BBI Solutions
Unit 2
Parkway
Pen-y-fan Industrial Estate
Crumlin
NP11 3EF
United Kingdom

T +44 (0)1495 363000
E info@bbisolutions.com
www.bbisolutions.com

To whom it may concern,

The information contained within the 'Concentration Data' tab was calculated theoretically and is subject to the below caveats and assumptions. The values were not calculated based on any physical test method and are not calculated on a batch-by-batch basis, they are therefore to be used as a guide only.

The number of particles per ml was calculated for each of the particle sizes from the known volume and concentration of gold chloride used in the manufacturing process.

Several assumptions were made when making the calculations including (but not limited to):

- All particles are perfectly spherical.
- All particles are exactly the same size.
- All gold ions are reduced to gold atoms and are incorporated into gold nanoparticles during the manufacturing process.
- All particles consist of gold only.

The known amount of gold chloride used in the manufacturing process for each size of nanoparticle was used to calculate what mass of gold would be present per ml of colloid. The volume of each gold nanoparticle (assuming they are perfectly spherical and the exact target size) and the mass of each particle (using the known density of gold and assuming the particles are pure gold) were then calculated. The mass of gold present per ml was then divided by the mass of each particle to calculate the number of particles present per ml.

Due to the number of assumptions which underpin the generation of these calculations, the information provided by BBI should be treated as an estimate and used for guidance only. This

Gold Particles											
Particle Diameter (nm)	No. particles per ml	No. moles particle per ml	Molar particle concentration (No. moles per L)	Particle radius (cm)	Volume of 1 particle (cm^3)	Mass of 1 particle (g)	Mass of gold per ml (g)	Moles of gold per ml	Moles of gold per litre	Surface area per particle	Surface area per ml (cm2)
5	5.00E+13	8.30289E-11	8.30289E-08	0.00000025	6.54498E-20	1.26318E-18	**6.32E-05**	3.21E-07	**3.21E-04**	7.85398E-13	39.27
10	5.70E+12	9.46529E-12	9.46529E-09	0.0000005	5.23599E-19	1.01055E-17	**5.76E-05**	2.92E-07	**2.92E-04**	3.14159E-12	17.91
15	1.40E+12	2.32481E-12	2.32481E-09	0.00000075	1.76715E-18	3.41059E-17	**4.77E-05**	2.42E-07	**2.42E-04**	7.06858E-12	9.90
20	7.00E+11	1.1624E-12	1.1624E-09	0.000001	4.18879E-18	8.08437E-17	**5.66E-05**	2.87E-07	**2.87E-04**	1.25664E-11	8.80
30	2.00E+11	3.32116E-13	3.32116E-10	0.0000015	1.41372E-17	2.72847E-16	**5.46E-05**	2.77E-07	**2.77E-04**	2.82743E-11	5.65
40	9.00E+10	1.49452E-13	1.49452E-10	0.000002	3.35103E-17	6.46749E-16	**5.82E-05**	2.96E-07	**2.96E-04**	5.02655E-11	4.52
50	4.50E+10	7.4726E-14	7.4726E-11	0.0000025	6.54498E-17	1.26318E-15	**5.68E-05**	2.89E-07	**2.89E-04**	7.85398E-11	3.53
60	2.60E+10	4.3175E-14	4.3175E-11	0.000003	1.13097E-16	2.18278E-15	**5.68E-05**	2.88E-07	**2.88E-04**	1.13097E-10	2.94
80	1.10E+10	1.82664E-14	1.82664E-11	0.000004	2.68083E-16	5.17399E-15	**5.69E-05**	2.89E-07	**2.89E-04**	2.01062E-10	2.21
100	5.60E+09	9.29924E-15	9.29924E-12	0.000005	5.23599E-16	1.01055E-14	**5.66E-05**	2.87E-07	**2.87E-04**	3.14159E-10	1.76
150	1.66E+09	2.75656E-15	2.75656E-12	0.0000075	1.76715E-15	3.41059E-14	**5.66E-05**	2.87E-07	**2.87E-04**	7.06858E-10	1.17
200	7.00E+08	1.1624E-15	1.1624E-12	0.00001	4.18879E-15	8.08437E-14	**5.66E-05**	2.87E-07	**2.87E-04**	1.25664E-09	0.88
250	3.60E+08	5.97808E-16	5.97808E-13	0.0000125	8.18123E-15	1.57898E-13	**5.68E-05**	2.89E-07	**2.89E-04**	1.9635E-09	0.71

Number of moles of particles calculated from number of particles per ml, using Avogadros number = 6.022E+23