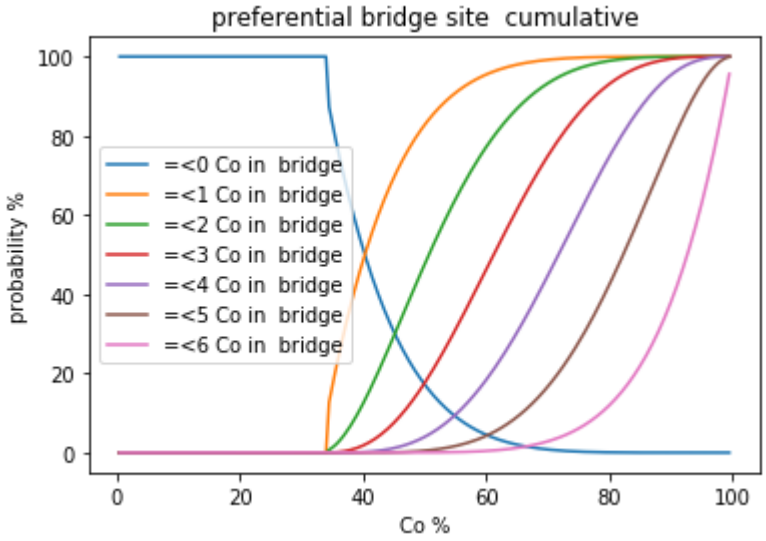




In [6]:

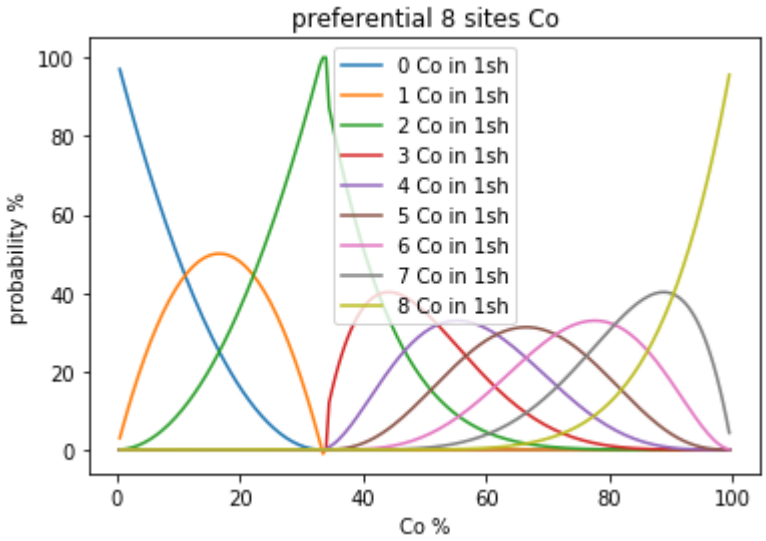
```
#############################################################################
p_6site= np.zeros((7,xlen))
for i in range(7):
    p_6site[i]=map(lambda C_occ: binomial((C_occ-0.33)/.67, 6, i) if C_occ >
makefig(p_6site,title='preferential bridge sites', preLab='', postLab=' Co in
#savemat('p_6site.dat',p_6site,'# preferential bridge sites')

p_6site_cum=makecum(p_6site)
makefig(p_6site_cum,title='preferential bridge site  cumulative', preLab='=<'
#savemat('p_6site_cum.dat',p_6site_cum,'# preferential bridge site  cumulativ
#############################################################################
```





In [7]:

```
1
2
3  ##########################################################################
4  p_8site= np.zeros((9,xlen))
5  for i in range(9):
6      if i<2:  p_8site[i]=p_2site[i]
7      elif i==2 : p_8site[i]= np.where(percent>0.33 , p_6site[i-2], p_2site[i])
8      elif i>2  : p_8site[i]= np.where(percent>0.33 , p_6site[i-2], 0)
9
10 makefig(p_8site,title='preferential 8 sites Co', preLab='', postLab=' Co in 1
11 #savemat('p_8site.dat',p_8site,'#preferential 8 sites Co')
12
13 p_8site_cum=makecum(p_8site)
14 makefig(p_8site_cum,title='preferential   cumulative', preLab='=<', postLab='
15 #savemat('p_8site_cum.dat',p_8site_cum,'#preferential   cumulative')
16 ##########################################################################
```




```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
<ipython-input-7-5da12470c766> in <module>()
      9
     10 makefig(p_8site,title='preferential 8 sites Co', preLab='', postLab=' C
o in 1sh')
---> 11 savemat('p_8site.dat',p_8site,'#preferential 8 sites Co')
     12
     13 p_8site_cum=makecum(p_8site)

NameError: name 'savemat' is not defined
```

In [ ]:

```
1
```

In [ ]:

```
1
```